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**ABSTRACT**

In this report, a one-page summary is included about each of the projects active within the 1956-74 period that responded to a questionnaire sent. In addition to the basic facts, a commentary on what were thought to have been major accomplishments of the particular group is presented. Keys to the information on project descriptions are provided, as well as keys for the index abbreviations. An index to the projects listed alphabetically by geographical area is included. Directors of projects outside the United States and inside are listed alphabetically by last name. A summary of UNESCO programs is presented. Geographical areas include: African, Asian, Australian, European, Latin American, and North American. (Author/EB)

**THE NINTH REPORT OF THE INTERNATIONAL CLEARINGHOUSE  
ON SCIENCE AND MATHEMATICS CURRICULAR DEVELOPMENTS**

**SCIENCE AND MATHEMATICS  
CURRICULAR DEVELOPMENTS INTERNATIONALLY,  
1956-1974**

**Edited Under the Direction of  
J. DAVID LOCKARD**

**A JOINT PROJECT OF**

**The Commission on Science Education  
of the American Association for  
the Advancement of Science**

**AND**

**The Science Teaching Center  
of the University of Maryland  
College Park, Maryland**

## PREFACE TO

### SCIENCE AND MATHEMATICS CURRICULAR DEVELOPMENTS INTERNATIONALLY, 1956-1974

#### The Ninth Report of The International Clearinghouse on Science and Mathematics Curricular Developments

##### Introduction

This publication is the first to give an international "overview" of science and mathematics curriculum developments from the first major endeavor in 1956 right through 1974. These eighteen years span one of the most productive periods in science teachings illustrious history; one that brought about major educational changes throughout the world. It is a pleasure to bring you this publication and we hope you find it stimulating as well as informative. A glimpse of educational evolution is contained within its covers.

##### Background

Information clearinghouse activities began at the University of Maryland in October of 1962 with release of the first report in the Spring of 1963. The operation has been a cooperative one with the Commission on Science Education of the American Association for the Advancement of Science receiving financial grants from the National Science Foundation. For the first few years data was gathered from the projects in science and mathematics education only in the United States and distribution of the report was mainly in this country. However, in 1965, this clearinghouse director was invited by the head of the Division of Science Teaching of UNESCO in Paris to consider expanding the operation to an international scale with advice from their organization. The AAAS Commission and the National Science Foundation both thought this was an excellent idea and the expansion was made. Since those early discussions The International Clearinghouse has been involved in identifying and sharing information on science and mathematics curriculum projects throughout the world. Summarizing reports were published in 1963, 1964, and 1965 on American projects and in 1966 our first international edition was released. International Clearinghouse Reports followed in 1967, 1968, 1970 and 1972. Their size increased from the original 40 page one to that in 1972 with its almost 1000 pages just crammed with specific details on the operation and achievements of the numerous projects around the world.

After over ten years operations of the Clearinghouse, an idea developed about producing an "overview" publication that would indicate what had happened in science and mathematics curriculum work since the first major science curriculum undertaking in 1956. That trend-setting project was developed by the Physical Science Study Committee (PSSC) operating out of the United States. Since it was a model for a number of projects to follow, its birth date was used as the beginning point for this edition.

The format of this Ninth Report is much different from previous editions. In this particular publication we supply a one-page summary about each of the projects active within the 1956-1974 period that responded appropriately to our most recent questionnaire. The questionnaire was mailed to all non-commercially originated projects that could be identified for those years. In addition to furnishing the basic facts of their projects, but in much less detail than in our earlier Clearinghouse Reports, the project directors were invited to write up to 300 words of commentary on what they thought had been the major accomplishments of their particular group. In this publication one can now see an evolution and an accomplishment of educational curriculum work in science and mathematics that has not before appeared in a single volume.

One recognizes that there are limitations of space as well as communication in this kind of production so many of the specific details of the projects that have been found in earlier Clearinghouse Reports will not be present in this survey edition. One will either have to go back to the 1972 and earlier editions which are still available for purchase or wait until a future detailed publication may be attempted in another two years. We do hope that the past series of Clearinghouse Reports and the new format will give two different views of the accomplishments in this important field. We encourage your reactions both critical and suggestive. Only with your constructive input can we continue to meet your informational needs in this particular area.

### PSSC Physics As One Curriculum Development Model

As noted earlier the work of the Physical Science Study Committee, beginning formally in 1956, seemed to trigger a massive science and mathematics curriculum development movement that continues even today. Although its methods of operation were not necessarily perfected, various facets of its developmental activities have been modified and adopted by a number of science curriculum writing teams.

The PSSC mode of curriculum development consisted of bringing together some 30 to 40 persons of diverse backgrounds interested in physics education for a summer writing conference which typically lasted four to six weeks. During that first summer, the objectives of the course would be developed and basic text material written. This, in turn, was trial-tested in a few selected schools throughout the country utilizing some of the physics teachers who helped write it as well as others selected for their outstanding science teaching qualities. During this first academic year of field testing, many notes were taken and the feedback was sent to a central headquarters. In the case of PSSC Physics it went to the Educational Development Corporation (EDC) Center in Cambridge, Massachusetts.

Then during the second summer another group of writers consisting of scientists, science educators, psychologists, and classroom science teachers, including some of whom had written the first summer and some who were new to the program, were brought together for another writing session. More detailed material was written, supplemental items such as audio-visual aids including films, tapes, laboratory exercises and laboratory equipment were also produced. Then a second academic year trial period followed usually with an intensive bit of work on the evaluation of the course achievement by the students being taught. In this way the tests were developed, rewritten and items analyzed for their value. New ones were put in their place if they were weak or inappropriate.

A third writing summer was held and the material was now getting in to a much more finalized form. More sophisticated activities could occur since there had been feedback from the two previous years and numerous other persons had now been involved from outside the original group of writers and testers. Concentration could be made on improving the total package. Then the third and final academic year trial period was held and during the Spring term the revised text package was put up for bidding by the commercial publishers on an open market basis. In the case of PSSC Physics, the D.C. Heath Publishing Company was the successful bidder and produced the first published version of the PSSC Physics Course. The laboratory equipment was of an inexpensive nature in an attempt to cut down the high costs of laboratory work as well as getting away from the "black boxes" whose internal operations were such mysteries to students. An aim had been to get away from so much technology and engineering and get back to more basic principles of physics that had to do with energy. This model, then, was an early one for curriculum development activities used in its basic form by a number of the other projects that followed.



What resulted was almost a complete program that tried to make the best of a good thing. The components of a science curriculum package might be made up of any or all of the following: text materials (one or more versions); laboratory exercises; laboratory equipment; audio-visual aids (including filmstrips, filmloop cartridges, films, flat photos, overhead transparencies, slides, tapes, etc.); teacher guides; student supplemental materials including readings, home laboratory activities, filmloop cartridges tapes, programmed materials, etc.; and teacher education materials that might be used by persons training teachers in a pre-service situation as well as by inservice teachers already out in the field willing to initiate a new course. Any or all of these parts might be used by any one of the curriculum projects in this country or others. And there were always a few other extraneous items that had been added depending on the situation. Creativity is a by-word in this business.

#### Acknowledgements

It is most appropriate that we sincerely thank all of the project directors and their staff members who make these reports possible. We ask them the same questions that many of our users from around the world have asked and the project directors and their staff members spend a great deal of time trying to fit their information into our format. For that important effort we are most grateful and I am sure that our readers are also. We appreciate very much the extensive help of the directors and look forward to their continued cooperation in the future. In addition to information, many of the projects very kindly furnish to The International Clearinghouse collection their actual "software" products and exemplary examples of their "hardware." Probably the most comprehensive such collection in the world is thus housed in a single location where one can see materials from all parts of the globe. These International Clearinghouse materials are completely available at any time for on-site work at The Science Teaching Center of the University of Maryland. Do come and use them.

Without the initial stimulation and encouragement of John Mayor way back in 1962 there would probably not be a Clearinghouse Operation. His role as Director of Education for the American Association for the Advancement of Science and that organization's Commission on Science Education were crucial to this project. And without the financial and intellectual support from the National Science Foundation and their staff persons such as Charles Whitmer, Howard Hausman and Larry Binder, this idea couldn't have germinated as well as it has.

Special thanks must go then to them and their colleagues; to John Mayor; to his AAAS colleague and now his successor, Arthur Livermore; to the Chairman of the AAAS Commission on Science Education, Al Baez, who was the stimulator of the international aspects of our operation while he was serving with UNESCO in Paris; to his successor there, Harold Foecke, and his colleagues; to Dennis Chisman of the British Council in London and his colleague Pam Thompson; to David Cohen of Australia's MacQuarie University who gave freely of his time while spending a full semester of his sabbatical leave with us; and to the many others like them who contribute even though they may be far from this campus.

Obviously, this kind of massive effort is not the work of any one individual. It is an accumulation of the efforts of many, many persons working cooperatively with the Director over the years. But for this Ninth Report a special word of praise must go to Catherine Cleare and Jackie Fralley, two science education doctoral students who spent a large part of their academic year 1973-1974 working with The International Clearinghouse operation particularly on this publication. Their major contributions to this work is greatly appreciated and gratefully acknowledged.

The individual who has worked most closely with the Director on putting this report

into final form is Leah Zimmerman, our office manager. Her calm and highly efficient manner makes this work a pleasure and her many excellent contributions to this and our other activities are too numerous to enumerate. Unfortunately for us another outstanding individual has just retired who spent some five years contributing greatly to the Science Teaching Center and The International Clearinghouse activities. Special thanks and best wishes go to Helen DeBord who played hostess to so many of you when you visited with us earlier.

Making their own kinds of important contributions to this operation have been Marlene Murray, our able administrative assistant and Beverly Ray, our diligent undergraduate aide. Eunice Jackson and Lisa Zimmerman were helpful on editing and proofing; Bill DiLorenzo and his foreign language education colleagues on translation work; and Sandra Lindsey along with Leah on the final typing.

And last, but certainly not least, I want to acknowledge the important and on-going work of the faculty and graduate assistants of the Science Teaching Center at the University of Maryland who not only contribute to the production of these biennial publications, but also serve as hosts and hostesses for our numerous domestic and foreign visitors. All of them have personal contacts throughout the world so they too get involved with the heavy load of correspondence associated with such a major operation. The faculty members of the Science Teaching Center of the University of Maryland during the past two years to whom we want to pay our most appreciative thanks are. Glenn Blough, Maureen Dietz, George Eley, Marjorie Gardner, Melton Golmon, Henry Heikkinen, John Layman, Robert Ridky, Dennis Sunal, Pat Sweeney, Jack Wheatley, David Williams and Emmett Wright. Graduate student staff members making similar contributions included Barbara Benning, Phil Cottrill, Jay Davidson, George Elliot, Sue Siegal, Pam Splaine, Estelle TaFoya, and Emma Ward. Without all these fine people there would be no University of Maryland Science Teaching Center.

You, as a reader of this Report are also an important contributor to the ongoing activities of The International Clearinghouse. Your comments and suggestions are encouraged. Please tell us how we might best serve you.

Science Teaching Center  
University of Maryland

J. David Lockard, Ph.D.  
Director

January, 1975

Erratum Note: Information on projects in Israel were unfortunately grouped with those of Asia instead of the Middle East in both the index and body of the text. See pages XVIII and XIX of the index for the text page references.

## THE UNIVERSITY OF MARYLAND SCIENCE TEACHING CENTER

The International Clearinghouse on Science and Mathematics Curricular Developments is located in the University of Maryland's Science Teaching Center at College Park, Maryland. Designed to serve as a representative facility of its type, the functions of the Science Teaching Center include teacher and supervisor education, graduate education, basic research in science education, and consultative services.

Some of the special projects that have been carried out by the STC staff or are still in operation, in addition to those of the International Clearinghouse, include: the reviewing activities of the National Science Teaching Association's Science Materials Review Committee; the Study of Inexpensive Science Teaching Equipment Worldwide (The IS-2 Study); the Chemistry Teaching Associates Program; the Academic Year Institute for Science Supervisors; In-service and Summer Institutes in the Biological, Physical and Earth Sciences; and special conferences for national, state, and local groups.

In the spring of 1973 the STC played host to an ICSU/UNESCO International Conference on the Training of Teachers for Integrated Sciences. The 10-day working sessions attracted over 230 individuals from 63 countries. During the following 3 days a new cooperative organization was formed called The International Council of Associations for Science Education (ICASE). Its membership consists of National Science Teaching Associations from around the world. ICASE has produced an International Directory of Associations, and is now writing a UNESCO Science Teachers Handbook to supplement the recently released New UNESCO Sourcebook on Science Teaching which was coordinated at the Maryland Science Teaching Center.

The facilities include two well-equipped science teaching rooms used for methods courses, a research and special projects room, a vivarium, an extensive science education library, preparation rooms, photography darkrooms, and The International Clearinghouse permanent collection room. In addition we share facilities with the Educational Technology Center that include a construction shop, graphic arts shop, audio-visual center, audio-tutorial center, ETV center, and multi-media rooms. The Science Teaching Center has close ties with other departments on campus, particularly with the academic science departments where our faculty members hold joint appointments in botany, chemistry, conservation, geology and physics.

Each year the Science Teaching Center is host to large numbers of domestic and foreign visitors. Guests have the opportunity to examine the latest materials from national and international sciences and mathematics curriculum projects which are collected in the Clearinghouse. Every attempt is being made to keep the collection as comprehensive as possible and it is believed to be one of the most up-to-date compilations of such materials in the world.

The Center shall continue to welcome and to aid visitors of every nation and all areas at all levels of science and mathematics education, since it is a basic aim to promote international cooperation through the dissemination of information, please contact Dr. J. David Lockard, Director, Science Teaching Center, University of Maryland, College Park, Maryland 20742. Telephone: (301) 454-4028.

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	Latin American Area . . . . .	170
	North American Area . . . . .	187
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# I. KEY TO THE INFORMATION ON THE PROJECT DESCRIPTIONS

official project title as furnished by the director	address to use when writing for additional project information	year project began and year it ended
director's name (past or present) and co-directors' or contact's names	telephone number for contacting project for more information	source of funding

which earlier international clearinghouse  
reports to see more about project details

AGES: of students involved	types of learning experi- ences and number in group	PRINTED MATERIALS:
LANG: languages available	<u>EXPER: C1 12+ 2-12 I</u>	types of printed
SUBJ: subject areas covered	LEC lectures	material the pro-
APPROACH: of presentation	SEM seminars	ject developed. See
ABILITY: ability level	DISC discussions	earlier I.C. reports
EVAL METH: evaluation methods	INDEP independent study	for title/details
of student accomplishments	LAB laboratory activities	NON-PRINT MATERIALS:
TESTING: frequency of testing	FLD field experiences	types of non-print
CONT RESP: who has the content	DEM demonstrations	materials such as
responsibility	SIM simulations	audio-visual aids/
ENVIR: the learning environments	TV televised lessons	lab equipment the
*means that answers have been	A/V audio-visual	project developed
rated from most to least descriptive	presentations	

**NARRATIVE:** a narrative with a maximum of 300 words usually written by the project director summarizing the goals or objectives of the project, its unique characteristics, the major underlying principles of learning involved, the kinds of project evaluations being employed, the estimated impact of the project and any projected plans for the future.

REASON: reasons for the project's original initiation	ADOPT: known adoption and present use of the project's materials	number of project personnel involved	PUBL: publication details inclu- ding format and implementation costs per 10 students in U.S. dollars
INITIATOR(S): names of project initiators		<u>PERS: ft pt nrt</u> (numbers under ft - full time, pt - part time, nrt - non-released time ADM administrator WR writer VSCH school visitor RES researcher TED in-service TRIAL teachers	

**REFERENCES:** bibliographic references to the project divided into articles of a descriptive nature and those pertaining more to related research studies

## II. KEY FOR THE INDEX ABBREVIATIONS

### SUBJECT:

agr-e	agricultural education
an	anthropology
art	art
astr	astronomy
b	biology
b-e	business education
b-s	behavioral sciences
c	chemistry
c-e	career education
c-s	computer science
com	communications
comp	computing
cyb	cybernetics
e-e	environmental education
e-p	environmental planning
e-s	earth-space
ec	economics
ecol	ecology
ed	education
el-s	elementary science
en-s	engineering science
eng	english
f	forestry
g	geography
g-s	general science
geol	geology
h	health
h-e	home economics
hist	history
hu	humanities
i-a	industrial arts
l-a	language arts
m	mathematics
m-s	marine science
mat	materials
med	medicine
meth	methods
mus	music
n-s	natural science
naut-s	nautical science
nuc-s	nuclear science
nutr	nutrition
p	physics
p-a	performing arts
p-e	physical education
p-s	physical science
phys	physiology
phil	philosophy
pr-s	primary science
psych	psychology
psych-ed	psychology education
r	religion
s	science
s-o	subject-oriented
s-s	social sciences
sur	survival
t	technology
u-s	urban studies
w-r-m	water resources management

### AGES:

TEd	teacher education
coll	college level
resch	researchers

### ABILITY:

avg	average
avg+	above average
all	all levels
EMR	educationally mentally retarded
EMH	educationally mentally handicapped
slow	slow learner
spec	special education
u-a	underachievers

### APPROACH:

c	conceptual
d-c	discipline-centered
dis	discovery
g-d-m	guided decision-making
hist	historical
inq	inquiry
integ	integrated
interdis	interdisciplinary
p	process
s-d	skill development
s-o	subject oriented
p-s	problem-solving
pol	political skills
psych	psychological
u	unified



**III. INDEX TO THE PROJECTS LISTED ALPHABETICALLY BY GEOGRAPHICAL AREA**

### III. INDEX TO PROJECTS LISTED ALPHABETICALLY BY GEOGRAPHICAL AREA

#### AFRICAN AREA

	Language	Subject	Ages	Approach	Ability	Page
<u>GHANA</u>						
JOINT SCHOOLS PROJECT (J.S.P.)	Eng	m	11-16	dis	avg	1
<u>KENYA</u>						
KENYA SCIENCE TEACHERS COLLEGE (KSTC)	Eng	b,c,p,m, i-a,g	19,TEd	integ	all	2
MATHEMATICS AND SCIENCE	Eng	b,c,p,m, s-s	-	inq,dis	avg,avg+	3
<u>LESOTHO</u>						
LESOTHO INTRODUCTORY SCIENCE IMPROVEMENT PROGRAM (LISIP)	Eng	s	14-19	integ,dis	all	4
<u>NIGERIA</u>						
MID-WESTERN STATE OF NIGERIA PRIMARY SCIENCE PROJECT (assisted by UNESCO/UNICEF)	Eng	b,c,p,e-s	6-12 TEd	integ,inq, dis	avg	5
NIGERIAN NATIONAL EDUCATION RESEARCH COUNCIL PROJECTS	Eng	b,c,p,e-s, m,t,s-s	-	interdis, integ,c,inq	all	6
PRIMARY EDUCATION PROJECT PRIMARY SCIENCE PROGRAMME	Eng Hansa	-	6-12	integ,p	all	7
<u>SIERRA LEONE</u>						
CORE COURSE INTEGRATED SCIENCE (CCIS)	Eng	b,c,p,e-s, t	11-13	integ,inq	all	8
<u>SWAZILAND</u>						
SWAZILAND INTEGRATED SCIENCE PROJECT (SWISP)	Eng	b,c,p	11-20	integ	all	9
<u>REGIONAL AFRICAN PROJECTS</u>						
AFRICAN PRIMARY SCIENCE PROGRAM (APSP)	Eng Swahili	pr-s	5-12	-	-	10
EAST AFRICAN REGIONAL MATHEMATICS PROGRAM (EARMF)	Eng	m	6-12	d-c,c	all	11
EAST AFRICAN SECONDARY SCIENCE PROJECT (EASSP)	Eng Swahili	b,c,p	15-18	-	-	12
EVALUATION OF SCIENCE EDUCATION PROGRAMME FOR AFRICA PRIMARY SCIENCE MATERIALS (SEPA Science)	Eng	pr-s	6-12 TEd	inq,integ	all	13
SCIENCE EDUCATION PROGRAM FOR AFRICA (SEPA)	Eng	b,p,c,t	6-12	integ,inq	all	14
WEST AFRICAN REGIONAL MATHEMATICS PROGRAM (WARMF)	Eng	m	6-17	d-c,c	all	15

ASIAN AREA

	Language	Subject	Ages	Approach	Ability	Page
<b>AFGHANISTAN</b>						
CURRICULUM AND TEXTBOOK PROJECT (C/T PROJECT)	(See U.S. Project Section for Details)					
<b>BANGLADESH</b>						
BANGLADESH EDUCATIONAL EQUIPMENT DEVELOPMENT BUREAU	Eng Bengali	-	-	-	-	16
<b>HONG KONG</b>						
HONG KONG BSCS ADAPTATIONS	Eng Chinese	b	14-17	inq	all	17
<b>INDIA</b>						
ALL INDIA SCIENCE TEACHERS ASSOCIATION PHYSICS STUDY GROUP (AISTA STUDY GROUP)	Hindi Marathi Eng	b,c,p	11-13 TEd	inq,dis, d-c	avg, avg+	18
BOMBAY SCIENCE AND MATHEMATICS IMPROVEMENT PROJECT	Eng,Hindi Marathi Urdu,Gujarati	b,c,p, e-s,m	5-12	integ,inq dis	all	19
CREATIVE PHYSICS TEACHING PROJECT AT THE UNIVERSITY LEVEL (CPTP)	Eng	p	16-18	inq	avg+	20
EXPERIMENTAL PROJECT ON TEACHING OF SCIENCE AND MATHEMATICS AT THE MIDDLE SCHOOL STAGE (SEP)	Hindi & 11 Regional Languages	b,c,p	11-13 TEd	d-c,inq	all	21
HIGH SCHOOL MATHEMATICS	Gujarati	m	13-16	d-c	all	22
INTEGRATED SCIENCE	Eng Gujarati	b,c,p, e-s	13-15	integ,inq	all	23
NATIONAL SCIENCE TALENT SEARCH SCHEME	Eng & all Regional Languages	b,c,p,m	16	d-c,interdis	avg+	24
PHYSICS RESOURCE MATERIAL FOR SECONDARY SCHOOL TEACHERS (PRM)	Eng	p	TEd	c,inq,dis, p,d-c	all	25
SCIENCE LEARNING THROUGH INQUIRY	Eng Gujarati	b,c,p	11-13	d-c,integ, inq, dis	all	26
UNICEF-ASSISTED PROJECT FOR THE IMPROVEMENT OF SCIENCE TEACHING AT ALL LEVELS OF SCHOOL EDUCATION (UNICEF PROJECT)	Eng,Hindi & 11 Regional Languages	b,c,p, g-s	6-11	d-c,integ	all	27
VIKRAM A. SARABHAI COMMUNITY SCIENCE CENTRE (VASCSC)	Eng Gujarati	b,c,p,e-s, m,t	9-20	d-c,integ, interdis,inq, dis,applied	all	28
<b>ISRAEL</b>						
AGRICULTURE AS ENVIRONMENTAL SCIENCE PROJECT (AESP)	Hebrew, Arabic,Eng	agr-e,e-e b,s-s,t	11-17	integ,inq, dis	all	29
CHAPTERS IN BIOLOGY AND AGRICULTURE	Hebrew	b	14-17	d-c,inq	avg	30

	Language	Subject	Ages	Approach	Ability	Page
CHEMISTRY IN MODERN SOCIETY	Hebrew	c	14-16	inq	avg	31
EXPERIMENTAL CHEMISTRY PROGRAMME FOR SECONDARY SCHOOL (REHOVOT CHEMISTRY GROUP) (ECPSS)	Hebrew	c	13,15-17 TEd	d-c,c,inq, dis	avg avg+	32
EXPERIMENTAL PHYSICS PROGRAMME FOR SECONDARY SCHOOLS (REHOVOT PHYSICS GROUP)	Hebrew	p	15-18	d-c,inq,dis	avg+ avg	33
HEBREW UNIVERSITY PROJECT FOR SECONDARY SCHOOL MATHEMATICS	Hebrew	m	15-18	d-c	all	34
ISRAEL BSCS ADAPTATION PROJECT (IBAP)	Hebrew	b	13-18	d-c,c,inq	avg avg+	35
ISRAEL ELEMENTARY SCIENCE PROJECT (MATAL)	Hebrew	b,c,p,e-s	5-11	p,c,inq,dis	all	36
MATHEMATICS FOR JUNIOR HIGH SCHOOLS	Hebrew Arabic	m	12-14	c,dis,inq	all	37
NETA: SECTION FOR 7th GRADE BIOLOGY FOR HETEROGENEOUS CLASSES CONTAINING CULTURALLY DEPRIVED STUDENTS	Hebrew	b	12	c,p	all	38
<b>JAPAN</b>						
ASTRONOMY AND EARTH SCIENCE CURRICULUM DEVELOPMENT FOR SENIOR SECONDARY SCHOOL (AESCD)	Japanese	e-s	15-17	integ	all	39
COLLEGE INTRODUCTORY CHEMISTRY COURSE ON THE CONCEPTS OF ENERGY AND STRUCTURE (CES)	Japanese	c,p	18-19	d-c,c	avg avg+	40
THE CONFERENCE OF SCIENCE EDUCATION STUDY IN OSAKA (CSES)	Japanese	b,c,p,e-s	6-14	integ,inq	avg	41
INTEGRATED SCIENCE CURRICULUM PROJECT	Japanese	s,e-e	12-14	integ,c,p	avg	42
INTERNATIONAL SILKWORM TEACHING SOCIETY (ISTS)	Eng Japanese	b,c,p	11-20	integ,inq, dis	all	43
LABORATORY INSTRUCTION AND TEACHING AIDS IN COLLEGE INTRODUCTORY CHEMISTRY (LCC)	Japanese	c	18-19	integ	Avg	44
MODERNIZATION OF SECONDARY SCHOOL CHEMISTRY (MSSC)	Japanese	c	15-17	d-c	avg+	45
MODULAR APPROACH IN THE TEACHING OF BIOLOGY (MATB)	Japanese	b	16-18	p,c	avg	46
THE SOCIETY OF UNIVERSITY EDUCATION IN THE BIOLOGICAL SCIENCE (SUEBS)	Japanese	b	19	d-c	avg+	47

	Language	Subject	Ages	Approach	Ability	Page
THE STUDY TO MODERNIZE THE PHYSICS CURRICULUM OF UPPER SECONDARY SCHOOLS (KBGK-PROJECT)	Japanese	p	16-17	d-c	Avg	48
VISUAL AIDS IN SCIENCE EDUCATION (VISUAL)	Japanese	b,c,p,e-s	15-17	d-c,interdis, integ	avg avg+	49
<u>KOREA</u> KOREAN SCIENCE EDUCATION PROJECT	Korean	b,c,p,e-s, m	6-18	d-c,integ,p, c	all	50
<u>MALAYSIA</u> INTEGRATED SCIENCE FOR MALAYSIAN LOWER SECON- DARY SCHOOL	Eng Malay	s	11-14	integ,p,c, dis	all	51
MALAYSIAN BIOLOGY, CHEMISTRY, PHYSICS PROJECT	Eng Malay	b,c,p	15-17	d-c,c,dis	avg avg+	52
MODERN GENERAL SCIENCE	Eng Malay	b,c,p	15-17	interdis,c, inq	avg avg+	53
SOUTHEAST ASIA SCIENCE AND MATHEMATICS EXPER- IMENT (SEASAME)	Eng	s,m	6-11 TEd	integ	avg avg+	54
<u>PHILIPPINES</u> THE BUREAU OF PUBLIC SCHOOLS ELEMENTARY MATHEMATICS IMPROVE- MENT PROGRAM	Eng	m	7-12 TEd	dis	all	55
SCIENCE EDUCATION CENTER, UNIVERSITY OF THE PHILIPPINES (SEC)	Eng Philipino	b,c,p,e-s, m	6-16	-	avg	56
SCIENCE EDUCATION PROJECT OF THE PHILIPPINES	Eng	b,c,p,m	TEd	integ,p,c, inq,dis	avg+	57
<u>REPUBLIC OF CHINA (TAIWAN)</u> THE ELEMENTARY SCIENCE CURRICULUM DEVELOPMENT PROJECT	Chinese	b,c,p,e-s	6-11	integ,p,c, inq,dis	all	58
<u>SINGAPORE</u> LOWER SECONDARY SCIENCE CURRICULUM DEVELOPMENT PROJECT (LSS)	Eng	b,c,p,t, s-s	13-14 TEd	integ,c,p, interdis, inq,dis	all	59
<u>SRI LANKA</u> CAAS SCHOOL BIOLOGY PROJECT (SBP)	Eng Sinhala	b	14-16	inq	avg	60
ELEMENTARY MATHEMATICS PROJECT OF SRI LANKA (SLEMP)	Sinhala Tamil	m	6-10	c.dis,inq, integ	all	61
JUNIOR SECONDARY SCHOOL MATHEMATICS PROJECT	Sinhala Tamil	-	11-14	d-c,c,inq, dis	all	62
JUNIOR SECONDARY SCHOOL SCIENCE PROJECT	Sinhala Tamil	-	11-14	integ,c,inq, dis	all	63

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<b>THAILAND</b>						
CEDO LABORATORY/WORKSHOP, COLLEGE OF EDUCATION, THAILAND	Thai	-	TEd	integ, inq, dis	all	64
THE INSTITUTE FOR THE PROMOTION OF TEACHING SCIENCE AND TECHNOLOGY (IPST)	Thai	b, c, p, m, g-s, p-s	6-17	integ, c, inq	avg	65
<b>AUSTRALIAN AREA</b>						
<b>AMERICAN SAMOA</b>						
SAMOAN CURRICULUM IN SCIENCE (Adapted from SCIS) (SCIS)	Eng Samoan	b, c, p	6-14 TEd	p, inq, dis	all	66
SAMOAN SEA STUDY LABS (SSSL)	Eng Samoan	m-s	13-19 TEd	-	all	67
<b>AUSTRALIA</b>						
AUSTRALIAN ACADEMY OF SCIENCE SCHOOL BIOLOGY PROJECT: THE WEB OF LIFE	Eng	b	16-17	inq, c	all avg	68
AUSTRALIAN SCIENCE EDUCA- TION PROJECT (ASEP)	Eng	b, c, p, e-s, s-s, an	12-15	interdis, integ, inq	all	69
AUSTRALIAN SCIENCE TEACHER EDUCATION PROJECT (ASTEP)	Eng	b, c, p, e-s	TEd	-	all	70
EDUCATION DEPARTMENT OF WESTERN AUSTRALIA HIGH SCHOOL MATHEMATICS PROJECT	Eng	m	13-15	d-c, p, c	all	71
INDIVIDUAL MATHEMATICS PROGRAM (IMP)	Eng	m	7-12	-	avg avg+	72
JUNIOR SECONDARY SCIENCE PROJECT (J.S.S.P.)	Eng	b, c, p, e-s	12-13	integ, inq	all	73
PROJECT PHYSICS (SOUTH EAST ASIAN ADAPTATION)	Eng	p	16-17	inq, p, c	avg avg+	74
SCIENTIFIC WORDS - NEW GUINEA (PROJECT SWNG)	Eng	all	12-17	integ	all	75
THE SCIENCE FOUNDATION FOR PHYSICS INTEGRATED AND MULTISTRAND SCIENCE TEXTBOOK PROJECT FOR THE NEW SOUTH WALES SIX YEAR SCIENCE COURSE (SHS)	Eng	b, c, p	-	integ	all	76
TECHNICAL SCHOOL SCIENCE	Eng	b, c, p, g-s	11-16	d-c, integ	all	77
VICTORIAN PRIMARY SCHOOLS' SCIENCE COURSE	Eng	b, c, p, e-s, m, t, s-s, e-e	5-11	interdis, c, integ, inq	all	78
WORDS IN SCIENCE PROJECT	Eng	all	12-15	integ	all	79



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<u>BRITISH SOLOMON ISLANDS</u>						
BRITISH SOLOMON ISLANDS UNESCO PRIMARY SCIENCE (SIEAS)	Eng	e-e,e-s, p,m,b	5-13 TEd	p,integ, interdis	all	80
<u>FIJI</u>						
UNDP-UNESCO PROJECT -- SECONDARY SCHOOL	Eng	b,c,p,e-s, m,t,s-s,b-e, h-e	12-17 TEd	integ,inq	all	81
<u>GUAM</u>						
ENVIRONMENTAL EDUCATION FOR GUAM SCHOOLS PROJECT (EEGSP)	Eng Chamorro	ecol	6-13 TEd	interdis,p, c,inq,dis	all	82
EUROPEAN AREA						
<u>CZECHOSLOVAKIA</u>						
LONG-TERM POST-GRADUATE COURSE UNESCO: "ON MODERN PROBLEMS IN BIOLOGY"	Eng	b	post- graduate	integ	avg avg+	83
<u>GREAT BRITAIN: ENGLAND</u>						
APPLIED STATISTICS (COMPUTER BASED LEARNING) (CALSTATS)	Eng	m,s-s	coll	interdis,c, inq	avg avg+	84
ASSISTANCE TO THE COMMON- WEALTH TEACHING OF SCIENCE (ACTS)	Eng	b,c,p	13-14	integ,inq, dis	all	85
ATTITUDES TO SCIENCE SCALES	Eng	-	14-16	-	all	86
CHELSEA SCIENCE SIMULATION PROJECT	Eng	b,c,p	16-19	d-c,dis	avg avg+	87
CHILDREN EXPLORE THEIR ENVIRONMENT - THREE FILMS	Eng	b,c,p, Eng,art	5-11 TEd	interdis	all	88
COMPUTER AIDED LEARNING PROJECT	Eng	b	13	d-c,dis	all	89
COMPUTER BASED LEARNING MATHS PROJECT (CALMATH)	Eng	m	9-13	p,c,inq	all	90
COMPUTERS IN THE CURRICU- LUM	Eng	b,c,p,s-s	14-18	d-c,dis, interdis	avg	91
COMPUTERS IN THE UNDER- GRADUATE SCIENCE CURRICULUM (CUSC)	Eng	b,c,p	18-20 adult	d-c,integ	avg, avg+ slow	92
CONSERVATION EDUCATION PROJECT	Eng	b,c,p,t,s-s, hist,g	12-17	-	avg avg+	93
CONTINUING MATHEMATICS PROJECT (CMP)	Eng	m	16-18 TEd	-	avg avg+	94
COURSES IN TEACHING & LEARNING IN HIGHER EDUCATION (TLHE)	Eng	b,c,p,m,t s-s,hu	adult TEd	p,c,inq,dis	-	95
CURRICULUM DIFFUSION RESEARCH PROJECT	Eng	curriculum development	TEd	-	-	96
EARLY MATHEMATICAL EXPERIENCES	Eng	m	3-5	c	all	97

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EDUCATIONAL USE OF LIVING ORGANISMS (EULO)	Eng	b	5-18	inq,dis	all	98
ENGINEERING SCIENCE	Eng	en-s	16-18	interdis, integ	all	99
INDIVIDUALISED SYSTEMS OF INSTRUCTION IN UNIVERSITY SCIENCE COURSES (ISUS)	Eng	p,m,t,c	18-20 adult	d-c,integ, interdis	avg avg+ slow	100
MATHEMATICS CURRICULUM-- A CRITICAL REVIEW. SCHOOLS COUNCIL PROJECT	Eng	m	12-16	inq	avg avg+ all	101
MATHEMATICS FOR THE MAJORITY	Eng	m	13-16	integ,c	avg slow	102
MEASUREMENT OF UNDER- STANDING OF PUPILS IN LEARNING SCIENCE	Eng	s	14-16	-	all	103
MIDLANDS MATHEMATICAL EXPERIMENT	Eng	m	10-18	dis,c,p	all	104
NUFFIELD A-LEVEL BIOLOGICAL SCIENCE	Eng	b	16-18	d-c,integ,p, c,inq,dis	avg+	105
NUFFIELD A-LEVEL CHEMISTRY EXAMINATION PROJECT	Eng	c	16-18	d-c	avg+	106
NUFFIELD ADVANCED LEVEL CHEMISTRY PROJECT	Eng	c	16-18	integ	avg avg+	107
NUFFIELD ADVANCED PHYSICS PROJECT	Eng	p	16-18 TEd	inq,c	avg+	108
NUFFIELD COMBINED SCIENCE PROJECT	Eng, Spanish, Italian	b,c,p	11-13	-	all	109
NUFFIELD MATHEMATICS TEACHING PROJECT	Eng,French, Italian, Dutch, German	m	5-13	c, dis	all	110
NUFFIELD 'O'-LEVEL BIOLOGY PROJECT	Eng	b	-	-	-	111
NUFFIELD PHYSICAL SCIENCE	Eng	c,p	16-18	integ	avg avg+	112
NUFFIELD PHYSICS TEACHING PROJECT (O-Level)	Eng,French, Spanish,Turkish, Polish, Japanese	p	11-16	d-c,inq, dis	avg+	113
NUFFIELD SECONDARY SCIENCE	Eng	s	13-16	interdis, integ	all	114
PROGRESS IN LEARNING SCIENCE	Eng	m,s	5-13	integ	all	115
PROJECT TECHNOLOGY	Eng	t	11-18	s-o	all	116
THE PSYCHOLOGY AND MATHEMATICS PROJECT	Eng	m	11-15	c	avg+ avg	117
SCHOOLS COUNCIL CURRICU- LUM ENRICHMENT PROJECT FOR GIFTED CHILDREN	Eng	b,e-s	7-11	integ,c, inq,dis	gifted	118

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SCHOOLS COUNCIL INTEGRATED SCIENCE PROJECT (S.C.I.S.P.)	Eng	b,c,p, e-s,t,s-s	13-16	integ,p	avg+	119
SCHOOLS COUNCIL MATHEMATICS FOR MAJORITY CONTINUATION PROJECT	Eng	m	13-16	interdis	avg	120
SCHOOLS COUNCIL PRIMARY MATHEMATICS PROJECT	Eng	m	5-11	-	all	121
SCHOOLS COUNCIL PROJECT FOR THE EVALUATION OF SCIENCE TEACHING MATERIALS	Eng	b,c,p	14-15	-	avg	122
SCHOOLS COUNCIL PROJECT: HEALTH EDUCATION 5-13	Eng	b,s-s,h,hu	5-13	interdis, inq, dis	all	123
SCIENCE 5/13 (Sc 5/13)	Eng (Spanish,Dutch, German in preparation)	b,c,p,m s-s	5-13	inq,dis	all	124
SCIENCE TEACHER EDUCATION PROJECT (STEP)	Eng,Hebrew, Australian	s	TEd	-	avg	125
SHROPSHIRE MATHEMATICS EXPERIMENT (SME)	Eng	m	11-16 TEd	d-c,c	avg avg+	126
SIXTH FORM MATHEMATICS CURRICULUM PROJECT	Eng	m	16-18	-	avg	127
UNIVERSITY PHYSICS ITEM BANK (UPIB)	Eng	p	18-20 adult	d-c	avg avg+ slow	128
<u>GREAT BRITAIN: SCOTLAND</u>						
BIOLOGY TEACHING UNIT (FORMERLY PART OF INTER-UNIVERSITY BIOLOGY TEACHING PROJECT)	Eng	b	18	-	avg+	129
CERTIFICATE OF SIXTH YEAR STUDIES IN BIOLOGY	Eng	b	17-18	d-c,inq	avg+	130
FIVE MATHEMATICS PROJECT	Eng	m	11-13	-	all	131
MATHEMATICS FOR GENERAL EDUCATION	Eng	m, s-s	14-16	inq	slow	132
SCOTTISH EDUCATION DEPARTMENT MATHEMATICS EXPERIMENT	Eng	m	12-16	-	-	133
SCOTTISH MATHEMATICS GROUP (SMG)	Eng, Spanish, Dutch,Swedish, Malaysian	m	12-18	d-c,dis	avg avg+ slow	134
SCOTTISH SECONDARY SCIENCE SCHEMES	Eng	p,c,b	12-18 TEd	integ	all	135
<u>GREAT BRITAIN: WALES</u>						
DEVELOPMENT OF SCIENTIFIC AND MATHEMATICAL CONCEPTS	Eng	s,m	7-11	c	all	136
PHYSICS INTERFACT PROJECT (PIP)	Eng	p	coll	d-c	all	137

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SWANSEA SCHEME	Eng	m	10-18	d-c	avg+	138
VALLEY PROJECT IN PRIMARY MATHEMATICS (Formerly Lower Valley Project)	Eng	m	5-13	c,dis	all	139
<u>HUNGARY</u>						
OPI MATHEMATICAL REFORM PROJECT	Hungarian	m	4-17 TEd	d-c,dis,c, interdis	all	140
A PROJECT FOR UPDATING MATHEMATICS TEACHING ON A SECONDARY SCHOOL LEVEL IN HUNGARY	Hungarian	m	15-18	dis	avg	141
<u>IRELAND</u>						
IRISH SCIENCE CURRICULUM INNOVATION PROJECT (ISCIP)	Eng	b,c,p,e-s, t,s-s	13-15 TEd	integ,inq	all	142
<u>ITALY</u>						
INIZIATIVA RELATIVITA PER LE SCUOLE SECONDARIE (IRSS) (Introducing Relativity for the Secondary School)	Italian	p,history of science	16-18	c	avg	143
<u>LEBANON</u>						
LEBANESE SCIENCE BOOK PROJECT (ELEMENTARY)	Arabic	g-s	6-10	inq	avg	144
LEBANESE SCIENCE BOOK PROJECT (INTERMEDIATE)	Eng, French	b,c,p,e-s	7-10	inq,integ	avg	145
<u>THE NETHERLANDS</u>						
ARITHMETIC FOR DOMESTIC SCHOOLS	Dutch	m	13-14	dis	avg slow	146
THE CONSTRUCTION OF AN ITEM BANK FOR SECONDARY SCHOOL MATHEMATICS	Dutch	m	12-15	interdis	all	147
PHYSICS CURRICULUM DEVELOPMENT PROJECT FOR GENERAL SECONDARY EDUCATION - PROJEKT LEERPAPKE-TONTWIKKELING NATUURKUNDE (PLON)	Dutch	p	13-15	p,c,inq,dis	avg avg+	148
RENOVATION OF CHEMISTRY CURRICULA (CMLS)	Dutch	c	6-18 TEd	d-c,integ	avg avg+	149
VAN A TOT Z, WERKBOEKEN DER WISKUNDE (MATHEMATICAL COURSE FOR SECONDARY EDUCATION) (A-Z)	Dutch	m	12-19	d-c	all	150
<u>POLAND</u>						
PRIMARY TEACHING OF MATHEMATICS	Polish	m	5-11	d-c,c	avg all avg+	151
<u>ROMANIA</u>						
THE SYSTEMATIC TEACHING OF PROBABILITY	Romanian	m	10-15 TEd	d-c,c,dis	all	152
<u>SPAIN</u>						
CANARY ISLANDS MATHEMATICS PROJECT (C.I.M.P)	Spanish	m	4-15	dis	all	153

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<u>SWITZERLAND</u>						
DEVELOPMENT & CORRESPONDING ANALYSIS OF CURRICULA FOR CONTINUING SCHOOLS IN ZUG (ENTWICKLUNG UND BEGEITENDE ANALYSEN DES CURRICULUMS DER WEITERBILDUNGSSCHULE ZUG) (EBAC-WS)	German	b,c,p,m, s-s,h, working technique, German philosophy	17-18	integ interdis	avg	154
SCHULMATHEMATIK UND ALLGEMEINE LERNZIELE (SL) (SCHOOL MATHEMATICS AND GENERAL EDUCATION)	German	m	6-14 TEd	d-c	avg	155
<u>TURKEY</u>						
SCIENCE TEACHING DEVELOPMENT	Turkish	b,c,p,m	15-17	d-c,inq	all	156
<u>WEST GERMANY</u>						
COMPUTER-BASED INSTRUCTION AS A TOOL FOR PEDAGOGICAL RESEARCH	German	p	13-15	d-c,dis	avg	157
ECOLOGY IN SCHOOLS	German	b,c,s-s, e-s,p	2-20	interdis,p, c,inq,dis	all	158
ENTWICKLUNG EINES NATURWISSENSCHAFTLICH ORIENTIERTEN PRIMARSCHUL-CURRICULUM (DEVELOPMENT OF A NATURAL SCIENCE ORIENTED PRIMARY SCHOOL CURRICULUM)	German	b,c,p	5-8	integ	all	159
INTEGRATED NATURAL SCIENCE CURRICULUM (PROJEKT INTEGRIETES NATURRIM CURRICULUM) (PINC)	German	b,c,p,t	12-15 TEd	integ,c	avg	160
INVESTIGATION OF THE METHODOLOGY AND STRATEGY FOR THE CONSTRUCTION OF INTEGRATED SCIENCE CURRICULUM	-	-	-	-	-	161
IPN CURRICULUM CHEMIE 5/6	German	c,p,t,b	10-12	inq,c,p, interdis	all	162
IPN CURRICULUM CHEMIE 8/13 (GYMNASIUM)	German	c,p	14-19	integ,inq dis	gymnasium	163
IPN CURRICULUM PHYSIK 5/8	German	p	10-14	d-c,c	all	164
IPN CURRICULUM PHYSIK 9/10	German	p	14-16 TEd	d-c,p,c, interdis	all	165
MODELS OF AN INTEGRATIVE MULTIPERSPECTIVE INSTRUCTION IN PRIMARY SCHOOL EDUCATION	German	s-s,t,b, c,p,m	6-11 TEd	interdis	avg+ avg slow	166
NATURWISSENSCHAFTLICHER UNTERRICHT IN DER GRUNDSCHULE (NUG) (NATURAL SCIENCE INSTRUCTION IN THE PRIMARY SCHOOL)	German	p,c	7-10	d-c,c,inq, p,dis,integ	all	167
PROGRAM NATL. WISSENSCHAFTEN (PROGRAM NATURAL SCIENCE)	German	s	5-6	p,c,interdis	all	168

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UNIT BANK BIOLOGY	German	b,c,s-s,m, p,cyb	10-20 TEd	d-c,integ, p,c,inq, dis	all	169
LATIN AMERICAN AREA						
<u>ARGENTINA</u>						
CURSO EXPERIMENTAL DE MATEMATICA (3 <sup>er</sup> ano) (Experimental Course in Mathematics, Third Year)	Spanish	m	15	d-c	all	170
ENSEÑANZA ACTUALIZADA DE LA QUIMICA - FIRST & SECOND COURSES (Current Teaching of Chemistry, First and Second Courses	Spanish	c	17	inq,dis,c	all	171
HEALTH EDUCATION (Educacion para la Salud)	Spanish	b	16	inq,dis, p,c	all	172
INTRODUCTORY PHYSICAL SCIENCE (I.P.S.)	Spanish	c,p	15	inq,dis,c	all	173
PILOT PROGRAM OF BIOLOGY I: "LIVING THINGS IN THEIR ENVIRONMENT" (Programa Piloto de Biología I: "Los Seres Vivos en su ambiente")	Spanish	b	12	inq,dis,p, c	all	174
PILOT PROGRAM OF BIOLOGY II: "THE DIVERSITY OF LIVING THINGS" (Programa Piloto de Biología II: "La Diver- sidad de Los Seres Vivos")	Spanish	b	13	inq,dis,p, c	all	175
PILOT PROGRAM OF BIOLOGY III: "STRUCTURES & FUNCTIONS OF ORGANISMS" (Programa Piloto de Biología III: "Estructura y Funcionamiento de los Organismos")	Spanish	b	14	inq,dis,p, c	all	176
PILOT PROGRAM FOR BIOLOGY IV: "INTEGRATION, CONTINUITY & EVOLUTION OF LIVING THINGS" (Programa Piloto de Biología IV: "Integración, Continuidad y Evolución de los seres vivos")	Spanish	b	15	inq,dis,p, c	all	177
VERBAL & MATHEMATICAL REASONING TESTS	Spanish	-	14-16	-	-	178
<u>BARBADOS</u>						
CARIBBEAN MATHEMATICS PROJECT (CMP)	Eng	m	11-15 TEd	c,p	all	179
WEST INDIAN SCIENCE CURRICULUM INNOVATION PROJECT/C (WISCIP/C)	Eng	b,c,p	11-14	integ,c,dis	avg	180



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<b>BRASIL</b>						
GRUPO DE ESTUDOS DO ENSINO DA MATEMATICA (GEEM) (Group Studies of the Teaching of Mathematics)	Portuguese	m	TEd	d-c	avg	181
INTEGRATED SCIENCE (Ciencia Integrada)	Portuguese	b,c,p,e-s, m,t,s-s	15-16	integ	avg	182
INTEGRATED SCIENCE FOR RECENTLY ALPHABETIZED ADULTS	Portuguese	electricity, h	adult	integ	-	183
<b>CHILE</b>						
PROYECTO DE PERFECCIONAMIENTO EN SERVICIO, CIENCIAS NATURALES (P.P.S.-c.n.) (Project for Perfecting Services for Natural Sciences)	Spanish	b,c,p	10-13 TEd	p,c	all	184
<b>COLUMBIA</b>						
BIOLOGIA: EL HOMBRE Y SU AMBIENTE (Biology: Man and His Environment)	Spanish	b	12-15	integ,inq, dis	avg	185
<b>JAMAICA</b>						
UNIVERSITY OF THE WEST INDIES SCIENCE EDUCATION CENTRE, MONA, JAMAICA (MONA)	Eng	b,c,p,e-s	12-15	integ,inq, dis	avg	186
<b>NORTH AMERICAN AREA</b>						
<b>CANADA</b>						
CURRICULUM RESOURCES INFORMATION BANK PROJECT (CRIB)	Eng	b,p	12-14 TEd	c,p,inq	avg	187
EDMONTON JUNIOR HIGH SCHOOL PROCESS-APPROACH PROJECT	Eng	b,c,p	13-15 TEd	p,inq,dis, c,d-c	avg	188
PATTERNS OF ENQUIRY PROJECT (POEP)	Eng	b,c,p, g-s	14-19 TEd	interdis, c,inq	avg avg+	189
TURN ON SCIENCE PROGRAM FOR NATIVE INDIAN STUDENTS WITH A FOCUS ON VALUES (TOSP)	Eng	b,c,p	12-16	interdis, integ,p,inq, dis	avg+ slow	190
TURN ON CHEMISTRY PROGRAM FOR NON-SCIENCE MAJOR STUDENTS (TOCP)	Eng	c	16-17	d-c	avg avg+	191

NORTH AMERICAN AREA (Continued)

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<b>UNITED STATES OF AMERICA</b>					
AAAS SCIENCE SUPPLEMENT ENVIRONMENTAL EDUCATION ENRICHMENT ACTIVITIES	b,c,p,t, s-s	6-11	interdis	all	192
ACTIVITIES IN SCIENCE (AIS)	b,c,p,e-s, h	-	dis,d-c	EMR	193
ADAPTING ACIENCE MATERIALS FOR THE BLIND (ASMB)	b,c,p,e-s	4-14 TEd	p,c,inq, dis	all	194
ADVANCED GENERAL MATHEMATICS & APPLIED BUSINESS INDUSTRIAL MATHEMATICS (AGM-III & ABI MATH IV)	m	16-17	d-c,dis	avg	195
AIBS PROJECT BIOTECH	b	14-20	d-c,p	all	196
AMERICAN POLITICAL BEHAVIOR (APB)	s-s	14-18	d-c,c,inq, dis,interdis	all	197
ANTHROPOLOGY CURRICULUM PROJECT	an	5-17	d-c,c	all	198
THE ARITHMETIC PROJECT COURSE FOR TEACHERS	m	TEd	d-c,p,c, inq,dis	all	199
AUDIO-TUTORIAL BIOLOGY IN THE SECONDARY SCHOOL	b	13-14	d-c,p	all	200
BALD ROCK ENVIROCAP PROJECT	b,e-s,m, s-s	9-11	interdis, inq	all	201
BILINGUAL CONTINUOUS PROGRESS MATHEMATICS (BCPM)	m	6-7	c,p	all	202
BIOLOGICAL SCIENCES CURRICULUM STUDY (BSCS)	b,n-s,hu	5-18 coll TEd	d-c,inq interdis	avg EMR slow	203
BIOLOGICAL SCIENCES CURRICULUM STUDY ELEMENTARY SCHOOL SCIENCE PROJECT (BSCS-ESSP)	b,c,p,e-s,m, s-s,h,l-a,art	5-11	interdis	all	204
BIOLOGICAL SCIENCES CURRICULUM STUDY (BSCS) HUMAN SCIENCES PROGRAM (HSP)	b,s-s,b-s	11-13	interdis	all	205
BIOLOGICAL SCIENCES CURRICULUM STUDY INVESTIGATING YOUR ENVIRONMENT: BSCS ENVIRONMENTAL MODULE	b,c,s-s	14-17	interdis, inq	all	206
BIOLOGICAL SCIENCES CURRICULUM STUDY - ME AND MY ENVIRONMENT (MAME) (Life Sciences: A BSCS Special Education Program)	e-e,b,c,p, e-s	13-18	d-c,p,inq, interdis	EMH	207
BIOLOGICAL SCIENCES CURRICULUM STUDY - ME NOW (ME NOW) (Life Sciences: A BSCS Special Education Program)	b	10-14	d-c,p,inq	EMH	208
BIOLOGICAL SCIENCE CURRICULUM STUDY MINICOURSE DEVELOPMENT PROJECT	b	18-20	d-c,p,inq, dis	avg avg+	209
BIOMEDICAL INTERDISCIPLINARY CURRICULUM PROJECT (BICP)	b,c,p,m,t, s-s,phys,med, c-s	16-18 TEd	interdis, integ,c	avg avg+	210

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BI-STATE PROJECT FOR THE IMPROVE- MENT OF IN-SERVICE TEACHER EDUCATION THROUGH SCIENCE	-	adult TEd	inq,dis,c, p	all	211
BOSTON COLLEGE MATHEMATICS INSTITUTE (BCMI)	m	5-19 TEd	d-c,p,c,inq, dis	all	212
BROAD SPECTRUM ENVIRONMENTAL EDUCATION PROJECT	e-e	5-18 TEd	interdis, c,inq	avg	213
BUILDING EDUCATIONAL BRIDGES BETWEEN SCIENCE AND THE HUMANITIES	b,c,p,s-s, a,r	19-20	interdis, integ,c	all	214
CALCULATORS IN GENERAL MATH	m	14	p	slow	215
CEMREL, INC. COMPREHENSIVE SCHOOL MATHEMATICS PROGRAM - ELEMENTARY COMPONENT (CSMP)	m	6-12	d-c,p,c, inq,dis	all	216
CEMREL, INC. COMPREHENSIVE SCHOOL MATHEMATICS PROGRAM - ELEMENTS OF MATHEMATICS (CSMP-EM)	m	12-18	d-c,c,dis	avg+	217
CENTER FOR THE DEVELOPMENT OF ENVIRONMENTAL CURRICULUM (CDEC)	e-e	7-18 TEd	-	avg	218
CENTER FOR URBAN RESEARCH IN ENVIRONMENTAL STUDIES (CURES)	b,c,p,e-s, s-s	10-17 TEd	interdis, p,c,inq, dis	all	219
CHEMICAL BOND APPROACH (CBA)	c	16,18	d-c,c,inq	all	220
CHEMICAL EDUCATION MATERIAL STUDY (CHEM STUDY)	c	16-18	dis	avg	221
CHEMICAL TECHNICIAN CURRICULUM PROJECT (ChemTeC)	c,t	17-20	d-c	avg	222
COMMITTEE ON LOW ACHIEVERS IN MATH - DENVER AREA (COLAMDA)	m	12-18	p	slow	223
COMMITTEE ON THE UNDERGRADUATE PROGRAM IN MATHEMATICS (CUPM)	m	16	d-c,integ	all	224
COMMUNITY ENVIRONMENTAL STUDY PROGRAM (CESP)	b,s-s,h-e, Eng	5-17	interdis, dis,p	all	225
COMPUTER ASSISTED INSTRUCTION LABORATORY IN MATHEMATICS & SCIENCE (CAI)	c,p,e-s,m	11-13	interdis	all	226
COMPUTER-BASED EDUCATION (C-BE)	t,s-s	coll	interdis	avg avg+	227
COMPUTER ORIENTED MATERIALS PRODUCTION FOR UNDERGRADUATE TEACHING (COMPUTe)	b,c,p,e-s,m, t,s-s,ec,g,u-s	coll	d-c	all	228
CONCEPTUALLY ORIENTED PROGRAM IN ELEMENTARY SCIENCE (COPES)	b,c,p,e-s	5-13	integ,c, inq,dis	all	229
CONSERVATION CURRICULUM IMPROVEMENT PROJECT (CCIP)	b,e-s,s-s, c,p,h-e	6-18	interdis, c,inq,dis	all	230
COOPERATIVE CURRICULUM IMPROVE- MENT PROGRAM - BIOLOGY (BioCo-TIE)	b	19	c,integ	all	231

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COOPERATIVE ENVIRONMENTAL EDUCATION PROJECT (CEEP)	e-e	12,TEd	d-c,integ, interdis	all	232
COOPERATIVE GENERAL SCIENCE PROGRAM (CGSP)	b,c,p,e-s, m	coll	integ	all	233
CORE-COURSE FOR COLLEGE SCIENCE MAJORS CONTAINING PHYSICS, CHEMISTRY AND BIOLOGY	b,c,p	18-20	integ	all	234
CRYSTAL LAKE OUTDOOR EDUCATION PROGRAM	b,c,p,e-s,m, t,s-s,art,mus, p-e,l-a	5-18	interdis, c,inq,dis	all slow spec	235
CURRICULUM AND TEXTBOOK PROJECT	m	7-12	d-c,p,inq	all	236
CUYAHOGA HERITAGE PROJECT. NORTHEAST OHIO	e-e	13-20 TEd	interdis, integ,p	all	237
DARTMOUTH SECONDARY SCHOOL COMPUTER PROJECT	comp,m,p,b, c,e-s,t,s-s	12-17 TEd	c	all	238
A DEMONSTRATION OF AN IMPROVED SCIENCE CURRICULUM FOR UNDERACHIEVING STUDENTS (DISCUS)	b,c,p,e-s	13-15	integ,dis	slow	239
DESOTO ENVIRONMENTAL LEARNING LABORATORY (ELL)	b,e-s,ecol	11-13	integ	all	240
DEVELOPING MATHEMATICAL PROCESSES (DMP)	m	5-11	p,p-s,d-c	all	241
DEVELOPMENT OF A SELF-STUDY PHYSICS PROGRAM IN A MULTI- DISCIPLINARY BASIC SCIENCE COURSE FOR SCIENCE MAJORS	p	coll	integ	all	242
DEVELOPMENT OF A ZOOMOBILE WILDLIFE TEACHING LABORATORY	b	5-13	p,c	all spec	243
EARTH & SPACE SCIENCE IMPROVE- MENT PROJECT (ESSIP)	e-s	13-18	integ	all	244
EARTH SCIENCE CURRICULUM PROJECT (ESCP)	e-s	13-18	inq,integ, interdis	all avg	245
EARTH SCIENCE TEACHER INSERVICE PROGRAM	e-s,meth	TEd	d-c,integ, c,inq	avg	246
EARTH SCIENCE TEACHER PREPARATION PROJECT (ESTPP)	psych-ed	12-18 TEd	psyc	all	247
ECO-CURRICULUM DEVELOPMENT AND LEARNING LABORATORY	b,c,p,e-s,m, t,s-s,Eng,art	5-20 TEd	interdis	all	248
EDUCATIONAL RESEARCH COUNCIL MATHEMATICS PROGRAM (ERCMP) (Formerly GCMP)	m	5-12	inq,dis d-c	all	249
EDUCATIONAL RESEARCH COUNCIL (ERC) UNIFIED SCIENCE PROGRAM	b,c,p,e-s,m, t,s-s,psyc,hu	13-20	interdis, p,c,inq	all	250
EDUCATIONAL RESOURCES INFOR- MATION CENTER (ERIC)	b,c,p,e-s,m,t, s-s	TEd resch	-	all	251
EKISTICS, A GUIDE FOR THE DEVELOPMENT OF AN INTERDIS- CIPLINARY ENVIRONMENTAL EDUCATION CURRICULUM	e-e	5-18	interdis	all	252

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ELEMENTARY SCHOOL SCIENCE PROJECT	b,p,c,m	7-13	-	avg	253
ELEMENTARY SCHOOL SCIENCE PROJECT (ESSP-USU)	b,c,p	6-7	dis	all	254
ELEMENTARY SCIENCE STUDY (ESS)	b,c,p,e-s, m, mus	2-14	dis	all	255
ELEMENTARY SCIENCE TEACHER TRAINING (ESTT)	b,c,p,e-s, hu	18-20 TEd	interdis, integ,p,c, inq,dis, hist	avg	256
ENGINEERING CONCEPTS CURRICULUM PROJECT - MAN AND HIS TECHNOLOGY (ECCP-MHT)	b,m,t, s-s	18-20 adult TEd	interdis, integ,p, inq	all	257
ENGINEERING CONCEPTS CURRICULUM PROJECT - THE MAN-MADE WORLD (ECCP-TMM)	b,p,m,t, s-s	15-18 adult TEd	interdis, integ,p, inq	avg avg+	258
ENGINEERING CONCEPTS CURRICULUM PROJECT - TECHNOLOGY-PEOPLE-ENVIRONMENT (ECCP-TPE)	m,t,s-s,b, c,p,e-s	12-16	interdis, integ,p,c	avg slow	259
ENVIRONMENTAL CENTER FOR OUR SCHOOLS (ECOS)	e-e	8-12 TEd	interdis, dis,c	all	260
ENVIRONMENTAL EDUCATION	b,c,p,e-s,m, t,s-s,Eng	6,10,13 15-17	interdis, dis,p,inq	all	261
ENVIRONMENTAL EDUCATION - COMMUNITY OPPORTUNITY FOR STEWARDSHIP (ECOS)	s-s,b,c,p,e-s, Eng,m	5-18 TEd	interdis, inq	all spec EMR	262
ENVIRONMENTAL EDUCATION CURRICULUM DEVELOPMENT PROGRAM	b,c,e-s, s-s	5-18	interdis	all	263
ENVIRONMENTAL EDUCATION DEMONSTRATION PROJECT	e-e	6-16 TEd	interdis, p,c,inq,dis	all	264
THE ENVIRONMENTAL IMPACT OF ELECTRICAL POWER GENERATION: NUCLEAR & FOSSIL: A MINICOURSE	b,c,p,e-e, s-s,ec	13-18 adult TEd	interdis, integ,p,c, inq,dis	all slow	265
ENVIRONMENTAL INFORMATION PACKETS	e-e	-	varies	all	266
ENVIRONMENTAL PLANNING WORKSHOPS FOR COMMUNITY LEADERS	e-p	adult	interdis, integ,p	-	267
ENVIRONMENTAL SCIENCE STUDY CURRICULUM (ESSC)	e-e	12-15	interdis, integ,inq, dis	all	268
ENVIRONMENTAL STUDIES PROGRAM (ESP)	e-e,b,e-s,t, s-s	coll	interdis, p	avg	269
ESSENTIA: ENVIRONMENTAL STUDIES (ES)	b,c,p,e-s,m, t,s-s,art,hu, 1-a	5-20 TEd	inq,dis, interdis	all	270
ETHNO-SCIENCE	b,e-s,e-e,an	14-18	interdis, integ	all	271

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EXPERIENCE IN OUTDOOR EDUCATION (EOE)	b,e-s,m,s-s, sur,art,Eng	5-12	interdis, integ,p,c, inq	all	272
EXPLORATIONS IN BIOLOGY (EIB)	b	14-17	inq	avg avg+	273
EXPLORING HUMAN NATURE (EHN)	s-s,b	16-18	interdis, c,inq,p	avg	274
EXPLORING NUMBER CONCEPTS (ENC)	m	5-6	p,c,dis	all	275
FOUNDATIONAL APPROACHES IN SCIENCE TEACHING (FAST)	b,c,p,e-s, t,s-s	12-17	interdis, integ,inq, dis	all	276
FUSE CENTER FOR UNIFIED SCIENCE EDUCATION	b,c,p,e-s, s-s	5-20 TEd	u	all	277
GEOGRAPHY CURRICULUM PROJECT	g	5-12	d-c,c	all	278
GRAND RAPIDS MATHEMATICS LABORATORY PROJECT	m	TEd	d-c,dis	all	279
THE GUIDED DESIGN SYSTEM APPROACH -- ENVIRONMENTAL EDUCATION	e-e	15-18	g-d-m	avg	280
GUIDED ENGINEERING DESIGN	t	17-18	g-d-m	avg	281
HIGH SCHOOL GEOGRAPHY PROJECT: GEOGRAPHY IN AN URBAN AGE (HSGP)	s-s,g	11,17	interdis, d-c,inq	all	282
HIGH SCHOOL POLITICAL SCIENCE CURRICULUM PROJECT. PRODUCT: COMPARING POLITICAL EXPERIENCES (CPE)	s-s	17-18	d-c,c,inq, pol	all	283
HUMANISTIC APPROACH TO NATURAL SCIENCE (HANS)	b,c,p,e-s, hu	18-20- TEd	interdis, integ,p,c, dis,hist	avg	284
HUNTINGTON TWO	b,p,s-s	12-20	dis	all	285
IDEA-CENTERED LABORATORY SCIENCE (I-CLS)	b,c,p,e-s	12-14	interdis, c,inq	all slow	286
IMPLEMENTATION OF THE NEW JERSEY STATE MASTER PLAN FOR ENVIRONMENTAL EDUCATION	e-e,s-s,b,c, p,e-s,m,t, art	5-20 TEd	interdis	all	287
INDEPENDENCE OUTDOOR LABORATORY	b,e-s,s-s	5-18	interdis	all	288
INDIVIDUALIZED CHEMISTRY (IC)	c	15-20	c	all	289
INDIVIDUALIZED SCIENCE (IS) (Formerly IPI-Science)	b,c,p,e-s	5-14	inq,integ, c,p	all	290
INDIVIDUALIZED SCIENCE INSTRUCTIONAL SYSTEM (ISIS)	b,c,p,e-s	14-18	integ, interdis	all	291
INDIVIDUALIZED SCIENCE INVESTIGATIONS (ISI)	b,c,p,e-s, psych	15-20 TEd	integ,p, inq	avg slow avg+	292
INNER-CITY TEACHERS OF SCIENCE (ICTOS)	b,c,p,m	coll TEd	interdis, p,c	all	293
INQUIRY ROLE APPROACH (IRA)	b	14-15 TEd	inq	avg+ all	294



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INTEGRATED SCIENCE APPROACH (ISA)	b,c,p	15-16	integ	avg+	295
AN INTEGRATED SCIENCE PROGRAM FOR PRE-SERVICE ELEMENTARY SCHOOL TEACHERS	b,c,p,e-s, meth	18-20 TEd	integ, inq	all	296
INTERDISCIPLINARY APPROACHES TO CHEMISTRY (IAC)	c	16-18	interdis	all	297
INTERMEDIATE SCIENCE CURRICULUM STUDY (ISCS)	b,c,p,e-s	12-15 TEd	integ	all	298
INTERRELATED EXPLORATIONS IN SCIENCE (IES)	b,c,p,e-s	11-13	integ	all	299
JEFFERSON COUNTY CURRICULUM DEVELOPMENT	b,c,p,e-s, m,s-s	6-20 TEd	interdis	avg avg+ slow	300
JOHN MUIR INSTITUTE (JMI) URBAN EXPERIENTIAL ENVIRONMENTAL STUDIES CURRICULUM PROJECT	e-e	12-18	interdis inq	all avg	301
K-12 ENVIRONMENTAL EDUCATION PROGRAM	e-e	5-18	interdis	all	302
K-12 MULTIDISCIPLINARY PROCESS CURRICULUM IN ENVIRONMENTAL EDUCATION	b,c,p,e-s,m, t,s-s	5-18	interdis, p	all	303
K-12 SCIENCE DESIGN - LAS CRUCES SCHOOLS (K-12 SD)	b,c,p,e-s, c-e,e-e	5-18 TEd	d-c, integ, p,c, inq, interdis, dis	all	304
KNOWLEDGE FOR USE PROJECT	all	adult	interdis	all	305
LABORATORY PROGRAM FOR COMPUTER ASSISTED LEARNING (PROJECT LOCAL)	m,b,c,p, e-s,s-s, b-e	8-18 TEd	inq, dis	all	306
LANAKILA MATHEMATICS PROJECT	m,c-e	5-12	d-c	all	307
LANDER CONSERVATION CENTER	e-e	6-18 TEd	interdis	all	308
LIFE SCIENCE INVESTIGATIONS - MAN AND THE ENVIRONMENT (MATE)	b,t,s-s, e-e	12-14	interdis, p, inq	all	309
LIGHTSHIP CHESAPEAKE, ELEMENTARY PROGRAM (LIGHTSHIP)	b,c,s-s	12	integ	all	310
LIGHTSHIP CHESAPEAKE HIGH SCHOOL - STUDENTS TOWARD ENVIRONMENTAL PARTICIPATION PROGRAM (STEP) (LIGHTSHIP)	b,c,naut-s	12-18	interdis, integ, dis	all	311
LINCOLN AREA ENVIRONMENTAL EDUCATION PROJECT (LAEEP)	s,s-s	TEd	interdis	all	312
LOS ANGELES UNIFIED SCHOOL DISTRICT OUTDOOR EDUCATION	b,e-s,s-s	10-12	interdis, inq, dis	all	313
THE MADISON PROJECT	m	7-16	d-c, c,p, d-c, inq	avg all	314
MAINE ENVIRONMENTAL EDUCATION PROJECT	e-e	5-20 TEd adult	interdis, p,c, inq, dis	all	315

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MAN: A COURSE OF STUDY (MACOS)	b,t,s-s	10-12	interdis, p,c,inq, dis	all	316
MAN'S CULTURAL RELATIONSHIP TO THE ENVIRONMENT - PAST, PRESENT, & FUTURE	b,e-s,s-s	8-18	interdis	111	317
MARINE ECOLOGY RESEARCH PROJECT (MER)	b,c	12-18	interdis, integ,inq, dis	all	318
MARINE ENVIRONMENTAL STUDIES PROGRAM	m-s	16-18	interdis	avg avg+	319
MARINE SCIENCE EDUCATION CENTER (MSEC)	b,c,p,e-s	4-18	p,inq	all	320
MATH IDEA KIT SERIES I (K-3); II (3-6)	m	6-11	c,dis	all	321
MATHEMATICS FOR CAREERS	m	14-20	c,inq,dis	all	322
MATHEMATICS INQUIRY IN THE CONRAD AREA (MICA)	m	5-13 TEd	d-c,c,inq	all	323
MATHEMATICS-METHODS PROGRAM (MMP)	m	19-20 TEd	interdis, p,dis	all	324
MCHS FORESTRY AND ENVIRONMENTAL EDUCATION PROJECT	f,e-e	15-19	s-d	all	325
METRICS - THE HAWAII METRIC PROGRAM	m	5-12	d-c	all	326
MINNESOTA ENVIRONMENTAL SCIENCE FOUNDATION, INC. (MESFI)	ecol,s-s, b,com	all	interdis, p,inq,dis	all	327
MINNESOTA SCHOOL MATHEMATICS AND SCIENCE TEACHING PROJECT (MINNEMAST)	m,s	5-9 TEd	-	all	328
MOBILE ENVIRONMENTAL EDUCATION LABORATORY (MEEL)	b,c,s-s, m	5-18	interdis	all	329
A MODEL COMPREHENSIVE PROGRAM IN URBAN ENVIRONMENTAL EDUCATION (UEEP)	e-e	4-18	interdis, c	all	330
A MODEL EDUCATIONAL PROGRAM IN ECOLOGY, KINDERGARTEN THROUGH ADULT EDUCATION	b,s-s,e-e	6-18 TEd adult	interdis, inq	all	331
MODERN COORDINATE GEOMETRY: A WESLEYAN EXPERIMENTAL CURRICULAR STUDY	m	15	c,integ	avg+	332
MONONA GROVE, K-12, UNIFIED, CONCEPT CENTERED SCIENCE PROGRAM	b,c,p,e-s, m,s-s	5-18	integ	all	333
NATURE OF EVIDENCE	b,c,p,s-s, geol,phil	18-20	interdis, g-d-m	avg	334
NEBRASKA PHYSICAL SCIENCE PROJECT (NPSP)	c,p	16-18	integ	avg avg+	335
OUTDOOR BIOLOGY INSTRUCTIONAL STRATEGIES (OBIS)	b,e-e	10-15 TEd	d-c,c,dis	all	336
OUTDOOR LABORATORY	e-s,b	5-14	interdis, dis	all	337

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PENNSYLVANIA NUCLEAR SCIENCE PROJECT (PNS)	nuc-s	15-19	interdis, integ,p,c, inq	avg avg+	338
PEOPLE AND TECHNOLOGY (P & T)	b,p,m,t, s-s	12-14	interdis, c,inq	all	339
PERSONALIZED ADVENTURES IN CHEMICAL EDUCATION (PACE)	c	15-20	p,inq,d-c, c,dis	all	340
PHASE ACHIEVEMENT SYSTEM (PAS)	b	coll	integ	all	341
PHYSICAL SCIENCE FOR NON-SCIENCE MAJORS (PSNS)	c,p	19-20	inq,integ	avg	342
PHYSICAL SCIENCE STUDY COMMITTEE ADVANCED TOPICS (PSSC ADVANCED TOPICS)	p	17-18	d-c,p,c, inq	avg+	343
PHYSICAL SCIENCE STUDY COMMITTEE COLLEGE INTRODUCTORY PHYSICAL SCIENCE (CIPS)	c,p	17-18 TEd	d-c,integ, p,c,inq	avg	344
PHYSICAL SCIENCE STUDY COMMITTEE (PSSC) COLLEGE PHYSICAL SCIENCE II (CPSII)	c,p	17-18	d-c,integ, p,c,inq	avg	345
PHYSICAL SCIENCE STUDY COMMITTEE COLLEGE-PHYSICS (CPSSC)	p	17-18	d-c	avg avg+	346
PHYSICAL SCIENCE STUDY COMMITTEE INTRODUCTORY PHYSICAL SCIENCE (IPS)	c,p	12-14	integ,p,c, inq	all	347
PHYSICAL SCIENCE STUDY COMMITTEE (PSSC) PHYSICAL SCIENCE II (PS II)	c,p	12-17	integ,p,c, inq	avg avg+	348
PHYSICAL SCIENCE STUDY COMMITTEE PHYSICS (PSSC)	p	16-17	d-c	avg avg+	349
PHYSICAL SCIENCE STUDY COMMITTEE (PSSC) UNDERGRADUATE PROGRAM FOR PHYSICS-CHEMISTRY TEACHERS	c,p,m,ed	17-20 TEd	interdis, integ,inq	avg	350
P.K. YONGE LABORATORY SCHOOL CORRELATED SCIENCE PROGRAM (CSP)	b,c,p,e-s	15-17	integ	all	351
PORTLAND PROJECT	b,c,p,m, s-s	14-17	integ,p, c	avg avg+	352
PREPROFESSIONAL INDIVIDUALLY PAGED INSTRUCTION (PIPI)	c,p,m,com	19-20	integ,p, interdis, d-c	all	353
PROGRAM FOR LOW ACHIEVERS IN MATHEMATICS (PLAM)	m	13-15	p,c,inq	slow	354
PROGRAMMED MATH TUTORIAL PROJECT (PMT)	m	5-7	-	u-a	355
PROJECT FOR THE MATHEMATICAL DEVELOPMENT OF CHILDREN (PMDC)	m	5-8	-	all	356
PROJECT I-C-E (INSTRUCTION-CURRICULUM-ENVIRONMENT) (I-C-E)	e-e	5-17 TEd adult	interdis, integ,c,inq, dis	all	357
PROJECT PART-TIME PUPILS AS RESPONSIBLE TEACHERS TO INCREASE MUTUAL ESTEEM	b,c,p,e-s, m,t,hu,i-a	4-18	interdis	all	358
PROJECT PHYSICS (formerly Harvard Project Physics)	p,astr,hu	16-20 TEd	interdis, d-c,integ, c	avg avg+	359

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QUANTITATIVE PHYSICAL SCIENCE (QPS)	p-s	14-18 adult	-	all	360
SCHOOL MATHEMATICS STUDY GROUP (SMSSG)	m	5-18 TEd	-	-	361
SCIENCE - A PROCESS APPROACH (AAAS)	b,c,p,e-s, m,s-s	5-12 TEd	interdis, integ,p	all	362
SCIENCE COURSES FOR BACCALAUREATE EDUCATION	b,c,p,e-s	coll	interdis, integ,c	all	363
SCIENCE CURRICULUM IMPROVEMENT STUDY (SCIS)	b,c,p,e-s	5-12	p,c,inq, dis	all spec	364
SCIENCE FOR THE SEVENTIES (SFTS)	el-s	4-12	p,c,inq, dis	all	365
SCIENCE FOR THE SEVENTIES AND INSTRUCTIONAL TELEVISION (SFTS-ITV)	el-s	5-12 TEd	inq,dis,p	all	366
SCIENCE, NATURE, & THE SURVIVAL OF MAN (SNSM)	e-c	16-19	interdis	slow	367
SECONDARY SCHOOL ENVIRONMENTAL EDUCATION PROJECT (SSEEP)	w-r-m	12+	interdis	all	368
SECONDARY SCHOOL MATHEMATICS CURRICULUM IMPROVEMENT STUDY (SSMCIS)	m	11-18	d-c	avg	369
SOCIAL SCIENCE EDUCATION CONSORTIUM (SSEC)	s-s	TEd	interdis	all	370
SOCIOLOGICAL RESOURCES FOR THE SOCIAL STUDIES (SRSS)	s-s	16-19	d-c,inq	all	371
SOUTH CENTRAL KANSAS ELEMENTARY MATH-SCIENCE PROJECT (SOCKEMS)	b,c,p,e-s, m	5-12	integ,c, dis	all	372
SPECIAL ISSUE ON PLANT PATHOLOGY FOR AMERICAN BIOLOGY TEACHER (PlPathABT)	b	18-20	d-c	all	373
STUDENT ASSISTED DEVELOPMENT OF MATERIALS FOR ENVIRONMENTAL & SOCIAL STUDIES (SADMESS)	s-s,e	16-18	p,dis	all	374
STUDENT CENTERED SCIENCE PROGRAM (SCSP)	b,c,p,e-s, m,s-s	5-13 TEd	integ,c, inq,dis	avg	375
STUDENTS' INSTRUCTIONAL GAMING NETWORK (SIGN)	m,s-s, Eng	10-17	d-c,p,c, dis	all	376
SUCCESS IN MATHEMATICS THROUGH AURAL READING TECHNIQUES (SMART)	m	10-13	p	all	377
SURVEY OF RECENT EAST EUROPEAN LITERATURE IN SCHOOL & COLLEGE MATHEMATICS	m,p,t, psych,ed	all TEd	varies	all	378
SURVIVAL: AN EXPERIENCE WITH THE NEW HUMANITIES	s-s,p-a	12-13	dis	all	379
TEACHERS' CENTER PROJECT	m	adult TEd	-	all	380
TEACHING ENVIRONMENTAL ISSUES	s-s,e-s	15-17	interdis	avg	381
TECH PHYSICS PROJECT (PRODUCT: PHYSICS OF TECHNOLOGY MODULES) (Formerly National Tech Physics Project)	p	18-20	p	all	382

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TECHNOLOGY FOR CHILDREN (T4C)	e-s,m,t, s-s,l-a	4-11	interdis, c,inq,dis	all	383
TIME, SPACE AND MATTER: INVESTIGATING THE PHYSICAL WORLD (TSM) (Formerly Secondary School Science Project)	e-s	12-15	interdis, integ,c,inq, dis	all	384
TOTAL EDUCATION IN THE TOTAL ENVIRONMENT (T.E.T.E.)	h-e	3-20 adult TEd	interdis, p,c	all	385
UNDER ROOF, DOME AND SKY	astr	6-17 TEd	d-c,inq, dis	all	386
UNIFIED SCIENCE AND MATHEMATICS FOR ELEMENTARY SCHOOLS (USMES)	b,c,p,m, t,s-s,l-a	6-14 TEd	interdis, integ,p,inq, spec dis	all	387
UNIVERSITY OF ILLINOIS ASTRONOMY PROGRAM (UIAP) (Formerly Elementary School Science Project - ESSP)	p,e-s,m, astr	11-14	interdis, d-c,integ,c, inq,dis	avg avg+	388
UNIVERSITY OF MARYLAND MATHEMATICS PROJECT (UMMaP)	m	12-15 TEd	c,d-c,inq, p	all	389
UPPER MISSISSIPPI RIVER ECO-CENTER	b,e-s,m, s-s,e-e	10-12 TEd	interdis, dis	-	390
VALUING THE ENVIRONMENT	e-e	6-11	interdis	all	391
WHAT PEOPLE EAT	nutr,c,b	17-19	dis,integ	all	392

#### **IV. DIRECTORS OF PROJECTS OUTSIDE THE UNITED STATES**

# IV. DIRECTORS OF PROJECTS OUTSIDE THE UNITED STATES

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**VI. PROJECT DESCRIPTIONS LISTED ALPHABETICALLY BY GEOGRAPHICAL AREA**

**JOINT SCHOOLS PROJECT  
MATHEMATICS (J.S.P.)**

**M.C. Mitchelmore &  
B. Raynor, Directors**

**Mathematical Association of Ghana  
P.O. Box 62  
Legon, Ghana, Africa  
Tel: -**

**1967-1975  
Gov: U.K.  
Ministry of  
Overseas Dev.**

**See ICh Report(s): 7,6**

<b>Ages:</b> 11-16	<b>Exper:</b> C1 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang:</b> Eng	<b>Lec</b>	texts
<b>Subj:</b> math	<b>Sem</b>	workbooks
<b>Approach:</b> discovery	<b>Disc</b>	tchr manuals
<b>Ability:</b> avg	<b>Indep</b> not	
<b>Eval Meth:</b> standardized tests, tchr jdgmts	<b>Lab</b> answered	
<b>Testing:</b> national exam (O-level)	<b>Fld</b>	
<b>Cont Resp:</b> tchr directed	<b>Dem</b>	
<b>Envir:</b> classroom, outdoors	<b>Sim</b>	
	<b>TV</b>	
	<b>A/V</b>	

The Joint Schools Project Mathematics Series is specially designed for students in West Africa, who take a five year course to School Certificate. The Project originated in Ghana, where a group of teachers started writing and testing material in 1964. The experimental editions were also used in Nigeria and Sierra Leone, and the final version (now metric) is suitable for use throughout West Africa. Adaptations for the West Indies and East Africa are also being published.

The aim of the course is to give students an understanding of the world around them in mathematical terms. This includes: the ability to visualise solid objects, and a familiarity with properties of simple solid and plane shapes; an understanding of number, in the abstract and in application to practical situations, and a knowledge of the various computing methods in use today; an acquaintance with the kinds of relations which may exist between mathematical quantities, and how they may be expressed; and the ability to reason correctly on familiar matters.

To achieve these aims, the course contains practical work; the students are encouraged to make solid models, geometrical and number patterns and to investigate them for themselves. To help this approach, a workbook is used alongside the textbook in the first three years of the course. The examples are made as relevant to the students' experience as possible. Some new topics are included purely for the enjoyment that is to be derived from them. The approach is also intuitive - a body of facts, both arithmetical and geometrical is built up by practical work. New results are constantly related to old ones by asking 'Why does this happen?'. Reasoning ability is fostered by relating logical principles to everyday situations.

The impact of the Project has exceeded all expectation, and it is now the most widely used modern mathematics course in West Africa.

<b>Reason:</b> * develop new course, change in philosophy	<b>Adopt:</b> not known	<b>Pers:</b> FT PT NRT	<b>Publ:</b> 200,000
	<b>Tchr Ed:</b> conducts work-shop; provides manuals	<b>Adm</b> 2	copies repro-
		<b>Wr</b> 20	duced commer-
		<b>VSch</b> 1	cially
<b>Initiator(s):</b> M.C. Mitchelmore, B. Raynor		<b>Res</b>	
		<b>TEd</b>	
		<b>Trial</b> 30	

**Descriptive References:**

Developing a New Curriculum (Chapter 6). Published for Centre for Curriculum Renewal and Educational Development Overseas, by Heinemann.

KENYA SCIENCE TEACHERS  
COLLEGE (KSTC)

A.W. Mbogho, Director

See ICh Report(s): 7

Ages: 19, tchr ed

Lang: Eng

Subj: biol, chem, phys, math,  
ind. ed., geography

Approach: integrated-academic,  
professional tchr-training

Ability: all

Eval Meth: achievement, lab  
& standardized tests, tchr  
jdgmts, student questionnaire

Testing: unit

Cont Resp:\* tchr guided & directed,  
administratively directed

Envir:\* classroom, lab, school library

P.O. Box 30596  
Nairobi, Kenya  
Africa

Tel: 66211

1966-1976

Gov, Bilateral  
Kenyan-Swedish  
(SIDA)

Exper: C1 12+ 2-12 I

Lec ✓

Sem

Disc

Indep

Lab

Fld ✓

Dem

Sim

TV

A/V ✓

Library

Printed Materials:

texts, lab books

supplementary books

tchr manuals

tests

Non-Print Materials:

slides

overhead transpar-

encies

models

lab equipment

The overall objective of this project is to produce teachers for Kenyan Secondary Schools, Forms 1-IV, (14-18 years of age) in Mathematics, Physics, Chemistry, Biology, Geography and Industrial Education. Educational goals include: 1) to give academic standard equivalent to A-level; 2) To provide professional training; 3) To give liberal and Civic Education adequate for future science teachers. A major characteristic is the long range integration of the three educational goals into a course which is totally professionally geared.

The principles of learning involved are: discovery; observation; reasoning; conclusion; and formation of principles. About 50% of the study time will be devoted to practicals. There will be a thorough study of practical and written material for Secondary Schools. Evaluation will be done using student oriented follow-up during training and afterwards. It has important impact since it is the main source of science and mathematics teachers for Kenyan Secondary Schools. Although originally introduced as a "Crash Programme", it is now proving to be of such high standards that it will most likely be reflected in an expansion of the work.

Reason: shortage of  
secondary science  
teachers

Adopt: -

Tchr Ed: -

Initiator(s): O. Bergman

Pers: FT PT NRT

Adm 3

Wr 42

VSch 42

Res

TEd 1

Trial

Publ: reproduced  
by mimeograph  
& offset

No references given

**MATHEMATICS AND SCIENCE**

Director: -

See ICh Report(s): none

Kenya Institute of Education

P.O. Box 30231, Nairobi

Kenya, Africa

1968-1973

Gov: State

<b>Ages: -</b>	<b>Exper:</b> Cl 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang: Eng</b>	<b>Lec</b>	texts
<b>Subj: biol, chem, phys, math, social science</b>	<b>Sem</b>	lab books
<b>Approach: inquiry, discovery</b>	<b>Disc</b>	supplementary books
<b>Ability: avg, avg+</b>	<b>Indep</b>	activity sheets
<b>Eval Meth: achievement, lab, oral tests,</b>	<b>Lab</b> ✓	tchr manuals
<b>student questionnaire</b>	<b>Fld</b> ✓	field guides
<b>Testing: unit, individual</b>	<b>Dem</b> ✓	tests, charts
<b>Cont Resp: tchr guided</b>	<b>Sim</b>	<b>Non-Print Materials:</b>
<b>Envir: classroom, sch library, lab</b>	<b>TV</b>	slides, slide tape
	<b>A/V</b>	lab equipment

**No narrative provided by the project**

<b>Reason: update content &amp; methods, change in the philosophy, develop new course</b>	<b>Adopt:-</b>	<b>Pers: FT PT NRT</b>	<b>Publ: repro-</b>
	<b>Tchr Ed: conducts work-</b>	<b>Adm</b> 7	<b>duced insti-</b>
	<b>shops; provides manuals</b>	<b>Wr</b> 7 35	<b>tutionally by</b>
	<b>&amp; guides</b>	<b>VSch</b> 7 10	<b>mimeograph</b>
<b>Initiator(s): -</b>		<b>Res</b> 7 10	
		<b>TEd</b> 7 10	
		<b>Trial</b> 300	

**Descriptive References:**

Secondary Curriculum Guide. Ministry of Education.

**LESOTHO INTRODUCTORY SCIENCE  
IMPROVEMENT PROGRAM (LISIP)**

P.J. Towse & S. Baholo, Directors

See ICh Report(s): none

Ministry of Education  
Maths/Science Centre  
P.O. Box 1126, Maseru  
Lesotho, Africa

Tel: Maseru 2851, EXT 6

1973-1976

Gov; ODM (U.K.)

Ages: 14-19	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec 3	activity sheets
Subj: science	Sem	tchr manuals
Approach: integrated, discovery	Disc 2	tests
Ability: all	Indep	newsletters
Eval Meth: achievement, lab, & standardized tests	Lab 1	Non-Print Materials:
Testing: term, unit	Fld 4	lab equipment
Cont Resp: admin directed	Dem 2	
Envir:* classroom & lab, sch grounds & library, community	Sim	
	TV	
	A/V	

The overall project purposes were: to adapt the West Indian Science Curriculum Program (WISCIP) to the needs of the Lesotho Junior Secondary Schools and to provide educational experiences in integrated science which are relevant for the majority of students who terminate their formal education at the Junior Secondary level (3 years), as well as catering for the requirements of those preparing for the Cambridge Overseas School Certificate taken at the end of the 5th year of secondary schooling.

The specific objectives were: to build upon a pupil centered activity type program making revisions and additions as necessary and to train teachers in the philosophy, pedagogy and science content needed for the implementation of a pupil centered rather than teacher centered program.

In this project the emphasis is on learning rather than on teaching. Thus the major underlying principle is "Learn by doing." The laboratory work provides the impetus for further inquiry. The unique characteristic of this project was to localize apparatus for the program so that students would be able to carry out a discovery approach to science with inexpensive but effective apparatus.

The project has not been fully evaluated. So far, evaluation has been based on intuition and comparison with experiences elsewhere. Teachers feel the program is a much more satisfactory one to follow than the traditional rote method it replaces because the students are much more involved.

Plans for the future involve the consolidation of the program and its implementation. In addition, the possibility of expanding the integrated science approach throughout secondary schooling will be investigated.

Reason: change in philosophy	Adopt: 80 tchrs, 8000 students, 60 sch	Pers: FT PT NRT	Publ: 6000
Initiator(s): E.S. Mohapi, R. Nichter	Tchr Ed: conducts work- shops; provides manuals, guides & consultants	Adm Wr 2 VSch Res TEd Trial 50	worksheets & 80 manuals reproduced institution- ally by offset & mimeograph (\$30/10 stu- dents)

**Descriptive References:**

Mee, A.J., P. Boyd and D. Ritchie. 1971. Science for the Seventies. Books 1 and 2, Teachers' Guides 1 and 2. Heinemann.



**MID-WESTERN STATE OF NIGERIA  
PRIMARY SCIENCE PROJECT  
(assisted by UNESCO/UNICEF)**

Felix O. Agun, Director

Science Curriculum Development  
Centre  
College of Education, Abraka  
Midwest State, Nigeria

1968-1974

Gov:State,  
UNICEF

See ICh Report(s): none

Ages: 6-12, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: biol, chem, phys, earth-space	Sem	tchr manuals
Approach: integrated, inquiry, discovery	Disc	charts
Ability: average	Indep	
Eval Meth: achievement & oral tests,	Lab	Non-Print Materials:
tchr jdgmts	Fld	models
Testing: term	Dem	
Cont Resp: tchr & student directed, tchr	Sim	
guided	TV	
Envir: community, sch grounds, classroom,	A/V	
laboratory		

This project's objectives are: 1) to broaden the child's horizon of experiences as part of his general education; 2) to enrich the child's environment in order to heighten the enjoyment of his explorations and investigations; 3) to accelerate the development of desirable scientific attitudes, interests and certain basic concepts; 4) to encourage and foster group-work and the team spirit; 5) to enable an early and better start by future secondary school pupils.

The project owes its origin to the decision of the Ministry of Education of Mid-Western Nigeria, to broaden the primary school curriculum to include Integrated Science Mathematics and the Manual Arts. The project was launched in 1966 with the UNESCO, UNICEF, the Federal Military Government and the Mid-Western State Government as cooperating partners. Effective execution of the program commenced in 1968 with the arrival of Dr. G.N. Sharma to supervise operations.

Internal evaluation has been carried out. Such feedback obtained has enabled different aspects of the program to be modified. None of the data from these evaluations has been published. Project materials were enthusiastically received by all the primary schools in the state. They are fulfilling a need which has long existed.

The program developed by Nigerians for Nigerian children. Project materials are used in all the 1,830 Primary (Elementary) Schools in the State. The project is backed with an effective Pre-service and In-service (3-month course) teacher education program and simple equipment production program.

The retraining program of primary teachers will continue until all the 16,000 teachers have gone through the 3-month course. More effective evaluation is planned and also the publication of data obtained.

Reason: change in philosophy, develop new course	Adopt: 16,000 tchrs, 425,000 students, 1,830 schools	Pers: FT PT NRT	Publ: 15,000 copies reproduced commercially (\$10/10 students)
Initiator(s): F.O. Agun, G.N. Sharma, E.A. Amami, P.E. Richmond	Tchr Ed: conducts workshops; provides manuals, guides & consultants, preservice courses	Adm 10 25 Wr 10 VSch 15 3 Res TEd 50 15 Trial 200	

Descriptive References:  
Science Teacher. Feb 1974. 41(2).

**NIGERIAN NATIONAL EDUCATION  
RESEARCH COUNCIL PROJECTS**

J.M. Akintola, Director

See ICh Report(s): none

Nigeria Educational Research Council 1971-1973

P.O. Box 8058

Lagos, Nigeria

Gov:Fed

Tei: 41593

Ages: -	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	texts
Subj: biol, chem, phys, math, tech, social science	Sem	lab books
Approach: interdisciplinary, integrated, conceptual, inquiry	Disc ✓	supplementary books
Ability: all	Indep	Non-Print Materials:
Eval Meth: -	Lab	slides
Testing: term, unit	Fld ✓	films
Cont Resp: tchr guided	Dem	games
Envir: classroom, sch library, lab	Sim	models
	TV	
	A/V	

The main role of NERC is to outline objectives, develop the appropriate contents to meet the declared objectives and to guide the national institutions in drawing up the appropriate syllabuses or courses. Related to this is the improvement of curricular offerings with the important and indispensable assignment of producing teachers with the necessary competence to initiate and manage innovation. Communities are shown the need for change and are encouraged to create, staff and fund the institutions whose task it is to identify and develop proposals for implementation.

Reason: update content & methods	Adopt: -	Pers: FT PT NRT	Publ: 8,000
Initiator(s): Nigerian Educational Research Council	Tchr Ed: conducts workshops	Adm	copies repro-
		Wr	duced commer-
		VSch not	cially by
		Res answered	mimeograph
		TEd	
		Trial	

**Descriptive References:**

National Secondary Education Curriculum Workshop. Sept 1973. Nigeria Educational Research Council. Ibadan.

**PRIMARY EDUCATION PROJECT  
PRIMARY SCIENCE PROGRAMME**

B.L. Young, Director

See ICh Report(s): 8

Science Specialist  
Institute of Education  
Ammado Bello University  
Zaria, Nigeria

Tel: ZARIA 3211

1970 -

UNESCO/UNICEF

Ages: 6-12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Hansa	Lec	activity sheets
Subj: -	Sem	tchr manuals
Approach: integrated, process	Disc	tests
Ability: all	Indep	overview
Eval Meth: tchr jdgmts	Lab	Non-Print Materials: equipment
Testing: -	Fld	
Cont Resp: administratively directed	Dem ✓	
Envir: community, school grounds	Sim	
	TV	
	A/V	

The Primary Science Programme has attempted to develop process oriented materials for use in primary schools throughout the northern states of Nigeria. The first two years stress an integrated approach with the science materials dovetailed into the creative activities sessions.

The materials are based on the recommendations of the Nigerian Educational Research Council. Content is chosen on the basis of its suitability for children at given ages and cognitive levels, the extent to which the ideas lend themselves to the use of concrete materials, and the capacity of the materials to bring out scientific processes. The science programme is closely co-ordinated with a parallel mathematics project.

Feedback on the effectiveness of the trial materials was obtained by preliminary testing in a local school, and from Mobile Teacher Trainers working in the 66 official trial schools. Some attempt has been made to evaluate teacher improvement. An independent assessment of improvement in pupil performance will be conducted later.

The project is due to expand into 1000 primary classes (class 1) in September 1974 under the auspices of the UNICEF project. Some states are implementing the project at a faster rate. The materials have influenced to a considerable extent the curriculum and examinations in teacher training colleges which are increasingly training their students to handle this project.

Reason: develop new course, publication	Adopt: 100 tchrs, 4,000 students, 60 schools	Pers: FT PT NRT	Publ: 1,500
Initiator(s): P.D. Merrick, B.L. Young	Tchr Ed: -	Adm 1 Wr 3 8 VSch 2 Res 2 TEd 2 Trial 100	copies reproduced institutionally & commercially by mimeograph & offset (\$4/10 students)

**Descriptive References:**

Young, B.L. 1973. Primary Science in Africa. School Science Review. 55(190): 16-25.

**CORE COURSE INTEGRATED SCIENCE  
(CCIS)**

D.R. Hill, Director

See ICh Report(s): none

Curriculum Revision Unit (Science)  
Institute of Education  
University of Sierra Leone  
Private Mail Bag,  
Freetown Sierra Leone  
West Africa

1971-1976

Gov:National;  
IDA, ODM, CEDO,  
British Council,  
SEPA

Ages: 11-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	activity sheets
Subj: biol, chem, phys, earth-space, tech	Sem	tchr manuals
Approach: integrated, inquiry	Disc ✓ ✓	tests
Ability: all second stage entrants	Indep	objectives
Eval Meth: achievement tests, tchr jdgmts	Lab ✓	overview
Testing: unit	Fld ✓ ✓	Non-Print Materials:
Cont Resp: curriculum team directed, tchr guided	Dem ✓	models
Envir:* classroom, school grounds, community	Sim	lab equipment
	TV	
	A/V ✓	

The CCIS development program was established in response to the specific needs of junior-secondary students in Sierra Leonean schools. A preliminary study of those needs and the resources for secondary science education resulted in the formulation and adoption of key characteristics for CCIS. The project: a) is an integrated science course designed for use by all students in the first three years of second stage education, b) can be taught in an ordinary classroom and with a minimum of commercially produced apparatus and materials, c) is potentially terminal in science education while providing a sound basis for further science studies, d) offers ample support and guidance for non-specialist science teachers, and e) relates specifically to the Sierra Leonean environment, and is intended for implementation as a low-cost program.

The overall Aims for the course are supported by sets of Goals specific to each of the seventeen teaching Units. Lessons within each Unit are linked with Specific Teaching Objectives designed to assist the inexperienced teacher to select and offer a rich, wide-ranging set of learning experiences while sustaining an ordered pattern of skills development and content treatment. Throughout, emphasis is placed on student inquiry and problem solving.

The development program, staffed by three full-time workers, has involved some sixty science teacher/lecturers in the writing process, together with a wide cross-section of specialist consultants. The progress of the program has been guided and monitored by a curriculum committee which will ultimately make recommendations to Ministry of Education for the pattern of implementation and the associated teacher education activities.

Reason: change in philosophy, World Bank Ed Project	Adopt:(partial) 16 tchrs, 900 students, 14 schools	Pers: FT PT NRT	Publ: 1000 copies reproduced by mimeograph
Initiator(s): D.R. Hill, S.T.P. Bundu, A.C. O'Brien	Tchr Ed: conducts work- shops; provides manuals, guides & consultants	Adm 3 Wr 60 VSch 3 Res TEd 6 Trial 16	

No references available

SWAZILAND INTEGRATED  
SCIENCE PROJECT (SWISP)  
David Slimming, Director  
See ICh Report(s): none

Science Education Centre  
c/o William Pitcher College  
P.O. Box 87  
Manzini, Swaziland  
Tel: Manzini 2763, ext 5

1972-1976  
Gov: U.K.;  
O.D.M. & British  
Council

Ages: 11-20	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts (planned)
Subj: biol, chem, phys	Sem	activity sheets
Approach: integrated	Disc ✓ 40+	tchr manuals
Ability: all	Indep	tests
Eval Meth:* standardized & lab tests	Lab ✓ 40+	newsletters
Testing: yearly, unit	Fld ✓ 40+	
Cont Resp: project in consultation with teachers	Dem ✓ 40+	Non-Print Materials:
Envir:* lab, classroom, sch grounds	Sim	slides (planned)
	TV	filmstrips (planned)
	A/V	

The impetus for the Swaziland Integrated Science Project, SWISP, came originally from local teachers who were dissatisfied with existing curricula at Junior Secondary level (Grades 8-10). The project was to provide a broad basis for acquiring scientific facts, concepts, skills and attitudes both for pupils who would discontinue school after this level and for those going on to higher level studies. After evaluating several integrated science courses a Caribbean scheme, WISCIP, was chosen as a starting point.

The new curriculum will eventually consist of fifteen teaching units and is concyclic in approach; the major integrating themes are energy, the particulate nature of matter and life. Each unit is made up of about 20 "activities" in which the students are guided through a scheme of experimental work by the teachers, and concludes with a pupils' summary and a test. The teacher is provided with very detailed advice regarding the preparation and conduct of the activities. This is necessitated by the high proportion of unqualified science teachers in the country but no teacher is expected to follow rigidly. The pupils are provided with worksheets for many of the activities.

Each unit is developed through three stages; pre-pilot and pilot trials lead to a "final" version. The first six units were finalized and introduced into all secondary schools in January 1974. Second year units are now being tried in ten pilot schools and third year materials are at the first draft stage awaiting pre-pilot workshops. Long term plans call for continuous evaluation and revision of the materials by the local science teaching panel.

All secondary school laboratories are being brought up to the minimum standard required for implementation of the program. Each school is also supplied with about 200 books on a wide range of science topics. About 30% of these are reference books for the teacher. The rest are used by the pupils for a science reference program which is being designed to generate interest and to broaden their background knowledge.

The housing of the project on the campus of the national Teacher Training College facilitates the relating of pre-service teacher education to the new curriculum and one of the most important aspects of the project lies in the opportunities it provides for in-service teacher training.

Pre-pilot and pilot trials of each unit are preceded by courses for teachers and followed by evaluation workshops. The introduction of the final version will involve two intensive in-service courses each year over the period 1974-1976.

Reason: update method, develop new course	Adopt: 14 tchrs, 1,000 students 10 schools	Pers: FT PT NRT Adm 6 Wr 6 VSch 6 Res 6 TEd 6 Trial 14	Publ: 300 copies reproduced institutionally by mimeograph & offset (£ 30/10 stu- dents)
Initiator(s): D. Slimming	Tchr Ed: conducts work- shops provides manuals & consultants		

#### Descriptive References:

Swaziland Teacher's Journal No. 63. June 1972. Page 25. (Published by The Ministry of Education, Swaziland).  
Science Education Newsletter No. 21. April 1973. Page 35. (Published by Science Department, The British Council).

**AFRICAN PRIMARY SCIENCE  
PROGRAM (APSP)**

Ralph H. Robins,  
Robert W. Carlisle, Directors

Education Development Center  
55 Chapel Street  
Newton, Massachusetts 02160  
Tel: (617) 969-7100

1965 -  
US/AID, Ford  
Foundation

See ICh Report(s): 8,7,6,5

Ages: 5-12

Lang: Eng, Swahili

Subj: primary science

Approach: -

Ability: -

Eval Meth: -

Testing: -

Cont Resp: -

Envir: -

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc ✓

Indep ✓

Lab ✓

Fld ✓

Dem

Sim

TV

A/V

Printed Materials:

tchr guides

texts

program monographs

Non-Print Materials:

films

The objectives of the project include: 1) Developing a range of materials using local environment and covering a wide diversity of science topics; 2) Assisting with the establishment of a network of locally manned and controlled science centers where continuing development can take place; 3) Encouraging the formation of an African organization able to carry on assistance to interested countries in science education and to conduct various international activities in that area.

Reason: update content  
& method

Adopt: -

Tchr Ed: conducts work-  
shops

Pers: FT PT NKT Publ: -

Adm

Wr

VSch not

Res answered

TEd

Trial

Initiator(s):

J.R. Zacharias

**Descriptive References:**

A Report of an African Education Program. 1967. Activities for Lower Primary.  
Martin, W.T. and J.L. Aldrich. Summer-Fall 1965. The African Education Program.  
EDC Quarterly Report. 106-107.

Yoloye, E.A. 1970. The African Primary Science Program. Journal of the Science Teachers Association of Nigeria. 9(1).

A Study of Teacher Response to Training on APSP Materials. 1970. Journal of the Science Teachers Association of Nigeria. 9(1): 21-25.

Osiyale, A.O. 1971. African Primary Science Program. Journal of the Science Teachers Association of Nigeria. 9(3).

**EAST AFRICAN REGIONAL MATHEMATICS  
PROGRAM (EARMF)**

P.O. Box 30278  
Addis Ababa, Ethiopia  
East Africa

1970-1974  
Gov: Fed(USAID)

Director: none

See ICh Report(s): 8

Ages: 6-12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: math	Sem	tchr manuals
Approach: discipline centered, conceptual	Disc ✓	Non-Print Materials:
Ability: all	Indep	audiotape
Eval Meth: achievement	Lab	
Testing: exams at end of primary school	Fld	
Cont Resp: tchr directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

EARMF, financed by USAID, is a program to implement the use of modern mathematics materials developed by its predecessor program, the African Mathematics Program, (conducted by Education Development Center, Newton, Massachusetts), into the teacher training colleges of Ethiopia and Kenya.

Writing effort has consisted of a modified mathematics course based on Entebbe Mathematics for use in the training colleges. Also involved is intensive training of tutors, primary school inspectors and supervisors in the use of modern mathematics materials to enable them to run in-service courses for teachers.

The program is scheduled to terminate in December 1974, although attempts are under way to seek additional external funding.

Reason: update content & methods	Adopt: -	Pers: FT PT NRT	Publ: reproduced institutionally by offset
Initiator(s):	Tchr Ed: conducts work-shops; provides manuals & guides	Adm 3	
H.P. Bradley, W.T. Martin, A.M. Eunatu		Wr 25	
		VSch 3	
		Res	
		TEd	
		Trial 50	

No references given

**EAST AFRIGAN SECONDARY SCIENCE  
PROJECT (EASSP)**

Director: -

Chief Inspector of Schools  
Ministry of Education  
Nairobi, Kenya

1968-1973  
Ministries of  
Ed, CEDO

See ICh Report(s): 8

Ages: 15-18

Lang: Eng, Swahili

Subj: biol, chem, phys

Approach: -

Ability: -

Eval Meth: -

Testing: -

Cont Resp: -

Envir: classroom, lab

Exper: Cl 12+ 2-12 I

Lec

✓

Sem

Disc

✓

Indep

✓

Lab

✓

Fld

✓

Dem

Sim

TV

A/V

✓

Printed Materials:

tchr guides  
texts

EASSP started as a regional project for Kenya, Uganda and Tanzania with its overall project purpose to improve the teaching of biology, chemistry and physics as secondary school level. A specific objective was to construct courses which will enable pupils to enjoy and get some understanding of modern science at the school level. The courses were developed using the Nuffield O Level materials as a basis. The UNESCO Biology Project also influences the content of the Biology course. The draft materials were tried in about 120 schools and are re-written in the light of feedback from the trials. The first published project materials will be available from January 1974. The next step will be the implementation by each country of the courses. Further versions will no doubt be evolved by them in the course of the next few years.

Reason: update content  
& method

Adopt: 300 tchrs,  
30,000 students,  
150 schools

Pers: FT PT NRT

Publ: -

Adm

Wr

VSch not

Res answered

TEd

Trial

Initiator(s): Ministries  
of Education, CEDO

Tchr Ed: conducts work-  
shops; provides manuals  
& consultants

Descriptive References:

Murray, J. 1970-71. School Science Review.



**EVALUATION OF SCIENCE EDUCATION  
PROGRAMME FOR AFRICA PRIMARY  
SCIENCE MATERIALS (SEPA SCIENCE)**

E.A. Yoloye, Director

See ICh Report(s): none

International Centre for  
Educational Evaluation  
Institute of Education  
University of Ibadan  
Ibadan, Nigeria

Tel: Ibadan 62550, ext 1151

1965 -

Foundation

Ages: 6-12, tchr ed

Lang: Eng

Subj: primary science

Approach: \* inquiry, integrated

Ability: all

Eval Meth: achievement & lab tests,  
tchr jdgts, interest inventories,  
observation checklist

Testing: -

Cont Resp: \* administratively directed,  
tchr guided

Envir: \* classroom, school grounds

No narrative provided by project

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tchr manuals

tests

Reason: update method

Adopt: -

Pers: FT PT NKT Publ: -

Initiator(s):

R.H. Robins,

H.M. Dyasi

Tchr Ed: conducts work-  
shops; provides manuals  
and consultants

Adm

Wr

VSch

Res

TEd

Trin

not  
answered

**Descriptive References:**

Yoloye, E.A. 1970. The African Primary Science Programme. The Journal of The Science Teachers Association of Nigeria. 9(1).

Yoloye, E.A. 1970. A Study of Teacher Responses to Training on APSP Materials. The Journal of the Science Teachers Association of Nigeria. 9(1): 21-25.

**Research:**

Evaluation for Innovation. 1971. Report of the Evaluation of the African Primary Science Program. Newton, Mass: E.D.C.

SCIENCE EDUCATION PROGRAMME  
FOR AFRICA (SEPA)

Hubert M. Dyasi, Director

P.O. Box 9169 Airport  
Accra, Ghana  
West Africa

Tel: 75707

1970 -

Gov: African State,  
UNESCO, Carnegie  
Corp, EDC

See ICh Report(s): 8

Ages: 6-12  
Lang: Eng  
Subj: biol, chem, phys, tech  
Approach: integrated, inquiry  
Ability: all  
Eval Meth: tchr jdgmts  
Testing: unit  
Cont Resp: tchr guided  
Envir: \* school grounds, classroom,  
library, community

Exper: C1 12+ 2-12 I  
Lec ✓  
Sem  
Disc ✓  
Indep  
Lab  
Fld  
Dem  
Sim  
TV  
A/V

Printed Materials:  
tchr manuals  
tests

Non-Print Materials:  
films

The primary objective of the Science Education Programme for Africa (SEPA) is the promotion of excellence and relevance in science education in Africa. Through its activities (e.g. workshops, training programmes, conferences, and research) and through publications and films, SEPA also seeks to serve as an instrument for promoting innovative and constructive educational change. "Science" is looked upon as one medium through which all-round human development may be fostered; thus it follows that SEPA's primary concern is for the individual and the realization of his potential in all areas of development.

The educational approach advocated by SEPA (which up until now has chiefly focused on primary education) emphasizes learning through direct contact with concrete phenomena which are indigenous to the local environment. Because the SEPA approach is essentially open-ended, the teacher's role is critical in "setting the stage". Materials selected are simple and familiar, they capture the child's interest, they encourage children to do things in their own ways, and they reveal that there is not always one right answer. The teacher responds to each child's learning needs on an individual basis, and encourages social interaction among children during classroom activities.

Fundamentally, both the teacher and the child should be competent in self-evaluation. As presently planned, evaluation activity focuses on three key areas: development of appropriate evaluation instruments, program evaluation, and the evaluation of pupil achievement within the program. The evaluation of the effects of teacher training on the program's successful implementation will be especially crucial since the SEPA approach fundamentally exemplifies "a way of working with children" rather than a mechanism for imparting knowledge.

Reason: change in philosophy	Adopt: -	Pers: FT PT NKT	Publ: reproduced
Initiator(s): African States	Tchr Ed: conducts workshops; provides guides & consultants	Adm 4 Wr 8 VSch Res 1 TEd Trial	by mimeograph & offset

Descriptive References:

- Yoloye, E.A. Feb 1966. Trends in Elementary Science Curricula. West African Journal of Education. pp 18-21. Ibadan.  
Gornall, F.A. May 1970. The African Primary Science Program. Commonwealth Education Liaison Committee Newsletter. 2(9)  
Dyasi, H.M. Spring 1974. Integrated Science Education in African Primary Schools. Prospects. 4(1).

Research:

- Yoloye, E.A. 1970. A Study of Teacher Response to Training on APSP Materials. Journal of Science Teachers Association of Nigeria. 9(1): 21-25.  
Duckworth, E.R. 1971. A Comparison Study For Evaluating Primary School Science in Africa. EDC. Newton, Massachusetts.  
Balogun, T.A. 1971. Task Analysis of Some APSP Units. Mimeograph. University of Ibadan.

**WEST AFRICAN REGIONAL MATHEMATICS  
PROGRAM (WARMP)**

D.A. Brown, Director

P.O. Box 4727  
Accra, Ghana  
West Africa

1970-1975

Gov:Fed(USAID)

See ICh Report(s): 8

Ages: 6-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: math	Sem	tchr manuals
Approach: discipline-centered, conceptual	Disc ✓	Non-Print Materials:
Ability: all	Indep	audiotape
Eval Meth: achievement tests	Lab	
Testing: exams: end of primary school, A & O levels	Fld	
Cont Resp: tchr directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

WARMP, financed by USAID, is a program to implement the use of modern mathematics materials developed by its predecessor program, the African Mathematics Program (conducted by Education Development Center, Newton, Massachusetts), into the primary and secondary schools and teacher training colleges of Ghana, Liberia and Sierra Leone.

Writing effort has consisted of a modified mathematics course based on Entebbe Mathematics for use in teacher training colleges and revised versions of primary and secondary Entebbe texts for pupils and teachers. Also involved is intensive training of tutors, primary school inspectors and supervisors in the use of modern mathematics materials to enable them to run in-service courses for teachers.

The program is scheduled to terminate in March 1975, although attempts are under way to seek additional external funding.

Reason: update content & methods	Adopt: -	Pers: FT PT NRT	Publ: reproduced institutionally
Initiator(s): H.P. Bradley, W.T. Martin, D.A. Brown	Tchr Ed: conducts work- shops; provides manuals & guides	Adm 3 Wr 25 VSch 3 Res TEd Trial 50	

No references given

**BANGLADESH EDUCATIONAL  
EQUIPMENT DEVELOPMENT BUREAU**

Md. Bazlul Haque, Director

See ICh Report(s): none

Dacca Polytechnic Institute  
Building (first floor)  
Tejgaon Industrial Area  
Dacca-8, Bangladesh

Tel: 315598

1965 -

Gov of People's  
Republic of  
Bangladesh

Ages: -	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Bengali	Lec ✓	list of equipment
Subj: -	Sem ✓	Non-Print Materials:
Approach: -	Disc	lab equipment
Ability: -	Indep ✓	
Eval Meth: -	Lab ✓	
Testing: -	Fld	
Cont Resp: -	Dem	
Envir: lab	Sim	
	TV	
	A/V	

The overall project purpose is to cut down foreign exchange on imported science equipment, help manufacturing locally and improve science education in the country. Specifically to: reduce foreign exchange expenditure through design and manufacture of science equipment within the country; improve equipment to meet local conditions and current syllabi; teach maintenance and repair procedures to teachers, laboratory technicians and institutions; provide advisory service to science equipment manufacturers; and provide quality testing and price standardization services. Materials produced and activities undertaken include: list of standard equipment; syllabi comparison report; designed and developed 150 items of prototype equipment with related drawings; manufactured and distributed 97 items of equipment designed and developed by the center to equip 125 model laboratories of the country free of cost; designed 35 items of educational charts and printed 10 items of such charts for free distribution to educational institutes of the country; model laboratory classroom with quality control section for standardization of equipment; training science teachers and laboratory technicians of secondary and higher secondary levels of education on proper use, care and maintenance of science equipment; advisory service to different educational institutions in building modern laboratories in their respective institutes; and, survey on the present condition of science laboratories of different institutions of the country with market study.

Reason: to design & manufacture science equipment within the country	Adopt: 125 schools & intermediate colleges	Pers: FT PT NRT	Publ: -
	Tchr Ed: conducts seminars	Adm	
		Wr	
		VSch	not answered
		Res	
Initiator(s): -		TEd	
		Trial	

No references given

## HONG KONG BSCS ADAPTATIONS

4N Seymour Road

1969-1974

Jimmy Chan, Director

14/F

Foundation

See ICh Report(s): 7

Hong Kong

Tel: 5-441871

Ages: 14-17

Lang: Eng, Chin

Subj: biol

Approach: inquiry

Ability: all

Eval Meth: tchr jdgmts

Testing: term

Cont Resp: tchr directed

Envir: lab

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:  
textsNon-Print Materials:  
lab equipment

The importance of teaching science through inquiry has been realized all over the world. In keeping with the modern philosophy of science education, many of the new inquiry-based teaching materials have been used in Hong Kong.

In February 1971 a research council in biological education was established with the goal in mind of developing suitable biology teaching materials for use in Hong Kong and for evaluating these materials in relation to students' abilities, family backgrounds, school facilities and peer influence. The council was the result of cooperation of a group of devoted biology teachers whose common interest was to improve biology teaching and to inculcate a proper scientific attitude in their students.

The first project of the council has been the adaptation of the American BSCS Versions (mainly the Yellow Version) for use in Hong Kong secondary schools in both English and Chinese languages.

It is hoped that feedback from teachers and evaluation research data will make it possible to improve future editions of this adaptation.

Reason: change in  
philosophyAdopt:(partial)  
10 schools

Pers: FT PT NRT

Adm

Wr 11

VSch

Res

TEd

Trial

Publ: reproduced  
commercially by  
offset (\$100/10  
students)

Initiator(s): J. Chan

Tchr Ed: provides  
consultants

## Descriptive References:

Biological Sciences Curriculum Study Publications. P.O. Box 930, Boulder, Colorado 80302.

ALL INDIA SCIENCE TEACHERS  
ASSOCIATION PHYSICS STUDY  
GROUP (AISTA STUDY GROUP)

The Doon School  
Dehradun 248001  
India

1968-1973  
Gov

B.G. Pitre, Director

See ICh Report(s): 8,7

Ages: 11-13, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang:* Hindi, Marathi, Eng	Lec	lab books
Subj:* phys, biol, chem	Sem	overview
Approach:* inquiry, discovery, disci- pline-centered	Disc ✓	Non-Print Materials:
Ability:* average, average +	Indep	lab equipment
Eval Meth:* tchr jdgmts, lab & achievement tests	Lab ✓	
Testing:* unit, term	Fld ✓	
Cont Resp:* tchr guided, material directed	Dem ✓	
	Sim	
	TV	
	A/V ✓	
Envir:* lab, classroom, community		

Initiated by All India Science Teachers Association (AISTA) and financed by the National Council of Educational Research & Training (NCERT), the Project was launched in 1968 as a single subject (Physics) curriculum development project covering grades 6-8, age group 11+ to 13+.

New inputs by way of media, learning theories and pragmatic philosophies have influenced the members in initiating this project. It is an outcome of growing social forces - mass education, rising expectations, stagnation and waste - and the impact of technology, methods and techniques in communication. It is our conviction that education is a cumulative process and every child learns best from his own experiences; information and skill gained in the classroom must be integrated meaningfully with the store of knowledge gained outside the classroom. Environmental issues and local situations have to be looked upon as a framework in which to act, rather than accepted as constraints. These factors necessitate modification of the role of a teacher, of the teaching program and the educational system.

Trials in schools, equipment development, teacher preparation, translations into regional languages and inter-disciplinary approach have logically followed initial efforts. Trials were (and still are being) held in diverse conditions: in rural/urban schools, in three language media, schools with/without labs, printed material in book/loose sheet and single/double color. These have led to modifications and expansion.

Development of academic leadership in science education has been a major goal. This is the only teacher initiated, independent, continuously expanding project in operation. Since 1971, three Centers for Science Education have been established, with full-time members, which have picked up the materials. Environmental studies, preparation of teacher-educators and development of materials for higher grades are now being undertaken.

Reason: change in philosophy	Adopt: 80 tchrs, 7,000 students, 25 schools	Pers: FT PT NRT Adm 1 Wr 5 VSch Res TEd Trial	Publ: 3,000 copies repro- duced institu- tionally by offset (\$3/10 students)
Initiator(s): All India Science Teachers Assoc, A.C. Joshi, B.G. Pitre	Tchr Ed: conducts work- shops, provides consul- tants		

**Descriptive References:**

Today's Education for the Needs of Tomorrow. 1970. Available at the headquarters.  
Today's Education for the Needs of Tomorrow. 1972.

**BOMBAY SCIENCE AND MATHEMATICS  
IMPROVEMENT PROJECT**

Madhuri Shah, Director  
See ICh Report(s): none

Education Department  
Municipal Corporation of  
Greater Bombay  
Mahapalika Marg  
Bombay 400 001, India  
Tel: 266486

1971 -

National Council  
of Science Ed  
(Delhi), Munici-  
pal Corp of  
Greater Bombay

Ages: 5-12	Exper: Cl 12+ 2-12 I
Lang: Eng, Hindi, Marathi, Gujarati, Urdu	Lec
Subj: biol, chem, phys, earth-space, math	Sem
Approach: integrated, inquiry, discovery	Disc
Ability: all	Indep not
Eval Meth: achievement & oral tests,	Lab answered
tchr jdgmts	Fld
Testing: -	Dem
Cont Resp: tchr directed	Sim
Envir: school grounds & library, class-	TV
room, lab	A/V

For the last five years the Education Department of the Municipal Corporation of Greater Bombay has ventured to introduce a planned, phased program of preparing an enriched curriculum in Science and Mathematics consisting of fully illustrated Teachers' Guides, Children's workbooks and workcards, and kits of materials with enough equipment for the children "to do Science, not watch it" in the age range 5 to 11/12 years. One of the objectives is to train and acquaint the teachers with the latest methods of using the integrated Science materials produced by the project for grades I through VI. Another objective was to raise the children's and teachers' level of understanding of basic scientific and mathematical concepts and skills by stressing logical reasoning, patterns and relationships and by involving them in activities through the use of inquiry methods and process approach.

The unique characteristics of this project are: first, it is run in five languages; secondly the materials produced are constantly tried out by the trained teachers under the supervision of the writing team; and thirdly students workcards with colored illustrations are designed to suggest possible lines of investigation by attempting to ask the right question at the right time so that appropriate things are investigated.

A three-fold evaluation of the project is in progress. The teachers are asked to fill in a questionnaire at the end of every unit. Supervisors observe the teachers while the materials are being used in the classroom and fill in a questionnaire. The information about the children's work is obtained by talking to children about their interest in their work, by giving them group tests and by making certain observations about their attitude toward the new materials. The results of the evaluation show that both teachers and children find the new material more enjoyable, more meaningful and derive greater benefit in terms of attitudes toward teaching and learning.

The task for the immediate future is the proper supervision, evaluation and revision of grades V, VI and VII materials and production of new materials for grades VIII, IX and X by the project team which consists of 25 members.

Reason: -	Adopt: 1400 tchrs,	Pers: FT PT NRT	Publ: 10,000
Initiator(s): M.R. Shah,	1,150,000 students,	Adm 2 1	copies repro-
R. Roche, C. Wallace,	270 schools	Wr 6	duced institu-
J.H. Brookes, H.I. Daftari,	Tchr Ed: conducts work-	VSch 14	tionally by
A.N. Gadgil	schop; provides manuals	Res	mimeograph &
		TEd 16	offset
		Trial	

**Descriptive References:**

Science Education Newsletter, Number 21. April 1973. Issued by Science Department, The British Council, 27 Chancery Lane, London WC2A 1PJ.

Bombay Science Education Newsletter, Number 11. Sept 1972. Issued by Bombay Association for Science Education, British High Commission, British Council Division, French Bank Bldg, Homji Street, Bombay 400 001.



**CREATIVE PHYSICS TEACHING  
PROJECT AT THE UNIVERSITY  
LEVEL (CPTP)**

Rais Ahmed, Director  
Contact: A.V. Jafri  
See ICh Report(s): none

Department of Physics  
Aligarh Muslim University  
Aligarh (India)

Tel: 1358

1971 -

National Council  
for Science Ed.,  
Univ. Grants  
Commission

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	tests, lab books,
Subj: phys	Sem	tests, newsletters,
Approach: inquiry	Disc ✓	charts
Ability: average +	Indep ✓	Non-Print Materials:
Eval Meth:* creativity tests, student	Lab ✓	audiotape
questionnaire, achievement & lab tests	Fld	models
Testing:* unit, term	Dem ✓	lab equipment
Cont Resp: student directed	Sim	
Envir:* resource center, classroom, lab	TV	
	A/V ✓	

The project's aim to develop a new method of teaching which would optimize the creative potential of B.Sc.(Hons.) Physics students. Relevant materials are also to be produced for the purpose.

The teaching-learning system is focused on the learner who is provided a free atmosphere and necessary facilities to work on his own. He is encouraged to be curious, to ask questions, to explore and to experiment. The role of the teacher is that of a helpful fellow-explorer and not that of an all-knowing guide. Lectures have been substantially cut down and students are exposed to a variety of experiences. Directed reading and open-ended experiments are valuable components of their learning experiences.

It is our conviction that the conventional system of physics teaching is unimaginative and uninspiring. There is too much stress on content and the student tends to get a lopsided view of physics and of the scientific method. This project attempts to involve the student in the learning and to promote qualities like imagination, curiosity and open-mindedness.

The student response has been very good. Teachers, too, have liked teaching and learning. The project has been widely reported at seminars and conferences and very well received. A comprehensive evaluation is currently being made.

Efforts will be made to extend the project both horizontally and vertically and to set up a Centre for Creative Education in Science.

Reason: change in philosophy	Adopt: 10 tchrs, 30 students, 1 school	Pers: FT PT NRT	Publ: 50 copies
Initiator(s): R. Ahmed, A.V. Jafri, D.S. Parmar, A. Ali	Tchr Ed: provides consultants	Adm 1 1	reproduced institutionally by mimeograph
		Wr 4	
		VSch	
		Res 1	
		TEd	
		Trial 1 9	

**Descriptive References:**

Ahmed, R., and A.V. Jafri. Aug 1972. An Experiment in Creative Teaching. Creativity Newsletter. 1(2): 31-37.



**EXPERIMENTAL PROJECT ON THE TEACHING  
OF SCIENCE & MATHEMATICS AT THE  
MIDDLE SCHOOL STAGE (SEP)**

A.N. Bose, Director

Department of Education for  
Science and Mathematics, NCERT  
Sri Aurobindo Marg,  
New Delhi - 110016

\*Gov, UNESCO

See ICh Report(s): 8,7,6,5

Ages: 11-13, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Hindi, 11 regional languages	Lec ✓	texts
Subj: biol, chem, phys	Sem	tchr manuals
Approach: discipline-centered, inquiry	Disc	tests
Ability: all	Indep	
Eval Meth: achievement & oral tests	Lab	Non-Print Materials:
Testing: term	Fld ✓	slides
Cont Resp: administratively directed	Dem ✓	films
Envir: community, classroom, sch library	Sim	lab equipment
	TV	
	A/V	

Until the early 1960's, science was being taught at the middle school stage in Indian schools in the form of General Science. This, however, did not prove successful for a number of reasons. The achievement at the end of secondary school in Science and Mathematics remained rather low as compared to other developed countries. In 1963, UNESCO Planning Mission visited India and they suggested that the disciplinary approach to teaching of Science may be adopted at the middle school stage. Therefore, a Project was initiated with the assistance of UNESCO for remedying the defects in science teaching in Indian schools and with the purpose of achieving higher standards of Science and Mathematics instruction at the secondary school stage. This purpose was further reinforced in the report of the Education Commission, popularly known as Kothari Commission.

Under this Project a compulsory integrated course of Science for the primary stage and a course of science and mathematics for all at the middle stage of school education on a discipline basis has been developed. This is a package program consisting of new syllabi, text materials, Teachers' Guides and laboratory equipment in the shape of demonstration kits.

The materials so produced were tried out in Delhi's middle schools/middle departments of Higher Secondary Schools for a period of three years and then the materials were revised and adopted in all 500 Delhi schools. The package program developed under this Project is being utilized at all levels of school education on a national level through the UNICEF-aided Project for the Improvement of Science Teaching. A further revision of these materials is progressing at the Department of Education in Science and Mathematics on the basis of the feedback received from the States.

Reason: -	Adopt: 1,001,000 tchrs,	Pers: FT PT NRT	Publ: reproduced
	50,000 schools	Adm 1	institutionally
Initiator(s): M.C. Pant		Wr 20	
	Tchr Ed: -	VSch ✓	
		Res ✓	
		TEd ✓	
		Trial	

No references given

**HIGH SCHOOL MATHEMATICS**

K.B. Shah, Director

See ICh Report(s): 8

Vikram A. Sarabhai Community  
Science Centre  
Gujarat University Campus  
Navrangpura, Ahmedabad 380009  
Gujarat State, India  
Tel: 42334

1969-1973

Private  
(VASCSC)

Ages: 13-16	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Gujarati	Lec ✓	texts
Subj: math	Sem	supplementary books
Approach: discipline-centered	Disc ✓ / ✓ /	tchr manuals
Ability: all	Indep	
Eval Meth: achievement tests	Lab	
Testing: term, weekly	Fld	
Cont Resp: administratively directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

The objectives of this High School Mathematics Project are: 1) to introduce the set-theoretical approach to mathematics in the teaching of Algebra and Geometry at the high school level; 2) to unify and integrate different branches of mathematics with the help of set language and the axiomatic approach to the number system; 3) to remould the existing structure in order to elaborate and generalize the basic concepts of mathematics and thereby attempt to correct a great many misconceptions and to present the subject matter in a logical manner; and 4) to switch over efficiently from the so-called classical mathematics to the New Mathematics.

Reason: update content & methods, change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: conducts work- shops; provides manuals & guides	Adm 2 10	institutionally
		Wr 2 10	& commercially
		VSch 2 10	by mimeograph &
		Res 2 10	offset
Initiator(s): K.B. Shah, M.D. Suthar, P.C. Vaidya, A.M. Vaidya		TEd 3	
		Trial 100	

No references given

**INTEGRATED SCIENCE**

C.J. Sanchorawala, Director

See ICh Report(s): 8

Vikram A. Sarabhai Community  
Science Centre  
Navrangpura, Ahmedabad 380009  
Gujarat State, India

Tel: 42334

1972-1975

Private  
(VASCSC)

Ages: 13-15	Exper: C1 12+ 2-12 I
Lang: Eng, Gujarati	Lec     ✓   ✓
Subj: biol, chem, phys, earth-space	Sem
Approach: integrated, inquiry	Disc    ✓   ✓   ✓
Ability: all	Indep
Eval Meth: achievement & lab tests,	Lab       ✓
tchr jdgmts, student questionnaire	Fld
Testing: term	Dem     ✓   ✓
Cont Resp: administration & tchr directed	Sim
Envir: lab	TV
	A/V

Most of the compulsory courses in general science divide the subject matter into physics, chemistry, biology, astronomy, earth science, space science etc. The boundaries between the subjects are artificially drawn. Integration is the primary fact of nature and all the subjects make up science as a body of knowledge.

The faculty of the Centre made a feasibility study and undertook this project with the following objectives: 1) students should play an active role in learning process; 2) students should get opportunity to develop ability to think independently; 3) students should be able to use and classify information; 4) students should know some facts and concepts concerning environment; 5) students should develop an adequate scientific vocabulary; 6) students should be able to comprehend some scientific concepts and use them in new situations; 7) students should develop ability to communicate effectively; 8) students should learn to think and act creatively; 9) students should develop awareness of the contribution of science to the economic and social life of the community; 10) students should learn to use scientific method in problem-solving.

Reason: change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced institutionally by mimeograph
	Tchr Ed: -	Adm       4	
		Wr        4	
		VSch	
		Res       4	
		TEd	
		Trial	

No references given

Initiator(s): K.B. Shah,  
C.J. Sanchorawala, L.  
L.S. Prahlada Rao, M. Sen

**NATIONAL SCIENCE TALENT SEARCH  
SCHEME**

Rais Ahmed, Director

See ICh Report(s): 5

National Council of Educational  
Research and Training  
Sri Aurobindo Marg  
New Delhi - 16, India

Tel: 79546

1963-

Gov

Ages: 16	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, all regional languages	Lec ✓	tests
Subj: biol, chem, phys, math	Sem	research reports
Approach * discipline-centered	Disc	
interdisciplinary	Indep ✓	
Ability: avg+	Lab ✓	
Eval Meth: aptitude tests	Fld	
Testing: yearly	Dem	
Cont Resp: tchr directed	Sim	
Envir: * sch library, lab	TV	
	A/V	

This national scheme was started as a pilot project in the territory of Delhi in 1963 with the chief objective of locating and nurturing scientific talent at the end of the higher secondary stage or equivalent stage. The idea was to prepare a team of scientists for India, by India and in India.

Each year from 1964 a maximum of 350 scholars have been selected to receive the award of scholarship and other academic facilities. The main criteria used in the selection are: an objective Science Aptitude Test; an essay on a scientific topic; a report on an original scientific project; and an interview.

The follow-up studies have indicated that the scholars selected under this plan have done well in their higher studies at various centers of advanced learning in India and abroad.

Reason: * change in the philosophy, develop new course, produce future scientists	Adopt: -	Pers: FT PT NRT	Publ: repro-duced insti-tutionally
	Tchr Ed: no special preparation needed	Adm 14	
		Wr 2	
		VSch	
		Res 2	
		TEd	
		Trial	

**Descriptive References:**

International Newsletter. Nov 1966-April 1972. E.T.S., Princeton, U.S.A.

National Science Talent Search Research Annual Reports, 7 Volumes. 1963-1968 and 1969-1971 (under print).

Rajasthan Journal of Education. Ajmer, India.

**PHYSICS RESOURCE MATERIAL FOR  
SECONDARY SCHOOL TEACHERS (PRM)**

V. Rajamadhav Rao, Director

See ICh Report(s): none

Department of Science  
Regional College of Education  
Mysore 570 006  
India  
Tel: 21+11

1970-1976

\*USAID, India,  
Government

Ages: tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec ✓	tchr manuals
Subj: physics	Sem	tests
Approach:* conceptual, inquiry, discovery, process, discipline centered	Disc ✓	objectives
Ability: all	Indep	overview
Eval Meth:* achievement & oral tests, tchr jdgmts	Lab ✓	Non-Print Materials:
Testing:* unit, term	Fld	lab equipment
Cont Resp:* administratively & tchr directed	Dem ✓	models
Envir:* classroom, lab	Sim	
	TV	
	A/V	

The objective of the project is to prepare a comprehensive handbook (in 3 volumes) of Resource Material in Physics for secondary school teachers in India, incorporating new approaches and improved methods of teaching. Volume I (Mechanics) in 16 Chapters and 12 Appendices has already been published in preliminary edition. Volume II (Heat; Optics & Waves) in 16 Chapters and 5 Appendices is due for publication in July 1974. Volume III (Electricity, Atomic & Modern Physics) is in the planning stage.

Each chapter of the PRM contains, in sequence: 1) a brief introduction, 2) a list of instructional objectives stated in behavioral terms, 3) a list of concepts to be developed, 4) comprehensive development of the subject content, in terms of the objectives, through student-learning activities, teacher demonstrations and classroom discussions, 5) a descriptive list of suggested additional/alternate activities with an emphasis on improvisation and 6) a set of questions and exercises for student-evaluation. Achievement tests are supplied separately.

The effectiveness of some selected units of the PRM (Vol I) is being evaluated under a research study involving the staff of the Physics and Education faculties of the college, 98 teachers from 49 schools and over 2600 students in both experimental and control groups from the southern region. Similar studies are envisaged for volumes II and III.

Reason:* update content & method, develop new course	Adopt:(partial) 49 tchrs, 2600 students, 49 schools	Pers: FT PT NET	Publ: 3000
	Tchr Ed:* no special preparation required, conducts workshops, provides consultants	Adm	1
		Wr	1 3
Initiator(s): S.N. Prasad, F.N. Dave, P.R. Rao, N.N. Swamy, P.R. Lalitha, L.K. Branson		VSch	4
		Res	1
		TEd	4
		Trial	49

**Research:**

Research Programme for Evaluating the Effectiveness of the Physics Resource Material (PRM) for Secondary Schools. March 1973. Research Reports in Education. Vol. 4. Mysore, India.

SCIENCE LEARNING THROUGH  
INQUIRY

L.S. Prahlada Rao, Director

See ICh Report(s): none

Vikram A. Sarabhai Community  
Science Center  
Navrangpura, Ahmedabad 380009  
Gujarat State, India  
Tel: 42334

1970 -  
VASCSC

Ages: 10-13	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Gujarati	Lec ✓ ✓	tchr manuals
Subj: biol, chem, phys	Sem	
Approach: * discipline centered, inte-	Disc ✓ ✓	
grated, inquiry, discovery	Indep ✓ ✓	
Ability: all	Lab ✓	
Eval Meth: lab tests, tchr jdgmts, student	Fld	
questionnaire	Dem ✓ ✓	
Testing: -	Sim	
Cont Resp: admin & tchr directed	TV	
Envir: classroom, lab	A/V	

This program places emphasis on the student as the focal point of the learning situation. The method of teaching science through the inquiry method emphasizes the principles and processes of science.

The program is designed to take advantage of the natural curiosity of the students and to encourage them to use their own skills in learning about science. Such an approach should help students not only in grasping the essentials of science but also in developing self-confidence, reasoning power and skill in handling laboratory equipment.

Reason: change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: conducts work-shops, provides guides	Adm 5	institutionally
		Wr 5	by mimeograph &
Initiator(s): A. Horn,		V3ch 5	offset
K.B. Shah, C.J. Sanchorawala,		Res 5	
L.S. Prahlada Rao, M. Sen,		TEd 5	
R. Kothari		Trial 16	

Descriptive References:

New Trends in Integrated Science Teaching. 1969-1970. UNESCO. 1: 207.

**UNICEF-ASSISTED PROJECT FOR THE  
IMPROVEMENT OF SCIENCE TEACHING AT  
ALL LEVELS OF SCHOOL EDUCATION  
(UNICEF PROJECT)**

A.N. Bose, Director

Department of Education for Science 1968-1976  
and Mathematics  
NCERT, Sri Aurobindo Marg,  
New Delhi - 110016 India

Gov, UNICEF

Tel: 78498

See ICh Report(s): 8

Ages: 6-11	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Hindi, 11 regional languages	Lec ✓	texts
Subj: biol, chem, phys, general science	Sem	tchr manuals
Approach: discipline-centered, integrated	Disc	tests
Ability: all	Indep	Non-Print Materials:
Eval Meth: achievement & oral tests	Lab	models
Testing: term	Fld	lab equipment
Cont Resp: administratively directed	Dem ✓	
Envir:* classroom, community	Sim	
	TV	
	A/V	

The Department of Education in Science and Mathematics has been engaged in developing improved curriculum materials for use at the middle school stage since 1963 with the assistance of UNESCO. Subsequently, the program was extended to cover the elementary school stage, also with the assistance of UNICEF, and was intended to reorganize and expand science teaching throughout the school stage in all the States of the country. The main goals of the Project are: 1) Development of a new syllabi for science courses for the entire school stage and for teacher training programs; 2) Development of instructional materials: text-books, laboratory manuals, Teachers' Guides and pre-service training material; 3) Training of Science Educators and Science teachers through short-term orientation-cum-refresher courses; 4) Equipping key institutions and selected schools with necessary science and workshop equipment; 5) Introducing revised syllabi and instructional materials in a phased manner in the schools.

The materials developed in the NCERT have been adopted or adapted and translated in almost all the major regional languages in India. These materials have been tried out in the pilot phase of the Project in about 50 primary and 30 selected middle schools of each State undertaking the Project. The Pilot Phase of the Project has covered practically all the States of India. Most of the States after completing the Pilot Project have now entered the phase of wider introduction of the new materials in their schools in a phased manner. The UNICEF aid is for the supply of kits to selected schools and partial assistance for the training of teachers and key personnel.

The wider introduction phase has already covered over 10,000 primary schools and 13,000 middle schools with UNICEF assistance. It is being expanded further through the resources of the States to 1,85,400 primary and 37,000 middle schools.

The Project is now being evaluated in all its aspects, academic and administrative.

Reason: -	Adopt: 2,95,000 tchrs,	Per: FT PT NRT	Publ: repro-
	2,45,000 schools	Adm 1	duced insti-
Initiator(s): M.C. Pant		Wr 20	tutionally by
	Tchr Ed:* provides guides,	VSch ✓	linotype &
	conducts workshops,	Res ✓	offset
	provides manuals	TEd ✓	
		Trial	

No references given

VIKRAM A. SARABHAI COMMUNITY  
SCIENCE CENTRE (VASCSC)

K.B. Shah, Director

See ICh Report(s): 8

Gujarat University Campus  
Navrangpura  
Ahmedabad 380009  
India

Tel: 42334

1966 -  
Gov: Fed, State,  
Local, Nehru &  
Asia Foundations

Ages: 9-20, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Gujarati	Lec ✓ ✓	texts
Subj: biol, chem, phys, earth-space, math, technology	Sem ✓ ✓	supplementary books
Approach: discipline centered, inter- disciplinary, integrated, inquiry, discovery	Disc ✓ ✓	tchr manuals
Ability: all	Indep	newsletters
Eval Meth: tchr jdgmts, student q're	Lab ✓ ✓	Non-Print Materials:
Testing: -	Fld	slides
Cont Resp: administratively & tchr directed	Dem ✓ ✓ ✓	overhead transpar- encies
	Sim	models
	TV	lab equipment
	A/V ✓ ✓ ✓	
Envir: classroom, lab		

The Centre is a non-profit, non-government institution set up as a local resource to integrate the efforts of motivated individuals and institutions in the improvement of science education. It is a forum for free exchange of ideas and experiences in education. The Centre emphasizes and provides adequate facilities for the participants to prepare and produce audio-visual content material. It has paved new paths for changing the State written syllabi. Initiating them as small projects, the Centre prepares new syllabi based on active thinking of practicing teachers, tries them out in a number of institutions and eventually submits final proposals to the State Government. The introduction of the new syllabi is then followed by refresher courses for teachers, production of subsidiary reading materials, teaching aids, etc. The Centre provides an example of how local enthusiasm can be channeled into independently producing something concrete and usable. It also provides a good model for disseminating new ideas and approaches in learning and teaching developed by national and international organizations.

Reason: update content & methods, change in philosophy, develop new courses	Adopt: - Tchr Ed: conducts work- shops; provides manuals, guides & consultants	Pers: FT PT NRT Adm 5 1 Wr 6 1 VSch 6 1 Res 6 1 TEd 6 1 Trial 100	Publ: reproduced institutionally by mimeograph & offset
Initiator(s): V.A. Sarabhai, K.B. Shah, C.J. Sanchorawala, L.S. Prahlada Rao, M. Sen, M.D. Suthar, R. Kothari			

#### Descriptive References:

International Newsletter. July 1970.

#### Research:

Raval, C.S. March 1971. Evaluation of the Outcomes of the Special Science Teaching Programmes Conducted By Community Science Centre. Submitted for M.Ed, Gujarat University.



**AGRICULTURE AS ENVIRONMENTAL  
SCIENCE PROJECT (AESP)**

Abraham Blum, Director  
See ICh Report(s): 8,7

Curriculum Center  
Ministry of Education & Culture  
4 Mamilla Road  
Jerusalem, Israel  
Tel: 02-226391

1966 -  
Gov: National

Ages: 11-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang:* Hebrew, Arabic, Eng	Lec ✓	texts, lab books,
Subj:* agriculture, environmental issues,	Sem	supplementary books,
biology, social sciences, tech	Disc ✓	activity sheets,
Approach: integrated, inquiry, discovery,	Indep	tchr manuals, tests,
applied	Lab	field guides, charts,
Ability: all	Fld ✓ ✓ ✓	objectives, overview,
Eval Meth: achievement, tchr jdgmts,	Dem ✓	catalogue of
student questionnaire, reports	Sim	materials
Testing: -	TV	Non-Print Materials:
Cont Resp: administratively & tchr	A/V ✓	slides, audiotape,
directed		games, lab equip-
Envir: school grounds, classroom, lab		ment

Agriculture is seen as applied biology and as the endeavor of Man to manipulate his environment to suit his needs. Theory, field experiments and laboratory investigations are interwoven. Relevant agricultural and environmental issues are used to let students discover how to analyze problems and how to come to a decision about them. The biological aspects are stressed, but agrotechnical, cultural, economic and other social science elements are introduced, where needed. The tendency is toward integration of these elements,

Science is conceived as one of Man's intellectual activities and as a part of a wider, cultural complex. Therefore items on cultural and social issues are included in the basic materials. Special additions were developed for Arabic and Jewish religious schools.

The materials were prepared for heterogeneous classes of medium level and include suggestions for more advanced students. Special programs of more prevocational character were developed for early school leavers. Other chapters are intended for use in agricultural and rural schools. Their approach is agrobiological and not vocational. Since most students live in towns, flowers and pot plants, which can be grown at home, were preferred in "Let's Grow Plants". For the same reason consumer problems like pesticide residue and biological control are raised in "Let's Protect Plants".

Reason: change in philosophy, develop new course	Adopt: 200 tchrs, 15,000 students, 200 schools	Pers: FT PT NRT	Publ: reproduced commercially by offset
Initiator(s): Ministry of Ed & Culture, A. Blum	Tchr Ed: conducts workshops, provides manuals, guides & consultants	Adm 2 Wr 8 VSch 4 2 Res 7 TEd 4 Trial 50	

**Descriptive References:**

Blum, A. 1971. Let's Grow Plants (Agriculture as Environmental Science). Israel Ministry of Education and Culture: Jerusalem.  
Agriculture as Environmental Science. 1973. New Trends in Integrated Science Teaching. Vol. II, pp. 203-211.

**Research:**

Blum, A. 1972. Students' Attitudes Toward a School Subject as Affected by Curriculum Reform. Proc. 4th Biennial Conf. Asian Assoc. for Biological Educ.: Jerusalem. Reported in Hebrew.

CHAPTERS IN BIOLOGY AND  
AGRICULTURE

A. Polyakov, Director

Chanan Lev Matzuvah  
Western Galilee  
Israel

1970-1977

University,  
Ministry of  
Education

See ICh Report(s): 8

Ages: 14-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Hebrew	Lec ✓	texts
Subj: biol	Sem	lab books
Approach: discipline-centered, inquiry	Disc	tchr manuals
Ability: avg	Indep	tests
Eval Meth: standardized tests & tchr jdgmts	Lab ✓	
Testing: unit	Fld ✓	
Cont Resp: tchr directed	Dem	
Envir: community, classroom, sch library,	Sim	
lab, outdoors	TV	
	A/V	

Since the introduction of a specially adapted Hebrew version of the B.S.C.S. (yellow version) most teachers concerned with the teaching of agriculture in Agricultural Schools and rural settlement schools expressed dissatisfaction regarding both the curricula for Biology and Agriculture. It was suggested to try and write a text for Biology studies for students living in agricultural surroundings.

The overall project purpose is to teach Biology in an agricultural context, stressing the aspect of Agriculture as "applied quantitative Biology". Specific objectives include teaching basic concepts of Biology in relation to basic concepts of Agriculture and making pupils familiar with the investigative and quantitative approaches regarding both subjects.

The target population is boys and girls, in Agricultural secondary schools and in rural settlement (kibbutz) schools. Most classes are, to a large extent, non-selective. The socio-economic background is very different in both types of schools. The former includes a high percentage of children of new immigrants to Israel from various cultural and intellectual backgrounds, many of them from under-developed countries in Asia and Africa. Kibbutz children come from an entirely different socio-economic and intellectual background, most of their parents either being born in Israel or immigrants from Western Europe.

Reason: update methods, develop new course	Adopt: 15 tchrs, 360 students, 11 schools	Pers: FT PT NRT	Publ: 1000
Initiator(s): Israel Science Teaching Center	Tchr Ed: conducts work- shops; provides manuals & consultants	Adm Wr ✓ VSch ✓ Res TEd ✓ Trial ✓	copies repro- duced by linotype

No references given

## CHEMISTRY IN MODERN SOCIETY

Shimshon Novick, Director

See ICh Report(s): 8

Israel Science Teaching Centre

Hebrew University

Jerusalem, Israel

Tel: 533523

1971-1974

Israel Science  
Teaching Centre

Ages: 14-16	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Hebrew	Lec	text & lab books
Subj: chem	Sem	programmed units
Approach: inquiry	Disc ✓	tchr manuals
Ability: average	Indep	tests
Eval Meth: achievement tests, tchr	Lab ✓	objectives
jdgmts, student q're	Fld	verview
Testing: term	Dem ✓	newsletters
Cont Resp: tchr & material directed	Sim	
Envir: community, classroom, sch	TV	
library, lab	A/V	

This course is in the form of a text containing chemistry subject matter, laboratory activities, demonstrations, and guidelines for discussion. Its major focus is on carbon compound chemistry as it relates to extant societal issues and to the students' immediate environment. Within this context, selected theoretical concepts are simply developed using a laboratory-oriented approach. The conceptual development of the text is based on the premise that students have attained an elementary grasp of the atomic model of matter as presented in a newly developed Israeli physics-chemistry course in the junior high school.

The text, Chemistry in Modern Society, consists of ten chapters. After an introduction to a societal issue related to carbon compound chemistry, the mole concept and chemical equation are treated in a context related to the problems of energy resources and air pollution. An introduction to bonds as related to carbon compound leads into units on petroleum and petrochemicals and oxygen-containing carbon compounds. Students then investigate the behavior of acidic and basic solutions. Following an elementary treatment of covalent bonding, the proton transfer theory is used to explain acid-base reactions. The text concludes with chapters on soaps and detergents and selected aromatic compounds and their social significance.

Reason: change in philosophy, develop new course	Adopt: 10 tchrs, 800 students, 7 sch	Pers: FT PT NRT	Publ: 5,000
Initiator(s): -	Tchr Ed: conducts workshops; provides consultants, no special preparation required	Adm 2	copies reproduced institutionally by offset
		Wr 3	
		VSch 2	
		Res 2	
		TEd 2	
		Trial 10	

## Descriptive References:

Novick, S. and F.X. Sutman. 1973. A Socially Oriented Approach Through Carbon Compound Chemistry. The Science Teacher. 40(2): 50-52.

**EXPERIMENTAL CHEMISTRY PROGRAMME  
FOR SECONDARY SCHOOL (REHOVOT  
CHEMISTRY GROUP) (ECPSS)**

David Samuel, Director

Department of Science Teaching  
Weizmann Institute of Science  
Rehovot, Israel

Tel: (03) 951-721, ext 778

1966-1978

Gov, UNESCO,  
Weizmann Institute

See ICh Report(s): 8,7,6,5

Ages: 13, 15-17, tchr ed

Lang: Hebrew

Subj: chem

Approach: discipline-centered, conceptual,  
inquiry, discovery

Ability: avg, avg+

Eval Meth: achievement, lab & standardized  
tests, student questionnaire

Testing: unit

Cont Resp: administratively directed,  
tchr guided

Envir: classroom, lab

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

texts

lab books

supplementary books

\*chr manuals

tests

objectives

newsletters

Non-Print Materials:

filmloops

overhead transpar-

encies, models

lab equipment

The project, which was initiated to introduce modern curricula and teaching methods into Israeli high schools, emphasizes the science-oriented streams in urban, rural and Kibbutz schools. Work is also being done on the teaching of chemistry to non-scientists in these schools and also in trade and technical schools.

Reason: update content  
& methods; change in  
philosophy; develop  
new course

Adopt: 30 tchrs,  
1,000 students  
15 schools

Tchr Ed: conducts work-  
shops; provides guides  
& consultants

Pers: FT PT NRT

Adm

Wr 2 5

VSch 2

Res 1

T&D 4

Trial 30

Publ: 15,000

copies repro-  
duced institu-  
tionally &  
commercially by  
offsec

No references given

**EXPERIMENTAL PHYSICS PROGRAMME  
FOR SECONDARY SCHOOLS (Rehovot  
Physics Group)**

Department of Science Teaching  
Weizman Institute of Science  
Rehovot, Israel

1963 -  
Gov, University

Haim Harari, Director

Tel: 03-951741

See ICh Report(s): 8,6

Ages: 15-18, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Hebrew	lec 36	texts
Subj: phys	Sem	lab books
Approach: discipline centered, inquiry, discovery	Disc	tchr manuals
Ability: * average +, average	Indep	tests
Eval Meth: achievement & lab tests, tchr jdgmts	Lab 28	periodical for physics teachers
Testing: matriculation exam	Fld	Non-Print Materials: lab equipment
Cont Resp: administratively & tchr directed	Dem	
	Sim	
	TV	
Envir: classroom, lab	A/V	

The "Rehovot Physics Group" was established in 1963 by the late Prof. A. de Shalit. Its chief objective was the development of new curricula for the Israeli High Schools, in line with current ideas prevailing in the U.S. and England about physics teaching. This meant the development of a student-centered program, in which students are required to work in the laboratory themselves, test hypotheses, and eventually "discover" the laws of physics. Naturally all this is done under the guidance of a teacher.

The objectives of this project are: 1) the development of a curriculum and of materials which will enhance the interest in, and the enthusiasm for chemistry in high school students; 2) the fostering of a creative atmosphere among high school chemistry teachers through the use of new teaching methods and materials; 3) revision of the curriculum so that it reflects the real interests and activities of research and applied chemists today; and 4) the de-emphasis of learning by rote and re-emphasis of student participation and open-minded scientific inquiry. This curriculum emphasizes the basic principles and concepts of chemistry and at the same time demonstrates the application of chemical sciences to everyday problems. Following a two year core course, various optional topics are being developed for the third and final year of high school, including environmental chemistry, the chemistry of macromolecules, the chemistry of transition elements and industrial chemistry. It is estimated that currently between 50 and 60% of the high school population studying chemistry is now using the original materials produced by the project or adaptations thereof. It is planned to complete the development, trials and revision of the materials by 1977.

The group hopes to expand its activities in the future, and to tackle the problem of slow learners and development of special materials suitable for students from underprivileged families. We also hope to develop films, film-loops and other audio-visual aids to help teachers working according to our programs.

Reason: update methods, develop new course	Adopt: 50 tchrs, 5,000 teachers, 25 schools	Pers: FT PT NRT	Publ: -
Initiator(s): A. de Shalit	Tchr Ed: conducts work- shops; provides manuals, guides, consultants	Adm 1 Wr 1 4 VSch 3 Res TEd 3 Trial	

Geller, Z. 1974. The Rehovot Programme - A Temporary Summary. Methods VII: Physics.  
School of Education, Tel Aviv University.

HEBREW UNIVERSITY PROJECT FOR  
SECONDARY SCHOOL MATHEMATICS

A.S. Amitsur, Director

Israel Science Teaching Centre  
Hebrew University  
Jerusalem, Israel

1968-

Gov: Ministry of  
Ed; University

See ICh Report(s): none

Ages: 15-18

Lang: Hebrew

Subj: math

Approach: discipline-centered

Ability: all

Eval Meth:\* tchr jdgmts, achievement tests

Testing: unit

Cont Resp: administratively directed

Envir: classroom

Exper: Cl 12+ 2-12 I

Lec ✓

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

texts

tchr manuals

The major underlying principles covered in this course include: proofs in high school algebra; teaching of worded problems in several separated steps; graphic solution where applicable; algorithmic solution; construction of mathematical models for real situations; the limitations of a model; the general idea of a function; reading of graphs; approximations of real numbers; the idea of a functional equation for logarithmic and exponential functions; exercises for all levels of mathematical ability, including hard problems for gifted students/classes; differential Calculus by linear approximations; the integral as linear functional; and abolition of Analytic Geometry as an independent subject.

Reason: update content &  
methods, develop new  
course

Adopt: 100 tchrs,  
6,000 students  
41 schools

Pers: FT PT NRT Publ: -

Adm 1

Wr 2 6

VSch 1 2

TEd

Trial

Initiator(s): A.S.  
Amitsur

Tchr Ed: -

No references given

ISRAEL BSCS ADAPTATION  
PROJECT (IBAP)

P. Tamir, Director

Israel Science Teaching Centre  
The Hebrew University  
Jerusalem, Israel

Tel: 02-533523

1964 -

Gov, UNESCO

See ICh Report(s): 8,7,6,5

Ages: 13-18, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Hebrew	Lec	texts
Subj: biol	Sem	lab books
Approach: discipline-centered, conceptual, inquiry	Disc ✓	supplementary books
Ability: average, average +	Indep	tchr manuals
Eval Meth: achievement, lab, oral & standardized tests, tchr jdgmts, student questionnaire	Lab ✓	tests
Testing: unit, matriculation exams	Fld ✓	newsletters
Cont Resp: administratively & tchr directed	Dem	Non-Print Materials:
Envir: classroom, lab	Sim	filmloops
	TV ✓	overhead trans-
	A/V	parencies

The project objectives have been to: 1) adapt, develop and implement inquiry oriented curriculum in biology based on laboratory and field investigations; 2) de-emphasize the learning of specific facts in favor of principles and skills; 3) develop new materials (texts, films, etc...) specially adapted to the local, cultural and social needs of Israel; 4) use educational technology and a multi-media approach to foster flexible and more individualized learning experiences; 5) educate teachers in light of the object stated above by pre-service and in-service training as well as by designing special teachers guides; 6) provide supplies and materials as required by the new curriculum; and 7) evaluate antecedents, transactions and achievements.

This is a laboratory centered, inquiry oriented curriculum which attempts to integrate practical experiences with discussions, analysis of research papers and individual projects. The goal is to provide the students with diversity of materials and options to meet their individual needs.

From its initiation, the IBAP has incorporated a comprehensive program of follow-up and evaluation. This consists of direct observations of supervisors, feedback from teachers, students and administrators and a variety of tests. New types of tests, such as special open-ended laboratory practical and inquiry oriented paper and pencil tests have been a significant original contribution of the project.

70% of all high school students in Israel use the IBAP materials. Most high school teachers have participated in teacher institutes and receive the Teacher Biology Bulletin. In most schools there has been a significant improvement in facilities and equipment. Biology has risen from a low prestige school subject to a highly respected one.

Reason: update content & method, change in philosophy	Adopt: 500 tchrs, 30,000 students, 250 schools	Pers: FT PT NRT	Publ: 50,000
		Adm 2 3	copies repro-
		Wr 20	duced commer-
		VSch 5	cially by off-
Initiator(s): A.P. Mayber, P. Tamir, E. Jungworth, A. Dreyber, A. Amir, Z. Dubinsky, R. Zemick, S. Glassman, O. Glassman	Tchr Ed: conducts work-shops; provides manuals, guides & consultants	Res 2	set (\$100/10
		TEd 5	students)
		Trial 40	
		Supplier 2 3	

**Descriptive References:**

Tamir, P. 1972. The Teaching of Biology in Israel - A Case Study. Asian Association of Biological Education. 6: 1-5.

Tamir, P., and S. Glassman. 1971. Laboratory Test for BSCS Students. BSCS Newsletter. 42: 9-13.

**Research:**

Jungworth, E. 1971. Content Learning in a Process Oriented Curriculum: Some Aspects of the BSCS Biology in Israel. Science Education. 55: 85-96.

Tamir, P. and S. Glassman. 1971. A Practical Examination for BSCS Students - A Proper Report. Journal of Research in Science Teaching. 8: 307-315.

Tamir, P. and E. Jungworth. 1972. Students Growth and Trends Developed as a Result of Studying BSCS Biology for Several Years.



ISRAEL ELEMENTARY SCIENCE  
PROJECT (MATAT)

David Chen, Director

See ICh Report(s): 8

Tel-Aviv University  
School of Education  
Ramat - Aviv  
Tel-Aviv, Israel  
Tel: 420763

1966-

Gov: Ministry  
of Ed; Partici-  
pating Schools

Ages: 5-11	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Hebrew	Lec	activity sheets,
Subj: biol, chem, phys, earth-space	Sem	tchr manuals,
Approach: process, conceptual, inquiry,	Disc ✓	tests, overview,
discovery	Indep ✓ ✓	newsletters
Ability: all	Lab ✓	Non-Print Materials:
Eval Meth: tchr jdgmts	Fld ✓	slides, flimstrips,
Testing: -	Dem	filmloops, films,
Cont Resp: tchr guided	Sim	overhead trans-
Envir: sch grounds, classroom	TV ✓	parancies, video-
	A/V	tapes, games

Through this project the students will accumulate basic knowledge in the sciences appropriate to their stage of development. They will acquire experience in the mastery of mental processes such as identifying, classification, association, etc, and will acquire a mastery of the following research skills: ability to make observations, ability to ask questions, planning experiments, interpreting data, reporting results, etc. The project combines concept-oriented elementary science teaching with behavior-oriented approaches. The more specific objective of the project is to set up a science curriculum for kindergarten and elementary school.

The project is aimed at an extremely diverse population with a large number of culturally deprived students. It relies on a number of foreign projects as sources of ideas. Emphasis is placed on the development of low cost equipment kits for individual manipulation by students. Experiments are in progress to study the feasibility of using audio-tutorial approaches to augment the program as well as further individualization of the program. A series of 20 teacher-training films is being produced.

The curriculum has been devised such that there is a good fit between children's cognitive levels and the problems posed in the units. The units are also constructed such that the students will be active and personally involved in their work.

Groups of teachers are given an intensive in-service training (450 hours), consisting of subject matter, methodology, developmental psychology and the units. These teachers in turn, teach the units in the field all over the country. Field courses are directed by the science superintendents. A series of educational television films are being tried out as a method of teacher training.

Reports on evaluation results will be available from September 1974 from the Project Headquarters.

Reason: update method, develop new course	Adopt: (partial) 3,000 tchrs, 120,000 students, 350 sch	Pers: FT PT NRT Adm 2 Wr 2 8 VSch 5 Res 3 TEd 2 Trial 120	Publ: 5,000 copies re- produced by mimeograph (\$50/10 students)
Initiator(s): A.M. Feuchtwantwanger	Tchr Ed: conducts work- shops; provides manuals, guides, films, consultants		

No references given



**MATHEMATICS FOR JUNIOR  
HIGH SCHOOLS**

J. Gillis, Director

See Ich Report(s): 8

Mathematics Group  
Department of Science Teaching  
Weizmann Institute of Science  
P.O.B. 26  
Rehovot, Israel  
Tel: (03) 951-721, ext 2316

1967-1974  
Gov, UNESCO

Ages: 12-14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Hebrew, Arabic	Lec 1	texts
Subj: math	Sem	supplementary books
Approach: * conceptual, discovery, inquiry	Disc 2	activity sheets
Ability: all	Indep 3 3	tchr manuals
Eval Meth: * achievement tests, tchr jdgmts, standardized tests	Lab	tests, newsletters
Testing: unit & term exams	Fld	teachers journal
Cont Resp: administratively directed	Dem	Non-Print Materials:
Envir: classroom	Sim	overhead transpar-
	TV	encies, games
	A/V	models, videotape

During the first years of the project, the group has concentrated mainly on writing textbooks for Mathematics in Junior High Schools (grades 7-9) and training and guiding of the teachers using these textbooks.

The goals of the project were as follows: 1) To introduce new topics into the mathematics curriculum of the Junior High School, topics which could arouse the interest of this age level, and prepare the students well and thoroughly for their more advanced studies in mathematics in Senior High School; 2) To stress understanding of the structure and methods of mathematics as opposed to mere drill and memorizing of the previous mathematics curriculum; 3) To stress and develop modern teaching methods and teaching aids.

In order to write material suited to each of the three levels (A, B and C), a study of the characteristics and needs of each level had to be made. The new material was evaluated by 1) Tests given identically to all students participating in the project 2-3 times/year; 2) Feedback given by senior teachers (counselors) who visit each school regularly.

A new edition of the textbooks will be prepared during the coming years - taking into account the experience accumulated during the first years of the project, and changes introduced meanwhile into the proposed curriculum.

Other activities include a more detailed study of a small selection of schools, teachers' seminars, and publication of a teacher's journal, "Shevavim", containing latest developments in the field and actual teaching material for both junior and senior high levels.

Reason: change in philosophy, develop new course	Adopt: 500 tchrs, 30,000 students 100 schools	Pers: FT PT NRT	Publ: reproduced institutionally by offset
Initiator(s): A. de Shalit	Tchr Ed: conducts work- shops; provides manuals, guides & consultants	Adm 2 Wr 2 5 VSch 1 6 Res 1 2 TEd Trial 15	

No references given

NETA: SECTION FOR 7th GRADE BIOLOGY School of Education  
FOR HETEROGENEOUS CLASSES CONTAIN- Tel-Aviv University  
ING CULTURALLY DEPRIVED STUDENTS Tel-Aviv, Israel

1968-1973

Gov: Ministry  
of Ed; UNESCO,  
Van Lear Foun-  
dation(Holland)

Moshe Smilansky, Director

Tel: -

See ICh Report(s): 8,7

Ages: 12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Hebrew	Lec ✓	*texts, lab books,
Subj: biol	Sem	programmed units,
Approach: * conceptual, process	Disc ✓	activity sheets,
Ability: all	Indep	tchr manuals &
Eval Meth: * achievement tests, student	Lab	guides, tests,
q're	Fld ✓	overview
Testing: unit, program pre & post tests	Dem ✓	Non-Pr'nt Materials:
Cont Resp: tchr guided	Sim	*slides, films,
Envir: *llab, classroom, outdoors	TV ✓	overhead trans-
	A/V ✓	parancies, games,
	games	lab equipment,
		pictures

The aim of this work was to adapt the existing biology curricula to the heterogeneity of the class, which is the reality of the educational reform. Here culturally deprived children study together with advanced students in the same classes. In the process of this adaptation we had to consider the following factors as given: the subject, the various levels of achievement and the existing teachers.

Based upon these factors and the constant drive for equality and social progress which is a major concern of the Israeli educational system, we have developed an adapted learning-teaching design on the subject of aquatic ecology. The adapted materials included student units, educational games, and audio visual aids. The subject matter was divided into "core" and optional material, and enrichment material at different levels of difficulty. This design offered both the teacher and the learner a greater amount of time and a variety of learning modes and teaching strategies for the core material.

In the long process of developing the materials we have been aided by a multiphased, multi-purpose and multi-methods evaluation system. The results of the study were that in heterogenous classes, the special teaching design succeeded in raising the achievement level so that even culturally disadvantaged children mastered the basic objectives of the program, while students with higher abilities increased their performance level. There was also an improvement in the attitudes toward biology, beyond the "effect of novelty" expected by an experimental program.

Reason: to respond to students' needs which were not met with the existing course	Adopt: 30 tchrs, 1000 students, 20 sch	Pers: FT PT NRT	Publ: 2,000
		Adm 1	copies repro-
		Wr 2	duced insti-
		VSch 1	tutionally by
Initiator(s): N. Sabar, E. Kaplan, B. Nachlieli, N. Mirsky, R. Zozofsky, M. Kaplan	Tchr Ed: conducts work-shops; provides manuals, films & consultants	Res 1	linotype (\$70/
		TEd 1	10 students)
		Trial 30	

#### Descriptive References:

- Sabar, N. 1971. Teaching Biology in Neta. Methodika. Tel Aviv (in Hebrew). 3: 152-155
- Sabar, N. 1971. Teaching Biology in Heterogenous Classes. Maalot. Haifa (in Hebrew). 2: 38.
- Sabar, N. 1974. Aquatic Organisms. Journal for Biology Teachers. Jerusalem, Hebrew University (in Hebrew). 40:34-39.
- Rese :
- Sabar, N. 1972. Can Students of Mixed Abilities Successfully Study in the Same Classroom? Fourth Biennial Meeting of the Asian Association for Biological Education. Jerusalem.
- Kaplan, E., and N. Sabar. 1974. A Seventh Grade Biology Curriculum for Heterogenous Classes Containing Culturally Deprived Students. Science Education.

ASTRONOMY AND EARTH SCIENCE  
CURRICULUM DEVELOPMENT FOR  
SENIOR SECONDARY SCHOOL (AESCD)

Jun Inamori, Director

Department of Astronomy and  
Earth Science  
Tokyo Gakugei University  
Koganei Tokyo 184, Japan

1968-1976

Gov

Tel: 042321-1741

See ICh Report(s): none

Ages: 15-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Japanese	Lec ✓ ✓	tchr manuals
Subj: earth-space	Sem	newletters
Approach: integrated	Disc	
Ability: all	Indep	
Eval Meth: achievement tests & tchr	Lab ✓ ✓	
jdgmts	Fld ✓ ✓	
Testing: term	Dem	
Cont Resp: tchr guided	Sim	
Envir: classroom	TV	
	A/V	

The purpose of the project has been to develop a new curriculum in astronomy and earth science as an integrated science course for the senior secondary school. A guidebook and manual of the new course will be prepared for use by science teachers.

The curriculum will include three approaches to the subject matter: a physical science approach, a historical approach and an approach viewing the universe as a system.

In planning the program the following student goals have been considered important:

- 1) students should develop both ability and attitude in natural science;
- 2) students should understand the basic concepts and systems of Astronomy and Earth Science;
- 3) students should understand the relationships among the areas of earth science, environmental science and human welfare;
- 4) students should develop ability in mathematics, physics and chemistry;
- 5) students should increase their interest in the phenomena of the earth and the universe.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: provides manuals & guides	Adm 8	by mimeograph
Initiator(s):		Wr 20	
K. Watanabe,		VSch 3	
T. Kimura		Res	
		TEd	
		Trial 3	

Research:

Inamori, J. 1969. Earth Science Education and Historical Science (Historical Science as a Basic Philosophy of Earth Science Education). Education of Earth Science. 22(5): 111-113. (In Japanese).

Inamori, J. 1972. Earth Science Education and System (System of the Earth and the Universe as a Basic Philosophy of Earth Science Education). Education of Earth Science. 25(2): 33-36. (In Japanese).

COLLEGE INTRODUCTORY CHEMISTRY  
COURSE ON THE CONCEPTS OF  
ENERGY & STRUCTURE (CES)

B. Tamamushi, Director

See ICh Report(s): 6,5,4

Nezu Chemical Institute  
Musashi University  
1-26 Toyotama-K. ni  
Nerimaku, Tokyo 176  
Japan

Tel: (03) 991-1191

1965-1970

\*Gov: Fed,  
Publisher

Ages: 18-19

Lang: Japanese

Subj: chem, phys

Approach: \* discipline centered,  
conceptual

Ability: \* average +, average

Eval Meth: \* achievement tests, tchr jdgmts

Testing: \* term, unit

Cont Resp: \* student & material directed

Envir: \* classroom, school library

Exper: Cl 12+ 2-12 I

Lec 1 1 2

Sem

Disc

Indep 2

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

texts

supplementary books

This project is planned to improve the traditional college introductory chemistry courses. The project started in 1965 and after two years, when a preliminary course plan was designed, the working group had a chance to have a conference on the problem of how to introduce these physical principles into introductory chemistry with American professors under sponsorship of the American National Foundation and the Japan Association for the Advancement of Science. The discussions in this conference gave Japanese colleagues a great stimulus to make a further study of the problem and finally to write the draft for a new textbook. The book, entitled Chemistry - Energy and Structure, was published in Japanese in 1971. This textbook is characterized by the introduction of fundamental principles of thermodynamics, quantum mechanics and statistical mechanics on the basis of students' knowledge of chemistry, physics and mathematics on the advanced high school level. Among five parts of the contents, four parts are used for the introduction of the principles and one part is used for the description of chemical elements and compounds (inorganic and organic) in close relation to theories and principles. The book seems to be somewhat difficult to follow for average students but selected problems with solving hints and readable reference books for each subject will help them to understand the contents. About 6000 prints have been sold in these three years after publication, proving that well selected students such as those at the University of Tokyo enjoy learning chemistry under the new program.

Reason: develop new  
course

Adopt: -

Tch Ed: -

Pers: FT PT NRT

Adm

Wr

VSch

Res

TEd

Trial

Publ: 6,000

copies repro-  
duced commer-  
cially by lino-

type (\$60/10  
students)

?

Initiator(s):

B. Tamamushi

Descriptive References:

College Chemistry in Japan. 1968. UNESCO Publication on Science Education in Japan.

Tamamushi, B. 1969. The Second U.S. - Japan Conference on College Chemistry.

Kagaku-Kyoiku. Published by Chem. Soc. Japan, 17(2).

Molecular and Thermodynamic Concepts in Elementary Chemistry Courses. 1969. A Report Based on the 2nd U.S. - Japan Conference on Chemical Education organized by the Advisory Council on College Chemistry. ACCC Serial Publication No. 41.

Research:

Tamamushi, B., et al. 1967. A Trial for College General Chemistry Course Plans.

Kagaku-Kyoiku. In Japanese. 15(2).

THE CONFERENCE OF SCIENCE  
EDUCATION STUDY IN OSAKA  
(CSES)

T. Isemura, Director

See ICh Report(s): 6,5,4

Biology Department  
College of General Education  
Osaka University  
Toyonaka, Osaka 560  
Japan  
Tel: 06 856 1151

-  
Private,  
Publisher

Ages: 6-14	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Japanese	Lec ✓	texts
Subj: bicol, chem, phys, earth-space	Sem	
Approach: integrated, inquiry	Disc	Non-Print Materials:
Ability: average	Indep	overhead transpar-
Eval Meth: achievement tests	Lab ✓	encies
Testing: unit	Fld	audiotape
Cont Resp: administratively directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

The objective of the project is to improve science education in grades one through nine. The approach will be learning by inquiry.

Evaluation of the project is incomplete although some studies were conducted in both elementary and secondary schools during the 1973 academic year.

The project is expected to have an important impact on future science text books.

Reason: develop new course, publication	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially (\$15/10 students)
	Tchr Ed: provides manuals	Adm 1 3	
Initiator(s): T. Isemura		Wr	
		VSch 3 15	
		Res 10 15	
		TEd 4	
		Trial 10	

Descriptive References:

Risu, C. and S. Risu. The Conference of Science Education Study in Osaka. Published by Keirinkan Publishing Company.

**INTEGRATED SCIENCE CURRICULUM  
PROJECT**

Y. Kakiuchi, Director  
Contact: Minoru Oshina

Tokyo Institute for Education  
1-1-14 Meguro, Meguro-ku  
Tokyo, Japan  
Tel: 492-6181

1971-1974  
Ministry of  
Education

See ICh Report(s): 8

Ages: 12-14	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Japanese	Lec	activity sheets
Subj: science, environmental ed	Sem	tchr manuals
Approach: integrated, conceptual, process	Disc	tests
Ability: average	Indep ✓	annual progress
Eval Meth: achievement & lab tests	Lab ✓	report
Testing: unit	Fld	Non-Print Materials:
Cont Resp: tchr directed	Dem	overhead transpar-
Envir: classroom	Sim	encies
	TV	lab equipment
	A/V	

The project objectives are: 1) to develop an integrated science curricula for the elementary and junior secondary schools as part of the compulsory education of the national curriculum set forth by the Ministry of Education; and 2) to develop a philosophy of integrated science teaching and make up some sample units representative of integrated science courses.

The unique characteristic of this project is that it integrates the basic concepts and processes of science with environmental education and other subjects.

Reason: update content	Adopt: 30 tchrs, 1,000 students, 20 schools	Pers: FT PT NRT	Publ: -
Initiator(s): Y. Kakiuchi		Adm	
		Wr	not
		VSch	answered
		Res	
		TEd	
		Trial	

No references given

**INTERNATIONAL SILKWORM  
TEACHING SOCIETY (ISTS)**

Mituo Nagoya, Director

See ICh Report(s): none

42 Sasanodai

Asahi Ku

Yokohamashi, Kanagawa Ken

Japan 241

Tel: 045 (361) 4475

1970-1974

Private,  
Participating  
Schools

Ages: 11-20

Lang: Eng, Japanese

Subj:\* biol, chem, phys

Approach: integrated, inquiry, discovery

Ability: all

Eval Meth: achievement & lab tests,  
tchr jdgmts

Testing: unit, individual

Cont Resp: tchr directed & guided,  
student directed

Envir: lab

Exper: C1 12+ 2-12 I

Lec ✓ ✓ ✓

Sem

Disc

Indep

Lab ✓ / ✓ /

Fld

Dem ✓ /

Sim

TV

A/V

Printed Materials:

texts

lab books

tchr manuals

newsletters

Non-Print Materials:

slides

films

lab equipment

Plans for the use of the silkworm in school science programs have been well developed in Japan over the past five years. The program is supported by the silkworm industry. At the same time the study of the silkworm has been included in some American and European school programs.

We believe there are many advantages in the use of the silkworm for school laboratory study. The silkworm has been bred by human beings for many years and is accustomed to artificial rearing. It is now possible to use artificial food which frees the teacher from having to provide fresh mulberry leaves. As the silkworm is a large insect, students can easily observe the various stages of its 40-day life cycle. The silkworm can serve as the subject of dissection studies as well as for various physiological and genetic investigations.

Reason: change in

philosophy, develop

new course

Adopt: 20 tchrs,

2000 students,

20 schools

Pers: FT PT NRT

Adm 4

Wr 2

VSch 10

Res 10

TEd 4

Trial 70

Publ: reproduced  
commercially  
(\$3/10 students)

Initiator(s): M. Nagoya,

T. Ikeda, S. Saito,

K. Itoyama, J.J. Eells

Tchr Ed: provides guides

**Descriptive References:**

Ikeda, T. Studies and Experiments of Rearing Silkworm on Artificial Food by American Teachers. The Heredity. 28(2).

Nagoya, M. Studies on Effects of Irradiation on the Silkworm. Science in Education. 3(4).

Barufaldi, J.P. A Silkworm Encounter. The American Biology Teacher. 35(7).

**Research:**

The Silkworm Study. Pamphlet, Tokyo Metropolitan Machida High School, Japan.

Supplemental Investigation in Life Science. Pamphlet, Science Education Center, The University of Texas.

Rearing the Silkworm Moth. Turtox Service Leaflet, Chicago, Illinois.



LABORATORY INSTRUCTION &  
TEACHING AIDS IN COLLEGE  
INTRODUCTORY CHEMISTRY (LCC)

U. Yoshino, Director

See ICh Report(s): 7

Ages: 18-19

Lang: Japanese

Subj: chem

Approach: integrated

Ability: average

Eval Meth:\* lab tests, student q're

Testing:\* term, unit

Cont Resp:\* tchr & student directed

Envir: classroom, lab

Nezu Chemical Institute  
Musashi University  
1-26 Toyotama-Kami  
Nerimaku, Tokyo 176  
Japan

Tel: (03) 991-1191

\* 1968-1971

Gov: Fed

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

✓

✓

✓

✓

✓

✓

✓

✓

Printed Materials:\*  
programmed units  
overview of project

Non-Print Materials:  
slides  
filmstrips  
filmloops  
overhead transparencies  
audiotape

The object of this project is to improve the method of laboratory instruction and teaching aids of Introductory Chemistry in Japanese colleges and universities. In the first place, instead of the traditional laboratory experiments which were usually divided into 'analytic-inorganic, organic and physical' chemistry experiments, some experiments of an 'integrated type' were designed and tested. Some examples are: Iodometry applied to analysis and reactions of some organic compounds; Experiment on co-ordination compounds (preparation, analysis, physical properties); Chemical kinetics of nucleophilic substitution reactions; Synthesis of polymers and measurement of their molecular weight. In the second place some types of demonstration experiments suitable for large classes, such as Flame reactions, Ion-exchange reactions, Oxidation states of manganese and also some lecture experiments combined with students' exercises, such as Chemical equilibrium of the reaction of ammonia with hydrogen chloride, Reaction of nitric oxide with oxygen in air (Priestley-Lavoisier's classical experiment) were designed and tested. Thirdly, some examples of teacher-made color slides with audiotapes, 8mm movie films and overhead projection (OHP) transparencies: Semimicro qualitative analysis techniques, Liquid phase chromatography, Synthesis of aniline from benzene, as slides; Chemical reaction in nature (volcanic, marine), Chemical balance, Neutralization titration, Filtration, Introduction to complex chemistry, as 8mm films (5-30 min.); Molecular and crystal structures, Materials for teaching the history of chemistry for OHP were produced and tested.

These new types of laboratory experiments and audio-visual teaching aids have been used in selected classes and schools and they have generally proved successful under teachers' proper attention. Most of them are, however, still in trial stage and not yet published in books or offered for sale.

Reason:\* update methods,

Adopt: -

change in philosophy

Tchr Ed: -

Pers: FT PT NRT

Adm

Wr

VSch

Res

TEd

Trial

Publ: Reproduced

by mimeograph

& linotype

2

Initiator(s):

B. Tamamushi, H. Inoue,

S. Takamoto, M. Takebayashi,

U. Yoshino

Descriptive References:

Tamamushi, B., and T. Ino. 1971. A Review of Audio-Visual Teaching Aids in College Chemistry. Kagaku-Kyoiku. In Japanese. 19(5).

Tamamushi, B. 1972. Teaching Aids in Chemistry, Past and Present. Kagaku-Kyoiku. 20(2).

Laboratory Instruction and Teaching Aids in College Introductory Chemistry. 1971.

A Report on the Project, In Japanese with English Abstract.

Research:

Takebayashi, M. 1970. Application of Iodometry of Organic Laboratory Experiments. Kagaku-Kyoiku. 18(3).

Takebayashi, M. 1970. Reactivities of Ethylenic and Acetylenic Linkages. Kagaku-Kyoiku. 18(3).

Yoshino, U., et al, 1970. Ionic Equilibrium in Solution. Kagaku-Kyoiku. 18(4).



**MODERNIZATION OF SECONDARY  
SCHOOL CHEMISTRY (MSSC)**

Michinori Ōki, contact

See ICh Report(s): 7

Department of Chemistry  
Faculty of Science  
The University of Tokyo  
Tokyo 113, Japan

Tel: 03-812-2111, ext 3446

1967-1970

Gov: Fed

Ages: 15-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Japanese	Lec ✓	texts
Subj: chem	Sem	lab books
Approach: discipline-centered	Disc ✓	
Ability: avg	Indep	
Eval Meth: -	Lab ✓	
Testing: -	Fld	
Cont Resp: -	Dem ✓	
Envir: -	Sim	
	TV	
	A/V	

This project primarily aims at attracting young people to chemistry. Some of the topics included in the curriculum developed by this project may seem rather sophisticated, but the project team considers that the topics are essential in order to understand.

Two guide lines structure the project. They are: (1) that the things must be dealt with in as deductive a way as possible and (2) that the material must be treated in a spiral fashion.

In Japan there had been a tendency in chemical education to teach a theory first and then to use the laboratory to fix the theory in the students' minds. The deductive way of thinking was thought important but the inductive way was taken as rather a minor factor. Thus the first point is to upset this tendency and to stress the inductive method. However, it is not possible to find out everything concerned with a phenomenon in this way.

The content of the text is divided into 17 chapters. A general idea of materials is gained within the first 5 chapters; the concept of chemical equilibria is established within the next 6 chapters, including reaction rates; and the chemical properties of matters are summarized by the concept of the chemical bond and the intermolecular interaction in the last 6 chapters.

Although the text book was not published until 1973, the project had a strong impact during the stage of determination of the Course of Study in 1970.

Reason: update content & method	Adopt: -	Pers: FT PT NRT	Publ: 5,000
	Tchr Ed: -	Adm 2	copies repro-
Initiator(s): M. Ōki		Wr 15	duced commer-
		VSch 4	cially by
		Res 20	linotype
		TEd	
		Trial	

**Descriptive References:**

Hayashi, Y., K. Ide, T. Nishihira, Y. Takebayashi, Y. Yoshida and T. Shimizawa. 1970. Kagaku-Kyoiku. 19, 137. (Japanese)

**MODULAR APPROACH IN THE  
TEACHING OF BIOLOGY (MATB)**

Haruo Kinoshita, Director

See ICh Report(s): none

Tokyo Metropolitan Institute for  
Educational Research & In-Service  
Training  
1-14, Meguro-1-Chome  
Meguro-ku Tokyo, Japan  
Tel: (03) 492-6181

1971-1976

Gov:Fed

Ages: 16-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Japanese	Lec ✓	texts, lab books,
Subj: biol	Sem ✓	programmed units,
Approach: process, conceptual	Disc ✓	activity sheets,
Ability: average	Indep	tchr manuals, field
Eval Meth: achievement & lab tests	Lab ✓	guides, tests,
Testing: individual	Fld ✓	objectives
Cont Resp: tchr guided	Dem ✓	Non-Print Materials:
Envir: classroom, laboratory	Sim	slides, films, over-
	TV ✓ ✓	head transparencies,
	A/V	videotape, audiotape,
		models, lab equip-
		ment

The project objectives have been to provide several different kinds of curriculum for high school biology, by means of developing more than 30 Modules which are self-contained with student guides, work-sheets, reading materials, AV aids, test sheets and teachers' guides.

This project was originally intended for Japanese high schools able to design their own biology courses which were concept and process-oriented. We tried to formulate a valid conceptual scheme for high school biology and develop appropriate learning materials including laboratory techniques. In the process of development we found the modular approach was the best method for this purpose. We have worked out and completed about 30 different kinds of modules. This project will continue for 3 years, and more than 30 modules will be added. By rearrangement of these modules we intend to construct 3 kinds of curricula.

Evaluation of each module will be done by more than 30 schools in 5 areas in Japan. Improvement of each module and redesign of curricula will be finished by the end of 1976. The publication of materials on a commercial basis is expected after the completion of the project.

Reason: change in philosophy, develop new course	Adopt:(partial) 18 schools	Pers: FT PT NRI	Publ: 300 copies
	Tchr Ed: provides manuals & guides	Adm 1	reproduced in-
		Wr 45	stitutionally
		VSch 10	by offset
		Res 14	
		TEd	
		Trial 47	

No references given

THE SOCIETY OF UNIVERSITY  
EDUCATION IN THE BIOLOGICAL  
SCIENCE (SUEBS)

Yujiuo Nakajima, Director

See ICh Report(s): 8

Tokyo Metropolitan Institute  
of Education  
Meguro 1-1-14  
Meguroku, Tokyo 153  
Japan

Tel: (03) 492-6181, ext 246

1971-1976

Gov

Ages: 19	Exper: C1 12+ 2-12 I	Non-Print Materials:
Lang: Japanese	Lec ✓	slides
Subj: biol	Sem	overhead transpar-
Approach: discipline-centered	Disc	encies
Ability: average +	Indep	videotape
Eval Meth: achievement	Lab ✓	audiotape
Testing: unit	Fld	
Cont Resp: tchr guided	Dem ✓	
Envir: classroom	Sim	
	TV	
	A/V ✓	

The Society of University Education in the Biological Sciences in Japan was established as an aftermath of the First U.S.-Japan Conference on College Biology which was held in Tokyo in January, 1967. The U.S. delegates were members of the CUEBS. Since there had been no society of any kind for college biology teaching, the Japanese delegates were chosen mainly from biologists who belonged to the BSCS Committee in Japan. To cope with the prospect that there would be Second and Third U.S.-Japan Conferences and also aiming to improve and update college biology education in Japan, the Japanese delegates decided to have the Japanese counterpart of CUEBS.

The society now has 69 members, biologists of colleges and universities from all over Japan who are interested in biology teaching. The chairman of the Society is Dr. Yosito Sinoto, the president of the International Christian University. The society publishes a biannual journal called 'University Biology Education', and holds a general meeting of the members at least once a year to discuss current problems in college biology teaching. The topics of the last meeting were the individualized teaching and modular approaches in college biology and environmental education.

The society is now trying to increase the number of the members and also to initiate the establishment of a unified society of biology education from elementary school through university levels.

Reason: update content	Adopt:(partial)	Pers: FT PT NRT	Publ: -
Initiator(s): Y. Sinoto, I. Komatsu	2 tchrs, 2 schools Tchr Ed: conducts work- shops	Adm 1 Wr VSch Res TEd Trial 2	

No references given

THE STUDY TO MODERNIZE THE PHYSICS  
CURRICULUM OF UPPER SECONDARY  
SCHOOLS (KBCK PROJECT)

K. Ishiguro, Director

See ICh Report(s): none

University of Tokyo  
College of General Education  
Meguro-ku, Komaba  
Tokyo, Japan 153

Tel: (Japan) 03-467-1171

1971-1976

Gov: Fed

Ages: * 16,17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Japanese	Lec	texts
Subj: phys	Sem	tchr manuals
Approach: discipline-centered	Disc ✓	Non-Print Materials:
Ability: avg	Indep	slides
Eval Meth: not yet determined	Lab ✓	films
Testing: not yet determined	Fld	filmloops
Cont Resp: * tchr directed, student guided	Dem ✓	overhead
Envir: classroom	Sim	transparencies
	TV	lab equipment
	A/V	

The Objective of this project is to prepare a new physics curriculum. Currently the contents of Physics courses in Japanese upper secondary schools are specified in the recommendation "Course of Study for Upper Secondary Schools" published by the Ministry of Education. If we want to improve the recommendation, suggestions must be presented before the next revision is started.

The major goal of this project is to present a physics curriculum through which students will realize that Physics is an interesting subject and that it should be afforded a position in the central core of the curriculum of upper secondary schools, even when the humanistic point of view is emphasized.

The curriculum to be proposed will have a rather conservative style in its aspect. It is to be composed of Mechanics, Electricity and Magnetism, Waves and Modern Physics. Some emphasis may be put on the description of the practical standard scale by which we judge the correctness of the laws of Physics, since it is very helpful even for students who will select non-scientific professions to know what the standard scale of judgement of correctness of physics is, and in which points it differs from the standards of other fields, such as Mathematics, the Social Sciences and Literature.

Reason: * update content & methods	Adopt: -	Pers: FT PT NRT	Publ: 100 copies
	Tchr Ed: provides	Adm 4	reproduced by
Initiator(s): H. Ootuka	manuals, guides, films	Wr 20	mimeograph
		VSch	
		Res	
		TEd	
		Trial 30	

Descriptive References:

Ootuka, H. 1971. On the Study of Education of Science. Journal of Physics Education Society of Japan. 19(3): 222. (Japanese)

Research:

Ono, K. 1974. On the Law of Action and Reaction. J. Phys. Education Society of Japan. 22(3).

Shimoda, K. 1973. An Experiment on Parallel Capacitor with Use of Recording Milli-volt Meter. J. Phys. Education Society of Japan. 21(2): 96.

Yano, Junji. 1974. A Handy Monochromatic Microwave Generator Using Herzian Spark. J. Phys. Education Society of Japan. 22(2).

VISUAL AIDS IN SCIENCE  
EDUCATION (VISUAL)

K. Higasi, Director

RM 51-12-11 Waseda University  
Shinjuku, Tokyo 160  
Japan

1970-1974

Gov

See ICh Report(s): 8

Tel: 03-209-3211, ext 376

Ages: 15-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Japanese	Lec	tests
Subj: biol, chem, phys, earth-space	Sem	
Approach: discipline-centered, inter-	Disc	Non-print Materials:
disciplinary, integrated	Indep not	slides
Ability: average, average +	Lab answered	filmloops
Eval Meth: achievement tests, tchr jdgmts,	Fld	films
student questionnaire	Dem	overhead transparen-
Testing: individual	Sim	cies
Cont Resp: tchr directed & guided	TV	videotape
Envir: classroom	A/V	

The members of this project with one exception were university professors, assistant professors and lecturers in physics, chemistry or biology. These people were chosen for their experiences in producing and developing science films and other visual materials for education -- some are well known in Japan through TV media.

The goal of this project was to produce new science films (16mm & 8mm) and other materials on a non-profit basis for high schools in Japan. An additional goal was to evaluate films and other materials commercially available in Japan which of course include HPP and CHEM study films. The project has produced a number of films, slides, videotapes, etc. and also reports on evaluation of easily obtainable materials. Many high school teachers in Tokyo and Osaka districts were involved in the research.

This project was called "Educational Materials and Instrumentation" in 1970 and renamed "Visual Aids in Science Education" in 1971. The project came to the end on March 31, 1974.

Reason: update content, change in philosophy, develop new courses	Adopt: - Tchr Ed: provides films & consultants	Pers: FT PT NRT Adm Wr VSch Res 15 TEd Trial 35	Publ: 400 copies reproduced in- stitutionally by offset & linotype
Initiator(s): B. Tamamushi			

Descriptive References:

Chemical Education from the Chemistry Society of Japan.

Research:

Evaluation of Materials (Visual), commercially obtainable.

**KOREAN SCIENCE EDUCATION  
PROJECT**

B.K. Ha, Director

See ICH Report(s): 8

Science Education Project  
Room 1012, Unified Government  
Building  
Seoul, Korea

Tel: 70-3414

1968 -

Gov:Fed; UNESCO,  
UNICEF

Ages: 6-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Korean	Lec ✓	texts
Subj: biol, chem, phys, earth-space, math	Sem	lab books
Approach: discipline-centered, integrated, process, conceptual	Disc ✓	tchr manuals
Ability: all	Lab ✓	
Eval Meth: achievement tests, tchr jdgmts	Fld ✓	
Testing: term & unit	Dem ✓	
Cont Resp: tchr guided	Sim	
Envir: school grounds classroom, lab	TV	
	A/V	

The overall objective of the project is to improve the quality of science and mathematics in the primary and secondary schools of Korea. The specific objectives have been: curriculum development and implementation; pre service and inservice teacher training; provision, development, maintenance and repair of laboratory equipment; development and improvement of communication among all those concerned in science and mathematics education by publication of a newsletter.

UNICEF has been involved in this project since its inception and continues to provide significant monetary support in terms of equipment, support for seminars and for adaptation research studies. Technical support has been and is being provided by UNDP/UNESCO.

Eleven Science Education Centers have been established, one in each of the nine Provinces and one in each of the two major cities-Seoul and Pusan. These Centers are involved in all of the activities of the project including the Adaptation Research Studies in which curriculum materials from overseas are studied, in some cases microtested, and assessed as to suitability for incorporation or adaptation for Korean needs.

The Korean Teachers' Mutual Fund is acting on behalf of the Ministry of Education, with the assistance of UNICEF and UNESCO in establishing a Science Equipment Development Center. It is expected that the Center will develop and produce low cost equipment suitable for use in Korean schools.

The production of textbooks in Korea is actually the responsibility of the Textbook Compilation Bureau, one of the seven Bureaus of the Ministry of Education. The results and recommendations of the activities of the Science Education Project, namely, curriculum studies, seminars, workshops and pilot use of trial editions of texts are taken into consideration by the Bureau. Some personnel are involved in both the Bureau and the Project.

Reasons: update content & method, develop new course	Adopt: country-wide	Pers: FT PT NRT	PuJl: reproduced
Initiator(s): Ministry of Education, UNICEF, UNESCO	Tchr Ed: conducts work- shops; provides guides & consultants	Adm Wr VSch not Res answered TEd Trial	commercially by linotype

**Research:**  
Evaluative Research on UNESCO/UNICEF assisted Korean Science Education Project. 1973.  
The Central Education Research Institute, Seoul, Korea.

**INTEGRATED SCIENCE FOR MALAYSIAN  
LOWER SECONDARY SCHOOL**

Director: -

Pusat Perkembongan Kurikulum  
Batu 2 1/2, Jalan Damansara  
Kuala Lumpur, Malaysia

1969-1974

Gov; CEDO

See ICh Report(s): 8

Ages: 11-14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Malay	Lec ✓	activity sheets
Subj: science	Sem	tchr manuals
Approach: integrated, process, conceptual, discovery	Disc ✓	objectives
Ability: all	Indep	newsletters
Eval Meth: tchr jdgmts, observations of administrators	Lab ✓	
Testing: unit	Fld	
Cont Resp: -	Dem ✓	
Envir: classroom, lab	Sim	
	TV	
	A/V	

The Ministry of Education embarked upon a program of curriculum renewal and improvement in science and mathematics in about 1967. It was found most convenient, at that time, to begin with science in the lower secondary school.

The Central Curriculum Committee decided that the Scottish Integrated Science Syllabus was most suitable for adaptation with respect to syllabus content and to the approach in teaching. State Curriculum Committees considered that the scheme offered sufficient scope for a trial and subsequent adaptation.

With the help of some British tutors in-service courses were run beginning in 1968 for about 45 lower secondary science teachers, several School Inspectors, Teachers College Lectures and State-Supervisors. These courses lasted from 3 to 4 weeks at a time. The Ministry also ran courses for Laboratory Assistants and Attendants so that they would be more sympathetic to the change in teaching methods.

The philosophy behind this course, as in many other courses, is that children will learn better if they are interested in what they are learning. Although this is nothing new, an effort is specially made, through the peculiar design of the course, to develop and maintain pupils interest in science by means of a carefully graded course of practical activities. The pupil is allowed to investigate a particular problem by means of simple instructions and careful questioning in "worksheets". These worksheets are a type of instructional material, encouraging and guiding the pupil to perform certain investigations and to draw tentative conclusions for himself by inductive and deductive processes.

Reason: update content & methods	Adopt: 2,000 tchrs, 100,000 students, 580 schools	Pers: FT PT NRT	Publ: reproduced by mimeograph & commercially
Initiator(s): Ministry of Education, Schools Division, Malaysia	Tchr Ed: conducts work- shops, provides manuals	Adm 1 Wr 1 10 VSch 1 10 Res TEd 50 trial	

**Descriptive References:**

New Trends in Integrated Science Teaching. UNESCO Vol 1, Article 27.



**MALAYSIAN BIOLOGY, CHEMISTRY,  
PHYSICS PROJECT**

**Director: -**

**See ICh Report(s): none**

**Curriculum Development Center  
Ministry of Education  
2 1/2 Jalan Damansara  
Kuala Lumpur, Malaysia**

**1971-1974**

**Gov; CEDO**

<b>Ages: 15-17</b>	<b>Exper: Cl 12+ 2-12 I</b>	<b>Printed Materials:</b>
<b>Lang: Eng, Malay</b>	<b>Lec</b> ✓	<b>texts</b>
<b>Subj: biol, chem, phys</b>	<b>Sem</b>	<b>tchr manuals</b>
<b>Approach: discipline-centered, conceptual, discovery</b>	<b>Disc</b> ✓	<b>newsletters</b>
<b>Ability: avg, avg+</b>	<b>Indep</b>	
<b>Eval Meth: tchr jdgmts</b>	<b>Lab</b> ✓	
<b>Testing: unit, national exams</b>	<b>Fld</b> ✓	
<b>Envir: classroom, lab</b>	<b>Dem</b> ✓	
	<b>Sim</b>	
	<b>TV</b>	
	<b>A/V</b>	

**No narrative provided by project**

<b>Reason: update content &amp; methods, change in the philosophy</b>	<b>Adopt: 131 schools</b>	<b>Pers: FT PT NRT</b>	<b>Publ: repro-duced commer-cially</b>
	<b>Tchr Ed: conducts work-shops; provides manuals</b>	<b>Adm</b>	
		<b>Wr</b>	
<b>Initiator(s): Schools</b>		<b>VSch</b> not	
<b>Division, Ministry of Education</b>		<b>Res</b> answered	
		<b>TEd</b>	
		<b>Trial</b>	

**No references given**



MODERN GENERAL SCIENCE

Director: -

See ICh Report(s): none

Curriculum Development Centre

Ministry of Education

2 1/2 Jalan Damansara

Kuala Lumpur, Malaysia

1973-1976

Gov, CEDO

Ages: 15-17	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Malay	Lec ✓	texts
Subj: biol, chem, phys	Sem	tchr manuals
Approach: interdisciplinary, conceptual, inquiry	Disc ✓	newsletters
Ability: avg, avg+	Indep	
Eval Meth: tchr jdgmts	Lab ✓	
Testing: unit, national exams	Fld	
Cont Resp: administratively directed	Dem ✓	
Envir: classroom, lab	Sim	
	TV	
	A/V	

No narrative provided by project

Reason: update content & methods, change in the philosophy	Adopt: (partial) 30 schools	Pers: FT PT NRT	Publ: repro-duced commer-cially
Initiator(s): Schools Division, Ministry of Education	Tchr Ed: conducts work-shops; provides manuals	Adm	
		Wr	
		VSch not answered	
		Res	
		TEd	
		Trial	

No references given

**SOUTHEAST ASIA SCIENCE & MATHEMATICS EXPERIMENT (SEASAME)**

Chin Pin Seng, Director

Regional Center for Education in Science & Mathematics (RECSAM)  
Glugor, Penang  
Malaysia

1973-1978

Gov: (Malaysian & U.S.), Foundation

See ICh Report(s): none

Ages: 6-11, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: science, math	Sem	tchr manuals
Approach: integrated	Disc	tests
Ability: average, average +	Indep	objectives
Eval Meth: achievement tests, tchr jdgmts, student questionnaire	Lab	Non-Print Materials:
Testing: unit	Fld	games
Cont Resp: tchr & student directed	Dem	models
Envir: classroom	Sim	lab equipment
	TV	
	A/V	

In order to play a more effective role complementing the efforts of the eight member countries of the Southeast Asian Ministers of Education Organisation (SEAMEO), the Regional Centre for Education in Science and Mathematics (RECSAM) launched in 1973 a five-year pilot project to design, develop and produce a prototype package of exemplar modules called the "Southeast Asia Science and Mathematics Experiment" (SEASAME). The Project makes full use of the Centre's resources, staff expertise and selected key educational personnel from the region to participate in the Centre's workshops on the development and production of suitable teaching/learning modules. The Project will be designed to produce several expected outcomes, the most important of which are to assist the child in applying the process skills of science and mathematics in dealing with his environment, thereby applying the systems way of thinking, and to develop also in the child ways of dealing with phenomena in terms of systems of inter-related and interacting facets in keeping with the requirements of a rapidly changing science-oriented society. It is planned to use multi-media approaches in the units of lessons to be developed. The curriculum research and development work in this Project will essentially consist of the following main areas of problem-oriented activities: 1) annual groups of selected key personnel from every member country of the Organisation will, after a brief orientation to modern techniques of curriculum writing, be responsible to develop, design and produce teaching modules and related apparatus under the guidance of the project staff; 2) similarly, selected key personnel will, after a short orientation in techniques of evaluation, produce the necessary evaluation instruments and procedures as based on the teaching modules developed earlier; 3) tryouts of the SEASAME units annually in member countries, this will involve prior training of national project coordinators, teachers and evaluators in each of the member countries concerned; and 4) the evaluation data will be collected, processed and analyzed by evaluation specialists and the revision of teaching modules will be made consequently on the feedback of such data, and will then be distributed to member countries as curriculum resource materials for their reference; evaluation will include the suitability of the teaching units for a group/class approach and also for urban/rural pupils.

Reason: update methods, change in philosophy, develop new course	Adopt: (trial)	Pers: FT PT NRT	Publ: 1,000
Initiator(s): S.W. Kosi, Poon Poh Kong, J. Dasbach, L.K. Cheong, Y.O. Chye, K.T. Lim	Tchr Ed: conducts workshops; provides guides	Adm	copies reproduced institutionally by mimeograph
		Wr 60 5	
		VSch 10	
		Res	
		TEd 10 5	
		Trial 80	

Descrip' References:

Proposals for Curriculum Research and Development of a Primary Science Mathematics Project 'Southeast Asia Science and Mathematics Experiment' (SEASAME). 1973. SEAMEO Regional Centre for Education in Science and Mathematics.

Research:  
None yet

THE BUREAU OF PUBLIC SCHOOLS  
ELEMENTARY MATHEMATICS IMPROVEMENT  
PROGRAM

Liceria Brillantes Soriano,  
Director

Special Subjects & Services Division 1962-1968  
Bureau of Public Schools  
Aroceros Street Gov  
Manilla, Philippines  
Tel: 49-17-43

See ICh Report(s): 5,4

Ages: 7-12, tchr ed

Lang: Eng

Subj: elementary math

Approach: discovery

Ability: all

Eval Meth: achievement tests

Testing: term & unit

Cont Resp: student directed

Envir: community, classroom

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tchr manuals

tests

objectives

The Elementary Mathematics Improvement Program is an attempt by the Bureau of Public Schools to develop and implement a new mathematics curriculum for the elementary schools. Aside from the inclusion of new topics and teaching devices, the important characteristic of the program is the emphasis placed on the improved process of learning mathematical concepts and developing basic skills needed in problem solving. The program consists of a curriculum writing phase and the complementary up-grading of competencies among elementary mathematics teachers. To effect a revised elementary mathematics curriculum, a new set of curriculum guides written in English were developed. The curriculum guides for Elementary Mathematics in Grades 1 to 4 were developed in 1965 and tried out in selected schools. Based on the feedback reports from the teachers who tried them out, these guides were revised in 1966. The curriculum guides for Grades 5 and 6 were produced in 1966, also tried out, and then revised in 1968.

These curriculum guides are based on the theory that children learn better through guided discovery and creativity. The activities presented therein emphasize understanding rather than memorization. The pupils are provided with learning situations which would lead them to discover mathematical meanings and concepts for themselves, thus gaining deeper and lasting understanding of mathematics.

Another curriculum material, the Elementary Mathematics, Background Information for Teachers, was developed in 1968, as a separate volume. This is an instructional material for teachers who may not have adequate background in the new mathematics.

To upgrade the competencies of elementary mathematics teachers, the workshop-laboratory type of inservice education is propagated whereby teachers learn mathematics the way they are expected to make children learn the subject.

Plans for the future include administration on the national level of Grade 4 and Grade 6 Elementary Mathematics Achievement Tests and translation into Filipino of the Elementary Mathematics Curriculum Ideas for Grades 1 and 2. Publication of inservice training manuals in Elementary Mathematics that will fuse methodology and content in the inservice training experiences is also planned.

Reason: update content &

method, develop new  
course

Adopt: -

Tchr Ed: conducts work-  
shops; provides guides  
& consultants

Pers: FT P T NRT

Adm

Wr

VSch

Res

TEd

Trial

Publ: 2,000

copies/grade

reproduced by

mimeograph

Initiator(s): L.B. Soriano,  
A. Juele, E.E. Abracia

No references given

SCIENCE EDUCATION CENTER,  
UNIVERSITY OF THE PHILIPPINES  
(SEC)

Diliman, Quezon City  
Philippines  
Tel: 97-60-61 loc 289

1964 -  
Gov, UNESCO,  
University,  
Ford, ~~Royalties~~

Dolores F. Hernandez, Director

See ICh Report(s): 8,7,6

Ages: 6-16, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang:* Eng, Pilipino	Lec ✓	texts
Subj: biol, chem, phys, earth-space, math	Sem	lab books
Approach: -	Disc ✓ ✓	activity sheets
Ability: average	Indep	tchr manuals
Eval Meth: achievement, lab & oral tests, tchr jdgmts, student questionnaire	Lab ✓	Non-Print Materials:
Testing: term, unit	Fld ✓	lab equipment
Cont Resp:* administratively & material directed	Dem ✓	
Envir:* classroom, lab, school library & grounds, community	Sim	
	TV	
	A/V ✓	

As indicated in earlier reports, the Center's activities cover three aspects: curriculum development, teacher education and research and development in science and mathematics education. Over a period of 10 years, the Center has undertaken activities in three areas, with a larger proportion of the time devoted to curriculum development which because of the lack of local materials was a priority need at the time when the Center was established. In the 70's, the activities tend to be about equally distributed among the 3 activity areas. The work related to research studies has been largely performed by graduate studies under the direction of SEC senior staff. A limited number of studies are being conducted by SEC staff in cooperation with other units of the University and external institutions of higher learning.

The Center which started as a curriculum development project has developed into an administratively independent unit of the University with an independent budget but with its academic degree programs offered with the College of Education as their Department of Science Teaching. The subject areas covered by SEC projects include all science and mathematics subjects offered in the school system (10-year range), and science and math teacher education for the secondary and elementary school levels.

The curriculum materials are student and activity-oriented; concepts have been chosen that are more meaningful to the Philippine situation; activities have been chosen that are feasible for most Philippine classrooms. Self-learning is encouraged and is made possible in many of the books, particularly the later books by inclusion of questions, problems, games at appropriate sections.

There are presently 9 regional science teaching centers which serve as dissemination centers for improvement of science and mathematics teaching as well as the use of the new curricula in science and math education. Five additional centers are contemplated.

Reason:* publication, change in philosophy, update content & methods, develop new course	Adopt: used nationally	Pers: FT PT NRT	Publ: reproduced institutionally & commercially by mimeograph & offset (\$18/10 students)
	Tchr Ed: conducts workshops; provides manuals & consultants	Adm 3	
		Wr 14.21	
		VSch 7	
		Res 14	
		TEd 1 7	
		Trial 45	

Descriptive References:

Brandou, J.R. Oct 1970. Science Education in Two Countries in the Far East - A First Hand View. The Science Teacher. 3(7).  
Teaton, B.J.D. Oct 1970. Innovations in Philippine Science Teaching. The Science Teacher. 37(7).

Research:

The Teaching of Concepts in Elementary School Mathematics: An Analysis of Teaching conducted in Philippine Setting.

**THE ELEMENTARY SCIENCE CURRICULUM  
DEVELOPMENT PROJECT (ASCD)**

Chu-sheng Yeh Cheng, Director

See ICh Report(s): none

Department of Elementary Education 1972-1974

Ministry of Education

Taipei Taiwan  
Republic of China

\*Gov: Fed, State

Tel: 1. 346454 2. 329916

Ages: 6-11	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Chinese	Lec ✓	texts, lab books,
Subj: biol, chem, phys, earth-space	Sem	supplementary books,
Approach: * integrated, process, conceptual,	Disc ✓	programmed units,
inquiry, discovery	Indep ✓	activity sheets,
Ability: all	Lab ✓	tchr manuals, field
Eval Meth: lab tests, tchr jdgmts,	Fld 1 2	guides, tests,
student questionnaire	Dem ✓	objectives
Testing: * unit, term	Sim	Non-Print Materials:
Cont Resp: teacher guided	TV ✓	slides
Envir: * classroom, lab	A/V ✓	filmstrips
		games
		lab equipment

An advisory Committee was organized with educators, scientists, and education administrators as members and with the Director-General of the Department of Elementary Education of the Ministry as chairman. Within the Committee, a working group was composed of professors and experts in the related fields. Under its direction, a team of 9 elementary school teachers were appointed to work full time. The goal of this Project is to develop curriculum, teaching units, teachers manuals and supplementary readers on science for Grade 1-6.

Based upon the discussions and decisions of the Group, the following guidelines have been adopted: 1) teaching of science at the elementary level should be centered on the development of children's interests in science, attitudes toward science and basic skills and abilities in the study of science rather than on merely acquiring knowledge; 2) equal emphasis should be placed on processes, conceptions, interests and information, throughout the 6 years of learning; 3) application of science in the daily life of children should be encouraged; 4) teaching of science should be closely integrated with that of other related subjects.

Trial teaching is being conducted along with the compilation of every one of the teaching units. From September 1974 - July 1977 an evaluation project is to be conducted in 30 schools.

After evaluation and revision, the teaching materials will be used in all schools. Similar projects have been initiated for elementary mathematics and for chemistry, biology, physics and earth science for Grade 7-9 in 1974 and are to be continued.

Reason: * change in	Adopt: -	Pers: FT PT NRT	Publ: 25,000
philosophy, develop		Adm 2 3	copies repro-
new course	Tchr Ed: conducts work-	Wr 9 12	duced institu-
	shops; provides manuals,	VSch 20	tionally
Initiator(s): Chu-sheng	guides and consultants	Res 1 11	(\$118/10 stu-
Yeh Cheng		TEd	dents)
		Trial 90 18	

No references given

**THE ELEMENTARY SCIENCE CURRICULUM  
DEVELOPMENT PROJECT (ASCD)**

Chu-sheng Yeh Cheng, Director

See ICh Report(s): none

Department of Elementary Education 1972-1974

Ministry of Education

Taipei Taiwan  
Republic of China

\*Gov: Fed, State

Tel: 1. 346454 2. 329916

Ages: 6-11	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Chinese	Lec ✓	texts, lab books,
Subj: biol, chem, phys, earth-space	Sem	supplementary books,
Approach: * integrated, process, conceptual,	Disc ✓	programmed units,
inquiry, discovery	Indep ✓	activity sheets,
Ability: all	Lab ✓	tchr manuals, field
Eval Meth: lab tests, tchr jdgmts,	Fld 1 2	guides, tests,
student questionnaire	Dem ✓	objectives
Testing: * unit, term	Sim	Non-Print Materials:
Cont Resp: teacher guided	TV ✓	slides
Envir: * classroom, lab	A/V ✓	filmstrips
		games
		lab equipment

An advisory Committee was organized with educators, scientists, and education administrators as members and with the Director-General of the Department of Elementary Education of the Ministry as chairman. Within the Committee, a working group was composed of professors and experts in the related fields. Under its direction, a team of 9 elementary school teachers were appointed to work full time. The goal of this Project is to develop curriculum, teaching units, teachers manuals and supplementary readers on science for Grade 1-6.

Based upon the discussions and decisions of the Group, the following guidelines have been adopted: 1) teaching of science at the elementary level should be centered on the development of children's interests in science, attitudes toward science and basic skills and abilities in the study of science rather than on merely acquiring knowledge; 2) equal emphasis should be placed on processes, conceptions, interests and information, throughout the 6 years of learning; 3) application of science in the daily life of children should be encouraged; 4) teaching of science should be closely integrated with that of other related subjects.

Trial teaching is being conducted along with the compilation of every one of the teaching units. From September 1974 - July 1977 an evaluation project is to be conducted in 30 schools.

After evaluation and revision, the teaching materials will be used in all schools. Similar projects have been initiated for elementary mathematics and for chemistry, biology, physics and earth science for Grade 7-9 in 1974 and are to be continued.

Reason: * change in	Adopt: -	Pers: FT PT NRT	Publ: 25,000
philosophy, develop		Adm 2 3	copies repro-
new course	Tchr Ed: conducts work-	Wr 9 12	duced institu-
	shops; provides manuals,	VSch 20	tionally
Initiator(s): Chu-sheng	guides and consultants	Res 1 11	(\$118/10 stu-
Yeh Cheng		TEd	dents)
		Trial 90 18	

No references given



**LOWER SECONDARY SCIENCE  
CURRICULUM DEVELOPMENT PROJECT  
(LSS)**

C. K. Cheah, Director

Science Department  
Institute of Education  
Singapore 9

Tel: IOE EXT 21

1971-1975

Asia Foundation

See ICh Report(s): none

Ages: 13-14, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec 10	lab books
Subj:* biol, chem, phys, tech, soc sci, values education	Sem 5	programmed units
Approach:* integrated, interdisciplinary, conceptual, process, inquiry, discovery	Disc 4	activity sheets
Ability: all	Indep 6	tchr manuals
Eval Meth:* tchr jdgmts, achievement & lab tests	Lab 1	field guides
Testing:* unit, term	Fld 2	overview
Cont Resp:* tchr guided & directed	Dem 3	objectives, charts
Envir:* lab, classroom, sch grounds & library, community	Sim 7	newsletters
	TV 8	Non-Print Materials:
	A/V 9	filmstrips

The LLS Program seeks to provide a more imaginative frame-work in which teachers can carry out their science teaching assignments more effectively. Updating of content and methodology will be carried out not only with the production of teaching materials but also through teacher training programs.

The Program attempts to take full advantage of pupils' natural curiosity for scientific exploration. It also seeks to investigate basic concepts in science. An additional feature is an examination of issues of a socio-scientific nature such as social responsibility in science and environmental problems.

The units for science teaching are based on broad themes or conceptual schemes. The whole program consists of basic units and optionals. The basic units selected to date are: Exploring Science, Structure of Matter, Energy, Water and Solutions, Ecology, and Social Biology.

A number of optionals are envisaged. Essentially project-like in character, the idea of having optionals is for each school to add local color to its own science teaching program.

As the Project will not be officially implemented in schools until January 1976, it is too early for us to speak of evaluation. Nevertheless 'informal' evaluation is going on all the time. We do realize however that evaluation is a vital phase of curriculum development and we hope that when the time comes it will be an exercise which permits in-depth study of problems and solutions.

Reason:* update methods & content	Adopt: 1000 tchrs, 44,000 students, 100 sch	Pers: FT PT NRT	Publ: 2,000
Initiator(s): R. Wang, J. Yip	Tchr Ed:* conducts workshops; provides manuals, guides, consultants, films	Adm 1	copies repro-
		Wr 1 20	duced insti-
		VSch 1	tutionally by
		Res 1	mimeograph &
		TEd 4	offset
		Trial 40	

**Descriptive References:**

Integrated Science Teaching in the Asian Region - Part I Concepts of Integrated Science Teaching. 1970. Regional Workshop Report.

Hall, W.C. Nov 1971. The Need for Integrated Science. Education in Science.

Blum, A. Towards a Rationale for Integrated Science Teaching. New Trends in Integrated Science Teaching, Vol. II. UNESCO.

**Research:**

Post-graduate research on attitudes of grade 7-8 pupils towards science in progress.

**CAAS SCHOOL BIOLOGY PROJECT  
(SBP)**

V. Basnayake, Director

See ICh Report(s): 6,5,4

Department of Physiology  
Faculty of Medical, Dental  
& Veterinary Science  
Peradeniya Campus  
University of Sri Lanka  
Peradeniya, Sri Lanka

1964-1969

\*Foundation,  
Government

Ages: 14-16	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Sinhala	Lec	supplementary books
Subj: biol	Sem	tchr manuals
Approach: inquiry	Disc 1	texts
Ability: average	Indep	
Eval Meth: achievement tests	Lab 2	
Testing: unit	Fld 4	
Cont Resp: * administratively directed,	Dem 3	
tchr guided	Sim	
Envir: * classroom, lab	TV	
	A/V	

The goal of the project was to improve the teaching of biology in Sri Lanka secondary schools for pupils of the age group 14-16 years.

Some unique characteristics of the project are: 1) involvement of the university and voluntary groups in preparing curriculum materials for use in the government school system. The sponsor of the project was the Ceylon Association for the Advancement of Science which is a voluntary organization of the scientific community in the country. The university was involved to a far greater extent than ever before in school curriculum work in Ceylon; 2) modification of the public examination to provide for the candidates in the project's trials of its curriculum materials. The Ministry of Education kindly made arrangements to have a specially-modified paper at the public examination (General Certificate of Education, Ordinary Level) for two teachers each with about 500 pupils with whom the project's materials were tried.

The curriculum materials did not get into the school system at-large, chiefly because government policy on school curricula changed; the project's materials had been prepared for biology in grades 9 and 10 and the replacement of biology, chemistry, and physics by integrated science.

The project has had an impact on the university, however, through a self-renewing influence upon the university teachers who took part in the project.

Supplementary materials prepared by the project on Ceylon biology are likely to be published by the government for use at senior secondary school level.

Reason: update methods	Adopt: -	Pers: FT PT NRT	Publ: 1,000
Initiator(s): Ceylon Assoc.	Tchr Ed: -	Adm 1 1	copies repro-
for Advancement of Science,		Wr 20	duced institu-
Ministry of Education		VSch	tionally by
		Kes	mimeograph
		TEd	
		Trial 16	

**Descriptive References:**

Crusz, H. Dec 1966. The CAAS School Biology Project. Proceedings of the First Asian Regional Conference on School Biology. Asian Association for Biology Education. pp. 76-99.

James, S.L. 1974. School Biology Project. The New Era. 55(1): 16-18.

**Research:**

Basnayake, V., and S.L. James. 1971. Time Requirement for Teaching a Biology Course. Journal of the National Education Society of Ceylon. 20: 3-21.

James, S.L. Aug 1972. Consistency of Performance in In-Course Tests and in a Public Examination of Classrooms in a Biology Curriculum Trial. Proceedings of the Fourth Asian Regional Conference in Biological Education. University of the Philippines Science Education Center: Asian Association for Biology Education. pp 388-390.

Ericagama, I. Aug 1972. Performance in a Biology Examination of Schools Before and During Participation in a Curriculum Revision Project in Sri Lanka. Proceedings of the Fourth Asian Regional Conference in Biological Education. University of the Philippines Science Education Center: Asian Association for Biology Education. pp 380-387.



**ELEMENTARY MATHEMATICS PROJECT  
OF SRI LANKA (SLEMP)**

**D.A. Perera, Director**

**See ICh Report(s): 7**

**Curriculum Development Centre  
255, Baudhaloka Mawata  
Colombo-7  
Sri Lanka  
Tel: 84386/82241 (Colombo)**

**1968-1976**

<b>Ages: 6-10</b>	<b>Exper: C1 12+ 2-12 I</b>	<b>Printed Materials:</b>
<b>Lang: Sinhala, Tamil</b>	<b>Lec</b>	<b>activity sheets</b>
<b>Subj: math</b>	<b>Sem</b>	<b>tchr manuals</b>
<b>Approach: * conceptual, discovery, inquiry,</b>	<b>Disc</b>	<b>tests</b>
<b>integrated</b>	<b>Indep</b>	
<b>Ability: all</b>	<b>Lab</b>	<b>Non-Print Materials:</b>
<b>Eval Meth: * tchr jdgmts, achievement &amp;</b>	<b>Fld</b>	<b>games</b>
<b>oral tests</b>	<b>Dem</b>	<b>models</b>
<b>Testing: individual</b>	<b>Sim</b>	<b>equipment</b>
<b>Cont Resp: tchr guided</b>	<b>TV</b>	
<b>Envir: community, school grounds, classroom</b>	<b>A/V</b>	

The main objective of the Project is to develop a new Curriculum in mathematics for the elementary school encompassing topics in modern mathematics taking into consideration the pattern of development of mathematical concepts in local children.

Individual experiments are carried out on children of different age groups selected from different environments and detailed observations are made of their responses by a team of research workers. With the advice of this team, suitable activities are designed for the children. These activities are tried out with children of appropriate grades and then passed on to teachers with additional guide notes. These teachers try out the activities with small groups of children on a part-time basis. The guide-notes are revised in accordance with the feedback supplied by them and put into the form of teachers' guides. The teachers' guides are made available to the teachers in the pilot schools. Frequent visits are made to the pilot schools by members of the curriculum team and discussions held with the teachers. They also observe children at work and peruse their written records. In the light of all these, the teachers' guides are edited and then printed enabling a larger number of teachers to use them.

In the curricular material that is prepared greater emphasis is placed on the children being made to discover facts for themselves. The teacher has to initiate discussion and help the children to proceed with the activity. The children work in pairs or in groups of 4 or 5. They are encouraged to talk among themselves about their discoveries and their problems. The teacher is expected to move from group to group and make observations of children's progress and determine what activities should be provided to them.

<b>Reason: update content</b>	<b>Adopt: (partial) 1,400 tchrs,</b>	<b>Pers: FT PT NRT</b>	<b>Publ: 15,000</b>
<b>&amp; method, change in</b>	<b>49,000 students, 900 schools</b>	<b>Adm 1 2</b>	<b>copies re-</b>
<b>philosophy, develop</b>	<b>Tchr Ed: conducts work-</b>	<b>Wr 3 10</b>	<b>produced in-</b>
<b>new courses</b>	<b>shops; provides guides &amp;</b>	<b>VSch 3 10</b>	<b>stitutionally</b>
<b>Initiator(s):</b>	<b>consultants</b>	<b>Res 8</b>	<b>&amp; commer-</b>
<b>S.B. Thoradeniya</b>		<b>TEd 44</b>	<b>cially by</b>
<b>P.T.S. de S. Wijetunga</b>		<b>Trial 30 100</b>	<b>mimeograph &amp;</b>
<b>G. Kannangara</b>			<b>linotype</b>
<b>C. Malvenna</b>			<b>(\$3/10 stu-</b>
			<b>dents)</b>

**Descriptive References:**

**Thoradeniya, S.B. Aug 1972. Developing a New Curriculum in Mathematics for the Elementary School. Paper read at Asian Seminar on Learning and Educational Process, Bangkok.**

**Research:**

**Perera, D.A. June 1972. Child Studies Relating to the Development of Mathematics Concepts in Primary School Children. Paper read at Expert Seminar in Science and Mathematics, Bangkok.**

**JUNIOR SECONDARY SCHOOL  
MATHEMATICS PROJECT**

**D.A. Perera, Director**

**See ICh Report(s): 7**

**Curriculum Development Centre  
255, Baudhaloka Mawatha  
Colombo-7  
Sri Lanka  
Tel: 84386**

**1971-1974**

**Gov:State**

<b>Ages: 11-14</b>	<b>Exper: Cl 12+ 2-12 I</b>	<b>Printed Materials:</b>
<b>Lang: Sinhala, Tamil</b>	<b>Lec</b> ✓ ✓	<b>texts</b>
<b>Subj: math</b>	<b>Sem</b>	<b>programmed units</b>
<b>Approach: discipline centered, conceptual, inquiry, discovery</b>	<b>Disc</b>	<b>tchr manuals</b>
<b>Ability: all</b>	<b>Indep</b>	<b>tests</b>
<b>Eval Meth: achievement &amp; oral tests</b>	<b>Lab</b>	<b>objectives</b>
<b>Testing: term</b>	<b>Fld</b> ✓ ✓	
<b>Cont Resp: administratively directed</b>	<b>Dem</b> ✓ ✓	
<b>Envir: community, sch grounds &amp; library, classroom</b>	<b>Sim</b>	
	<b>TV</b>	
	<b>A/V</b> ✓ ✓	

The goal of the project has been to produce a mathematics Curriculum for the Junior Secondary Schools as a part of the compulsory national curriculum in general education set forth by the Ministry of Education of the Republic of Sri Lanka. The course will be in use throughout the country by all Junior Secondary School pupils. It will be a continuous course extending from Grade 6 to Grade 9, at the end of which the pupils will take the National Certificate of General Education examination.

The learning experiences are based on the objects of the pupils environment and the demands made on them for everyday activities including further education. Pilot tests are being conducted by the Curriculum Development Centre.

Plans for the future include a curriculum for the grades 10 and 11 to meet the needs of the different courses to be designed using, Physical Sciences, Biological Sciences and Social Sciences as well as revision of the present Curriculum to suit the changes caused by the Sri Lanka Elementary Mathematics Project.

<b>Reason: update content &amp; methods, change in philosophy, develop new course</b>	<b>Adopt: 6,500 tchrs, 734,000 students, 6,000 schools</b>	<b>Pers: FT PT NRT</b>	<b>Publ: 250,000 copies (\$5/10 students)</b>
<b>Initiator(s):</b>	<b>Tchr Ed: conducts work-shops; provides guides &amp; consultants</b>	<b>Adm</b> 1 5	
<b>A.J. Gunawardena</b>		<b>Wr</b> 10	
<b>S. Paramanathan</b>		<b>VSch</b>	
		<b>Res</b>	
		<b>TEd</b> 38	
		<b>Trial</b> 40	

**No references given**

JUNIOR SECONDARY SCHOOL  
SCIENCE PROJECT

A.M. Ranaweera, Director  
See ICh Report(s): 7

Curriculum Development Centre  
255, Bauddhaloka Mawatha  
Colombo-7  
Sri Lanka  
Tel: 84386

1971-1974

Gov: State

Ages: 11-14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Sinhala, Tamil	Lec	texts
Subj: integrated science	Sem	tchr manuals
Approach: integrated, conceptual, inquiry, discovery	Disc ✓	tests
Ability: all	Indep	objectives
Eval Meth: achievement & oral tests	Lab ✓	guides
Test ng: term, unit	Fld ✓	
Cont Resp: administratively directed	Dem ✓	
Envir: community, school grounds & library, classroom	Sim	
	TV	
	A/V	
	Radio ✓	

The objectives of the Project were to develop an integrated science curriculum for the Junior Secondary School, as part of the compulsory national curriculum in general education set forth by the Ministry of Education, Govt. of Sri Lanka. The program will be in use throughout the country by all Junior Secondary School pupils. It will be a continuous course extending from Grade 6 to Grade 9 at the end of which, the pupils will take the National Certificate of General Education examination.

The learning experiences are based on the pupils environment and developed to meet the needs of national development and the pupils everyday life. Pilot tests are being conducted by the Curriculum Development Centre.

Plans for the future include a Grade 10 - 11 Curriculum Project in Physical Science and Biological Science and a Primary Science Project for Grades 1 - 5.

Reason: update content & methods, change in philosophy, develop new course	Adopt: 7,000 tchrs, 734,000 students, 6,000 schools	Pers: FT PT NRT	Publ: 250,000
	Tchr Ed: conducts workshops; provides guides & consultants	Adm 5 Wr 10 VSch 10 Res TEd 30 Trial	copies reproduced institutionally by linotype (\$5,10 students)
Initiator(s): A.M. Ranaweera, G. Dharmawardane			

Descriptive References:

UNESCO Science Education Newsletter. Feb 1974. Region Office: Bangkok.

Final Report: Japanese National Commission for UNESCO. Nov 1972. Regional Meeting for Science Education Improvement in Asia, Tokyo, Japan.

CEDO LABORATORY/WORKSHOP,  
COLLEGE OF EDUCATION, THAILAND  
David Leonard, Director  
See ICh Report(s): none

Prasarnmitr  
50123 Sukhumvit Road  
Bangkok 11, Thailand  
Tel: 911039, ext 32

1972-1976  
Gov: British &  
Thai, CEDO  
(British Coun-  
cil)

Ages: tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:*
Lang: Thai	Lec 2	suggestions for
Subj: science	Sem 3	apparatus to be made,
Approach: * integrated, inquiry, discovery	Disc 4	objectives
Ability: all	Indep	
Eval Meth: * lab tests, tchr jdgmts,	Lab 1	Non-Print Materials:*
videotaped teaching of peers, practice	Fld 4	videotape
teaching	Dem 2	models
Testing: -	Sim	lab equipment
Cont Resp: * material & student directed,	TV 3	black & white prints
tchr guided	A/V	
Envir: * lab, TV studio, classroom		

The objectives of the Workshop have been: 1) to use apparatus to demonstrate certain teaching points in science; 2) to use apparatus in a variety of experimental situations; 3) to successfully construct apparatus from simple, cheap materials, using tools readily available in Thailand; 4) to be able to use questions to develop the understanding of pupils doing science in schools; 5) to become aware of the new curricula and materials to be offered in Thailand; 6) to use natural materials to increase understanding and observation by pupils in schools; 7) to train Thai lectures to develop the course after the expert has left.

Some unique features of the program are: 1) continuous assessment of apparatus construction and use on a 1-5 scale; 2) videotaped lesson given to peers, using apparatus or experiment and played back for critical review; and 3) observation and supervision of students using apparatus in teaching practice schools.

One of the branches of the College of Education at Bangsaeen is getting help with starting a similar Laboratory/Workshop. Hopefully the work will continue but this will depend on the encouragement by the Thai administration as the external aid is being withdrawn. The success of such a project must be seen in terms of whether there is some vestige of influence left some 10 or 20 years after the project has been started.

Reason: update methods	Adopt: -	Pers: FT PT NRT	Publ: 500 copies
Initiator(s): R. Morris,	Tchr Ed: * conducts work-	Adm 2	reproduced in-
G. Van Prargh,	shops; provides consul-	Wr 4	stitutionally
B. Gontong	tants & manuals	VSch 4	by mimeograph
		Res 2	(\$125/10 stu-
		TEd	dents)
		Trial	

#### Descriptive References:

Leonard, D. Jan 1974. Improving Science Teaching in Thailand. Educational Development International. 2(1). CEDO.

#### Research:

Menajaya, P. Evaluation of Scientific Equipment Production Project for Teaching in M.S. 2\* by the Teacher Students. 1972. Prasarnmitr, M.Ed. Thesis, The College of Education.

\*M.S. 1,2,3 = grades 8,9,10 in U.S. system.

THE INSTITUTE FOR THE PROMOTION  
OF TEACHING SCIENCE AND TECHNOLOGY  
(IPST)

924 Sukhumvit Road  
Bangkok, Thailand  
Tel: 924020

1970-1976  
Gov, UNESCO  
UNDP

Sunan Sumitra, Director

See ICH Report(s): 8

Ages: 6-17	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Thai	Lec ✓	texts, lab books
Subj: biol, chem, phys, math, general	Sem	supplementary books
science, physical science	Disc ✓	activity sheets,
Approach: integrated, conceptual,	Indep	overview, newsletters
inquiry	Lab ✓	tchr manuals, tests
Ability: avg	Fld ✓	objectives, charts
Eval Meth: achievement tests, tchr	Dem ✓	Non-Print Materials:
jdgmts, student questionnaire	Sim	slides, films
Testing: term, unit	TV	overhead transpar-
Cont Resp: administratively directed	A/V	encies, modesl
Envir: school grounds & library, class-		videotape, slide
room, lab		tape, lab equipment

The objectives of the Institute are to promote the development of modern science and mathematics curricula, and the teaching practices congruent with modern approaches to teaching and learning science and mathematics for the schools of Thailand. Curriculum development in IPST is carried out by various Design Teams working in close cooperation with one another. One of the unique characteristics of IPST is the comprehensive series of design teams composed of personnel from the Ministry of Education, universities and teacher's training colleges, and from elementary and secondary school classrooms.

Each design team consists of a Head and approximately 10 members, mostly working parttime in conjunction with their regular assignments in the Ministry or in high schools, colleges or universities where they teach.

All of the teams are committed to a student-centered approach to science and mathematics education. This means planning for experiments and other student activity in classrooms that are not equipped as laboratories. Experiments and activities have been integrated into all text materials produced for students; guides contain extensive suggestions and background information to assist teachers; portable kits have been designed and produced to facilitate the student-centered approach.

The work of IPST has been under continuous formative evaluation. Trial teachers have been involved in testing the work of the design teams from the time of earliest efforts. Feedback instruments that measure in the cognitive, affective and psychomotor domains have been generated and validated. They are in an integral part of the program. Summative evaluation instruments are under development for each course.

Following three-five years of development and trial teaching that has included formative evaluation and revision based on feedback, the new science and mathematics curricula will be submitted to the Ministry of Education for their approval and for implementation throughout Thailand. The impact will alter the teaching of science and mathematics at all primary and secondary school levels for an entire nation. Higher education will be influenced as well.

Future plans call for an extensive teacher preparation program. Teachers from throughout Thailand will be brought into Bangkok for six-week intensive training programs. Regional teacher centers will be established throughout Thailand. Curriculum work at the elementary school level (already in progress in mathematics) will probably be extended to science and to an integrated science/mathematics program for the primary schools. Other areas of the curriculum (i.e. social studies, languages, fine arts, etc) will receive attention also.

Reason: update content	Adopt: (trial) 116 tchrs,	Peis: FT PT NRT	Publ: 1500
& method, change in	5800 students, 58 schools	Adm	copies repro-
philosophy, develop	Tchr Ed: conducts work-	Wr	duced institu-
new course, publication	shop; provides manuals,	VSch	tionally by
Initiator(s): Ministry	guides & consultants	Res	offset
of Education		TEd	
		Total 150-100	

Descriptive References:

Eighth Report of The International Clearinghouse on Science and Mathematics Curricular Developments. 1972.

RECSAM Regional Workshop on Proposals for RECSAM's Second 5-Year Plan (1975-1980).  
Vol. 1 and Vol. 2. 1974.

**SAMOAN CURRICULUM IN SCIENCE**  
(Adapted from SCIS) (SCIS)

John Bromley, Director

Department of Education  
Pago Pago  
American Samoa 96/99

Tel: overseas Oakland 633-4246

1971-1976

Gov: Fed, Local

See ICh Report(s): none

Ages: 6-14, tchr ed	Exper: CI 12+ 2-12 I	Printed Materials:
Lang: Eng, Samoan	Lec ✓ ✓	lab books
Subj: biol, chem, phys	Sem ✓	tchr manuals
Approach: process, inquiry, discovery	Disc ✓	newsletters
Ability: all	Indep ✓	Non-Print Materials:
Eval Meth: oral tests, tchr jdgmts,	Lab	games
student questionnaire	Fld ✓	lab equipment
Testing: varies	Dem	
Cont Resp: tchr guided	Sim	
Envir: school grounds & library, classroom	TV	
	A/V	

The Samoan Curriculum In Science program that the Department of Education, Government of American Samoa, is implementing is based on the Science Curriculum Improvement Study (SCIS) curriculum.

The program has been adapted for American Samoa. All plants and animals used in the Life Science units of SCIS are collected from the local island environment. The Physical Science units are also scheduled for rewriting to localize some of the activities.

The Micronesian Title III project, "Elementary Science Improvement Project" has been very helpful in supplying advice and materials for the adaptation to an island environment.

The project goals and objectives, major principals of learning, etc. are the same as the Science Curriculum Improvement Study on which the project is based.

The project is having a major impact on science education in American Samoa. By September, 1976, all elementary grades in Samoa will be doing SCIS. (By that time, the Department of Education will have spent \$250,000 to implement the program here--in 27 schools, on six islands, for our 6000 students.)

Reason: change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: 300 copies
Initiator(s): J.P. Bronley	Tchr Ed: conducts work-shops; provides manuals & consultants	Adm 3 Wr 3 VSch 3 Res TEd 4 Trial 12	reproduced commercially by mimeograph (\$400/10 students/5 yrs)

See publications of Science Curriculum Improvement Study.



**SAMOAN SEA STUDY LABS  
(SSSL)**

Ronald L. Needham, Director

c/o Fagaitua High School  
Department of Education  
Pago Pago, American Samoa 96799  
Tel: 622-7504

1972-1975

Gov: Fed (EEEE  
Title III)

See ICh Report(s): none

Ages: 13-19, tchr ed

Lang: Eng, Samoan

Subj: marine science

Approach: -

Ability: all

Eval Meth: student questionnaire

Testing: pre & post project

Cont Resp: \* administratively & tchr  
directed

Envir: \* lab, boat

Exper: \*C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials: \*

activity sheets,

annual report

evaluation design

objectives, tests

tchr manuals

field guides

programmed units

Non-Print Materials:

slides, videotape,

film, overhead

transparencies, lab

equipment, boat

fittings, fishing

tackle

The resources of the sea represent an almost untapped source of food and jobs for Samoans and yet there is general apathy among Samoans toward the development and conservation of these resources. The Samoan Sea Study Lab (SSSL) program is designed to reverse this apathy in high school students by providing students with experiences that will encourage interest in the sea and bring about understanding of the importance of the resources of the sea. The program has three components: interest stimulation, interest development, and career awareness.

Component I is a two-week minicourse in marine studies, required of all 9th grade students. The minicourse students spend seven class periods in the on-shore marine laboratory, one class period on a reef walk field trip, and two half-day excursions on the SSSL floating laboratory, which is equipped with a variety of oceanographic gear. The students measure and sample the ocean, study their data and samples, do behavioral studies and pollution and aquaculture experiments, and occasionally get seasick.

The SSSL elective semester class, Component II, which is open to students completing the minicourse, provides more extensive learning opportunities for interested students. In this class students practice coastal navigation, study biological, physical, chemical, and geological oceanography, learn fisheries techniques, conduct experiments of their own design in aquaculture and pollution effects, and learn the realities of water transportation systems. The semester class experience includes about fourteen boat trips ranging in length from half-day to overnight. This class was available only at the pilot school in 1974.

Some students become interested enough to consider choosing a vocation or field of study in higher education dealing with the sea. The SSSL staff, in cooperation with the High School Counselors, provides current and active information and counseling about the availability and advisability of marine related jobs and study opportunities. This advice makes up Component III of the program.

Reason: develop new  
course

Adopt: 2 tchrs, 450  
students, 1 school

Pers: FT PT NRT

Adm 1

Wr

VSch

Res

TEd 1

Trial

Publ: 1,000

copies repro-

duced insti-

tutionally &

commercially

by mimeograph

& offset

Initiator(s): S.M.

Atuatasi, R.L. Needham

Tchr Ed: \* conducts work-  
shops; provides manuals  
& consultants

No references given

AUSTRALIAN ACADEMY OF SCIENCE  
SCHOOL BIOLOGY PROJECT: THE  
WEB OF LIFE

D.G. Morgan, Director

191 Royal Parade  
Parkville  
Victoria 3052  
Australia

Tel: 347-2573 (Melbourne)

1965 -

Australian  
Academy of  
Science

See ICh Report(s): 8,7

Ages: 16-17

Lang: Eng

Subj: biol

Approach: \* inquiry, conceptual

Ability: \* all, average

Eval Meth: tchr jdgmts

Testiug: term, unit

Cont Resp: material directed

Envir: lab

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc ✓

Indep

Lab ✓

Fld ✓

Dem

Sim

TV

A/V

Printed Materials:

texts

lab books

tchr manuals

tests

charts

Non-Print Materials:

slides

films

The broad heading 'biology' covers perhaps a wider range of scientific activity than other scientific disciplines. Though it deals with analysis of the parts of a system it differs from them in throwing great emphasis on the whole functioning system with all its complex interactions. To be informed on these matters is important to the ordinary citizen and to all types of scientist and technologist. To be able to make wise decisions concerning them is important, not only to the individual, but to human society as a whole.

For these reasons this course has aims which go well beyond clear and accurate presentation of selected biological information and beyond an historical account of major biological theory. The overall course objectives are to foster in the individual student: 1) scientific understanding of the living world, including man; 2) understanding of the nature, scope and limitations of science; 3) competence and willingness to apply biological understanding to scientific and everyday problems, and to approach these problems in scientific ways; and 4) ability to communicate effectively, and to work jointly with others towards solving problems of mutual concern.

These goals require thoughtfully designed teaching strategies. The resource materials provided and learning situations employed should represent science as a process of inquiry, use inquiry-centered teaching strategies, and base the student's development of concepts on direct, personal experience.

Reason: update methods,  
change in philosophy

Adopt: most senior  
secondary schools in  
Australia

Initiator(s): Australian  
Academy of Science, Ed  
Dept of Victoria & South  
Australia

Tchr Ed: provides con-  
sultants

Pers: FT PT NRT

Adm 1

Wr 5

VSch 4

Res

TEd

Trial 100's

Publ: 50,000

copies per run

reproduced com-

mercially by

linotype

(\$110/10 stu-  
dents)

Descriptive References:

Australian Science Teachers Journal. Various Numbers 1967-1974.

All BSCS Newsletter Publications.



**AUSTRALIAN SCIENCE EDUCATION  
PROJECT (ASEP)**

Director: -

See ICh Report(s): 8,7

Curriculum Development Centre  
Australian Department of Education  
450 St. Kilda Road  
Melbourne, Victoria  
Australia  
Tel: 267-2988

1969-1973  
Gov: Fed, State

Ages: 12-15	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	lab books, supplementary books, activity sheets, tchr manuals, tests, overview, newsletters, charts
Subj: biol, chem, phys, earth-space, social sciences, anthropology	Sem	
Approach: interdisciplinary, integrated, inquiry	Disc ✓ ✓	
Ability: all	Indep ✓	
Eval Meth: achievement, lab & diagnostic tests, tchr jdgmts	Lab ✓	
Testing: individual	Fld ✓	
Cont Resp: tchr guided, material & student directed	Dem ✓	Non-Print Materials:
Envir: * lab, sch grounds, community, school library	Sim	slides, filmloops, films, games, lab equipment
	TV	
	A/V ✓	

The goals of the project have been: 1) to develop instructional materials in science for use by teachers and students in Grades 7 to 10 in secondary schools throughout Australia; 2) to develop in children some understanding of man, his physical and biological environment, inter-personal relationships, skills and attitudes important for scientific investigation, some understanding of the nature, scope and limitations of science, some understanding and concern for the consequences of science and technology.

Some special characteristics of the program are: 1) materials permit individual student progress, providing student choice within topics and student and teacher choice among topics; 2) inquiry approach, laboratory or field centered; 3) materials designed for three Piagetian levels of development: concrete, transition between concrete and formal, and formal; 4) an environmental scheme forms the basis for original choice of topics, emphasizing the environment as seen by children and extending beyond traditional science subject matter; 5) reading levels have been carefully controlled.

Formative evaluation of each unit was carried out in 4-8 local schools closely observed by Project staff. A wider trial was conducted in all Australian States to determine State differences and requirements. In the national trial, each unit was tried in 26 classes.

A small team will service the published materials. They will begin to collect feedback systematically with a view to future revision and supplementation of the materials.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: 43,000
	Tchr Ed: provides guides, films & consultants	Adm 3	copies reproduced by Govt printer by offset (\$28/10 students)
Initiator(s): W.C. Radford, Australian Council for Educational Research		Wr 14	
		VSch 20	
		Res	
		TEd 8 30	
		Trial 500	

**Descriptive References:**

- Lucas, A.M. 1971. ASEP - A National Curriculum Development Project in Australia. Occasional Paper. SMEAC, Eric Center, Ohio.
- Dale, L.G. 1973. Australian Science Education Project (ASEP). Science Education News. American Association for the Advancement of Science.

**AUSTRALIAN SCIENCE TEACHER  
EDUCATION PROJECT (ASTEP)**  
D.R. Driscoll & P.J. Fensham  
See ICh Report(s): 8

School of Teacher Education  
Canberra College of Advanced  
Education  
P.O. Box 381 Canberra City  
Australia 2601  
Tel: 52211

1972-1975  
Gov: Australian  
Advisory Comm.  
for R & D in  
Ed

Ages: tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: biol, chem, phys, earth-space	Sem ✓ ✓	Tchr manuals
Approach: -	Disc ✓ ✓	newsletters
Ability: all	Indep ✓ ✓ ✓	Non-Print Material
Eval Meth: tchr jdgmts, student q're	Lab ✓ ✓	slides
Testing: -	Fld	videotape
Cont Resp: tchr directed	Dem ✓ ✓	audiotape
Envir: -	Sim ✓ ✓	
	TV	
	A/V	

The overall project purpose is to develop a number of units of work suitable for the professional education of pre-service teachers of science. The specific objectives of the project are: 1) to give to pre-service science teachers an insight into both the nature of their subject and of children, 2) to develop general techniques of classroom and laboratory management and practice, 3) to provide a channel for increased communication and dialogue amongst science teacher educators in Australia.

The project is aimed at those involved in the professional education of science teachers. The intention is not to provide a complete course, but to produce a varied collection of units of work in a number of areas, from which an individual lecturer could select those which he felt could usefully be incorporated into his course.

Reason: update method, develop new course	Adopt: (partial) 50 tchrs, 1000 students, 25 sch	Pers: FT PT NRT	Publ: 100
Initiator(s): D.R. Driscoll P.J. Fensham	Tchr Ed: no special preparation required	Adm 1 Wr 4 VSch 50 Res 1 TEd Trial 50	copies repro- duced insti- tutionally by offset (\$10/ 10 students)

No references available

EDUCATION DEPARTMENT OF  
WESTERN AUSTRALIA HIGH  
SCHOOL MATHEMATICS PROJECT

N. Hoffman, Director

See ICh Report(s): 8,6,5

Secondary Mathematics Curriculum  
Branch  
8 Parliament Place  
West. Perth 6005  
Western Australia  
Tel: 22 1677

1961 -  
Gov:State

Ages: 13-15	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec 1 2	texts
Subj: math	Sem	tchr manuals
Approach:* discipline-centered, process, conceptual	Disc	
Ability: all	Indep 3	
Eval Meth: achievement tests, tchr jdgmts	Lab	
Testing: varies	Fld	
Cont Resp:* administratively & tchr directed	Dem	
	Sim	
	TV	
	A/V	
Envir:* classroom, sch library		

The aims of the project have been to: 1) develop significant mathematics topics each from fundamental concepts and each as part of one integrated study. The topics, are developed to the level of attainment at which the students are capable of operating; 2) produce textbooks and where appropriate teachers' notes for four levels of student ability - Advanced, Ordinary, Elementary and Basic.

The levels begin with common material but subsequently diverge considerably both in depth of treatment and content. The books are now in use in about 98% of all schools in Western Australia. The schools have the choice of any text books but these texts seem to have been preferred because of the price, the suitability for Western Australia and the availability of the books.

There has been no evaluation of the project or research studies associated with the project.

Since the beginning of 1973 all the texts have been revised for metric measurements. It is now planned to reconsider all the first year materials particularly for the child who has above average mathematics ability.

Reason: develop new course	Adopt: 600 tchrs, 65,000 students, 240 schools	Pers: FT PT NRT	Publ: 300,000
Initiator(s):	Tchr Ed: provides manuals & consultants	Adm 1	copies/year re-
J.R. Greenway,		Wr 4 2	produced insti-
R. Mortlock, N. Hoffman		VSch 1 2	tutionally by
		Res	offset (\$25/10
		TEd 2	students)
		Trial	

No references given

**INDIVIDUAL MATHEMATICS  
PROGRAM (IMP)**

M.L. Clark, Director

See ICh Report(s): 8,7,6,5,4

Australian Council for Educa-  
tional Research  
Box 210, Hawthorn  
Victoria, Australia 3122  
Tel: 81-1271

1964-1974  
Publisher,  
ACER

Ages: 7-12, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: math	Sem	tests
Approach: -	Disc	learning sequence
Ability: average, average +	Indep	cards
Eval Meth:* achievement tests, tchr	Lab	activity sheets
jdgmts	Fld	record books &
Testing: diagnostic pre-tests,	Dem	charts, puzzle cards
mastery tests	Sim	Non-Print Materials:
Cont Resp: tchr guided	TV	overlay grids, pegs
Envir:* classroom, sch grounds	A/V	pencils, outlines
		spinner & stamps

The general purpose of the project has been to provide flexible text and assignment materials in upper elementary school mathematics which facilitate individual progress through a modern program based on the outlines developed by an all States Curriculum Officers' Conference convened by the Australian Council for Educational Research (ACER) in March, 1964. It includes a comprehensive testing program integrated with the development of several major topics in mathematics.

Specific objectives are to develop ability to calculate accurately with whole numbers and fractions; to recognize and use spatial relationships and patterns; to recognize and use common measures of length, capacity, time, weight, area and volume (now in metric); to make sound estimates and verify these; to use an appropriate vocabulary and organize information in a meaningful way; to work independently on some tasks and co-operately on other tasks; and to reorganize mathematical elements of real life situations.

A unique characteristic of the program is that its placement and mastery tests effectively monitor and individualize rate of progress through an integrated course in elementary mathematics. It can be used either by whole classes or small groups, or by individuals. The kit can be prorated between classes but individuals retain their own test record book and work sheets. Additional and enrichment assignment booklets are provided.

Manipulation of a variety of shapes, patterns and grids as well as field work, provides exploratory experience in a wide range of situations leading to an understanding of basic mathematical concepts. Knowledge gained and skills developed are reinforced through the assessment procedures and enrichment exercises.

During the development stages formative evaluation was undertaken by project staff and trial classroom teachers. There has been no published summative evaluation, but copy of a report on a follow-up study of Kit B is held by the University of Melbourne, Faculty of Education.

Reason: update method, change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: 15,000
	Tchr Ed: provides manuals	Adm 2 1	kits reproduced
Initiator(s): ACER, S.S. Dunn		Wr 6	commercially
		VSch	by offset
		Res	
		TEd	
		Trial	

**Descriptive References:**

Izard, J.F. Dec 1966. An Individual Approach to the Testing of Mathematics.  
Tasmanian Teacher. 17:16-18.

Education (NSW), Nov. 16, 1966. 47: 1963.

Queensland Teachers Journal. May 1967. 72: 126-128.

**Research:**

Izard, J. A Report on a System of Instructional Materials for Mathematics, Designed to Cater for Difference in Individual Attainment and Rate of Working.  
Unpublished mimes. 1966. pp 104 plus appendices. A.C.E.R. library (F372.73044).

**JUNIOR SECONDARY SCIENCE  
PROJECT (J.S.S.P.)**

**Director: -**

**See ICh Report(s): 8,7,6,5,4**

c/o Australian Council for  
Educational Research  
P.O. Box 210, Hawthorn  
Victoria, Australia 3122  
Tel: (Melbourne) 81-1271

**1966-1968**

**Gov: State;  
Foundation,  
Publisher,  
ACER**

<b>Ages:</b> 12-13	<b>Exper:</b> C1 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang:</b> Eng	<b>Lec</b>	tchr manuals
<b>Subj:</b> biol, chem, phys, earth-space	<b>Sem</b>	tests
<b>Approach:</b> integrated, inquiry	<b>Disc</b> ✓	overview
<b>Ability:</b> all	<b>Indep</b> ✓	learning sequence
<b>Eval Meth:</b> * achievement tests, tchr jdgmts,	<b>Lab</b> ✓	cards & books
lab tests	<b>Fld</b> ✓	activity sheets
<b>Testing:</b> unit & diagnostic tests	<b>Dem</b> ✓	
<b>Cont Resp:</b> material directed	<b>Sim</b>	
<b>Envir:</b> * lab, sch grounds, community	<b>TV</b> ✓	
	<b>A/V</b>	

The project originally aimed to develop materials for use in classrooms in grades 7 through 10, which would develop in pupils an understanding of the universe as conceived by scientists, some understanding of the scope and nature of science, certain skills important to science, and certain attitudes relevant to science. The areas of study included in the set of 18 units finally developed to cover grades 7 and 8 were The Earth in Space, The Earth and its History, How Matter Behaves, How Matter Combines, and Living Things.

The outstanding new characteristic of the materials when they were first produced was that provision was made for individual differences in the rate of learning and the development of skills. In each JSSP Unit, pupils begin a Unit together, but there are different programs of activity according to the rate at which students work. All students have opportunity for enrichment work, and those who need it have remedial work. At the end of the time allotted by the teacher for the Unit, the class starts together on the next Unit. All students therefore cover the same basic learning sequence. The remedial activities are provided following testing of progress.

Learning through a variety of media and varied experiences is stressed throughout. Laboratory and field experiences are an integral part of the learning. Reinforcement of knowledge gained and of skills developed is built in through the assessment procedures, as well as the enrichment materials.

Formative evaluation was a feature of the trials given the materials in the early stages of the Project. A consolidation of reaction by teachers and other observers to the first printed materials led to the first major revision carried out in 1972 and 1973 and to the production of an edition in 1974 in booklet rather than boxed card form. There has been no formal summative evaluation.

The success of the Project led to the establishment of the Australian Science Education Project, the materials from which are, in 1974, just beginning to be available to schools.

<b>Reason:</b> change in philosophy, develop new course	<b>Adopt:</b> 300 tchrs, 12,000 students, 300 sch	<b>Pers:</b> FT PT NRT	<b>Publ:</b> 25,000
<b>Initiator(s): -</b>	<b>Tchr Ed:</b> provides guides	<b>Adm</b> 1 1	copies repro-
		<b>Wr</b> 6	duced commer-
		<b>VSch</b> 6	cially by
		<b>Res</b>	offset (\$25/10
		<b>TEd</b> 6	students)
		<b>Trial</b> 40	

**Descriptive References:**

JSSP General Information Booklet. Cheshire Publishing Pty. Ltd. 346 St. Kilda Road, Melbourne, 3004, Victoria, Australia.

**PROJECT PHYSICS (SOUTH EAST  
ASIAN ADAPTATION)**

**A.A. Hukins, Director**

**See ICh Report(s): 8**

**School of Education  
University of New South Wales  
P.O. Box 1  
Kensington, New South Wales 2033  
Australia  
Tel: Sydney 622.3258**

**1971-1974+**

**Gov:Fed, State;  
University;  
Publisher**

**Ages: 16-17**

**Lang: Eng**

**Subj: phys**

**Approach:\* inquiry, process, conceptual**

**Ability:\* average, average +**

**Eval Meth: varies**

**Testing: unit**

**Cont Resp: tchr directed**

**Envir: lab**

**Exper: C1 12+ 2-12 I**

**Lec 5**

**Sem 5**

**Disc 2**

**Indep 4**

**Lab 1**

**Fld**

**Dem 5**

**Sim**

**TV**

**A/V 3**

**Printed Materials:**

**texts, lab books,  
supplementary books,  
programmed units,  
tchr manuals, tests,  
overview, news-  
letters**

**Non-Print Materials:**

**slides, filmstrips,  
filmloops, films,  
overhead transparen-  
cies, slide tape,  
lab equipment**

The adaption has preserved the unique features of the U.S. Project Physics, that is, the multimedia system providing maximum flexibility for teachers and students.

Responsibility for guaranteeing a proper adaptation for South East Asia was handed over by the American authors to an independent committee set up in Australia. The Project Physics Committee consisted of physics educators from all Australian states and from New Zealand.

A thorough adaptation to local conditions was carried out. Examples, illustrations and photographs were changed to a local context, and data in the unit dealing with astronomy was replaced by data for the southern hemisphere.

The main impact of the adaptation has been in New South Wales where some 220 teachers and 4500 students are using the course. Some 35 teachers and 700 students in other Australian states, especially Tasmania and Western Australia, are using it, and about 35 teachers and 600 students in New Zealand.

**Reason: adaptation of**

**Harvard Project Phys-**

**ics to South East**

**Asian countries**

**Adopt: 290 tchrs,**

**5800 students,**

**181 schools**

**Tchr Ed: conducts work-  
shops; provides guides**

**Pers: FT PT NRT**

**Adm 1 20**

**Wr 9**

**VSch 2**

**Res 2 7**

**TEd 15**

**Trial 40**

**Publ: reproduced**

**commercially**

**(\$300/10 stu-  
dents)**

**Initiator(s): F.G. Watson,**

**G. Holton, S.T. Butler,**

**S. Horwitz, B. Price**

**Descriptive References:**

**About the Project Physics Course. 1974. Published by Horwitz Group Books, 506 Miller Street, Cammeray, New South Wales 2062.**

**Research:**

**Evaluation of Senior Science Courses in New South Wales Schools. Dec 1972. New South Wales Evaluation Committee.**

SCIENTIFIC WORDS - NEW GUINEA  
(PROJECT SWNG)

Contact: P.L. Gardner

See ICh Report(s): none

Faculty of Education  
Monash University  
Clayton, Victoria, Australia  
Tel: 541-2854

1968-1971

Gov: (PNG Education  
Department)

Ages: 12-17

Lang: Eng

Subj: all scientific fields

Approach: integrated

Ability: all

Eval Meth: achievement tests

Testing: diagnostic

Cont Resp: -

Envir: -

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

not

Lab

applicable

Fld

Dem

Sim

TV

A/V

Printed Materials:

tests

report

This project set out to identify specific vocabulary difficulties of Papuan-New Guinean high school science students, for whom English is a second language. (English is the medium of instruction in P.N.G. high schools). It was planned to produce a comprehensive list of relevant, non-technical and non-trivial words likely to be encountered frequently in science. Six hundred such words were identified. The project then developed multiple-choice test items assessing comprehension of these words. These tests were administered to a random sample of P.N.G. Grade 9 and 10 students.

A report of the findings of the project has been prepared, and has been circulated to the Education Department, to the University, and to schools in P.N.G.

The project has been replicated in Australia (the Words in Science Project).

Reason: investigate non-  
technical language  
difficulties

Adopt: -

Tchr Ed: -

Pers: FT PT NRT

Adm 2

Wr 2

VSch

Res 2

TEd

Trial 12

Computer

punch-card

operator 1

Publ: 200 copies

reproduced

institutionally

by offset

Initiator(s):

P.L. Gardner

Research:

Gardner, P.L. 1971. Project SWING - Scientific Words, New Guinea. Melbourne, Monash University. 219 pages.



THE SCIENCE FOUNDATION FOR  
PHYSICS INTEGRATED AND MULTISTRAND  
SCIENCE TEXTBOOK PROJECT FOR THE  
NEW SOUTH WALES SIX YEAR SCIENCE  
COURSE (SHS)

University of Sydney  
Sydney 2006  
Australia  
Tel: 660 8537 and 660 9383

1961-1974  
Foundation

H. Messel, Director

See ICh Report(s): 8,7

Ages: 12-17	Exper: CI 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec 1	texts
Subj: biol, chem, phys	Sem	lab books
Approach: integrated	Disc	tchr manuals
Ability: all	Indep 3	newsletters
Eval Meth:* achievement & lab tests	Lab 4	
Testing: term	Fld 2	
Cont Resp: tchr directed	Dem	
Envir:* classroom, school library	Sim	
	TV	
	A/V	

This project completed its first stage in 1961 and at that time was one of the first integrated courses spanning the four junior years (ages 12, 13, 14 and 15) ever attempted. It was followed by what is now known as a multistrand science course covering the two senior (ages 16 and 17) secondary school years.

The junior integrated course covered the fields of physics, chemistry, biology, geology and astronomy at modified, ordinary, credit and advanced levels. The multistrand course covers the fields of physics, chemistry and biology at two levels of ordinary and advanced. The junior course is a required subject for students and has some 750 periods in it. It rejects the study of specialized science in favor of an integrated course, reflects new thinking and, in particular, hopes to achieve greater relevance to modern society. The senior course covering the 5th and 6th years of secondary education tends towards preparation of tertiary studies, but not exclusively, as these two years are also seen as a continuation of the educative process of the earlier years.

The seven books and relevant teaching materials have been in use both in Australia and overseas for the past thirteen years. The junior course has been revised twice and the senior course is nearing the completion of its first major revision. The revised and extended multistrand course covering the two senior years will be completed and in use by the schools early in 1975. This multistrand senior course is a fairly extensive one, covering twelve periods of science per week. There is a student's manual, a teachers' manual and a student's book, along with a host of project materials.

Reason: change in philosophy	Adopt: 1,000 tchrs, 40,000 students, 350 schools	Pers: FT PT NRT	Publ: 500,000
Initiator(s): H. Messel	Tchr Ed: conducts work-shops; provides manuals	Adm 1 2 Wr 50 VSch 20 Res 5 TEd 10 Trial 300	copies repro-duced by Govt printing office by offset (\$67/10 stu-dents)

**Descriptive References:**

A look at the new Integrated and Coordinated Science Courses in N.S.W. and the Science Foundation for Physics Textbook Series. Published by the Science Foundation.



**TECHNICAL SCHOOL SCIENCE**

Contact: Executive Officer, T.S.S.C.

See ICh Report(s): 7,6,5,4

Curriculum and Research Branch

234 Queensberry St.

Carlton, 3053

Victoria, Australia

Tel: Melbourne 347-3833

1958-

Gov: State  
(Victorian  
Education  
Dept.)

Ages: 11-16	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	tchr manuals
Subj: biol, chem, phys, general science	Sem ✓	newsletters
Approach: discipline-centered, integrated	Disc ✓	
Ability: all	Indep ✓	
Eval Meth: achievement, lab & standardized tests, tchr jdgmts	Lab ✓	
Testing: term & unit	Fld ✓	
Cont Resp: tchr directed	Dem ✓	
Envir: classroom sch library, lab	Sim ✓	
	TV	
	A/V	

The primary purpose of this project was to develop "Courses of Study" for use in the Technical Schools of the Victorian Education Department (About one quarter of Victorian post-primary schools are Technical Schools.) Initially the courses developed were imposed on science teachers in Technical Schools, but at the moment the majority of Courses of Study are simply "suggested" and may be deviated from.

The materials produced take the form of detailed syllabuses and are written in terms of content; the organization of learning experiences is left entirely to the discretion of teachers. This approach is to be expected as the development process is largely under the control of practicing teachers.

Evaluation of the project, in formal terms, is largely non-existent. In the main the development group has depended on informal feedback from teachers in the field. This feedback is facilitated by the fact of teachers in the field moving on and off the Technical Schools Science Standing Committee (T.S.S.S.C.).

The future activities of the project are seen as continuing the present process plus increasing involvement of practising teachers.

Reason: update content & method, change in philosophy, develop new course	Adopt: 12,000 tchrs, 60,000 students, 120 schools	Pers: FT PT NRT	Publ: 2,000 copies reproduced institutionally by mimeograph
Initiator(s): Technical Schools Science Standing Committee	Tchr Ed: conducts workshops; provides consultants; no special preparation required	Adm 2 Wr 5 VSch 2 Res TEd Trial	

No references available

**VICTORIAN PRIMARY SCHOOLS' SCIENCE COURSE**

Director: -

See ICh Report(s): 6,5

Ages: 5-11

Lang: Eng

Subj: biol, chem, phys, earth-space, math, tech, social science, environ

Approach: interdisciplinary, integrated, conceptual, inquiry

Ability: all

Eval Meth: tchr jdgmts

Testing: varies

Cont Resp:\* tchr guided, student directed

Envir: classroom, sch grounds & library, community

Curriculum & Research Branch

234 Queensberry St.

Carlton, Victoria, 3053, Australia

Tel: Melbourne 347-3833

1964-1970

Gov: State;  
Victorian Education Dept.

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:  
tchr manuals

Non-Print Materials:  
films

The primary aim of this course is to encourage teachers in primary schools in Victoria to include the biophysical environment of children in the normal range of teaching situations.

Simply put, the intention of this course is that primary school children should experience situations in which they are encouraged to observe, investigate, and explore their natural environment in fashions that relate to other aspects of the primary curriculum such as language and numeracy.

Few of the learning experiences that result will be considered to be about "science" in the full sense of the word, but it will certainly be true that children will be undergoing very important precursor experiences to science and to other related discipline areas. In this and other respects the Victorian Primary Schools' Science Course is to be seen as very similar to the Nuffield Junior Science course and to Science 5/13.

To this date there has been little done in the way of formal evaluation; in the main evaluation has been quite informal and is seen, in fact, as being formative rather than summative. As the project has had rather less impact than the project administrators would like it would seem that in the future the project will be reactivated on a minor scale to investigate the possibility of somewhat more structured teaching materials.

Reason:\* develop new course, change in philosophy

Initiator(s): Research Branch Officers

Adopt: unknown

Tchr Ed: conducts workshops; provides guides, films, consultants; no special preparation required

Pers: FT PT NRT

Adm

Wr

VSch

Res

TEd

Trial

1

3

2

1

2

30

Publ: reproduced institutionally by linotype

No references available

**WORDS IN SCIENCE PROJECT**

Contact: P. L. Gardner  
See ICh Report(s): none

Faculty of Education  
Monash University  
Clayton, Victoria  
Australia 3168

1971-1972

Gov: Fed, State,  
ASEP

Tel: 514-2854

Ages: 12-15	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tests
Subj: all scientific fields	Sem	reports
Approach: integrated	Disc	
Ability: all	Indep	not
Eval Meth: achievement tests	Lab	applicable
Testing: diagnostic	Fld	
Cont Resp: -	Dem	
Envir: -	Sim	
	TV	
	A/V	

The project set out to identify specific non-technical vocabulary difficulties amongst science students in grades 7, 8, 9 and 10 in Victoria, Australia. The tests used to measure these difficulties were, with minor modifications, the same as those used for the Scientific Words-New Guinea project (described elsewhere in this report).

A report of the project has been prepared, and the findings have been used by writers associated with the Australian Science Education Project while preparing their instructional materials. The work of the project has also been drawn upon in a unit on Readability, currently being prepared by the Australian Science Teacher Education Project.

The plans for the future are as follows: (1) The project is to be replicated in the Philippines (commencing July 1974); (2) Some early planning has commenced on a project to investigate difficulties with logico-gramatical terms (e.g. 'moreover', 'nevertheless', 'if and only if') amongst high school science students.

Reason: to investigate non-technical language difficulties	Adopt: -	Pers: FT PT NET	Publ: 200
	Tchr Ed: -	Adm	copies repro-
		Wr	duced by
		VSch	offset
		Res	
		TEd	
		Trial	
		clerical & data pro-	
		cessing	10

**Descriptive References:**

Gardner, P.L. 1972. Difficulties with Non-Technical Vocabulary amongst Junior Secondary School Students: the Words in Science Project. In R.P. Tishner (ed) Research 1972. Australian Science Education Research Association: Brisbane. pp. 58-81.

**Research:**

Gardner, P.L. 1972. Words in Science. Melbourne: Australian Science Education Project.

BRITISH SOLOMON ISLANDS UNESCO  
PRIMARY SCIENCE (SIEAS)

British Solomons Teachers College  
P.O. Box 1 Honiara  
British Solomon Islands

1972-  
UNESCO UNICEF

Director: -

Tel: 07: 43

See ICh Report(s): none

Ages: 5-13, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec	programmed units
Subj:* environmental, earth-space, math,	Sem	tchr manuals
phys, biol	Disc	
Approach:* process, integrated, inter-	Indep	Non-Print Materials:
disciplinary	Lab	lab equipment
Ability: all	Fld	
Eval Meth: student questionnaire	Dem	
Testing: continuous	Sim	
Cont Resp: material directed	TV	
Envir:* classroom sch grounds, communit	A/V	

The goals or objectives of the project are: (1) To devise a curriculum in basic science for Standards I - VII which is appropriate to the Solomon Islands; (2) To provide suitable science teaching materials to the senior primary schools; (3) To train teachers in the methods and special techniques of science teaching and the organization of suitable pupil activities at this level; and (4) To provide appropriate materials for this teacher training program.

In order to produce a curriculum appropriate to the Solomon Islands Environment, the approach developed was based on local materials and indigenous ideas vis-a-vis content. The approach included the involvement of indigenous teachers in the planning and development of the program, through interviews, a weekly Curriculum Development Seminar, the pre-service program, In-Service workshops, and classroom development of the units by the teachers. Thus the decision makers in the process were the indigenous teachers and the pupils in the classroom. The resulting curriculum should emerge from and be compatible with the culture.

Since the curriculum model has as its structure the processes of science, it is envisaged that a Test on Processes will provide an assessment of the progress of the program. It is considered highly undesirable to institute an examination in Environmental Studies or Science at the Standard VII level, or at any level for that matter. The test on Processes will draw its content vehicle from all spheres of schooling and the environment, and will not be identifiable with a "subject area". It is envisaged that such a test will be completed by August 1974.

As a result of our approach to the development of the Curriculum with maximum teacher/pupil involvement at the decision making level, the program has been received with enthusiasm. With the proposed introduction of composite classes in 1975 the S.I.E.A.S. with its child-centered approach will assume a major role during the school day. The program has been instrumental in the adoption of a more child-centered approach in other subject areas. The program is being developed on the basis of "give a man a fish and you feed him for a day; teach him to fish and you feed him for life". Our aim has been to produce a curriculum acceptable to the recipient country. The activity format is such that teachers can write their own activities and/or units based on work done by the children in their classroom. This material is then edited by the project staff and published as a trial version.

Reason: develop new course	Adopt: -	Pers: FT PT NET	Publ: 600 books
		Adm	1 reproduced
Initiator(s): Education	Tchr Ed: conducts work-shops	Wr	2 institution-
Dept Honiara, UNESCO?		VSch	2 ally by
UNICEF		Res	2 mimeograph
		TEd	2
		Trial	150

No references given

UNDP UNESCO PROJECT -- SECONDARY  
SCHOOL

G. Bishop, Director

Curriculum Development Unit  
University of the South Pacific  
Suva, Fiji

1970-1975

UNESCO

Tel: -

See ICh Report(s): none

Ages: 12-17, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts, lab books
Subj: biol, chem, phys, earth-space, math,	Sem	supplementary books
tech, soc sci, business studies, home ec	Disc	programmed units
Approach: integrated, inquiry	Indep	activity sheets
Ability: all	Lab ✓	tchr manuals
Eval Meth: achievement tests	Fld	field guides, tests
Testing: term exams	Dem ✓	overview, charts
Cont Resp: tchr directed	Sim	newsletters
Envir: classroom	TV	Non-Print Materials:
	A/V ✓	slides, filmstrips
		filmloops, games
		models
		lab equipment

The Regional Project for Secondary School Curriculum Development was set up in 1970, located at the University of the South Pacific. The Project is a joint cooperative venture between the United Nations Development Program, Unicef and the Governments of the South Pacific.

The objectives of the Project, as laid down in the Plan of Operation are: 1) to assist the Governments in the region to improve the quality and capacity of their secondary level education; 2) to provide a new and comprehensive curriculum based on the requirements of the region; 3) to produce experimental curricular materials and teaching aids based on the new curriculum; 4) to train teachers to implement this curriculum innovation; and 5) to establish a permanent unit in the University of the South Pacific for curriculum and teaching materials development and for pre-service and in-service training of teachers.

In the field of science we have issued experimental science kits to supplement the use of simple, locally-improved equipment. The whole emphasis of the Science course is to encourage children to discover and find out things for themselves by doing, using their own eyes and hands and brains. To ensure this it was essential to issue simple experimental science kits. Along with the science kits are sent pupils' booklets and activity cards. In addition to pupils' booklets and activity cards, all new curricular 'units' are accompanied by teachers' guides and handbooks. This is essential to ensure that the teachers understand the philosophy behind what we are trying to do, can use the new techniques and methods with confidence and can put the materials to proper and maximum advantage.

Reason: update content & method	Adopt: (partial)	Pers: FT PT NRT	Publ: repro-
Initiator(s): G. Bishop	Tchr Ed: conducts work-shops; provides guides & consultants	Adm 8	duced commer-
		Wr 8	cially and
		VSch 8	institutionally
		Res 10 25	by offset
		TEd	
		Trial 500	

No references given

**ENVIRONMENTAL EDUCATION FOR  
GUAM SCHOOLS PROJECT (EEGSP)**

Dave Hotaling, Director

Environmental Project  
Department of Education  
Agana, Guam 96910

1971-1974

Gov:Fed (ESEA  
Title III)

See ICh Report(s): none

Ages: 6-13, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Chamorro	Lec	tchr manuals
Subj: ecology	Sem       ✓   ✓	field guides
Approach: interdisciplinary, process,	Disc	tests
conceptual, inquiry, discovery	Indep	overview
Ability: all	Lab       ✓	Non-Print Materials:
Eval Meth: achievement tests, tchr	Fld       ✓	slides
jdgmts, student q're	Dem	films
Testing: unit	Sim	lab equipment
Cont Resp: administratively directed	TV	
Envir: community, sch grounds, classroom	A/V       ✓	

The Environmental Education for Guam Schools Project was approved for Title III funding in July 1971 and got underway at the end of the following month. A Task Force (steering committee) of 15 interested citizens was formed by invitation and from time to time has contributed input to the operation of the Project. The Project Director, Mr. Dave Hotaling, formerly a high school biology teacher, made a research trip to the Mainland in November 1971 and included interviews with several curriculum experts for the advisory position of General Consultant, soon to make a two-week visit to Guam. In the Spring term of 1972, the University of Guam's well-qualified Biosciences Division offered a course on the ecology of Guam to elementary teachers. Twelve of the teachers who completed this course became the nucleus of the group who were subsequently to teach the curriculum developed by the Project. This latter, on the recommendation of the General Consultant, Dr. Ernest Burkman, Director of Florida State University's Education Research Institute, and with the permission of Rand McNally, was adapted from the Life Science portion of the Science Curriculum Improvement Study - developed by the University of California, Berkeley - an eminently successful activity-oriented Mainland program. Four of our teacher/naturalists adapted the Teacher's Guides for Guam.

We are now in the second year of testing the revised materials in two pilot schools, Mongmong/Toto and Tamuning. Project teachers attend a two-day workshop prior to the opening of school, and fortnightly inservice meetings through the year to discuss feedback and plan future activities.

Organisms are collected and cultured for the Project classrooms, currently 52 of them, by a teacher/naturalist with the cooperation of the Department of Agriculture. The Majority of high school biology teachers on the Island are interested in a program by which they would, in turn, take a year out of the classroom to do the collecting and culturing of organisms for Project students. The outdoor environment is emphasized and teachers are encouraged to take field trips, on and off campus. A nature trail has been laid out adjacent to each pilot school. Garden plots also have been prepared. From all reports, the students, teachers, and principals involved are enthusiastic about and rewarded by the program and the Evaluator's recommendation is that it both continue and expand.

Reason: develop new course	Adopt: 50 tchrs, 1,200 students, 2 schools	Pers: FT PT NRT Adm 2 Wr 6 VSch Res 1 TEd Trial 50	Publ: 60 copies reproduced institutionally by mimeograph (\$60/10 students)
Initiator(s): G. Perez, J. Branch, D. Hotaling	Tchr Ed: conducts workshops; provides manuals & consultants		

**Research:**

Kallingal, A. Impact of Environmental Education for Guam Schools - An Evaluation. An ERIC Document - number not yet available.

LONG-TERM POST-GRADUATE COURSE  
UNESCO: "ON MODERN PROBLEMS IN  
BIOLOGY"

Ing. V. Zalabák, Director

See ICh Report(s): 8

Institute of Microbiology CAS  
Budějovická 1083,  
14220 Praha 4-Krye  
Czechoslovakia

Tel: 491841

1964 -

UNESCO, CAS,  
University

Ages: post graduate	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec 10 ✓ ✓	science papers
Subj: biol	Sem ✓ ✓	Non-Print Materials:
Approach: integrated	Disc ✓ ✓	slides
Ability: average, average +	Indep ✓	lab equipment
Eval Meth: lab test	Lab ✓	
Testing: individual	Fld	
Cont Resp: administratively directed,	Dem	
tchr guided	Sim	
Envir: classroom, school library, lab	TV	
	A/V	

The course was designed to give young scientists, graduated from Universities and practicing in their fields for two or three years, a more profound education and methodical preparation for their research careers. The course enabled the participants to get acquainted with modern approaches to the problems of microbiology, virology, cell biology, parasitology, medical physiology and plant physiology. The scholars carried out their research work under the supervision of the scientists of the Czechoslovak Academy of Sciences (CAS).

The course was operated by the Institute of Microbiology CAS in cooperation with the University of 17th November and sponsored by UNESCO. The CAS provided for the tuition and the research stay of the participants as well as their accommodations, travel expenses within the CSSR, and social events, which take place in the course of the year. Medical care was free for all participants. The return air-tickets for the participants, the text books, chemicals, and some devices needed for the research work were further provided by the UNESCO contribution.

During the 1964-74 period 10 courses were held and altogether 101 fellows from 22 countries took part in the courses. After finishing the course 16 scholars continued their research stay in the CAS Institutes, having been granted the postgraduated scholarship by the University of 17th November, and took the C.Sc. (PhD) degree.

Reason: update content	Adopt: -	Pers: FT PT NRT	Publ: -
Initiator(s): Institute	Tchr Ed: -	Adm 1	
of Microbiology CAS		Wr 1	
		VSch	
		Res 10	
		TEd	
		Trial 18	

Descriptive References:

Vienna Conference of Directors of UNESCO's Long-term Post-graduate Courses in the Basic Sciences. 1973. Vienna, Osterr: UNESCO Commission. pp 63-68.



APPLIED STATISTICS  
(COMPUTER BASED LEARNING)  
(CALSTATS)

University of Leeds  
Leeds 2  
England

1971-1975  
Gov:Fed

J.R. Hartley, Director

Tel: Leeds 31751, ext 7106

See ICh Report(s): 8

Ages: college	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	lab books
Subj: math, social sciences	Sem	activity sheets
Approach: interdisciplinary, conceptual,	Disc	tests
inquiry -	Indep ✓	computer programs
Ability: * average, average +	Lab ✓	
Eval Meth: achievement tests, student	Fld	
questionnaire, computer (on-line	Dem	
performance data)	Sim ✓	
Testing: individual	TV	
Cont Resp: tchr guided, material directed	A/V	
Envir: lab		

In July 1973 a grant of £98,365 was awarded to three institutions - Leeds University, Leeds Polytechnic and Bradford University - to develop a computer based Statistics course for Social Science students. The funds were for a two year period of work.

The computer terminal will not be used directly in the initial learning of Statistical concepts. In order to help the student to make best use of conventional teaching a series of Student Guides are being prepared. These contain a summary of teaching points with references, and computer simulation exercises which illustrate the underlying concepts. This activity is followed by a test-teach program administered at the computer terminal. These programs question the student, correct his misconceptions and provide further practice and explanation. The performance data is stored for each student and these files can be inspected by the teachers.

Another major aim of the work is to enhance the student's understanding by having him solve problems and plan and carry out statistical investigations. When given the problem the learner must set up his hypotheses and discuss, at the terminal, the experimental design, the methods of data collection and the most appropriate techniques of analysis. These ideas are then applied using a "simulated statistical laboratory". This is a suite of programs which allows populations to be set up, samples to be drawn, and calculating routines to be written and used. The student expresses his conclusions in a short report which is submitted to his tutor.

The high degree of co-operation between the different institutions and departments is an important feature of this work. The working procedures which are necessary to achieve this degree of co-operation and the various ways the different institutions use the products should be of interest. They will be documented within an overall evaluative study which will also make financial, technical and other educational assessments.

Reason: change in philosophy, develop new course	Adopt:(partial) 12 tchrs, 500 students, 3 schools	Pers: FT PT NRT	Publ: 500 copies
		Adm 2	reproduced in-
		Wr 6	stitutionally
		VSch 4	by mimeograph
		Res	
		TEd	
		Trial 12	

Descriptive References:

Hartley, F.R., and D.H. Sleeman. 1971. A Computer Based Statistical Laboratory in D. Packham, A. Cleary, and T. Mayes (eds). Aspects of Educational Technology. 5:425-434. (Pitman).

Abbatt, F.R., and F.R. Hartley. 1974. Teaching Planning Skills by Computer. International Journal of Math Education in Science and Technology.

Research:

A Final Report to Social Science Research Council. 1972. Available from the Computer Based Learning Project, Leeds University.

Abbatt, F.R. Preliminary Experience in Using a Computer to Teach the Planning of Experiments in the Social Sciences. Internal Report, P.1. Available from Computer Based Learning Project, University of Leeds.



ASSISTANCE TO THE COMMONWEALTH  
TEACHING OF SCIENCE (ACTS)

Dennis A. Carter, Director

See ICh Report(s): 8

Ministry of Education  
Victoria, Mahe  
Seychelles, United Kingdom  
After Jan, 1976: 94 Cranley  
Gardens, London, N10 3AH,  
United Kingdom

1973-1975

Gov: British &  
Local

Ages: 13-14	Exper:*	Cl	12+	2-12	I	Printed Materials:
Lang: Eng	Lec					lab books
Subj: biol, chem, phys	Sem					
Approach: * integrated, inquiry, discovery	Disc	3				
Ability: all	Indep					
Eval Meth: -	Lab	1				
Testing: -	Fld	4				
Cont Resp: administratively directed	Dem	2				
Envir: * classroom, sch grounds, community	Sim					
	TV					
	A/V					

A local decision was taken to introduce a modern science course in all Junior Secondary Schools (JSS). The course selected was the Scottish Integrated Science Course. The Ministry of Overseas Development (Britain) sent an officer, through Technical Assistance auspices to assist with implementation and necessary training.

The Malaysian edition of this course is presently being used and progressively modified for Seychelles. All teachers in the Junior Secondary Schools are teachers of general subjects but almost none had undertaken a course in science. Two, 2 week in-service courses (1972 & 1973) were organized by British Council (London) to introduce the teachers to the course. Teaching of the course, in the JSS commenced January 1973. Regular in-service meetings are held for the teachers in order to cover new units and to give greater confidence to the teachers in those units previously encountered.

Classrooms are the base for the lessons, most of which are individual or group practicals using investigatory - discovery methodology and sometimes demonstration. An extensive programme of visits to the schools to assist the teachers is essential.

All students in the Teacher Training College will have experienced the course by the end of 1974. The next step will be to give greater depth to the training of teachers entering JSS in order to allow greater confidence and effectiveness in the teaching of the Course. Originally, the teachers already in the schools, and willing to be trained, were the ones who started the course in the schools. The training now, must become a pre-service endeavour.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: conducts work- shops	Adm 1	
Initiator(s): D.A. Carter		Wr 1 1	
		VSch 1	
		Res	
		TEd 1 1	
		Trial	

Descriptive References:

Curriculum Paper No. 7. 1971. Science for General Education. Published by Her Majesty's Stationery Office.

# ATTITUDES TO SCIENCE SCALES

L.S. Skurnik, Director

See ICh Report(s): none

National Foundation for  
Educational Research  
The Mere, Upton Park  
Slough, Bucks  
England  
Tel: Slough (75) 28161

1966-1969

Schools Council

Ages: 14-16	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	examiner's manual
Subj: -	Sem	attitude scales
Approach: -	Disc	technical manual
Ability: all	Indep	
Eval Meth: student questionnaire	Lab	not answered
Testing: -	Fld	
Cont Resp: -	Dem	
Envir: -	Sim	
	TV	
	A/V	

This project was established as part of a proposal to evaluate Nuffield O-level science materials and O-level science teaching in general. The aims of the project were: 1) To define the attitudes of secondary school pupils towards science; 2) To develop reliable and valid scales by which these attitudes may be recognized and assessed; and 3) To relate the scores on these scales to variables such as the sex of the pupil, ability, etc.

Interviews were held with a number of secondary school pupils on their attitudes to science and to school, and this led to the production of over 3,000 attitude statements. The statements were analyzed and tested and grouped under five main headings: Science Interests, Science in Society, Learning Activities in Science, Science Teachers, and School. The 70 best items were selected to form two final questionnaires: one in which the items were grouped under the five main headings above, and one in which they appeared in random order.

During the summer of 1968 these questionnaires were completed by more than 2,000 CSE and GCE candidates and the results analyzed. The questionnaires have also been administered to a large sample of fourth form pupils who have been similarly assessed by other measures of personality, attitude, and scholastic aptitude.

Reason: evaluation	Adopt: -	Pers: FT PT NRT	Publ: -
Initiator(s): -	Tchr Ed: -	Adm	
		Wr	
		VSch	not answered
		Res	
		TEd	
		Trial	

No references given

**CHELSEA SCIENCE SIMULATION  
PROJECT**

R. Lewis, Director

See ICh Report(s): none

Chelsea College  
(University of London)  
Bridges Place  
London SW6 4HR

Tel: 01-736-3401

1971-1973  
University

Ages: 16-19

Lang: Eng

Subj: biol, chem, phys

Approach: discipline-centered, discovery

Ability: \* average, average +

Eval Meth: tchr jdgmts, student q're

Testing: -

Cont Resp: tchr guided

Envir: lab

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:  
supplementary books  
tchr manuals

Non-Print Materials:  
computer programs

Some research during the period 1968-70 at Chelsea was directed towards the mathematical needs of science students particularly in the light of the recent changes in curriculum. It became apparent that in some circumstances mathematical models of science situations could be better appreciated if they formed the basis of a computer program. The role for the computer had become somewhat broader when in 1971, the Science Simulation Project started.

It was decided to limit the work to science and to upper secondary or first year college students. Also, the material was to be designed for interactive use. The needs of science teachers were the primary consideration. In developing the simulation material it was the aim to develop the use of the computer in such a way as to enable students to extend their range of existing investigations - to be able to ask the question, "What will happen if....?" in a broader range of circumstances than hitherto possible. There was no question of replacing existing laboratory or field work, on the contrary the simulation units had to be an integral part of the science course and so would depend on more traditional teaching methods. The computer was only to be used if it provided an increase in the amount of student participation in some aspect of the curriculum which was impossible in any other way.

It was not assumed that the student (or teacher) had any knowledge of computing beyond the use of a typewriter terminal and so the computer program (written in BASIC) had to be self-explanatory. A Seminar held jointly with the Institute of Mathematics and its Applications in September 1971 brought together teachers and computer scientists to exchange views on the potential of computer simulation.

The Science Simulation Project has been just the first phase of development at Chelsea in the use of computers in teaching and learning. The Schools Council is supporting a further phase with the Computers in the Curriculum Project which started in 1973.

Reason: update method

Adopt: -

Pers: FT PT NRT

Publ: reproduced

Initiator(s): R. Lewis,  
P.G. Dean

Tchr Ed: conducts work-  
shops; provides manuals  
& consultants

Adm 1

commercially

Wr 1

VSch 1

Res

TEd

Trial 30

**Descriptive References:**

Lewis, R. 1971. Computer Simulation of Science Laboratory Experiment. Bulletin, Institute of Maths. and its Applications. 7(8).

Science Simulation Seminar. 1972. Bulletin, Institute of Maths. and its Applications. 8(2).

Dean, P.G. 1973. The Use of Computer Simulation for Experimental Biology in the Upper Secondary School. Journal of Biology Education. 7(2): 29-32.

**CHILDREN EXPLORE THEIR  
ENVIRONMENT - THREE FILMS**

John Howard, Director

L.E.T.C.  
Bishop Grosseteste College  
Lincoln, England

Lincoln 27347

1969-1972

Gov

See ICh Report(s): none

Ages: 5-11, tchr ed	Exper: Cl 12+ 2-12 I	Non-Print Materials:
Lang: Eng	Lec	films
Subj: biol, chem, phys, English, art	Sem	
Approach: interdisciplinary	Disc ✓	
Ability: all	Indep	
Eval Meth: tchr jdgmts	Lab	
Testing: -	Fld ✓	
Cont resp: tchr guided & student directed	Dem	
Envir: school grounds, community	Sim	
	TV	
	A/V	

These three short films show how children in primary schools learn through the exploration of their environment and how they react when confronted with new problems and learning situations. Work on the films began when Mr. J. Howard was seconded to the Nuffield Junior Science Project; they have subsequently been completed under this Schools Council Project. The titles of the three films are: Children Observed, The Explorers, and From Small Beginnings. The films are intended for initial and in-service teacher training, and may also be of interest to parents and social workers.

Reason: change in philosophy, develop new course	Adopt:(partial) Tchr Ed: provides films	Pers: FT PT NRT Adm 5 Wr 5 VSch 5 Res 5 TEd 5 Trial 5	Publ: films pro- duced commer- cially
Initiator(s): R. Wastnedge, J. Howard			

**Descriptive References:**

Howard, J. Jan 21, 1972. Over to Child Centered: Making Films for Teacher Training. Times Educational Supplement. 46-47.

## COMPUTER AIDED LEARNING PROJECT

W.R. Broderick

See ICh Report(s): none

Educational Computer Centre

Teachers Centre Annexe, Tring Gardens

Harold Hill, Romford RM3 9QX

Essex, England

1969-1976

Gov: research  
council

Tel: Ingrebourne 49115

	Exper: C1 12+ 2-12 I	Printed Materials:
Ages: 13	Lec ✓	texts,
Lang: Eng	Sem ✓	programmed units,
Subj: biol	Disc ✓	activity sheets,
Approach: * discipline-centered, discovery	Indep - ✓	tchr manuals,
Ability: all	Lab ✓	tests, behavioral
Eval Meth: * achievement & lab tests, tchr	Fld	objectives, over-
jdgmts, student questionnaire	Dem	view
Testing: individual	Sim	Non-Print Materials:
Cont Resp: * material & admin directed	TV	slides, audiotape,
Envir: * lab, classroom	A/V ✓	models, lab equip.

## No narrative provided by project

Reason: research into	Adopt: (partial) 12 tchrs,	Pers: FT PT NRT	Publ: -
computer managed instruc-	600 students, 10 schools	Adm 1	
tion (CMI)		Wr 1 1	
Initiator(s): -	Tchr Ed: conducts work-	VSch 1	
	shops; provides manuals	Res 1	
	guides & consultants	TEd 1	
		Trial 12	

No references given

**COMPUTER BASED LEARNING  
MATHS PROJECT (CALMATH)**

J.R. Hartley, Director

See ICh Report(s): 8

Computer Based Learning Project  
University of Leeds  
Leeds 2, England

Tel: Leeds 31751, ext 7106

1969 -

Gov:(Research  
Councils);  
University

Ages: 9-13	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	instructional
Subj: math	Sem	material
Approach: process, conceptual, inquiry	Disc	✓
Ability: all	Indep	✓
Eval Meth: achievement, oral & standard- ized tests, tchr jgmts	Lab	Non-Print Materials:
Testing: individual	Fld	lab equipment
Cont Resp: material directed	Dem	computer programs
Envir: classroom	Sim	
	TV	
	A/V	
	Computer- based material	✓

**Practice Tasks in Arithmetic.** The computer programs can generate tasks at run-time at different difficult levels which suit the on-line estimates which are made of individual students' competence. The feed back mode can also be varied and remedial instruction is produced by generating tasks which are based on the particular errors made by the students. Experiments have concentrated on devising appropriate models of learning and on integrating the package so that it is used by tutors as a normal part of their teaching. Several evaluation studies have been carried out.

**Number Sentences.** These questions involve the properties of the number system and the fundamental laws of mathematics. Experiments have been carried out which study the individual methods of working so that an adaptive teaching system can be built up. The discussion and comparison of performances has used information processing methods developed by Newell, Simon and Waterman.

**Problem Solving.** These situations include sample word problems which use the knowledge and subordinate skills outlined under paragraphs one and two above. A package is capable of generating these problems at run-time and teaching in a variety of modes, but Author Language work is also included.

**Logo.** This programming language is being used by pupils within the schools mathematics curriculum. It is hoped that it will add to the pupils' arithmetical understanding and also develop his thinking skills.

Reason: change in philosophy	Adopt:(partial) 8 tchrs, 100 students	Pers: FT PT NRT	Publ: -
		Adm	2
Initiator(s): J.R. Hartley, K. Lovell, K. Tait	Tchr Ed: conducts work- shops; provides manuals & consultants	Wr	2
		VSch	
		Res	2 2
		TEd	
		Trial	8

**Descriptive References:**

- Woods, P. and J.R. Hartley. 1971. Some Learning Models for Arithmetic Tasks and Their Use in Computer Based Learning. British Journal of Educ. Psychol. 41(1): 35-48.  
Tait, K., J.R. Hartley, and R.C. Anderson. 1973. Feedback Procedures in Computer Assisted Arithmetic Instruction. British Journal of Educ. Psychol. 43(2): 161-171.  
Hartley, J.R. and D.H. Sleeman. 1973. Towards More Intelligent Teaching Systems. Int. J. of Man-Machine Studies. 5: 215-235.

**Research:**

- A Final Report to Social Science Research Council. 1972. (Available from the Computer Based Learning Project, Leeds University).  
A Progress Report to Social Science Research Council. 1973. (Available from the Computer Based Learning Project, Leeds University).

**COMPUTERS IN THE  
CURRICULUM**

R. Lewis, Director

See ICh Report(s): none

Chelsea College  
University of London  
Bridges Place  
London SW6 4HR, England

Tel: 01-736-3401

1973-1976

Gov:School  
Council

Ages: 14-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: biol, chem, phys, social sciences	Sem	tchr manuals
Approach: discipline-centered, interdisciplinary, discovery	Disc	Non-Print Materials:
Ability: average	Indep	computer programs
Eval Meth: tchr jdgmts, student q're	Lab	
Testing: -	Fld	
Cont Resp: tchr guided	Dem	
Envir: classroom, lab	Sim	
	TV	
	A/V	

The aim of the project is to examine the use of the computer to assist teaching and learning in a wide variety of subjects other than mathematics, by teachers who will have had virtually no computer experience. It will not be concerned at all with programmed instruction but will seek to answer the teacher's question: 'I wish to teach topic A; will a computer assist my objectives?' Topic A could be a unit in biology, chemistry, physics, geography or social studies, the subjects which the project expects to select. The work will be concentrated on the fifth and sixth forms of secondary schools and sections will be suitable for the full ability range.

Much of the Project's philosophy is based on experience gained from four years of investigation into the use of the computer in the Chelsea Science Simulation Project. The computer is seen as a resource to aid teaching and learning, supplementing, but in no way replacing, present laboratory and field activities. Perhaps the most important feature of the computer's use is the freedom it gives in designing pupil-centered investigations in topic areas where this has not before been possible.

It is expected that most of the material produced will be in the form of small units of work designed to fit into existing curriculum areas. The computer program is only a very small part of a unit and is relatively easy to produce. What is difficult and time-consuming is the design and production of written documents for pupils and for teachers. These provide support for the program and the links with the main body of teaching thus making the whole unit an integral part of the curriculum. The materials must satisfy a real need in the teaching pattern and for this and the other reasons mentioned it is essential that practising teachers create the units. Each working group of six or eight teachers has a particular subject interest and will be studying the areas in which they are experts.

Reason: update method	Adopt: -	Pers: FT PT NRT	Publ: reproduced
Initiator(s):	Tchr Ed: conducts work-	Adm 1 1	institutionally
R. Lewis, J. Lewis	shops; provides manuals	Wr 3 60	by mimeograph
	& consultants	VSch	
		Res	
		TEd	
		Trial	100

No references given



**COMPUTERS IN THE UNDERGRADUATE  
SCIENCE CURRICULUM (CUSC)**

L.R.B. Elton, Director

See ICh Report(s): none

Institute for Educational  
Technology  
University of Surrey, Guildford  
Surrey, GU2 5XH  
Great Britain  
Tel: Guildford (0483) 71281, ext 402

1974-1978

Gov, University

Ages: * 18-20, adult	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: biol, chem, phys	Sem	
Approach: * discipline-centered, integrated	Disc	Non-Print Materials:
	Indep	audiotape
Ability: average, average +, slow learner	Lab	computer programs
Eval Meth: achievement tests, tchr jdgmts, Fld	Dem	
student questionnaire	Sim	
Testing: individual	TV	
Cont Resp: tchr directed	A/V	
Envir: lab		

The University of Surrey is collaborating with University College London and Chelsea College London in a feasibility study of the use of computer methods in undergraduate science education with special reference to the use of graphics, and of the problems arising in connection with transfer and dissemination.

As a first stage the computer is being introduced into the normal undergraduate curriculum in physics, physical science, chemistry and biology in connection with lecture courses, laboratory courses and personalized systems of instruction. In all instances, the student works on-line with a graphics terminal using self-instructional packages designed to explore the potential of this learning situation, and formative evaluation is achieved through observation, testing, interviews and questionnaires.

In line with the aims of the project, students use library programs stored in the computer and do not write their own programs, although it is hoped that the experience will motivate students towards writing their own programs at a later stage. The present feasibility study extends over two years and it is hoped that it will be followed by a two year development program.

Reason: update approach, develop new course, publication	Adopt: (partial) 7 tchrs, 250 students, 1 school Tchr Ed: -	Pers: FT PT NRT Adm 1 1 Wr 2 1 7 VSch Res TEd Trial 7	Publ: -
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Initiator(s): L.R.B. Elton,  
W.H. Lee, J.E. Smith,  
R. Shirley, M. Cox,  
D.M. Laurillard,  
G. Waterworth

**Descriptive References:**

Blum, R., ed. 1971. Computers in Undergraduate Science Education. Commission on College Physics. College Park, Maryland.

**Research:**

Cox, M. and L.R.B. Elton. 1974. Solving the Schrodinger equation with a desk calculator plotter. Amer. J. Physics. 42: 340.

Cox, M., L.R.B. Elton, D. Laurillard, and S. Penton. In Press. Computer exercises in an undergraduate mechanics course. Int. J. Math. Educ. Sci. Technology.

**CONSERVATION EDUCATION PROJECT**

Centre for Science Education  
Chelsea College, Bridges Place  
London SW6 4HR, England

1970-1973

P.J. Kelly, Director

Private

See ICh Report(s): 8

Tel: 01-736-3401

Ages: 12-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	lab books
Subj: biol, chem, phys, technology, social sciences, history, geography	Sem	tchr manuals
Approach: interdisciplinary	Disc ✓	Non-Print Materials:
Ability: average, average +	Indep ✓	slides
Eval Meth: tchr jdgmts	Lab ✓	
Testing: none	Fld ✓	
Cont Resp: tchr guided	Dem	
Envir: community, sch grounds & library, classroom, lab	Sim ✓	
	TV	
	A/V	

That there is a general social concern for the environment and a need for a more rational exploitation and judicious conservation of resources is not in doubt. The problem is deciding what can be done about it. For us, the problem was more specific: what part can education play? The Conservation Education Project was set up in an attempt to answer this question in a practical form, and the result is the series of books 'People and Resources'. It has two major aims: 1) to help students become aware of the diverse ways in which people affect and are affected by the use of natural resources; and 2) to provide students with experiences of decision-making concerned with the balance between environmental exploitation and human needs.

The principles on which these aims are based are described in the Introduction. They were established at a Symposium on 'Conservation in Education' held at Chelsea College in 1971. People from many walks of life, including education, science, conservation groups, industry, politics and religion, contributed to the discussions and to them we offer our gratitude.

The books provide a collection of activities which are sufficiently flexible to be adapted for use throughout the secondary school range up to the sixth-form general studies level. The activities focus on a wide range of questions which arise from evidence, such as tables of data, photographs, diagrams and excerpts from documents, presented as open-ended problems; and from practical work undertaken by the students and involving experiments in the laboratory and field, and survey work in home, school and local areas. Most of these activities were tried out in schools and, indeed, many were developed in the school situation. They have evolved through a process of continuous revision and careful vetting.

The materials are being published by Evans Brothers Limited, Montague House, Russell Square, London, WC1B 5BX, under the series title 'People and Resources'.

Reason: update content & method, change in philosophy, develop new course	Adopt: not known	Pers: FT PT NRT	Publ: reproduced commercially
	Tchr Ed: no special preparation required	Adm	
		Wr 4	
		VSch 2	
		Res	
		TEd	
		Tral 20	

**Descriptive References:**

Kelly, P.J. 1972. Education for Conservation. J. Inst. Health Educ. 11(1).  
Also ESSO Magazine. Autumn 1972.

**CONTINUING MATHEMATICS PROJECT  
(CMP)**

Robert W. Morris, Director

See ICh Report(s): none

Mantell Building  
University of Sussex  
Falmer, Brighton  
Sussex, England  
Tel: Brighton 66755

1971-1976

Gov:Council for  
Ed Technology,  
Schools Council,  
Dept of Ed &  
Science, Indus-  
try

Ages: 16-18, tchr ed	Exper:* Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	programmed units
Subj: math	Sem	activity sheets
Approach: -	Disc	tchr manuals
Ability:* average, average +	Indep	1 tests
Eval Meth:* achievement tests, student questionnaire	Lab	4 objectives
Testing: individual	Fld	Non-Print Materials:
Cont Resp:* material directed, tchr guided	Dem	slides, filmstrips
Envir:* sch library, classroom	Sim	3 slide tape, games
	TV	audiotape, videotape
	A/V	2

This project was set up at the University of Sussex in August 1971. Sponsored by the Council for Educational Technology, the Schools Council, the Department of Education and Science, the Scottish Education Department and with generous contributions from industry it is to run for five years.

Its purpose is to develop a flexible system of self-instructional materials to promote the continued study of mathematics by students who have only encountered the subject in general education. In the preparation of materials, special consideration will be given to students whose principal interests lie in subjects such as economics, geography or biology, or who are looking towards a career in business or teaching. But the units produced will be suitable for study by any students who have followed a normal mathematics course up to the age of 15 or 16 with moderate success. A modular construction will provide the required flexibility.

The learning materials will be so designed that constant recourse by the student to a teacher of mathematics ought not to be necessary. They will emerge as units of study with tests of progress built into the courses. It is envisaged that guidance on choice of courses and help with self-assessment will be forth coming from a tutor, who might well be a specialist in a subject other than mathematics.

Although programmed texts will comprise a substantial part of the output, use will be made of such other media and modes of teaching as lend themselves helpfully to particular topics. For example, different audio-visual forms will be used where they have advantages in teaching effectively and sustaining a high degree of motivation among the students. Practical and experimental work will be included. Games and simulations will also be employed.

Units produced by the project team so far include courses in elementary Probability, Statistics and Calculus. There are also units which give an introduction to Flow-charts, Critical Path Analysis, Information and Coding and the Mathematics of Finance. A number of revision units on Indices, Logarithms, etc. have been prepared for use by students who may need them.

Reason: need for self-learning materials	Adopt: -	Pers: FT PT NRT	Publ: produced
Initiator(s): -	Tchr Ed: conducts work-shops; provides manuals & consultants	Am 1 Wr 4 VSch 1 Res TEd	for trials by offset

No references given

**COURSES IN TEACHING & LEARNING  
IN HIGHER EDUCATION (TLHE)**

L.R.B. Elton, Director

See ICh Report(s): none

Institute for Educational Technology 1969-

University of Surrey, Guildford  
Surrey GU2 5XH, Great Britain

Gov, University  
Participating  
Schools

Tel: Guildford (0483) 71281, ext 402

Ages: tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	supplementary books
Subj: biol, chem, phys, math, tech, soc sci, humanities	Sem ✓	tests
Approach: process, conceptual, inquiry, discovery	Disc ✓	overview
Ability: -	Indep	newsletters
Eval Meth: tchr jdgmts, student q're, follow-up studies	Lab ✓	evaluation reports
Testing: -	Flt	Non-Print Materials:
Cont Resp: tchr guided	Des ✓	videotape
Envir: classroom, AVA Center	Sim	
	TV	
	A/V ✓	

The training of university teachers, not only for their present tasks, but especially in connection with the promotion of innovation and change, is a comparatively new development in Universities. At Surrey, short courses have been provided since 1968 and they have been studied from the point of view of course improvement and the light they throw on the problem of institutionalization of innovations.

Conclusions so far are: (a) The need is for both pre-service and in-service training through short courses. (b) There is considerable overlap between the needs of teachers in the sciences and humanities. (c) Most course participants engage in some form of innovation in their teaching following attendance at courses. (d) There is need for in-service training through longer part-time courses for selected experienced teachers who will become in turn the instructors on short courses and the major agents for innovation in their institutions.

Reason: update content & method, change in phil- osophy, develop new course	Adopt: -	Pers: FT PT NRT Publ. -
	Tchr Ed: conducts work- shops, provides manuals & consultants	Adm 1
		Wr
		VSch
Initiator(s): L.R.B. Elton, J.M. Kilty, B.C. Stace		Res 1 1
		TEd 1
		Trial 150

**Descriptive References:**

Flak, B. and K.L. Dow. The Assessment of University Teaching. Society for Research in Higher Education, London.

Greenaway, H. Training of University Teachers. Society for Research in Higher Education, London.

Elton, L.R.B. June 1971. Teaching Criteria for Promotion. A.U.T. Bulletin. p. 6.

Research:  
Elton, L.R.B. and J.M. Kilty. To be published. Courses in Higher Education at Surrey University. Staff Development in Universities Conference, University of London 1974.  
Eckstein, B. June 1973. Course on Teaching and Learning in Higher Education, Guildford. A.U.T. Bulletin.

**CURRICULUM DIFFUSION  
RESEARCH PROJECT**

Peter J. Kelly, Director

See ICh Report(s): 8

Centre for Science Education  
Chelsea College  
Bridges Place  
London, SW6 4HR  
England

1971-1974

Social Science  
Research Council

Ages: tchr ed

Lang: Eng

Subj: curriculum development

Approach: -

Ability: -

Eval Meth: -

Testing: -

Cont Resp: -

Envir: -

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep      not  
            answered

Lab

Fld

Dem

Sim

TV

A/V

This three year study (1971-74) of the diffusion and adoption of curriculum development projects in England and Wales has had three main aspects. First, a study of the dissemination strategies of some curriculum development projects and the related extent of adoption over the period 1962-74. Secondly, a series of questionnaire studies of head and assistant teachers concerned with their use and awareness of a range of curriculum development projects, their use and awareness of a range of curriculum development projects, their communication activities, factors facilitating and limiting the adoption of projects, and their opinions on the outcomes and effects of curriculum development projects. Thirdly, a number of case studies of local education authorities and schools have also been undertaken.

The work has focussed mainly on curriculum developments in science at the secondary level.

Reason: to adopt &  
diffuse curriculum  
innovations

Adopt: -

Tchr Ed: -

Pers: FT PT NRT    Publ: -

Adm

Wr

VSch

Res

TEd

Trial

not  
answered

Initiator(s): -

No references given

EARLY MATHEMATICAL EXPERIENCES  
Professor and Mrs. G. Matthews,  
Directors  
See ICh Report(s): none

Centre for Science Education  
Chelsea College of Science and  
Technology  
Bridges Place, London SW6  
England  
Tel: 01-736 3401

1974-1977  
Schools Council

Ages: 3-5	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	teachers manual
Subj: math	Sem	newsletter
Approach: conceptual	Disc	
Ability: all	Indep not	Non-Print Materials:
Eval Meth: -	Lab answered	videotapes
Testing: -	Fld	
Cont Resp: -	Dem	
Envir: -	Sim	
	TV	
	A/V	

The Nuffield Mathematics Project identified the need to help pre-school children develop mathematical concepts and overcome the handicap of those who start in the infants' school without relevant experience, activities and conversation. A 'tree' of concepts was mapped out, through joint work by the Nuffield Mathematics Project and the Institut des Sciences de l'Education at Geneva (see Nuffield Mathematics: Development of Individual Assessments). The 'tree' provides a firm basis for the activities of young children, but detailed school or class-based work is based on the early 'branches', to determine how nursery children acquire ideas such as ordering, sorting, matching, comparisons; and spatial ideas such as neighborhood and recognition of shapes.

The project objectives are: 1) To identify and classify relevant experiences leading to mathematical ideas. This will involve observing nursery classes and relating their work to the theoretical development of early mathematical concepts. 2) To produce guides for teachers to help them to stimulate the development of mathematical concepts in young children.

During the first 15 months, work will continue on the 'concept tree', while steps are taken to identify good nursery schools and classes. The project team will maintain contact with these schools and arrange for groups of teachers to meet to discuss their methods and approach. It is hoped also to involve College of Education staff at this stage. Teachers' guides will be prepared during this phase and tested during 1975/76 in a number of schools. Audio-visual recordings of children at work will be prepared, partly for evaluation purposes and partly for dissemination and training courses.

The teachers' guides will be provided in the form of general guidance and not as a sequence of lessons. Structure will, however, be indicated by the 'tree' and simple ways of recording progress will be suggested. The guides will include: 1) the 'tree' of concepts and a description of stages of development; 2) an account of experiences relevant to the acquisition of concepts, including play, activity, communication with the teacher, and exploration of the environment; 3) case studies of actual activities, records of conversations and reproductions of children's work; and 4) links with experiences such as the 'pre-science' of the Pre-School Education Project and the work in language development - see Pre-School Language Project and Communication Skills in Early Childhood.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: -
Initiator(s): -	Tchr Ed: conducts work-shops	Adm	
		Wr	
		VSch not	
		Res answered	
		TEd	
		Trial	

**Descriptive References:**

Matthews, Geoffrey and Julia. 1973. Pre-School Mathematics, Mathematical Gazette, LVII.

A Study of Nursery Education (Working Paper 41). 1972. Schools Council, Evans/Methuen Educational.

EDUCATIONAL USE OF LIVING  
ORGANISMS (EULO)

P.J. Kelly, Director

See ICh Report(s): 8,7

Centre for Science Education  
Chelsea College  
University of London  
Bridges Place, London SW6 4HR  
Tel: 01-736-3401

1969-1974

Gov, Foundation

Ages: 5-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: biol	Sem	tchr manuals
Approach: inquiry, discovery	Disc	Non-Print Materials:
Ability: all	Indep not	slides
Eval Meth: -	Lab answered	filmstrips
Testing: -	Fld	wall charts
Cont Resp: -	Dem	
Envir: sch grounds, lab	Sim	
	TV	
	A/V	

The EULO project purposes are: 1) to determine the needs of schools with respect to living organisms and the associated educational, administrative, and biological problems; 2) to identify and evaluate the usefulness of different species of living organisms; and 3) to devise culture and maintenance techniques suitable for use in schools and relevant teaching procedures for the effective use of the appropriate species.

Materials available include booklets and visual aid materials for use by teachers. Selection of the topics and basic information was aided by replies to an initial questionnaire survey of over 300 primary and secondary schools in England and Wales covering such topics as which living organisms are maintained in schools, how they are used and some of the problems associated with their use and maintenance.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially
	Tchr Ed: assists in conducting workshops	Adm 1	
Initiator(s): J.D. Wray		Wr 1	
		VSch 1	
		Res 1	
		TEd	
		Trial	

Descriptive References:

Kelly, P.J. and J.D. Wray. The Educational Use of Living Organisms. Journal of Biological Education. 5(5): 213-8.



ENGINEERING SCIENCE  
L. M. Cantor, Director  
See ICh Report(s): none

Engineering Science Development Unit  
University of Technology  
Loughborough, Leics LE11 3TU  
England

1970-1976  
Schools  
Council

Tel: Loughborough (050-93) 63171

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: engineering science	Sem	teacher manual
Approach: interdisciplinary, integrated	Disc	
Ability: all	Indep not	
Eval Meth: -	Lab answered	
Testing: -	Fld	
Cont Resp:	Dem	
Envir: -	Sim	
	TV	
	A/V	

During recent years the Joint Matriculation Board, in response to requests from schools, has developed a syllabus for Engineering Science at A-level providing an alternative to Physics as a University entry qualification. The Board furnished schools with guidance material, including a set of trial texts and evolved a system of internal assessment and external moderation of practical work consisting of experimental investigations and a project. The examination, which was first held in 1969, comprises an objective test, a comprehension and communication exercise, a project design problem and questions involving decision-making choices on engineering devices and scientific analysis. In order to extend the guidance to schools, Loughborough University of Technology and the Schools Council have established the Engineering Science Development Unit, to produce and test guidance material and pupils' texts.

The aim of the project has been not primarily the training of engineers and scientists but rather that the material produced should help prepare students adequately for employment or higher education in a wide range of subjects and careers. All students using the material should leave school with an understanding of scientific method, an ability to approach practical problem solving rationally, and an appreciation of the breadth and significance of the major activities which constitute modern engineering. If these aims are achieved the students would also be well prepared to future work in science and engineering.

The scientific content of the materials is based upon the content of the current engineering science syllabuses. The main part of the materials is the students' text, and this will be divided into ten sections, each one dealing with a major area of scientific concepts, and each area to be introduced through a consideration of one or more important engineering situation. In addition there will be a Teachers' Resource Book (1975) and a Students' Resource Book (1975) including references sources for information, guidance and equipment, and a Problems Book (1975).

The material does not create a course in itself, as Nuffield Science materials do, but provides support for a number of existing courses, primarily those in Engineering Science examined by the Joint Matriculation Board and Associated Examining Board but with some relevance for existing and developing courses in A-level Physics and Engineering. All material has been tested in fifteen trial schools and colleges prior to publication.

Reason: -	Adopt: -	Pers: FT PT NRT	Publ: -
Initiator(s): -	Tchr Ed: conducts work-shops	Adm	
		Wr	
		VSch not	
		Res answered	
		TEd	
		Trial	

#### Descriptive References:

J.M.B. Examination Papers in Engineering Science. Available from the Joint Matriculation Board, Manchester 15.

Topics in Engineering Science for Teachers. An occasional bulletin produced by the Unit and available on application. Four issues to date.

**INDIVIDUALISED SYSTEMS OF INSTRUCTION IN UNIVERSITY SCIENCE COURSES (ISUS)**

L.R.B. Elton, Director

See ICh Report(s): 8,7

Institute for Educational Technology  
University of Surrey, Guildford  
Surrey, GU2 5XH, Great Britain

Tel: Guildford (0483) 71281, ext 402

1969-  
University,  
Nuffield &  
Leverhulme,  
Philips  
Industries

Ages: * 18-20, adult	Exper: * Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec 3	texts
Subj: * phys, math, tech, chem	Sem	supplementary books
Approach: * discipline-centered, integrated, interdisciplinary	Disc	programmed units
Ability: * avg, slow learner, avg+	Indep	1 tests
Eval Meth: achievement tests, student q're	Lab	2 objectives
Testing: * term, unit	Fld	Non-Print Materials:
Cont Resp: * tchr directed, student directed	Dem	slide tape
Envir: * classroom, lab	Sim	2 lab equipment
	TV	
	A/V	

The aim of the project is to investigate and develop methods and materials for self-study, designed to help students individually with problems arising in their learning and to enable them to achieve greater independence of learning. Important characteristics of the methodology of the project are: institute staff are actively engaged in normal teaching and develop innovations in conjunction with their teaching; they disseminate their innovations in conjunction with teaching staff at over twenty universities and colleges through a number of inter-University collaborations; and all evaluation is carried out independently of those who innovate and teach.

The major impact of the project has been through linking it to the more recently established Higher Education Learning Project (Physics), which involves eight institutions and which will make it possible to institutionalize innovations developed in the project. The major innovations relate to Personalised Systems of Instruction, and to Self-service laboratories and Computer exercises. Recently the project has been linked to the Science in its Social Context Project, which involves nine institutions all engaged in producing self-study material in the area of Science and Society.

Reason: update method, change in philosophy, develop new course	Adopt: 5 tchrs, 300 students, 2 sch	Pers: FT PT NRT	Publ: 300 copies
	Tchr Ed: -	Adm 2	reproduced
		Wr 3	institutionally
		VSch	by offset
Initiator(s): L.R.B. Elton, D.J. Boud, P.J. Hills, S. O'Connell		Res 10 3	
		TEd	
		Trial 10	

**Descriptive References:**

Elton, L.R.B. 1973. Instructional Methods in Tertiary Science Teaching. Aims, Methods and Assessment in Advanced Science Education. (ed. D.E. Billing and B.S. Furness). Heyden and Son Ltd., London. Chapter 10.

**Research:**

Elton, L.R.B., P.J. Hills and S. O'Connell. 1971. Teaching and Learning Systems in a University Physics Course. Physics Education 6: 95.

Elton, L.R.B., D.J. Boud, J. Nuttall and B.C. Stace. 1973. Teach yourself paradigm - the Keller Plan. Chemistry in Britain. 9:164.

Davis, Q.V. and P.J. Hills. 1972. A systematic Approach to a first year undergraduate course in electrical engineering. Aspects of Educational Technology 'I, Pitman.

**MATHEMATICS CURRICULUM--A CRITICAL  
REVIEW. SCHOOLS COUNCIL PROJECT**

J. V. Armitage, Director

See ICh Report(s): none

Education Building  
University Park  
Nottingham, NG7 2RD  
England

Tel: Nottingham 56101, ext 2298

1973-1976

Schools Council

Ages: 12-16, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: math	Sem	
Approach: inquiry	Disc	
Ability:* avg, avg+, all	Indep	not
Eval Meth: -	Lab	answered
Testing: -	Fld	
Cont Resp:* administratively directed,	Dem	
tchr guided	Sim	
Envir: -	TV	
	A/V	

The mathematics teacher of today faces a daunting array of modern literature and novel classroom material. The aim of the project is to help teachers perform their own critical appraisal of existing mathematics syllabuses and teaching apparatus for the secondary pupil.

It is planned to make a series of surveys of central mathematics topics which will give a synoptic view of the topic at school level. Each survey will: show how the topic connects up with other branches of mathematics; discuss ways of introducing the topic to pupils of differing backgrounds and abilities; analyse the advantages and disadvantages of each approach with regard to mathematical development and classroom presentation; and investigate possible applications. Each survey will be published in the form of a booklet.

The following surveys are planned: Number; Geometry; Algebra; Combinatorial Mathematics and Related Topics; Applications; Calculus; Inter-Disciplinary Activities; 11 - 13. In addition, a unifying booklet, entitled "Aims and Objectives in Teaching Mathematics" will attempt to set in wide perspective the topics which occupy the foreground in the preceding studies and will serve as an introduction to the series.

Each survey involves three stages of development. In the first stage, planning material is written which outlines the contents of the eventual booklet and includes some draft articles. This planning material is duplicated in limited quantities for circulation among groups of teachers. During the second stage these groups review the planning material and contribute further articles. In the third stage an editorial fellow writes the booklet. It is expected that publication of the booklets will start in 1976.

Reason: review content & method	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially
Initiator(s): -	Tchr Ed: -	Adm	
		Wr	
		VSch	not
		Res	answered
		TEd	
		Trial	

No references given

# **MATHEMATICS FOR THE MAJORITY**

Philip Floyd, Director

See ICh Report(s): none

Institute of Education  
University of Exeter  
Gandy Street, Exeter EX4 3QL  
England

1967-1972

Schools Council

Ages: 13-16

Lang: Eng

Subj: math

Approach: integrated, conceptual

Ability: average, slow

Eval Meth: -

Testing: -

Cont Resp: -

Envir: -

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:  
teachers manuals

The aim of the project was to produce a series of teachers' guides which would lead teachers into reassessing their work in mathematics with pupils between 13 and 16 years of age of average and below average ability; and which would provide source materials and ideas from which these teachers could make up their own courses. The project objectives are: 1) to provide pupils with experience of mathematical situations to encourage powers of judgement and imagination; 2) to remove barriers isolating mathematics from other areas of the curriculum and other interests of the pupils; 3) to give pupils some understanding of mathematical concepts which underlie the numeracy required for every day affairs; and 4) to enable pupils to appreciate in some measure the order and pattern of their environment.

The project team was concerned with the preparation of a number of teachers' guides, which do not in themselves make up a course, but attempt to provide material from which teachers can develop courses for the less able pupils, more extensive material for brighter young school leavers, and further material to provide non-specialist teachers with background mathematical knowledge. It is suggested that formal class teaching should be minimal, and that pupils should learn mathematics through practical and individual work. This has obvious implications for the school, both in the amount and type of space needed and in the teaching situation, where the role of the teacher changes from that of a purveyor of information to that of an adviser/tutor. In addition, the guides have been prepared with the non-specialist mathematician in mind, and in a team-teaching situation much of the presentation and discussion can be conducted by such non-specialists.

An evaluation officer worked in four main areas: 1) evaluation activities intended to clarify and enlarge on the objectives of the project. This included a) identifying different aspects of the curriculum problem which the project is trying to tackle; b) clarifying the objectives of teaching mathematics to the average and below average pupils; c) finding out as much as possible about the educational attainments of the pupils concerned, and examining other related factors; 2) evaluation activities intended to facilitate the editing of trial versions of the guides; 3) evaluation activities designed to measure the impact on the pupils involved, both as regards the project's declared objectives and also in relation to other aspects of pupil behavior; and 4) evaluation activities designed to lead to the publication of a descriptive report on the project and its impact on the educational scene.

Reason: -

Adopt: 378 schools

Pers: FT PT NRT Publ: -

Initiator(s): -

Tchr Ed: conducts work-shops

Adm

Wr

VSch

Res

TEd

Trial

not

answered

## **Descriptive References:**

Raising the School Leaving Age (Working Paper 2). 1965. Schools Council. HMSO.

Mathematics for the Majority (Working Paper 14). 1967. Schools Council. HMSO.

Choosing a Curriculum for the Young School Leaver (Working Paper 33). 1971. Evans/Methuen Educational.

MEASUREMENT OF UNDERSTANDING  
OF PUPILS IN LEARNING SCIENCE

F. W. Wagner, Director

Institute of Education  
The University  
Southampton SO9 5NH  
England

1966-1969

Schools Council

See ICh Report(s): none

Ages: 14-16

Lang: Eng

Subj: science

Approach: -

ability: all

Eval Meth: testing

Testing: -

Cont Resp: -

Envir: -

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep not  
answered

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tests

teachers manual

The project was established as part of a proposal to evaluate Nuffield O-level science materials, and its aim has been to produce a set of tests of cognitive attainment which can be used to compare the outcome of different teaching methods in O-level science courses.

The function of the test was clearly defined and a list made of subject material to be used in test items. Some 1,000 items were produced by a group of writers commissioned by the project. Groups of these items were put together to form 15-minute tests, and the tests were tried in a number of schools. The most discriminating and valid items were extracted for use in second stage trials.

The tests and teachers' manual were used by the Evaluation of Science Teaching Methods Project during 1971-72, and it is hoped that these will be available shortly through the National Foundation for Educational Research.

Reason: -

Adopt: -

Pers: FT PT NRT Publ: -

Initiator(s): -

Tchr Ed: -

Adm

Wr

VSch

Res

TEd

Trial

not  
answered

No references given

**MIDLANDS MATHEMATICAL EXPERIMENT**
**R.M. Stokes, Director**
**See ICh Report(s): 8,7,6,5**
**R.H. Collins, Secretary**  
**31 Oldway Drive**  
**Solihull, B91 3HP, England**  
**Tel: (021) 704-6309**
**1961-1973**
**Gov; publisher**

<b>Ages:</b> 10-18	<b>Exper:</b> C1 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang:</b> Eng	<b>Lec</b>	<b>texts</b>
<b>Subj:</b> math	<b>Sem</b>	<b>programmed units</b>
<b>Approach:</b> * discovery, conceptual	<b>Disc</b> ✓	<b>tchr manuals</b>
<b>Ability:</b> all	<b>Indep</b> ✓	<b>charts</b>
<b>Eval Meth:</b> * achievement tests, tchr jdgmts	<b>Lab</b> ✓	<b>Non-Print Materials:</b>
<b>Testing:</b> public exam	<b>Fld</b>	<b>lab equipment</b>
<b>Cont Resp:</b> tchr directed	<b>Dem</b>	
<b>Envir:</b> classroom	<b>Sim</b>	
	<b>TV</b>	
	<b>A/V</b>	

Midlands Mathematical Experiment is concerned with constructing a new syllabus which (1) takes notice of contemporary mathematics; (2) includes contemporary uses of mathematics in industry, science, etc.; (3) puts mathematics into a setting which the pupils recognize as within their experience of the twentieth century; and (4) is taught in the light of educational developments of the past thirty years. Attention is given to providing background experience, aiming at insight into structure and encouraging pupils to recognize the patterns into which mathematical ideas fall.

<b>Reason:</b> * update methods & content	<b>Adopt:</b> unknown	<b>Pers:</b> FT PT NRT	<b>Publ:</b> (\$25/10 students)
		<b>Adm</b> 1	
<b>Initiator(s):</b> C. Hope, R.H. Collins, R.M. Stokes, J. Cordingley, J. Barratt, A. Bailey	<b>Tchr Ed:</b> provides manuals & consultants, conferences	<b>Wr</b> 3 20	
		<b>VSch</b>	
		<b>Res</b>	
		<b>TEd</b> 3 12	
		<b>Trial</b>	

**No references given**

**NUFFIELD A-LEVEL BIOLOGICAL  
SCIENCE**

P.J. Kelly, Director

See ICh Report(s): 8,7,6,5

Biology Section  
Centre for Science Education  
Chelsea College (Univ. of London)  
Bridges Place, London S.W.6

Tel: England 01 736 3401

1965-1969

Nuffield  
Foundation

Ages: 16-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: biol	Sem	lab books
Approach: discipline-centered, integrated, process, conceptual, inquiry, discovery	Disc	supplementary books
Ability: avg+	Indep	tchr manuals
Eval Meth: achievement & lab tests, tchr jdgmts	Lab	field guides
Testing: annual or 1/2 yr exams, continuous assessment	Fld	overview
Cont Resp: tchr, student & material directed, tchr guided	Dem	newsletters
Envir: sch grounds & library, lab	Sim	Non-Print Materials:
	TV	slides, filmloops,
	A/V	films, models, lab equipment

The materials produced by the Nuffield Advanced Biological Science Project do not represent a rigid syllabus. They have been devised after careful evaluation of the results of extensive school trials so they can be used in a variety of ways related to the different circumstances found at the sixth form level in British schools and the varied abilities, backgrounds, and aspirations of students.

The work has three major objectives: To develop in students the intellectual and practical abilities which are fundamental to the understanding of biological science; To introduce students to a body of biological knowledge relevant to modern requirements, through investigating living things and studying the work of scientists. In doing so, students will consider the processes of research and the implications of science for society; To develop in students the facility for independent study, especially how to learn through critical evaluation rather than memorizing by rote.

These aims have been central not only to the design of the publications and other materials but also to the complementary examinations that have been prepared.

The materials of the project are published by - Penguin Education, Horton Road, West Drayton, Middlesex.

Reason: update content & method, develop new course	Adopt: -	Pers: FT PT NRT	Publ: repro- duced commer- cially
Initiator(s): Nuffield Foundation	Tchr Ed: conducts work- shops; provides manuals, guides, films & con- sultants	Adm 1 1 Wr 14 2 VSch 2 2 Res 1 2 TEd many Trial 97	

**Descriptive References:**

Kelly, P.J. and W.H. Dowdeswell. 1970. The Nuffield A-Level Biological Science Project. Journal of Biological Education. 4(4).

Kelly, P.J. 1970. Implications of Nuffield A-Level Biological Science. School Science Review. 52:179.

**Research:**

Eggleston, J.F. and P.J. Kelly. 1970. The Assessment of Attainment in Project Work for Nuffield A-Level Biology. Educational Research. 12(2).

Kelly, P.J. and R.E. Lister. 1969. Assessing Practical Ability in Nuffield A-Level Biology. Studies in Assessment.

Kelly, P.J. 1971-72. Evaluation Studies of the Nuffield A-Level Biology Trials. Journal of Biological Education. 5(6) and 6(4).



**NUFFIELD 'A' LEVEL CHEMISTRY  
EXAMINATION PROJECT**

J.C. Mathews, Director

Department of Educational Research 1970-1974  
University of Lancaster  
Lancaster, England Gov

Tel: Lancaster 65201

See ICh Report(s): 8

Ages: 16-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	overview
Subj: chem	Sem	research report
Approach: discipline-centered	Disc ✓	
Ability: avg+	Indep	
Eval Meth: achievement, lab & standardized tests, tchr jdgmts	Lab ✓	
Testing: public exam at end of course	Fld	
Cont Resp: admin directed	Dem	
Envir: classroom, lab	Sim	
	TV	
	A/V	

The great wave of curriculum development which started in the United Kingdom in the 1960's was accompanied by an equally strong move towards a reformation of evaluation and assessment techniques. A comparison of present-day examinations in the General Certificate of Education with those of the 1950's reveals some striking changes which may be summarised as follows:

The use of new techniques, in particular the use of fixed response questions (objective tests), structured questions, multiple marking by impression, and the introduction of an element of internal assessment by teachers.

The introduction of examination specifications. These specifications are statements in a quantitative form of what the examination was intended to test, not only in terms of its subject content, but in terms of the objectives and other features of the curriculum.

An extension of teacher involvement. This showed itself partly in the element of internal assessment, partly in the increased use of teachers in the construction of the written examination, and partly in closer consultation with teachers about the structure and operation of the examination.

The main purpose of the investigation now reported was to determine whether the outcome of examinations could be used as an aid to a continuous process of curriculum development. To do so, it was necessary to investigate an assessment system which had been designed to match a particular curriculum; and the Nuffield 'A' level Chemistry Course and its system of assessment appeared to provide a suitable medium for research of this type.

It is not anticipated that all curricula and examinations could be monitored by exactly the same process as that appropriate to Nuffield 'A' level chemistry. Nevertheless, it is hoped that all the principles and some of the processes could be applied to the science subjects at least, and it would be rash to assume that none of them is applicable to the humanities and arts.

Reason: curriculum evaluation	Adopt: -	Pers: FT PT NRT	Publ: 100
	Tchr Ed: -	Adm 1	copies repro-
Initiator(s): J.C. Mathews, J.R. Lecce		Wr	duced insti-
		VSch	tutionally by
		Res 1	offset
		TEd	
		Trial	

No references given

**NUFFIELD ADVANCED LEVEL  
CHEMISTRY PROJECT**

E.H. Coulson, Director

See ICh Report(s): 8,7,6

Centre for Science Education  
Chelsea College  
Bridges Place  
London, SW6 4HR  
England

1965-1969  
Nuffield  
Foundation

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: chem	Sem	texts
Approach: integrated	Disc ✓	programmed units
Ability: average, average +	Indep ✓	tests
Eval Meth: -	Lab ✓	
Testing: -	Fld	Non-Print Materials:
Cont. Resp: -	Dem	overhead transpar-
Envir: -	Sim	encies
	TV	filmloops
	A/V ✓	

The overall project purpose was the development of a teaching scheme for chemistry for the 16-18 year age group. Some specific objectives were: 1) Production of an integrated course in chemistry for use with the 16-18 year age group; 2) The course to be practically based and to demand maximum pupil involvement; 3) Technological application of chemical facts and principles to be stressed throughout the course; 4) The development of a system of assessment that should be in harmony with the spirit of the course.

Reason: -	Adopt: 500 tchrs, 4,300 students, 270 schools	Pers: FT PT NRT	Publ: -
Initiator(s): E.H. Coulson	Tchr Ed: -	Adm Wr VSch not Res answered TEd Trial	

**Descriptive References:**

- Nyholm, R. 1969. Achievement and Prospect. Education in Chemistry. 6(6).  
Coulson, E.H. 1969. General Survey. Education in Chemistry. 6(6).  
Raitt, J.G. 1969. Special Studies. Education in Chemistry. 6(6).

# NUFFIELD ADVANCED PHYSICS PROJECT

Jon Ogborn, Director

See ICh Report(s): 8,7,6

Centre for Science Education

Bridges Place

London SW6 4HR, England

Tel: 01-736-3401

1967-1972

Nuffield

Ages: 16-18, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec	tchr manuals
Subj: phys	Sem	supplementary books
Approach:* inquiry, conceptual	Disc ✓	lab books
Ability: avg+	Indep ✓	tests
Eval Meth:* achievement & lab tests, tchr jdgmts	Lab ✓	Non-Print Materials:
Testing: public exam at end of 2-yr course	Fld	slides
Cont.Resp: tchr directed	Dem ✓	filmloops
Envir:* lab, classroom sch library	Sim	films
	TV	lab equipment
	A/V	

This project is one of more than 12 projects sponsored by the Nuffield Foundation. It is concerned with physics for students staying on at school at the ages 16-18, who take a public examination which partly determines university entrance.

The project's main concern has been to rethink physics teaching at this level, long a strong tradition in British Schools. The main emphasis is on encouraging independence and maturity of thought in students, together with a concentration on widely useful and deeply important concepts. Teaching is personal, in small groups. There is much experimentation of a wide variety of types. Students are asked to learn from books and from a variety of reading, as well as from experiments and discussion. An individual investigation by each student is part of the course, assessed in the examination. Sections of the course deal with significant applications and with work in the style of the engineer: including a systems approach to electronics, for example. Other innovations include material for teaching quantum ideas and a statistical introduction to thermodynamics.

The project has published all of its materials with Penguin Books Ltd., from whom information is available. The volume, Teacher's Handbook, summarises the approach and content of the whole course. There are 10 units each with a teacher's guide and student's book (combined for units 9 and 10). The students' books generally supplement rather than replace existing texts. There are a limited number of slides and filmloops, and a 16 mm film (computer analogue of Einstein solid).

In-service training is through courses arranged nationally by the project and locally by Departments of Education and by Local Education Authorities.

Reason:* update method, change in philosophy, update content	Adopt: 200 tchrs, 2,500 students, 150 schools	Pers: FT PT NRT	Publ: (\$2,000/10 students)
		Adm 1	
		Wr 6	
		VSch 6	
Initiator(s): Nuffield Foundation, K.W. Keohane	Tchr Ed: conducts work-shops; provides manuals & consultants	Res 1	
		TEd 4 4	
		Trial 100	

## Descriptive References:

Ogborn, J.M. and P.J. Black. April 1972. Physics Education.

Ogborn, J.M. and P.J. Black. 1970. Bulletin of Institute of Physics. Vol. 21.

Ogborn, J.M. and P.J. Black. April 1968. Education in Science. No. 27.

**NUFFIELD MATHEMATICS TEACHING  
PROJECT**

Geoffrey Matthews, Director

See ICh Report(s): 8,7,6,5,4

Nuffield Foundation  
Regents Park  
London N.W.1.  
United Kingdom

Tel: 01-722-8871

1964-1972  
Foundation

Ages: 5-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr, Italian, Dutch, German	Lec	tchr manuals
Subj: math	Sem	Non-Print Materials:
Approach: conceptual, discovery	Disc	films
Ability: all	Indep not answered	
Eval Meth: tchr jdgmts	Lab	
Testing: none	Fld	
Cont Resp: tchr guided	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

The purpose of the project was to devise a contemporary approach to mathematics for children from 5 to 13. It was the first project in the country for this age range and, as such, has had a considerable effect on teaching in general at this age range. Materials were aimed at teachers rather than children, although some materials for children have been produced for the secondary level. Teachers' centers were set up to provide in-service training on the materials of the project and to provide a place where teachers could discuss and develop the materials produced by the project teams. Although the project, as such, has come to an end the work of the project is continuing in teachers centers throughout the country. The aims and methods of the project are given in greater detail in I do and I understand and Into Secondary School.

Reason: update content & methods	Adopt: -	Pers: FT PT NRT	Publ: 1,000,000
Initiator(s): -	Tchr Ed: provides guides & films	Adm 2	copies repro-
		Wr 7	duced commer-
		VSch	cially by
		Res	linotype
		TEd	
		Trial	

**Descriptive References:**

Supplement 13 - Where. ACE 57 Russel St. Cambridge, England.

**Descriptive Brochures from:**

John Murray, 50 Albemarle St., London W1, U.K.

John Wiley, 605 Third Avenue, New York 10016, U.S.A.

NUFFIELD 'O'-LEVEL BIOLOGY  
PROJECT

Contact: Grace Monger

See ICh Report(s): 8,7,6

Centre for Science Education  
Chelsea College  
University of London  
Bridges Place, London SW6 4HR  
England

1970-1971

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Ages: -	Exper: Cl 12+ 2-12 I
Lang: Eng	Lec
Subj: biol	Sem
Approach: -	Disc
Ability: -	Indep not answered
Eval Meth: -	Lab
Testing: -	Fld
Cont Resp: -	Dem
Envir: -	Sim
	TV
	A/V

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A revision of the project has been made and will be published by Longman Group Ltd., Longman House, Burnt Mill, Harlow, Essex, CM20 2JE at the end of this year.

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Reason: -	Adopt: -	Pers: FT PT NRT	Publ: -
Initiator(s): -	Tchr Ed: -	Adm	
		Wr	
		VSch not answered	
		Res	
		TEd	
		Trial	

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Descriptive References:

- Kelly, P.J. and G. Monger. 1973. An Evaluation of the Nuffield O-Level Biology Course Materials and Their Use, Part I. School Science Review. 55:199.
- Kelly, P.J. and G. Monger. 1974. An Evaluation of the Nuffield O-Level Biology Course Materials and Their Use, Part II. School Science Review. 55:193.

**NUFFIELD PHYSICAL SCIENCE**

Contact: K.W. Keohane  
See ICh Report(s): 8,6,5

Chelsea College Centre for  
Science Education  
Bridges Place  
London SW6  
England  
Tel: 01 - 736 - 3401

1965-1972  
Foundation

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	texts
Subj: chem, phys	Sem ✓	lab books
Approach: integrated	Disc ✓	supplementary books
Ability: avg, avg+	Indep ✓	tchr manuals
Eval Meth: achievement tests, tchr jdgmts	Lab ✓	Non-Print Materials:
Testing: exam at end of 2 year course	Fld ✓	lab equipment
Cont Resp: administratively directed	Dem ✓	
Envir: schools	Sim	
	TV	
	A/V	

The purpose of the Nuffield Physical Science Course was to produce an integrated course in physical science while working toward a more flexible curriculum for the senior students in English schools.

The project includes a treatment of materials of science, a compulsory practical project and new examining procedures.

Independent study, laboratory investigation, lectures, seminars and discussion sessions form the backbone of the presentation methods.

Reason: update content, change in philosophy	Adopt: 300 tchrs, 3,000 students, 150 schools	Pers: FT PT NRT	Publ: reproduced commercially
Initiator(s): J.E. Spice	Tchr Ed: conducts workshops	Adm 4 8 2 Wr VSch Res TEd	
		Trial 100	

No references given

NUFFIELD COMBINED SCIENCE  
PROJECT

M.J. Elwell, Director

See ICh Report(s): 7,6,5,4

Center for Science Education  
Bridges Place, London SW 6  
United Kingdom

Tel: 01 736 3401

1965-1969

Foundation

Ages: 11-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp, Italian	Lec	tchr manuals
Subj: biol, chem, phys	Sem	activity books
Approach: integrated, inquiry	Disc ✓	
Ability: all	Indep ✓	
Eval Meth: tchr jdgmts	Lab ✓	
Testing: as needed	Fld ✓	
Cont Resp: tchr guided	Dem ✓	
Envir:* lab, sch grounds & library	Sim	
	TV	
	A/V ✓	

No narrative provided by project

Reason: update method	Adopt: -	Pers: FT PT NRT	Publ: reproduced
Initiator(s): M.J. Elwell,	Tchr Ed: -	Adm	commercially
C.D. Bingham, K. Wild,		Wr	
J.R. Lance		VSch not	
		Res answered	
		TEd	
		Trial	

No references given



**NUFFIELD PHYSICS TEACHING PROJECT  
(0-LEVEL)**

Eric M. Rogers, Director

See ICH Report(s): 6,5

Science Teaching Project  
Chelsea College of Science &  
Technology, Bridges Place  
London SW6, England

Tel: London 736-3401

1962-1966

Gov (State),  
Nuffield

Ages: 11-16	Exper: 1 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr. Sp, Turkish, Polish, Japanese	Lec	tests
Subj: phys	Sem	lab books
Approach: dicipline-centered, inquiry, discovery	Disc ✓	supplementary books
Ability: avg+	Indep ✓	tchr manuals
Eval Meth: achievement tests, tchr jdgmts	Lab ✓	tests
Testing: yearly exams	Fld	Non-Print Materials:
Cont Resp: tchr guided	Dem ✓	lab equipment
Envir: lab	Sim	
	TV	
	A/V	

In 1961 The Association for Science Education published a report suggesting a new syllabus and changes of policy for physics in Grammar schools: more emphasis on teaching for understanding and less on rote memory; and more 'modern physics'. There were few funds for curriculum development, design of apparatus and practical trials until the Nuffield Foundation sponsored a complete project in 1962.

The Project offers a program for the physics taken by many students: a 5-year course from 11 1/2 to 16 1/2.

The Project did not emerge as just a changed syllabus -- or a package of different apparatus. Its extensive Guides offered suggestions for "teaching for understanding", with discussion of reasons. As principal vehicles: students do their own experimenting with only brief "sailing orders" not cookbook instructions; homework and class discussions use questions that ask for understanding and creative thinking.

We developed apparatus 'kits' -- 16 sets for an experiment, to encourage students' experimenting instead of demonstrations. This is not a pure 'discovery' method -- (which seems misleading) -- still less a slow, heuristic scheme -- but there is strong emphasis on learning by doing. Since that takes time, there are some demonstrations.

Nationwide examining Boards have provided examinations for the final year that fit the Project's aims in questions and marking.

We are producing students' textbooks which discuss arguments and describe experiments -- without "giving the show away".

The Project has given suggestions to many teachers. Full adoption has increased to 20% of the school population taking general physics. Owing to organizational changes, classes now have a wider ability spectrum. We are producing booklets of simpler questions to give less academic students a sense of success.

Reason: update content & method, change in philosophy	Adopt: 1,000 tchrs, 80,000 students, 250 schools	Pers: FT PT NRT	Publ: 400,000 copies repro- duced commer- cially by offset (\$3000/ 10 students for equipment)
Initiator(s): D. McGill, E.M. Rogers, E.J. Wenham, J.L. Lewis	Tchr Ed: conducts work- shop; provides manuals & consultants	Adm 4 7 12 Wr 3 12 VSch 2 5 5 Res 12 TEd 12 100 Trial 2 80	

**Descriptive References:**

Rogers, E.M. The Nuffield Project. Physics Today. 20(3).  
Wenham, E.J. March 1967. School Science Review. 165: 337-346.

NUFFIELD SECONDARY SCIENCE  
Hilda Misselbrook, Director  
See ICh Report(s): 8,6

Centre for Science Education  
Chelsea College of Science and  
Technology  
Bridges Place, London SW6  
England  
Tel: 01-736-3401

1965-1970  
Nuffield  
Foundation,  
Schools Council

Ages: 13-16	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	teacher manual
Subj: science	Sem	tests
Approach: interdisciplinary, integrated	Disc not	
Ability: all	Indep answered	Non-Print Materials:
Eval Meth: -	Lab	filmloops
Testing: -	Fld	slides
Cont Resp: -	Dem	pictures
Envir:	Sim	
	TV	
	A/V	

This project was concerned with science for those pupils of 13-16 who are unlikely to take GCE O-level in science, and was based upon ideas expressed in Schools Council Working Paper 1, Science for the Young School Leaver. This suggested that the main criterion of the work in this field should be that the work had significance for the pupils, and this criterion was maintained as the materials have been developed. Emphasis was also given in the Working Paper to the involvement of pupils through their own experimental investigations of problems which are real to them, and such investigations constituted a major part of the work.

Appraisal of data and evidence collected through the pupils' own investigations was seen to be an essential step to looking critically at the evidence collected by others. Discussion at a number of levels from a simple discussion by the pupils of their own experimental results to one in which they consider a social or moral problem which has arisen during a piece of work was an important element in the work.

For a number of reasons, including the wide ability range of the pupils concerned, the difference in their interests and environments, and the variety of schools they attend, Nuffield Secondary Science was not designed as a course. It is material which is flexible and capable of adaptation so that from it teachers can select material from which to construct coherent courses which are relevant to their own pupils. The content is contained in the eight themes listed below which were suggested in Working Paper 1 as being fundamental for all pupils. The work ignores the traditional boundaries between science 'subjects' and areas are included which have not normally appeared in school science courses in the past.

A full on-going assessment continued throughout the trials and the texts were completely rewritten twice in the light of information obtained from the teachers by means of detailed questionnaires. In development trials, each team member was assigned to a group of schools in order to observe the trial lessons and report on the problems encountered. In the following year this work was mainly carried out by two team members seconded full time for this purpose.

Reason: -	Adopt: -	Pers: FT PT NRT	Publ: -
Initiator(s): -	Tchr Ed: -	Adm	
		Wr	
		VSch	
		Res	
		TEd	
		Trial	

#### Descriptive References:

Choosing a Curriculum for the Young School Leaver (Working Paper 33). 1971. Schools Council. Evans/Methuen Educational.  
Alexander, D.J. 1974. Nuffield Secondary Science: An Evaluation. Macmillan Education.

# PROGRESS IN LEARNING SCIENCE

Wynne Harlen, Director

See ICh Report(s): none

School of Education, University  
of Reading, London Road, Reading,  
Berkshire RG1 5AQ, England

Tel: Reading 85234, ext 218

1973-1976

Gov

Ages: 5-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	overview
Subj: math, science	Sem	newsletters
Approach: integrated	Disc	✓ diagnostic materials
Ability: all	Indep	✓ forms for record
Eval Meth: tchr jdgmts	Lab	✓ keeping
Testing: -	Fld	Non-Print Materials:
Cont Resp: tchr directed	Dem	videotape
Envir:* classroom lab	Sim	slide tape
	TV	audiotape
	A/V	

Progress in Learning Science aims to increase the effectiveness of science teaching not by providing more curriculum materials but by helping teachers to use existing resources more efficiently. The project is concerned with the development of basic concepts, skills and attitudes relevant to learning science in the age range of five to thirteen years.

The principles of learning which guide the project are derived from the findings and theory of Piaget, that children learn most effectively from active first-hand interaction with materials and from activities which match their stages of development in the ideas involved. Whilst teachers can already find plenty of suggestions for activities, investigations and experiments which can be carried out by children, there is little to guide a teacher's choice as to which ones will suit the ideas and skills of individual children.

The project is providing help with both aspects of the matching problem: identifying the point of development reached by a child in various ideas, and learning what activities are appropriate to children at different stages. Material in the form of checklists is being developed to help teachers pick up cues to children's ideas from observation during naturalistic situations as a normal part of their work. Guides to the interpretation of children's behaviors and means of recording the observations help teachers to gather information which they use on the spot in their work with the children and also to accumulate records which indicate the progress being made by the class and by individuals. Other material suggests the kinds of activities which can be understood by, and which encourage progress in, children at different points in development of scientific ideas and skills.

The project differs from many curriculum projects in that it is concerned with informing teachers' decisions rather than suggesting teaching material. Its ideas are not readily conveyed through the written word, and a scheme for in-service courses, in which audio-visual materials will be prominent, has been devised. Materials for these courses are being constructed by the project and will be conveyed through local agents to head teachers, ending in the involvement of a whole school staff in discussing and implementing the project's output.

Reason: update method	Adopt: materials not available	Pers: FT PT NRT	Publ: 200 draft
Initiator(s):		Adm 1	copies repro-
W. Harlen	Tchr Ed: conducts work-shops; provides manuals and videotapes	Wr 1 1	duced insti-
		VSch 1	tutionally by
		Res	offset
		TEd 1	
		Trial	100

## Descriptive References:

Harlen, W. 1974. Progress in Learning Science - A New Form of Help for Teachers.  
School Council for Wales Science Bulletin. No. 11.

**PROJECT TECHNOLOGY**

G.B. Harrison, Director

See ICh Report(s): 8

Loughborough College of Education  
Loughborough, LE11 0BR  
England

Tel: Loughborough (05093) 61558

1967-1972

Schools Council

Ages: 11-18

Lang: Eng

Subj: technology

Approach: subject oriented

Ability: all

Eval Meth: -

Testing: -

Cont Resp: -

Envir: all

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc ✓

Indep ✓

Lab ✓

Fld

Dem ✓

Sim

TV

A/V ✓

Printed Materials:

texts

handbooks

Project Technology was established to design, test and arrange publication of teaching materials for schools wishing to include in their curriculum work in and about technology, and to stimulate outside support of all kinds for the schools. The project is concerned: 1) to see that all children become aware of the technological forces which are working on them, and which they have at their disposal, and that they are aware of their ability and responsibility to control these forces; 2) to see that as many children as possible, of all ages and abilities, have the opportunity to become involved in the technological design process; and 3) to help all children push forward the frontiers of their own technological resources in terms of theoretical knowledge and practical skills.

All teaching materials have been prepared as the result of an assessment of what was required in the schools, have been tested in a number of schools, and revised in the light of these trials. Materials can, roughly speaking, be divided into four categories, the first two intended mainly for teachers, and the last two for teachers and pupils.

Project Technology Handbooks help fill gaps in the teacher's knowledge and experience, help him or her initiate and supervise technological activities, and give guidance on the availability, use and construction of apparatus. Review material includes case studies and methods of operation which have helped schools in introducing and developing technological activities. Technology Briefs, about 100 totally, aim to inspire and guide pupils in order to involve them personally and directly in the technological design process. The briefs therefore suggest fields of activity and identify some of the problems in these fields, but allow different interpretations.

Course material includes: Basic Electronics and Control Technology as complete courses and Photocell Applications, Fibres in A-level Chemistry, Technology and Man, and History Units.

The evaluation unit headed by D.A. Tawney has been based at Keele University since 1969.

Reason: to include  
technology in the  
curriculumAdopt: regional and  
local groups

Tchr Ed: -

Pers: FT PT NRT Publ: -

Adm

Wr

VSch

Res

TEd

Trial

not

answered

Initiator(s):

G. Harrison for  
Schools Council**Descriptive References:**Mind-making of machine-making? Dialogue 1. September 1968.

Technology and the Schools (Working Paper 18). 1968. Schools Council. HMSO.

School Technology, formerly Bulletin. Quarterly from the Centre for School Technology, Trent Polytechnic.

THE PSYCHOLOGY AND MATHEMATICS  
PROJECT

Contact: R.R. Skemp

See ICh Report(s): 7,6,5

Department of Education  
University of Warwick  
Coventry CV4 7AL  
Warwickshire, England

Tel: Coventry 24011, ext 6019 .

1962-1968

Participating  
Schools

Ages: 11-15	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec 3	texts
Subj: math	Sem 4	
Approach: conceptual	Disc 1	
Ability: * avg+, avg	Indep 2	
Eval Meth: tchr jdgmts	Lab	
Testing: term	Fld	
Cont Resp: administratively directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

The purpose and objective of the project was the application of on-going psychological research to the learning and teaching of mathematics. A combined honors school of Psychology with Mathematics at Manchester University aimed at an interdisciplinary approach. The results of this honors school were applied experimentally in Leicestershire schools, and then embodied in generally available texts.

Reason: psychological approach to learning mathematics	Adopt: not known	Pers: FT PT NRT	Publ: reproduced commercially
	Tchr Ed: provides guidebooks	Adm 1	
		Wr	
Initiator(s):		VSch 1	
R.R. Skemp		Res	
		TEd	
		Trial	

Descriptive References:

Skemp, R.R. 1971. The Psychology of Learning Mathematics. Penguin Books, Inc., 7110 Ambassador Road, Baltimore, Maryland, 21207, U.S.A. and Harmondsworth, England; Victoria, Australia.

**SCHOOLS COUNCIL CURRICULUM  
ENRICHMENT PROJECT FOR GIFTED  
CHILDREN**

Eric Ogilvie, Director

See ICh Report(s): none

Northampton College of Education  
Moulton Par  
Northampton NN2 7AL  
England

Tel: Northampton 22321

1975

Gov, Schools  
Council

Ages: 7-11	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: biol, earth-space	Sem	newsletters
Approach: integrated, conceptual, inquiry, discovery	Disc	Non-Print Materials:
Ability: gifted	Indep	slides
Eval Meth: standardized tests, tchr jdgmts, student q're	Lab	slide tape
Testing: individual	Fld	lab equipment
Cont Resp: student & material directed	Dem	
Envir: school grounds & library	Sim	
	TV	
	A/V	

No narrative provided by project

Reason: develop new course, publication	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially
Initiator(s): -	Tchr Ed: provides consultants	Adm 1 Wr 2 VSch 2 Res TEd 1 Trial 4	

Descriptive References:  
Schools Council Dialogue

**SCHOOLS COUNCIL INTEGRATED  
SCIENCE PROJECT (S.C.I.S.P.)**

R. C. Landbeck, Director

90 Lillie Road  
London, SW6 7SS  
England (until Aug 1975)

Tel: 01-385-5506

1969-1973

Schools Council

See ICh Report(s): 8

Ages: 13-16	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	lab books
Subj: biol, chem, phys, earth-space, tech, social science	Sem	supplementary books
Approach: integrated, process	Disc ✓	tchr manuals
Ability: avg+	Indep	newsletters
Eval Meth: achievement tests, tchr jdgmts	Lab ✓	technicians' manuals
Testing: exam at end of 3-yr course	Fld ✓	Non-Print Materials:
Cont Resp: tchr guided	Dem ✓	slide tape
Envir:* lab, sch library, classroom, sch grounds, community	Sim	
	TV	
	A/V	

The project was established to develop an integrated science course for 13-16 year old pupils. In addition to biology, chemistry and physics the scheme includes some earth science and social science. Integration is achieved partly by content but mainly by studying some of the processes of science.

These processes are pattern finding and problem solving. In pattern finding the scientist is searching for generalizations which sum up a large number of observations. Such processes are common to scientists (although they apply more precisely to some sciences) and hence provide the integrating them.

An important emphasis of the project is on the social technological aspects of science. Science increasingly affects the lives of people and it is important to place it in this context. Often decision making is involved and children are encouraged to participate in this through a book of case studies 'Science and Decision Making'.

Evaluation studies were made of the teaching materials and of various ways of assessing pupil learning. As a result it was possible to revise the materials for final publication and produce a terminal examination which is now administered by The Associated Examining Board, Aldershot, Hants.

To assist adoption the project is now engaged in dissemination. About one hundred schools throughout Britain have agreed to adopt the published materials and it is hoped that they will act as focal points from which further dissemination will take place. They have been grouped into fourteen areas, each headed by a coordinator who organises regular meetings and advises them on problems. By 1975 when the project is completed it is hoped that it will continue to grow and be sustained by these local groups.

Reason: change in philosophy	Adopt: 300 tchrs, 4,000 students, 120 schools	Pers: FT PT NRT	Publ: 15,000
Initiator(s): W.C. Hall, B.S. Mowl	Tchr Ed: conducts work- shops; provides guides	Adm 5 Wr 5 VSch 5 Res 5 TEd Trial	copies repro- duced

**Descriptive References:**

Hall, W.C. 1972. Integrated Science - A Patterns approach to science teaching.  
Physics Education. Vol. 7.

Mowl, B. June 7, 1973. Concepts and Patterns. Times Educational Supplement.  
Special Project examination in Integrated Science - Ordinary Level. The Associated  
Examining Board, Wellington House, Aldershot, Hampshire, GU11 1BQ.

**Research:**

Assessment Reports. 1973, 1972, 1971. Prepared by project.

Hall, W.C. 1973. Development of the Learning Model and its use in teaching and  
assessment in SCISP. Ph.D. Thesis, University of London.



**SCHOOLS COUNCIL MATHEMATICS FOR  
MAJORITY CONTINUATION PROJECT**

Peter Kaner, Director  
See ICh Report(s): 8

3, The Cloisters  
Cathedral Close  
Exeter, England

Tel: 56226

1971-1973

Gov: State,  
Schools Council

Ages: 13-16	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: math	Sem	tchr manuals
Approach: interdisciplinary	Disc	newsletters
Ability: average, slow	Indep not	
Eval Meth: tchr jdgmts, student q're	Lab answered	Non-Print Materials:
Testing: -	Fld	slides
Cont Resp: * student & tchr directed	Dem	audiotape
Envir: community, school grounds, classroom	Sim	games
	TV	
	A/V	

The Project's task has been to provide classroom materials for use in teaching low achieving pupils, 14-16 years. The subject is mathematics but the organizing principle has been environmental rather than mathematical. Thus, the packages produced demonstrate a new organization of material in which basic ideas of elementary mathematics are present. These basic ideas refer more to problem solving within an environmental context than the accumulation of technical skills.

Our evaluation has shown that the organization we have used has been seen as coherent and satisfactory to students. Their technical skill has improved while working with our materials, but even more important, their use of mathematical strategies of thinking has increased together with their perception of the relevance of mathematics in applications.

Great emphasis has been placed on the design of the materials. The publishers have achieved a high standard of visual communication which has led to the motivation of previously apathetic students and has contributed to the quality of work and enjoyment achieved by more average students. The origination of the materials by working groups of teachers has meant that student contact has been maintained throughout the writing phase and this has enabled the Project to achieve a high degree of appropriateness of content which has also led to an increase in motivation and response. The packages are found useful within other subject disciplines such as environmental studies, geography, home economics and physical education.

Reason: develop new course, publication	Adopt:(partial) 400 tchrs, 10,000 students, 400 schools	Pers: FT PT NRT	Publ: 250 copies reproduced commercially & institutionally by offset, linotype & silk-screen (\$40/10 students)
Initiator(s): Schools Council		Adm 2 Wr 3 400 VSch 2 14 Res 2 TEd Trial 300	

**Descriptive References:**

MMCP: A Complex Mixture of Awareness and Ignorance. Newsmaths. Vol. 6/7.  
Maths for the Majority Continuation Project. Dec 1971. Mathematics for School.  
Teachers Can Write. Nov 1971. Times Educational Supplement.

**Research:**

Evaluation in Curriculum Development - 12 Case Studies. Schools Council Research Studies. London: MacMillan Education, Ltd. Evaluation of Mathematics for the Majority Project.

Research Studies of Effect of the Project in Leicester Schools. School of Education, Leicester.

Teacher-based Curriculum Development. Research Thesis School of Education, University of Lancaster.

**SCHOOLS COUNCIL PRIMARY MATHEMATICS PROJECT**

J. Wrigley, Director

See ICh Report(s): none

University of Reading  
School of Education  
London Road, Reading RG1 5AG  
Berkshire, England

Tel: Reading 85234, ext 218

1972-1975

Gov

Ages: 5-11	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr guide
Subj: math	Sem	
Approach: -	Disc	
Ability: all	Indep	not
Eval Meth: achievement tests	Lab	answered
Testing: a one-off test	Fld	
Cont Resp: -	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

The project is attempting to investigate and describe the current situation of mathematics for the 5-11 year age group in the schools of England and Wales. Pupils from schools selected at random have answered questions covering a wide range of math topics. At the same time their teachers have indicated how important they consider each topic. The teachers have completed questionnaires on the organization and resources in their schools, and stated what they see to be the weaknesses and strong points of mathematics as taught today.

Student teachers from Colleges of Education are acting as observers in a study of how apparatus is used in the maths lesson. It is hoped that this will point to ways in which practical activity can best be employed to help a child understand a mathematical concept.

The project is also looking at record keeping in maths, and investigating teachers' methods for dealing with children's mistakes.

Reason: review existing situation in schools	Adopt: -	Pers: FT PT NRT	Publ: repro-
	Tchr Ed: provides	Adm 1	duced insti-
Initiator(s): The Schools Council, London;	guide books	Wr 1	tutionally by
J. Wrigley		VSch 1	offset
		Res 1	
		TEd	
		Trial	

**Descriptive References:**

Ward, M. Maths for Ten-Year-Olds. Mathematics in School. Part 1, Jan 1974; Part 2, March 1974; part 3, May 1974.

**SCHOOLS COUNCIL PROJECT FOR THE  
EVALUATION OF SCIENCE TEACHING  
METHODS**

Contact: Maurice Galton

See ICh Report(s): 8

University of Leicester  
School of Education  
21 University Road  
Leicester, LE2 3Rf, England

Tel: Leicester 24211

1970-1974

Schools Council

Ages: 14-15	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tests
Subj: biol, chem, phys	Sem	observation
Approach: -	Disc	schedule
Ability: avg	Indep	not
Eval Meth: achievement tests, student q're	Lab	answered
Testing: pre- and post-testing	Fld	Non-Print Materials:
Cont Resp: -	Dem	videotape
Envir: classroom	Sim	
	TV	
	A/V	

This project completed its work in September 1973. The final report is now in preparation and will be published in the Schools Council Research series some time in the year 1974-75. The purpose of the Project was two-fold. First to identify characteristics of various teaching styles operating within science classrooms in the United Kingdom. This was done through the systematic observation of 120 teachers by a team of observers. A new observation instrument; the Science Teacher Observation Schedule (STOS), was developed and shown to have good reliability under normal classroom conditions. The second part of the study was an attempt to link the performance of pupils on special tests of attainment and measures of attitude with the style practiced by the teacher. The findings show that there are sharp differences between biologists, chemists and physicists in both the use of the different styles and the reactions of the pupils toward them.

Further analysis of the data is now concerned to examine differences between boy and girl pupils with the aim of identifying possible differences in their cognitive preferences.

Reason: evaluation of Nuffield Science	Adopt: -	Pers: FT PT NRT	Publ: repro-
	Tchr Ed: -	Adm	duced commer-
Initiators: J.F. Eggleston, M.J. Galton		Wr	cially
		VSch	not
		Res	answered
		TEd	
		Trial	

**Descriptive References:**

Schools Council Project for Evaluation of Science Teaching Methods, A.S.E. Bulletin.  
1971. 8: 33-34.

Interaction Analysis and Evaluation. 1973. Paedagogica Europaea VIII.

**Research:**

A Science Teacher Observation Schedule, S.T.O.S. In press. Schools Council Research Series, Macmillan.

The Context of Science Teaching. Schools Council Publications.

A Modified Science Opinion Poll - A users manual. National Foundation of Educational Research, Slough, Bucks.

SCHOOLS COUNCIL PROJECT:  
HEALTH EDUCATION 5-13

D.T. Williams, Director

See ICh Report(s): none

21 Thoroughgood Road  
Clacton-on-Sea  
Essex, England

Tel: Clacton 28401

1973-1976

Gov: Fed, State  
(Schools  
Council)

Ages: 5-13

Lang: Eng

Subj: biol, social sciences, health,  
humanities

Approach: interdisciplinary, inquiry,  
discovery

Ability: all

Eval Meth: being developed

Testing: being developed

Cont Resp: tchr guided

Envir: community, sch grounds,  
classroom, lab

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tchr manuals

objectives

overview

newsletters

Non-Print Materials:

slides

videotape

The project started on 1st September 1973 and will last for three years - ending in July/August 1976. The aims of the project are: 1) to identify the concepts fundamental to health education, 2) to develop a rationale of health education, 3) to develop teacher's guides for the health education of pupils aged 5 to 13 and to identify and develop material in support of them, and 4) to produce video recording in support of the guides with particular references to dissemination and in-service training.

The organization of the project is based upon the premise that curriculum development is synonymous with teacher development. From this stems the belief that teacher involvement is a crucial part of the project - particularly so in a field of study so ill defined and contentious as in health education.

It was suggested to each of the four Local Education Authorities involved that 24 teachers (composed of 6 infant teachers, 6 lower junior teachers, 6 upper senior teachers and 6 secondary teachers) be allowed to participate in the project and that they be released from teaching duties for one afternoon per fortnight to do so. Thus there would be four teacher/writing groups meeting with the project team once every two weeks at local teacher centers. It is envisaged that the writing groups will continue for a 3 term period - Spring, Summer and Autumn Term 1974. It is also anticipated that the ideas and materials generated by the individual writing groups will be used in schools revised and re-written as the project proceeds.

Reason: update methods,  
develop new course,  
publication

Adopt: -

Tchr Ed: conducts work-  
shops, provides manuals

Pers: FT PT NRT

Adm 1

Wr 3

VSch

Res

TEd

Trial

Publ: will be  
reproduced  
commercially

Initiator(s): Schools  
Council, H Cote

#### Descriptive References:

Health Education and the School Curriculum. June 1974. Ideas Curriculum Magazine of Goldsmith College, London.

Health and the School Curriculum. Sept 1973. Science Bulletin of Wales. Published by Schools Council Committee for Wales.

#### Research:

McCafferty, I. A Report on Aspects of Health Education as seen by Local Education Authorities. Project Publication.

Williams, D.T. Towards a Framework of Health Education. Project Publication.

SCIENCE 5/13 (Sc 5/13)

L.F. Ennever, Director

See ICh Report(s): 8,7

Schools Council

Information Section

160 Great Portland Street

London W1N 6LL, England

Tel: 01-580-0352

1967-1974

Gov: Foundation

Ages: 5-13, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng (Sp, Germ, Dutch in preparation)	Lec	tchr manuals
Subj: biol, chem, phys, math, soc sci	Sem	field guides
Approach: inquiry, discovery	Disc	tests, objectives
Ability: all	Indep	overview
Eval Meth: tchr jdgmts	Lab	newsletters
Testing: -	Fld	Non-Print Materials:
Cont Resp: student-directed	Dem	slides, filmloops,
Envir: varies	Sim	filmstrips, films,
	TV	overhead trans-
	A/V	parancies, video-
		tape, slide tape,
		audiotape, models,
		lab equipment

The Project aims to help teachers help children between the ages of five and thirteen years to learn science: it produces, therefore, materials only for teachers. Its long-term aim is to help teachers, and to get them to help each other, in becoming usefully more critical about their own work and more discriminating about their own children's educational development and their attainment in relation to it. The kind of science envisaged stems from first hand investigation by children themselves of their own environment, and the achievements hoped for are related to children's differing stages of educational development rather than their chronological ages. Teachers are helped to discriminate stages of educational development, and both aims and objectives related to these stages are suggested. The written materials, teachers' guides to children's investigations on varied topics, are also related to these stages of development and have been thoroughly evaluated. Enquiries by children are encouraged to spread from the objective examination of cause and effect to other fields appropriate to their interests and learning, so the Project is seen as one likely to further the integration of the curriculum. In the course of these investigations children are encouraged to devise their own experiments, with the teacher's help, and to improvise and construct some of the apparatus needed.

Work related to the project is proceeding in most of the local authorities in England and Wales and many in Scotland. Twenty-two of these areas, designated Pilot Areas, form the Area Representatives Committee to conduct in-service work and evaluation. Many colleges of education are involved. A Consultative Committee advises the Project. The program of evaluation was sophisticated and attracted much attention; it also served the ends of dissemination. An after-care program is being planned.

The materials have been published by Macdonald Educational.

#### Descriptive References:

Trying for a New Look at Science. 1974. Trends in Primary Education, Pub. Peter Owen, London.

A Case Study of a Project. March 1974. Secondary Education. 4(2).

Science 5/13 Dialogue. Summer 1972. Schools Council Newsletter, No. 11.

#### Research:

Harlen, W. Nov 1971. Some Practical Points in Favour of Curriculum Evaluation.

Journal of Curriculum Studies. 3(2).

Formulating Objectives - Problems and Approaches. Oct 1972. British Journal of Educational Technology. 3(3).

Harlen, W. Evaluation and Science 5/13. 1974. Schools Council Publications, Evans/Methuen Educational.

SCIENCE TEACHER EDUCATION  
PROJECT

Clive R. Sutton,  
J.T. Haysom, Directors  
See ICh Report(s): 8,7

School of Education  
University of Leicester  
21 University Road  
Leicester LE1 7RF  
England  
Tel: Leicester 24211

1970 -  
Nuffield  
Foundation

Ages: tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Australian, Hebrew	Lec	worksheets
Subj: science	Sem ✓	Non-Print Materials:
Approach: -	Disc ✓	videotapes
Ability: avg	Indep ✓	
Eval Meth: -	Lab ✓	
Testing: -	Fld ✓	
Cont Resp: -	Dem	
Envir: -	Sim	
	TV	
	A/V ✓	

This curriculum development project on methods of training science teachers is producing materials for use by tutors of student teachers and organizers of in-service training programs for classroom science teachers. The emphasis is on the student's professional development of pedagogy rather than on his academic development as a scientist. The overall project purposes are: to engage as many as possible of the science tutors who train teachers in the United Kingdom in discussion and experiment with a variety of different activities for student teachers; to help the student teacher to develop understanding and skills useful to him; and, to help student teachers to perceive themselves as teachers in the classroom situation. The specific objectives are to create a tested pool of descriptions of such activities ("curriculum units"), together with appropriate resource materials needed to sustain them. From this pool, tutors will be able to select items and adapt them in constructing their own courses. Each of the curriculum units is self-contained and may be used separately but they have been related to one another according to various models and descriptions of the teaching or learning process with the intention of providing an integrating theory to the pedagogy. The units have been given a theoretical orientation towards psychology, sociology, philosophy and curriculum development. Thus the contributions of authors such as Piaget, Bloom, Kerr, Hirst and Flinders have a natural place.

The STEP publications being released in 1974 by the publisher McGraw Hill Book Company (U.K.), Ltd. include: Activities and Experiences - gives numerous ideas for planning courses in colleges and universities; Theory into Practice - activities in school for student teachers; Meadowbank School - case studies in education; Through the Eyes of the Pupil - a collection of pupil's writings to help student teachers put themselves into pupils' shoes; Readings in Science Education; The Art of the Science Teacher - surveys the main aspects of professional studies; and, Innovation in Teacher Education - descriptions of aspects of the project and related teaching procedures. Australian and Israeli related projects in progress.

Reason: update	Adopt: 180 tutors,	Pers: FT PT NRT	Publ: -
method	2,000 students,	Adm	
	76 institutions	Wr	
Initiator(s): -		VSch	not
	Tchr Ed: -	Res	answered
		TEd	
		Trial	

No references given



**SHROPSHIRE MATHEMATICS  
EXPERIMENT (SME)**

R.S. Heritage, Director

See ICh Report(s): 8,7,6,5

Ages: 11-16, tchr ed

Lang: Eng

Subj: math

Approach: discipline-centered, conceptual

Ability: avg, avg+

Eval Meth: standardized tests, normal  
school tests, public exam

Testing: pre & post testing

Cont Resp: administratively & tchr  
directed

Envir: sch grounds & library, classroom,  
lab

Mere House - Sandbach Road  
Alsager - Cheshire ST7 2AQ  
England

Tel: 09-363-2963

1963-1970

Gov: Local; Pub-  
lisher, Partici-  
pating Schools

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

texts

tchr manuals

newsletters

The initial aims of SME were to introduce teachers to the new content which was then (1963 on) becoming accepted at the school level and to modernize the approach in the classroom.

Because of the desire to complete courses with a known endpoint, it was decided to retain existing GCE examination syllabuses B for the pupils who were suited to that level of work. On the other hand, CSE syllabuses, with their greater breadth and freedom were less restrictive. In 1969, a syllabus mode 2 was drawn up by the teachers in the experiment and submitted to their board. This became operative in 1970. For non-examination pupils, the work was even less constrained and teachers were free to try any aspect of the material they wished. Texts were produced for GCE and CSE pupils but no special ones for the remainder. Texts are published by Penguin Education, Horton Road, West Drayton, Middlesex, England. Some alternative material is to be published as top books to enable pupils to cover syllabuses C at O-level and corresponding syllabuses in CSE examinations.

The second aim was more subtle than a mere change of content. It was an attempt to avoid the tendency for mathematics teaching to be solely concerned with drill and skills and to encourage mathematical thinking on the part of the pupils. For this reason the texts were of a new type: they consisted almost wholly of questions leading to the establishment of results of steadily increasing generality. The course is an integrated one in which there is careful building of concepts and schemas to enable proper mathematical development to take place.

Since the experiment was begun, new information about learning has become accessible and further topic books are in preparation embodying this and extending the scope of the material available. So that this material can be properly tested and evaluated, a continuation project, the MATHEMATICS LEARNING PROJECT is being set up.

Reason: update content &  
method, publication

Adopt: not known

Tchr Ed: no special

preparation required

Initiator(s): I.R.

Vesselo, R.S. Heritage

Pers: FT PT NRT

Adm 1

Wr 1

VSch 1

Res 1

TEd 1

Trial 60

Publ: reproduced

commercially by

letterpress

(\$20/10 stu-

dents/yr)

**Descriptive References:**

The Shropshire Mathematics Experiment. May 1965. Mathematical Gazette. XLIX(368).

The Shropshire Mathematics Experiment: A Retrospect. To be published. Mathematical Gazette.

**Research:**

Vesselo, L.R. 1965. The Shropshire Mathematics Experiment: Report of the Experiment. Reprinted in: Heritage, R.S., 1974. Mathematics Learning with Special Reference to the Texts of the Shropshire Mathematics Experiment. M.Ed. Thesis, University of Birmingham.



**SIXTH FORM MATHEMATICS  
CURRICULUM PROJECT**

C. P. Ormell, Director

See ICh Report(s): 8

School of Education  
Reading University  
London Road  
Reading RG1 5AQ, U.K.

Tel: 85234, ext 218

1969-1976

Gov: School  
Council

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: math	Sem	supplementary books
Approach: -	Disc ✓ ✓	tchr manuals
Ability: avg	Indep ✓ ✓ ✓	tes'
Eval Meth: achievement tests, tchr	Lab	objectives
judgmts, student questionnaire	Fld	overview
Testing: term	Dem	newsletters
Cont Resp: administratively material	Sim	
directed	TV	
Envir: classroom	A/V	

In 1966 a Conference was held at Reading University (Berkshire, England) concerned with the sixth form mathematics situation. Although no consensus view emerged from the work of the Conference it became clear that there were grounds for concern about the situation. Conflicting views about what was wrong, and what was needed to be done, seemed to reflect deep-seated differences of philosophy and attitude. In 1967 and 1968 discussion of the situation continued and it was decided to set up a Study of the sixth form situation in mathematics. Two preliminary reports stress the importance of relevance in the material used by sixth formers. It was proposed to write a new kind of relevance-oriented material to try to meet this need.

During the years 1969-1973 packages of materials were produced on the following topics: Indices, Quadratic Models, Limits, Generalization, Binomials, Linear Models, Geometric Series, Indices Integral, Indices Rational and Negative, Logarithmic/Exponential, Further Binomials, Biological Models, Introductory Probability, and Geometry from Coordinates, Calculus Applied, Vector Models, Basic Mechanics, and Probability and Statistics. In addition to the above series Harder Problem Supplements, Mathematics in the Sixth Form, and Presenting Mathematics from the Applicable Point of View have been published.

It has become clear that in addition to its specialist interest mathematics has a "general interest" concerned with its use in discussing the possibilities of real situations. Mathematics which is used to "discuss" the possibilities of real situations may be called "projectively applicable mathematics". The project has generated sufficient projectively applicable mathematics to sustain a 1 or 2 year sixth form course suitable for non-specialists. The first six titles in the Projects series Mathematics Applicable will be published later in 1974 or early in 1975.

Reason: update content & method, change in philosophy, develop new course	Adopt: 20 tchrs, 80 students, 13 sch	Pers: FT PT NRT	Publ: 500 draft copies reproduced commercially by offset (\$170/10 students)
Initiator(s): School Council	Tchr Ed: conducts workshops; provides manuals, guides & consultants	Adm 4 Wr 5 VSch 5 Res TEd Trial 150	

**Descriptive References:**

- Knowles, F.L. 1971. An Approach to Applicable Mathematics. Math Teaching. 56: 50-53.  
Ormell, C. Sept 1971. Mathematics through the Imagination. Dialogue 9.  
Ormell, C.P. 1972. Mathematics Applicable v Pure and Applied. Int. J. Math. Educ. Sci. Technol. 3: 125-131.

**Research:**

- Ormell, C.P. 1972. Mathematics, Science of Possibilities. Int. J. Math. Educ. Sci. Technol. 3:329-341.  
Ormell, C.P. 1973. The Sixth Form Mathematics Project. Evaluation in Curriculum Development: Twelve Case Studies. Macmillan. 47-69.  
Ormell, C.P. 1973. The Problem of Curriculum Sequence in Mathematics. New Essays in the Philosophy of Education (Ed. G. Langford and D.J. O'Connor), Foutledge and Kegan Paul. 216-233.

UNIVERSITY PHYSICS ITEM BANK  
(UPIB)

L.R.B. Elton, Director

See ICh Report(s): none

Institute for Educational  
Technology  
University of Surrey, Guildford  
Surrey GU2 5XH, Great Britain

Tel: Guildford (0483) 71281  
ext 402

1972-1977

University,  
Participating  
Schools

Ages: 18-20, adult	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tests
Subj: phys	Sem	
Approach: discipline-centered	Disc	
Ability: avg, avg+, slow learner	Indep	
Eval Meth: tchr jdgmts	Lab	
Testing: -	Fld	
Cont Resp: tchr directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	
	self-eval ✓	✓
	testing ✓	✓

A national bank of objective test items in university physics is being established as the result of an initiative taken by the Standing Conference of Professors of Physics in the United Kingdom. Participating departments pay a subscription and contract to produce a minimum of 25 items annually. These are given field trials and their item characteristics established before they are included in the Bank. Each member department holds a complete copy of the Bank and this is constantly updated. The use of the Bank will be evaluated once an adequate number of items has been accumulated.

Reason: update method, change in philosophy	Adopt:(partial) 100 tchrs, 35 schools	Pers: FT PT NRT Adm 1 Wr 100 VSch Res TEd Trial 100	Publ: repro- duced insti- tutionally
Initiator(s): L.R.B. Elton, C.J. Chelu	Tchr Ed: -		

Descriptive References:

Wood, R. and L.S. Skurnik. 1969. Item Banking. National Foundation for Educational Research, Slough, England.

Ferris, F.L., Jr. 1960. Testing for Physics Achievement. Amer. J. Physics. 28: 269.

**BIOLOGY TEACHING UNIT  
(FORMERLY PART OF INTER-  
UNIVERSITY BIOLOGY TEACHING  
PROJECT)**

Departments of Zoology &  
Education  
University of Glasgow  
Glasgow, Scotland

1969 -  
University,  
Nuffield

Gaye Manwaring, Director  
See ICh Report(s): 8

Tel: 041-339-8855, ext 7197

Ages: 18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: biol	Sem	programmed units
Approach: -	Disc	activity sheets
Ability: average +	Indep	tchr manuals
Eval Meth: achievement tests, student questionnaire	Lab	tests
Testing: individual	Fld	newsletters
Cont Resp:* material & student directed	Dem	✓ Non-Print Materials:
Envir: sch library	Sim	✓ slides
	TV	✓ filmstrips
	A/V	✓ videotape
		slide tape

This project involves the development and use of self-instructional audio-visual programs on biology. The programs are intended for elementary students at university, polytechnic and college and for senior school pupils. The background of our students varies; many have done no biology before, but some have done a considerable amount. A diagnostic test is available to determine which programs each student should take.

Each program consists of a full-frame filmstrip in color, a cassette and a students workbook. A teacher's guide containing objective test items is also available. The implementation of programs into a course involves management problems to determine the number of copies of each program and the number of sets of equipment needed to teach a given number of students within a certain time.

The programs are popular and are available to students in a self-teaching lab on a self-service, non-compulsory basis. Also available in the center are commercially produced filmloops, slides, filmstrips, books, and charts. Microscopes and a collection of microscope slides and videocassettes of practical work are also included. Displays on a variety of biological topics have been organized. These displays include animals, plants, photographs, models, diagrams, simple experiments and models. The students use the center in a variety of ways - to prepare for lectures, to learn entirely new information, for revision and for general interest. It runs smoothly without direct supervision or booking.

The biology teaching unit seeks to combine biological expertise with educational technology. In addition to the production of instructional materials, the unit has been involved in research into the most effective ways of communicating and motivating students with the chosen media and the study of management problems in the implementation of self instruction.

Reason: change in philosophy, develop new course, publication	Adopt: 800 students	Pers: FT PT NKT	Publ: 5 copies
	Tchr Ed: provides manuals & films	Adm 1 1	reproduced in-
Initiator(s): -		Wr 1 1 2	stitutionally
		VSch	& commercially
		Res	
		TEd	
		Trial varied	
		Artist &	
		Photogr 3 3 4+	

**Descriptive References:**

- Manwaring, G. May 1973. Self-Instructional Biology. Visual Education.  
 Manwaring, G. Dec 1973. The Design of Audio Visual Programmes. Visual Education.  
 Dowdeswell, W.H. 1970. Inter-University Biology Teaching Project. Journal of Biology Education. 197-203,  
 Research:  
 Richmond, W.K. 1973. The Free School. Methuen. 156-162.

**CERTIFICATE OF SIXTH YEAR  
STUDIES IN BIOLOGY**

P. Smith, Director

See ICh Report(s): none

Scottish Centre for Mathematics,  
Science & Technical Education  
College of Education  
Dundee, Scotland  
Tel: Dundee 25484, ext 59

1973-1976

Gov

Ages: 17-18

Lang: Eng

Subj: biol

Approach: \* discipline-centered, inquiry

Ability: average +

Eval Meth: achievement tests

Testing: yearly national exam

Cont Resp: \* tchr & administratively directed

Envir: lab

Exper: Cl 12+ 2-12 I

Lec

✓

Sem

✓

Disc

✓

Indep

✓

Lab

✓

Fld

✓

Dem

✓

Sim

TV

A/V

Printed Materials:

tchr manuals

objectives

Draft Syllabus for CSYS Biology. The syllabus consists of material arranged into twelve Units of Study. The Units themselves are grouped into five categories as follows: Processes, Cells, Organisms, Populations and Ecosystems.

Each CSYS candidate will be required to study three units, not more than one from any single category. The time available per unit should not be less than 50 periods of 40 minutes, i.e. a total of 150 periods for the theoretical and practical coverage of the chosen units. Each candidate will also undertake one project of about 40 periods duration, and one assignment of about 20 periods duration. The project will normally be an experimental study of a topic related to one of the Units of Study. The assignment will be a period of experimental or observational or literary research into a topic in a different study unit from that relating to the project. It will be used as the basis for the extended account or essay mentioned below.

Practical work can be very diverse, and it is thought wholly beneficial only to make suggestions from which teachers may choose, according to their inclinations, and the practicalities of their school situation. Alternative relevant practical work which the teacher can provide is equally acceptable.

Assessment and Examination Recommendations. At the moment it is proposed that the assessment of the candidates will be based on four lines of evidence, viz. Theory, Project, Practical and Assignment. Theory will be assessed by an external written examination.

Criteria for assessment of projects, practical books and assignment essay will be decided, and laid down by the Board in their guidance to internal and external assessors. (These would reflect the different skills being tested in these three areas of examination).

Reason: develop new course	Adopt: 100 tchrs, 400 students, 100 schools	Pers: FT PT NRT Adm 1 Wr 12 VSch 2 Res 1 TEd Trial 5	Publ: 150 copies reproduced in- stitutionally by offset
Initiator(s): Scottish Ed Dept, Scottish Certificate of Ed Exam Board	Tchr Ed: conducts work- shops; provides guides & consultants		

No references given

**FIFE MATHEMATICS PROJECT**

Contact: Geoff Giles

See ICh Report(s): none

Department of Education

University of Stirling

Stirling, Scotland

Tel: 0786 3171

1969 -

Fife Educ

Authority

Ages: 11-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	workcard booklets
Subj: math	Sem ✓	
Approach: -	Disc ✓	
Ability: all	Indep ✓	
Eval Meth:* student self-evaluation,	Lab	
tchr jdgmts, achievement tests	Fld	
Testing: not specified	Dem	
Cont Resp: student directed	Sim	
Envir: classroom	TV	
	A/V	

The project arose out of the problems experienced by Mathematics teachers in comprehensive secondary schools in Fife in teaching mixed ability classes of 12-13 year old pupils. The aim was to provide individualized material which would enable these teachers to develop new methods of working which would compliment classroom teaching. The Fife Mathematics Project is a flexible mixture of class teaching and individual work by pupils with the following features: considerable freedom of choice, material designed to stimulate use of equipment whenever appropriate, emphasis on learning by absorbing, and personal involvement of pupils. One interesting characteristic is the opportunity it provides for pupils to be responsible for their own progress and to take meaningful decisions in the classroom.

At present about 20 schools can be said to be using the project. There has been a gradual grass-roots spread from the initial 2 class Pilot Experiment in 1970. As the material is now on sale by DIME Projects, Department of Education, University of Stirling, Stirling FK9 4LA, Scotland, schools outside Fife are able to work in the same way.

Evaluation is at present taking place under a research project in mathematical education financed by the Scottish Education Department. In addition a book edited by Prof. D.H. Crawford is to be published by Oxford University Press later this year in the series Oxford Studies in Education describing the project and the reactions to it of teachers and pupils.

Reason: needs of teachers	Adopt: 100 tchrs,	Pers: FT PT NRT	Publ: 2,000
facing comprehensive educ	4,500 students,	Adm	2
& mixed ability classes	20 schools	Wr	1
		VSch	
Initiator(s): G. Giles,	Tchr Ed: no special	Res	2
& math teachers in Fife	preparation required	TEd	
		Trial	20
			students)

**Descriptive References:**

Giles, G. 1973. Who Should Write Workcards? Mathematics in School. 2(1).

Paperbook series: Oxford Studies in Education by Oxford University Press (Title not yet fixed, publication later in 1974).

# MATHEMATICS FOR GENERAL EDUCATION

J. Nisbet, Director

See ICh Report(s): none

Scottish Centre for Mathematics  
Science & Technical Education  
College of Education  
Dundee, Scotland

1971-1976

Gov

Tel: Dundee 25484, EXT 59

Ages: 14-16	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj:* math, soc sci	Sem	tchr manuals
Approach: inquiry	Disc	
Ability: slow learner	Indep	Non-Print Materials:
Eval Meth: tchr jdgmts	Lab	overhead trans-
Testing: none	Fld	parancies
Cont Resp: tchr guided, material directed	Dem	games
Envir:* classroom, sch grounds & library, community	Sim	models
	TV	
	A/V	

Five areas of mathematical interest have been identified as being relevant in some way to the needs of these pupils, and of potential interest to them: 1) calculating skills and tools; 2) statistics; 3) graphs/algebra; 4) shape (including trigonometry); 5) computing.

The Committee feels that much of the mathematics might be taught within the framework of a number of projects, although there will also be a place for short and specific skill revision or teaching units, some of these to service other subject department courses. A project should usually be a maximum of 10 periods' work and whenever possible the outcome should be of obvious value to the pupil, school or society and not simply something to be discarded on completion. This is not to say, however, that the Committee is treating utility as the sole criterion in its thinking; some work will be planned for the enrichment of the pupils' mathematical experience.

Pupils' material will consist of workcards and worksheets, and/or booklets, whichever seems most appropriate for each part of the course. It has also been agreed that the course should be planned to cover two years; if possible the activities for the second year being at a more mature level and more obviously related to post-school life.

As in all subject fields the prime general aim is to enrich the lives of the pupils and to contribute to their personal growth, doing this in particular by, amongst other things, developing their confidence in handling numerical information and their appreciation of order and shape in the environment.

Reason: develop new course	Adopt: (partial) 42 tchrs, 1,250 students, 14 sch	Pers: FT PT NRT	Publ: 1500
Initiator(s): Scottish Education Dept	Tchr Ed: provides guides	Adm 1 1	copies repro-
		Wr	duced insti-
		VSch 4	tutionally by
		Res	offset
		TEd	
		Trial 42	

No references given

SCOTTISH EDUCATION DEPARTMENT  
MATHEMATICS EXPERIMENT

J. Nisbet, Director  
John A.R. Hughes, contact

See ICh Report(s): 8

The Scottish Center for Mathematics, 1970-  
Science & Technical Education  
College of Education  
Park Place  
Dundee ddl, 4hp, Scotland  
Tel: 0382 25484-6, ext 59

Scottish Ed  
Dept, Local  
Ed Authorities

Ages: 12-16	Exper: C1 12 2-12 I	Printed Materials:
Lang: Eng	Lec	work cards & sheets
Subj: math	Sem	
Approach: -	Disc ✓	
Ability: -	Indep ✓	
Eval Meth: -	Lab ✓	
Testing: -	Fld	
Cont Resp: -	Dem	
Envir: -	Sim	
	TV	
	A/V	

The overall project purpose is to devise a course in mathematics which is suitable for the needs of pupils who do not, in the first instance, propose to continue the study of mathematics beyond the Ordinary Grade of the Scottish Certificate of Education. The course is primarily concerned with providing a mathematical education for non-specialists but permits students who so wish to carry the subject further.

The work for the first year (Grade 8) is suitable for mixed ability classes in a secondary comprehensive school. There is emphasis on the use of apparatus. The work has been divided into a series of modules. Each module is a development of a mathematical situation or topic and on average provides of the order of two to twelve periods of work. There are now 36 modules for Grades 8 and 9, 24 for Grade 10 and 11 for Grade 12. The first 36 are available from Heinemann Educational Books, Ltd. in London.

To provide for variations in ability, a module will usually consist of four color coded sections. Each pupil will begin a module by working his way through the Red Set of cards and sheets, at the end of which he will take a test to decide whether he has grasped the concepts and principles covered in this set. Should the test show that he has not done so, he will then tackle the Blue Set, which in a different situation or situations will recap the ground covered in the Red Set. Should he successfully complete the test he will proceed to the Orange Set which extends and amplifies the ground-work laid in the Red Set. Depending on his progress through the Orange Set he may either stop at the end of it or proceed to the Green Set. It is expected that only the best pupils in a given age group will reach the Green Set, which should be regarded as 'stretching' material for the best pupils.

Reason: develop new course	Adopt: 180 tchrs, 6,500 students, 27 schools	Pers: FT PT NRT	Publ: -
Initiator(s): Scottish Education Dept	Tchr Ed: conducts area meetings, provides consultants	Adm	
		Wr	
		VSch	not
		Res	answered
		TEd	
		Trial	

No references given



SCOTTISH MATHEMATICS GROUP  
(SMG)

Peter Whyte, Director

Hutchesons' Boys' Grammar School  
Beaton Road, Glasgow G41 4NW  
Scotland

1963-1975

Gov, Royalties

See ICh Report(s): 8,7

Tel: 041-423-2933

Ages: 12-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Span, Dutch, Swedish, Malaysian	Lec ✓ ✓	texts
Subj: math	Sem	newsletters
Approach: discipline-centered, discovery	Disc ✓ ✓	progress papers
Ability: avg, avg+, slow learner	Indep	math sheets
Eval Meth: achievement tests	Lab	Non-Print Materials:
Testing: term, weekly, unit	Fld	overhead
Cont Resp: tchr guided	Dem ✓ ✓	transparencies
Envir: classroom	Sim	
	TV ✓ ✓	
	A/V	

The initial objective of the project was to produce a syllabus in keeping with modern trends as a basis for the mathematics taught in the first five years of the secondary school. The initiative came from the Scottish Education Department. The general objective of this syllabus is to provide a course that will interest pupils in mathematics and will train them to use the language in which popular, technical and professional texts are now being written. It gives pupils an early introduction to the concept of a set, the structure of a number system, the use of vectors and the idea of a group. The aim is to relate mathematics to the solution of up to date problems by means of linear programming, the use of matrices, iterative processes and calculating machines - in short to include the kind of mathematics which reflects modern developments and leads to useful links with later work at school, college or university.

The Scottish Mathematics Group was formed from the members of the Syllabus Committee. A series of text books (Modern Mathematics for Schools, Books 1 - 9), written by the Group was published jointly by Blackie & Son, Bishopbriggs, Glasgow, and W & R Chambers, Thistle Street, Edinburgh. A revised series has now been produced to take advantage of the experience gained in the classroom with the original textbooks and to reflect the changing mathematical needs in recent years. In order to cater more adequately for the wider range of pupils now taking certificate-oriented courses, parallel sets of A and B exercises have been introduced. The A sets are easier than the B sets and provide straightforward but comprehensive practice. Book 1 of the revised series was published in 1971 and Book 9 will be published in 1975.

Currently, the Group is producing Foundation Mathsheets for less able pupils, giving extra provision for classes of widely mixed ability. The complete system will allow all pupils in a class to be working at the same topic at three different levels - Mathsheets, A exercises and B exercises. In addition, a set of transparencies for use with overhead projectors is being designed to fit each of the books in Modern Mathematics for Schools.

Reason: update content & method	Adopt: 100% of tchrs, students & sch in Scotland & Holland; partial in 5 other countries	Pers: FT PT NRT	Publ: -
Initiator(s): Scottish Education Dept	Tchr Ed: conducts tchr training courses	Adm	
		Wr	21
		VSch	1
		Res	
		TEd	11
		Trial	250

#### Descriptive References:

- Reviews by Dr. E.A. Maxwell (Cambridge) in Mathematical Gazette, 11(380). May 1968.  
G. Bell & Sons, London.
- Mason, J. April/May 1974. Useful Introductions. Sesame (newspaper of the Open University)
- Williams, J. March 1974. Review of the Series - Modern Mathematics for Schools. Mathematical Gazette.

SCOTTISH SECONDARY SCIENCE SCHEMES    The Scottish Centre for Mathematics, 1962-  
 A.W. Jeffray, Director    Science & Technical Education    Scottish Ed  
 See ICh Report(s): 8    College of Education    Dept  
                                  Park Place  
                                  Dundee dd1 4hp, Scotland.

Tel: (0382 25484-6, ext 59

Ages: 12-18, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: phys, chem, biol	Sem	
Approach: integrated	Disc	
Ability: all	Indep	
Eval Meth:	Lab	
Testing:	Fld	
Cont Resp:	Dem	
Envir:	Sim	
	TV	
	A/V	

The overall project purpose is to provide science education of the best and most relevant kind to young people of all levels of ability between the ages of 12 and 18. The specific objectives are very detailed at all stages but not possible to summarize here. These have been carefully stated for the three disciplines and for pupils of different levels of ability. The major goal of this project is to reach the whole population of Scotland of all social, cultural and intellectual backgrounds.

Reason: update method & content	Adopt: 320,000 students, 450 schools	Pers: FT PT NRT	Publ: -
		Adm	
Initiator(s): Scottish Ed Dept, Consultative Committee on the Curriculum for Scotland	Tchr Ed: conducts training courses, provides guides	Wr	
		VSch	not
		Res	answered
		TEd	
		Trial	

No references given

DEVELOPMENT OF SCIENTIFIC  
AND MATHEMATICAL CONCEPTS

J. Rogers, Director

University College of  
North Wales  
Bangor, Wales

Tel: Bangor (0248) 3349

1968-1973

Schools Council

See ICh Report(s): none

Ages: 7-11

Lang: Eng

Subj: science, math

Approach: conceptual

Ability: all

Eval Meth: -

Testing: -

Cont Resp: -

Envir: -

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tests

research report

teacher handbook

not

answered

This research project was established to: 1) construct and carry out tests for use in the study of the development of scientific and mathematical concepts in children between the ages of seven and twelve; and 2) attempt to relate this development to a) maturation of the pupil and b) ability (as measured by intelligence tests). It was intended that the assessment material should be available for use by teachers as measures of development.

During the first phase the research team worked in close association with groups of teachers in North Wales, testing material with a sample of approximately 800 children. Concept assessment kits have been developed in Area, Weight and Volume, and the program has included: 1) the construction of 'concrete' test material readily handleable by children, 2) the grading of different test items in a sequence reflecting concept development in children, 3) the construction of a standard questioning procedure; and 4) the construction of recording sheets which would enable the tester to analyze the responses of the children.

The second phase of the project involved the testing of a sample of children from a wider geographical area in order to obtain additional information on conceptualization processes.

Teachers in South Wales and the border counties were involved in the assessment procedure. This enabled the team to increase the sample size and to receive teacher feedback on the feasibility of general usage of the material for assessment or as a framework for a teaching sequence in the classroom situation.

It is hoped to publish: 1) a research report based on data from phases 1 and 2, and including details of test items. This will be published in the Schools Council Research studies series by Macmillan Education; 2) concept assessment materials for Volume, Area and Weight, validated for use by teachers with children of 7-11 years; and 3) a handbook for teachers to explain how to record and interpret the tests and use the materials in the teaching situation to promote concept development.

Reason: -

Adopt: -

Pers: FT PT NRT Publ: -

Initiator(s): -

Tchr Ed: -

Adm

Wr

VSch

Res

TEd

Trial

not

answered

No references given

**PHYSICS INTERFACE PROJECT (PIP)**

Coordinator: R.A. Sutton

See ICh Report(s): 8

Department of Physics  
University College  
P.O. Box 78  
Cardiff CFI IXL, Wales  
United Kingdom  
Tel: 44211, ext 2118

1971-1978

Nuffield

Ages: college	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	programmed units
Subj: physics	Sem	activity sheets
Approach: discipline-centered	Disc	tchr manuals
Ability: all	Indep	tests
Eval Meth: diagnostic pre-tests	Lab	
Testing: unit pre & post tests	Fld	Non-Print Mtterials:
Cont Resp: material directed	Dem	slide tape
Envir: lab, classroom	Sim	audiotape
	TV	models
	A/V	lab equipment

With financial support from the Nuffield Foundation, the Physics Interface Project began as a pilot study in 1971. After two years of investigation, the Foundation provided further funds to enable the project to continue as a major scheme over a five year period from January 1973. Six British university physics departments are involved in producing and developing materials, and the aim of the project is to help physics students in the transition from school to university.

A series of diagnostic procedures is being developed to survey the actual stage of preparation of first-year physics students. These procedures will in due course be complemented by a wide range of short, self-contained, self-teaching units in a variety of forms. The majority of the self-teaching units thus far produced are in a written form, but many contain practical experiments as an integral part, requiring only simple equipment. Some units, however, have been designed for experimental work in laboratory conditions. All the present units are currently undergoing formative evaluation trials, and consequently are not yet available for publication. Subject areas given most urgent consideration are mathematical aspects of physics, electricity, optics and mechanics. The diagnostic procedures are based on self-assessed objective tests containing four-option multiple-choice questions. Advice is given, by tutors or otherwise, on the relevant follow-up materials to be worked through depending on each student's particular needs.

It is envisaged that the major effort on the production of materials and their evaluation will be concentrated in the first three years (1973-4-5), and the remaining two years will be devoted to the wider dissemination of the results.

Reason: help physics	Adopt: undergoing	Pers: FT PT NNT	Publ: reproduced
students in transition	eld trials	Adm 1	institutionally
from school to univer-	Tchr Ed: -	Wr 1 4 12	by offset
sity		VSch	
Initiator(s): C.A. Taylor,		Res	
E.J. Burge, S.J. Eggleston,		TEd	
O.S. Heavens, K.W. Keohane		Trial 15	

**Descriptive References:**

- Sutton, R.A. 1972. The School-University Physics Interface Project. Physics Education. Vol. 7.  
Taylor, C.A. 1973. The Physics Interface Project. Physics Education. Vol. 8.

**SWANSEA SCHEME**
**J.D. Weston, Director**
**See ICh Report(s): 8,7,6,5**
**Department of Pure Mathematics  
University College  
Swansea SA2 8PP  
Glam., Wales**
**1963-1968**
**Private**
**Tel: Swansea 25678, ext 334**

<b>Ages: 16-18</b>	<b>Exper: C1 12+ 2-12 I</b>	<b>Printed Materials:</b>
<b>Lang: Eng</b>	<b>Lec</b> ✓	<b>texts</b>
<b>Subj: math</b>	<b>Sem</b>	<b>tchr manuals</b>
<b>Approach: discipline centered</b>	<b>Disc</b> ✓	
<b>Ability: average +</b>	<b>Indep</b>	
<b>Eval Meth: achievement tests</b>	<b>Lab</b>	
<b>Testing: term</b>	<b>Fld</b>	
<b>Cont Resp: administratively directed</b>	<b>Dem</b>	
<b>Envir: classroom</b>	<b>Sim</b>	
	<b>TV</b>	
	<b>A/V</b>	

The chief purpose of the Swansea Scheme has been to demonstrate that, with suitable presentation, topics can be treated with logical accuracy in the sixth-form to a far greater extent than is usual at present, and consequently that pupils can be given a better understanding of the nature of pure mathematics than has hitherto been possible.

The scheme evolved as a result of informal meetings of school teachers and university mathematicians in Swansea. A specially-designed syllabus was drawn up and accepted by the Welsh Joint Education Committee as an alternative to its standard syllabus in Pure Mathematics at Advanced Level. Two schools have participated fully in the scheme since its initiation.

No systematic evaluation of the scheme, in terms of the subsequent careers of the pupils, has yet been attempted, but a large percentage of pupils who have passed through the scheme have gone on to university, and many of these pupils have been very successful in their undergraduate studies in mathematics and in other subjects.

The future of the scheme is still uncertain. Teachers from a number of schools in the area have been taking an interest in the scheme, and have attended courses related to it; but it is doubtful whether many of them are yet ready to commit themselves to full participation.

The Swansea Scheme was set up by voluntary efforts entirely, and cannot be 'costed' in any conventional way.

<b>Reason: update content &amp; method, change in philosophy</b>	<b>Adopt: (partial) 2 tchrs, 15 students, 2 schools</b>	<b>Pers: FT PT NRT</b>	<b>Publ: reproduced</b>
	<b>Tchr Ed: provides manuals &amp; consultants</b>	<b>Adm</b> 2	<b>commercially</b>
<b>Initiator(s): J.D. Weston</b>		<b>Wr</b> 2	<b>by offset</b>
		<b>VSch</b>	
		<b>Res</b>	
		<b>TEd</b> 2	
		<b>Trial</b> 7	

**DeDeriptive References:**

Hughes, M.G. July 1965. A Sixth-Form Experiment. Teacher in Wales.

Hughes, M.G. Oct 1968. Accurate Reasoning in Sixth-Form Pure Mathematics. Mathematical Gazette.

Mathematics Projects in British Secondary Schools. 1968. Mathematics Association.

**VALLEY PROJECT IN PRIMARY  
MATHEMATICS (Formerly Lower Valley  
Project)**

W. J. Norman Emery, Director

"Rockleigh"  
Edwardsville, Treharris,  
Glam, United Kingdom, Wales

Tel: Treharris 338

1968-1973

Gov. Local

See ICh Report(s): 8,7

Ages: 5-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	programmed units
Subj: math	Sem	activity sheets
Approach: * conceptual, discovery	Disc ✓	tests
Ability: all	Indep	Non-Print Materials:
Eval Meth: achievement tests, tchr	Lab ✓	slides
jdgmts, student questionnaire	Fld	
Testing: individual	Dem	
Cont Resp: tchr directed	Sim	
Envir: * classroom, lab	TV	
	A/V	

The aim and objectives of this project are: (1) to insure a continuous, progressive program in Mathematics learning, based on understanding, concept development and application; (2) to examine the mathematical development of primary pupils, and to discover ways of providing for individual needs; (3) to assess pupil/teacher reaction to existing approaches and materials and to investigate pupil response to new content; (4) to investigate need for a new psychology in mathematics teaching: to establish a new teacher/pupil relationship within the mathematics situation, with an improvement in attitudes; (5) to assess new achievement levels, if pupils are allowed to progress at individual rate; (6) to encourage learning through experience, leading to understanding, to improve the quality of thought and provide pleasure and satisfaction through creativity; (7) to encourage every pupil to acquire: (a) an understanding of basic mathematical concepts, (b) a sound knowledge of relevant facts and relationships in number, money, weights and measures, (c) a competence in operations involving skills and techniques, (d) an awareness of spatial relationships, with shape; (8) to devise an organization pattern to meet individual classroom requirements in mathematics learning activities.

The Project deliberately set out to isolate concept development activities while maintaining an integrated approach. Activity, experience, experiment, investigation and discovery are the major approaches underlying the project.

The Project received enthusiastic response from teachers in phase 1: It has now widened to include other areas in stages 2 and 3. Unfortunately, due to statutory reorganization of local authorities, the Project had to end in July 1973, but it is hoped that new areas will be introduced in due course.

Reason: change in philosophy	Adopt: 30 tchrs, 1,000 students, 6 schools	Pers: FT PT NRT	Publ: 100
Initiator(s): W.J.N. Emery	Tchr Ed: * conducts work- shops; provides consultants	Adm 5 Wr 1 VSch 3 Res 2 TEd 1 Trial	copies/week reproduced institutionally

**Descriptive References:**

Choat, E., ed. 1973. Pre-School and Primary Mathematics. Ward Lock Educational Publishing Company, 116 Baker Street, London W1M 2BB.

**OPI MATHEMATICAL REFORM PROJECT**
**E. Hodi, Director**
**H-1071 Budapest**
**Gorkij fasor 17 21, OPI  
Hungary**
**1961-**
**Gov:State**
**See ICh Report(s): 6,5,4**
**Ages: 4-17, tchr ed**
**Lang: Hungarian**
**Subj: math**
**Approach: \* discipline-centered,  
interdisciplinary, discover, conceptual**
**Ability: all**
**Eval Meth: \* tchr jdgmts, achievement tests**
**Testing: \* unit and individual**
**Cont Resp: \* administratively directed, tchr  
jdgmts**
**Envir: \* classroom, sch grounds**
**Exper: Cl 12+ 2-12 I**
**Lec**
**Sem**
**Disc 3 4**
**Indep 1 2**
**Lab**
**Fld**
**Dem**
**Sim**
**TV**
**A/V**
**Printed Materials: \***
**activity sheets**
**tchr manuals**
**texts**
**tests**
**newsletters**
**Non-Print Materials: \***
**films**
**games**

The goal of the Project is to develop mathematical curricula for mass education, (K-12) with particular attention to individual differences. The content areas can best be called various aspects of mathematics as a whole. Each of the following areas appear as early as grade 1 in certain mathematical activities which are in the same time also related to other content areas without this becoming explicit. An identification of these contents by the children comes at a later stage, possibly after three or more years of informal activities. In other words, familiarization comes before systematization, and the identification of the content areas serves in the beginning only for teachers, who are strongly discouraged from early formalization.

Apart from the two main areas: Arithmetic and Algebra (integrated between them as also with the rest of mathematics), and Geometry (or rather geometries, both without and with the use of coordinates, vectors, matrices, group ideas, etc), the following three main content areas are distinguished within the integrated mathematics: 1) Sets, Logic; 2) Functions, Calculus; and 3) Probability, Statistics.

Children use various mathematical apparatus and worksheets in the lower grades. From grade 3 or 5 they also use textbooks. Teachers also have guides at their disposal. Evaluations are made from time to time, but much is left to the teachers' judgement. At this time a combination of "measuring" the formal aspects and assessing those aspects of the attainment which lend themselves to measurement is regarded as the most suitable way of obtaining feedback of educational results in the field of mathematics.

**Reason: change in  
philosophy**
**Adopt: 100 tchrs, 3000  
students, 50 schools**
**Pers: FT PT NRT**
**Adm 2 1**
**Wr 4**
**VSch**
**Res 1**
**TEd 20**
**Trial 100**
**Publ: 10,000**
**copies repro-**
**duced insti-**
**tutionally &**
**commercially by**
**mimeograph,**
**offset &**
**linotype**
**Initiator(s): T. Varga**
**Tchr Ed: \* conducts work-  
shops; provides manuals,  
guides & consultants**
**No references given**



J. Surányi, Director

See ICh Report(s): none

Ages: 15-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Hungarian	Lec	supplementary books
Subj: math	Sem	activity sheets
Approach: discovery	Disc ✓ ✓	tchr manuals
Ability: avg	Indep ✓ ✓	newsletters
Eval Meth:* achievement tests, tchr jdgmts	Lab	
Testing: unit	Fld	
Cont Resp:* administratively directed, tchr	Dem	
jdgmt	Sim	
Envir: classroom	TV	
	A/V	

The purpose of this project is to prepare a new syllabus to be introduced in general secondary schools (9th-12th forms or gymnasium). The project, instead of inculcating in the students an amount of ready-made knowledge and reclaiming mechanical applications of it, intends to educate pupils for a mathematical way of thinking. For this end, students are brought in suitable situations stimulating them to discover an ever larger part of mathematics. At the elementary schools a project has been carried on for more than 10 years. It is guided by quite analogous principles as those, which will be outlined here for the secondary school project. Moreover, in the elementary school the gradual introduction of a syllabus based on this project is foreseen from the next school year on. The present secondary level project, however, cannot yet reckon with students taught in this spirit. Consequently, for the time being, a number of items both in knowledge and in abilities have to be prepared on secondary level, which later on will be elaborated on primary level.

In the first two years, the acquiring of experience is preponderant, while for the last two ones systematization and the revelation of structural relation are characteristic. In the realization of an education based on such a conception it should not be neglected that the rate of the students' work can be very different. It is learning in small groups or individually that promotes the most independent discoveries and progress at an individual rate. The teacher helps the students with his advice, questions or task assignments. Continuous readiness and the independent creative work of the teacher is necessary in order to observe the progress and develop the interests of the students.

The aim of the content is to present mathematics to the students on an up-to-date level and to illuminate the connections between different areas by focusing on some important points as relations, functions and concepts of numbers. The students are given exercise books and working papers, and complementary reading texts. For these the teacher is given guide-books containing the solution of the exercises, the didactic problems involved and the mathematical background of the material. Occasionally articles or book passages connected with the subject are also provided.

This year the detailed project for the first and second classes has been prepared. Our future aim is the gradual elaboration of the project for all the four classes of the gymnasium, the revision of the materials in the light of experiences, and the elaboration of the methodology of teaching in the spirit of the project.

Reason: change in the philosophy, develop new course	Adopt: (partial) 12 tchrs, 100 students, 9 schools	Pers: FT PT NRT	Publ: 500 copies
	Tchr Ed: provides guides and consultants	Adm 2	reproduced
		Wr 15	institutionally
Initiator(s) Bolyai János Mathematical Society - Budapest		VSch 4	by mimeograph
		Res 2	
		TEd 3	
		Trial 12	

#### Descriptive References:

Piroska Gábor. 1974/4. A Matematika Tanítása. Report on a Mathematical Experiment. In Hungarian.

**IRISH SCIENCE CURRICULUM  
INNOVATION PROJECT (ISCIP)**

B.L. Powell, M.B. Freestone,  
Directors

Curriculum Development Unit  
School of Education  
Trinity College  
Dublin 2, Ireland

1973-1976

Gov

Tel: Dublin 772941, ext 222/550

See ICh Report(s): none

Ages: 13-15, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: biol, chem, phys, earth-space, technology, social sciences	Sem	tchr manuals
Approach: integrated, inquiry	Disc ✓ ✓	field guides
Ability: all	Indep ✓ ✓ ✓	tests
Eval Meth: achievement & lab tests, tchr jdgmts, student questionnaire	Lab ✓ ✓ ✓	objectives,
Testing: term	Fld ✓ ✓ ✓	overview
Cont Resp: tchr directed	Dem ✓	newsletters
Envir: community, school grounds, lab	Sim	Non-Print Materials:
	TV	videotape
	A/V ✓	

Science teachers involved in the I.S.C.I.P. project have participated in all stages of the work. They took part in discussions on the objectives of the course and revised other existing schemes. Regular meetings of Heads of Department produced a contents list to meet these objectives. This list was then analyzed, discussed and revised by all teachers. Pre-service courses are organized within and between schools where all teachers have their say and also each teacher sends in regular feedback forms as comment on the work in progress. Within the classroom or laboratory, the role of the teacher is that of guide and counsellor. I.S.C.I.P. is a pupil-centered course with clearly defined objectives.

The following broad areas were decided upon to meet the objectives: science and the scientist in the laboratory, the living and non-living worlds, energy systems, man and his development, ecology, conservation and pollution, the earth - both at the physical and molecular levels, technology, human biology, space. The single subjects of Physics Chemistry and Biology are therefore integrated in the scheme.

I.S.C.I.P. has attempted to design a curriculum that can meet two basic needs: to some of the children, it will be their only contact with science and therefore the work is related to the local setting as far as possible, and the role and significance of science in today's world is emphasized. At the same time, we have attempted to ensure that this course will give the grounding required by those children who will continue to study science in the senior years in the school.

I.S.C.I.P. has a carefully controlled evaluation mechanism fulfilling both a formative and summative function. Teacher feedback from inservice sessions and teacher meetings, and from formal teacher feedback forms. I.S.C.I.P. internal evaluation involves direct assessment and measurement procedures incorporating objective testing, practical testing, pupil attitude questionnaires and teacher-based assessment. The whole process is properly controlled and the results are computer analyzed using statistically valid samples. On the completion of the pilot phase outside, independent experts will assess all phases of the work in order to determine the suitability of the scheme.

Reason: change in philosophy, develop new course	Adopt: 53 tchrs, 3,000 students, 14 schools	Pers: PT PT NRT	Publ: reproduced
		Adm 2	institutionally
		Wr 4 7	by offset (\$20/ 10 students/yr)
Initiator(s): School of Ed, Trinity College; City of Dublin Vocational Education Committee	Tchr Ed: conducts work- shops; provides manuals, guides & consultants	VSch 1 Res 2 4 TEd 2 4 Trial 5 3	

**Descriptive References:**

New Trends in the School Curriculum. 1973. Journal of the Association of Secondary Teachers of Ireland. 2(2): 10-13.

The Irish Science Curriculum Innovation Project. 1972. Journal of the Irish Association for Curriculum Development. 1(2): 18-24.

Curriculum Development in Action. Feb 1973. 'OIDEAS' Journal of the Department of Education of the Irish Government. 31-42.

**Research:**

Oldham, E.E. Some Aspects of the Evaluation of the Irish Science Curriculum Innovation Project. (M.Ed. Thesis, for Dublin University).

**INIZIATIVA RELATIVITA PER  
LE SCUOLE SECONDARIE (IRSS)**

Giulio Cortini, Director

See ICh Report(s): none

Seminario Didattico della  
Facolta di Scienze  
Via A. Tari 3 - 80138 - Napoli  
Italy

Tel: 081 - 315184

1971-1976

Government,  
University,  
Participating  
Schools

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Italian	Lec ✓	supplementary books
Subj: phys, history of science	Sem	activity sheets
Approach: conceptual	Disc ✓	tchr manuals
Ability: average	Indep	tests
Eval Meth: achievement tests	Lab ✓	Non-Print Materials:
Testing: unit	Fld	lab equipment
Cont Resp: administratively & tchr directed	Dem ✓	
Envir: classroom	Sim	
	TV	
	A/V ✓	

This project is sponsored by the Societa Italiana di Fisica (SIF) and by the Associazione per l'Insegnamento della Fisica, and is supported by the SIF and the Ministry of Education. It has been carried out by groups which work in several cities, under the coordination of a Technical Committee.

The declared purpose of the project is to study, under controlled conditions, the possibility of introducing Special Relativity into the Physics curriculum of the Italian secondary schools, where the conventional programs give very little emphasis to twentieth century physics. A more fundamental scope has been to encourage the formation of research groups on didactical problems in several Italian universities and to involve rather large groups of teachers in curriculum development.

A teaching program involving a modified curriculum as well as an especially devised didactical approach to Special Relativity was defined in three large one-week seminars held in Serapo (October 1971 and Nov 1972) and in Naples (June 1973). In the finally defined teaching program of Special Relativity (S.R.) strong emphasis is given to the experimental foundations of S.R. and an in depth treatment is given to the concept of time. Three student booklets have been prepared about specific topics such as Galilean Relativity; Solar System; Special Relativity. Several teacher guides have been prepared. Use of some PSSC films and of some Harvard Project Physics film loops is an integral part of the program. Some laboratory materials have also been prepared.

A controlled pedagogical experiment with comparison of general achievements reached by experimental classes and conventional classes began with the current scholastic year and will be finished in 1976. Unified publication of all the material will follow.

Reason: update content	Adopt: 15 tchrs, 330 students, 15 schools	Pers: FT PT NRT	Publ: 1,000
Initiator(s): G. Cortini, S.D. Napoli, S. Bergia, S.D. Modena, G. Fiorito, S.D. Torino, S.D. Palermo, B. Palma-Vittorelli, T. Tomasini, S.D. Bologna	Tchr Ed: provides manuals, guides, consultants & short meetings	Adm 3 Wr 15 VSch Res 15 TEd Trial 15	copies repro- duced commer- cially by offset (\$1,000/10 students)

**Descriptive References:**

Cortini, G. Oct 1973. An Experiment on the Teaching of Special Relativity in the Italian Secondary Schools, CIREP. Meeting in Venice.

LEBANESE SCIENCE BOOK PROJECT  
(INTERMEDIATE)

George I. Za'rour, Director.

See ICh Report(s): none

Science and Mathematics  
Education Center  
American University of Beirut  
Beirut, Lebanon

Tel: 340-740 EXT 2259 (Beirut)

1971-1974

Gov

Ages: 12-15	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr	Lec	texts
Subj:* biol, phys, chem, earth-space	Sem	tchr manuals
Approach:* inquiry, integrated	Disc 1	
Ability: avg	Indep	
Eval Meth: tchr jdgmts	Lab 2	
Testing: -	Fld	
Cont Resp:* admin directed, tchr	Dem 3	
guided & directed	Sim	
Envir:* classroom, lab	TV	
	A/V	

The Science and Math Education at the American University of Beirut (A.U.B.) was in part responsible for revising the Lebanese intermediate curriculum five years ago. Responsible individuals in the Ministry of Education sensed a need for a change in emphasis and orientation in science training. As a result A.U.B. was contracted by the Ministry of Education of the Lebanese Government to produce science textbooks and teachers' guides by specific dates. Although this stage of production is actually a trial stage, the contractual obligations end with the printing of the books.

The textbooks emphasize activities. This reflects a specific requirement in the prescribed curriculum that approximately 1/2 of the time should be spent in laboratory activities. Although it might be too much to expect a sudden and radical change in teaching method from lecturing and memorization to discussion, reasoning and activities, it is hoped that the teachers will at least partially meet this requirement. In-service teacher training institutes together with the teachers' guides have helped contribute to this shift in the approach to teaching.

Some materials were written in English and translated to French or vice versa. In Lebanon, science is taught in French or English for non-native speakers. Informal reports suggest that the language is difficult for the average government school students. With this in mind, some of the pictures and illustrations in the books are intended to help explain the printed matter.

It is believed that traditional methods of lecturing and memorization have been severely shaken as a result of this project. Moreover, the quality of local book production in the prevailing competitive market is bound to improve.

Reason: develop new course	Adopt: all govt sch & 1/3 private sch	Pers: FT PT NRT	Publ: 75,000
Initiator(s): W.D. Haddad, Science & Math Ed Center, Ministry of Ed	Tchr Ed: conducts work- shops; provides consultants	Adm 2 Wr 5 VSch Res 2 TEd 3 Trial	copies repro- duced commer- cially by offset (\$20/10 students)

No references given

LEBANESE SCIENCE BOOK  
PROJECT (ELEMENTARY)

George I. Za'rour, Director

See ICh Report(s): none

Science & Mathematics Education  
Center

American University of Beirut  
Beirut, Lebanon

Tel: 340-740, ext 2259 (Beirut)

1972-1975

Gov

Ages: 6-10	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Arabic	Lec	texts
Subj: general science	Sem	tchr manuals
Approach: inquiry	Disc 1	
Ability: average	Indep	
Eval Meth: tchr jdgmts	Lab 3	
Testing: -	Fld	
Cont Resp: * administratively directed,	Dem 2	
tchr guided	Sim	
Envir: classroom	TV	
	A/V	

Elementary science in Lebanon is taught by most schools in the native language, Arabic. Some research has been undertaken by faculty members of the Science and Mathematics Education Center (SMEC) at the American University of Beirut (A.U.B.) to determine the readability and comprehension level of elementary science books which were in use. Other relevant research was Piagetian in nature and involved conservation tasks as well as the understanding of natural phenomena. Efforts were expended to take into consideration the implications of the research in producing the manuscripts. This was done in spite of time limitations resulting from a decree to introduce books for two consecutive grades at a time.

The books are commercially published and the copyright is held by the Ministry of Education in Lebanon. SMEC's claim is to the production of the material as a result of a contractual agreement. The books emphasize concept formation, call for activities, and reflect an effort to emphasize understanding rather than rote memorization. The examples, pictures and illustrations are from the local environment.

Initial reports reveal that the project has been well-received and that the greatest impact may be on the teachers of the lower elementary grades who have to change from well-established practices rather than on in-coming first or second grade students.

Reason: develop new course	Adopt: all government schools of Lebanon & 1/3 of private schools	Pers: FT PT NRT	Publ: 100,000
Initiator(s): W.H. Haddad, & faculty of SMEC	Tchr Ed: * conducts workshops; provides consultants	Adm 2	copies repro-
		Wr 6	duced commer-
		VSch	cially by off-
		Res 3	set (\$10/10
		TEd 3	students)
		Trial	

No references given

## ARITHMETIC FOR DOMESTIC SCHOOLS

W.J. Brandenburg, Director

See ICh Report(s): none

Ministry of Education  
State University  
Westerhaven 16 Groningen  
Holland

Tel: Holland 050-1145257

1966-1971

Foundation

Ages: 13-14	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Dutch	Lec ✓	texts
Subj: math	Sem	tchr manuals
Approach: discovery	Disc	
Ability: avg, slow learner	Indep	
Eval Meth: achievement tests	Lab	
Testing: unit	Fld	
Cont Resp: tchr guided	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

No narrative provided by project

Reason: update methods, develop new course	Adopt: 20 schools	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: provides manuals	Adm	institutionally
Initiator(s):		Wr	by mimeograph
W.J. Brandenbury		VSch	
N.A.J. Lagerweg, M. Behs		Res	
		TEd	
		Trial	20

No references given

**THE CONSTRUCTION OF AN ITEM  
BANK FOR SECONDARY SCHOOL  
MATHEMATICS**

Jan Timmer, Director

See ICh Report(s): 8,7

Ages: 12-15

Lang: Dutch

Subj: math

Approach: interdisciplinary

Ability: all

Eval Meth: standardized tests,  
student questionnaire

Testing: unit

Cont Resp: tchr guided, material  
directed

Envir: classroom

Research Institute for  
Applied Psychology  
Prinsengracht 303  
Amsterdam, Holland  
The Netherlands  
Tel: 020-233201

1967-1975  
University,  
oundation

Exper: C1 12+ 2-12 I

Lec ✓

Sem

Disc

Indep

Lab

Fld ✓

Dem

Sim

TV

A/V

Printed Materials:

tchr manuals

tests

overview

Non-Print Materials:

models

The purpose of the project is to provide multiple choice items for educational purposes to the schools. The objective of the project is to construct an item bank for mathematics and to offer these items to the teachers. All items are multiple choice items to the teachers. These items can be used for guidance and evaluation purposes for the new mathematical curricula in Holland. It is for the purpose that every teacher of mathematics can use and try out the items which fit in with his curriculum. In this way we hope to give the discussions about the content of the items and about the objectives a more concrete base.

A part of the item bank has been used to construct the instruments to measure cognitive gains to compare pupils taught by different teachers using different working methods in terms of their cognitive attainment and their attitudes.

Reason: change in

philosophy, develop

new course, publication

Adopt: (partial)

2,500 teachers,

70,000 students,

1,500 schools

Pers: FT PT NRT

Adm 1

Wr 3

VSch 2

Res 1 1

TEd

Trial 500

Publ: reproduced

institutionally

& commercially

by offset

Initiator(s):

A.D. de Groot,

L. Muskens, P. de Koning,

I.B.H. Abrar

Tchr Ed: provides manuals

& consultants

Research:

Reports available from Project Headquarters on request.



PHYSICS CURRICULUM DEVELOPMENT  
PROJECT FOR GENERAL SECONDARY  
EDUCATION - PROJEKT  
LEERPAKKETONTWIKKELING  
NATUURKUNDE (PLON)

Gebouw K.V.S.  
Sorbonnelaan 4 Utrecht  
The Netherlands  
Tel: 030 - 531175/533107/532717

1972-1979  
Gov:State

H.P. Hooymayers, Director

See ICh Report(s): none

Ages: 12-16	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Dutch	Lec ✓	overview
Subj: phys	Sem	newsletters
Approach: process, conceptual, inquiry, discovery	Disc ✓	
Ability: avg, avg+	Indep ✓	
Eval Meth: not determined	Lab ✓	
Testing: not determined	Fld ✓	
Cont Resp: tchr guided	Dem ✓	
Envir: classroom, sch library, lab	Sim	
	TV	
	A/V ✓	

The general project goal is: optimizing of educational processes in physics for an important number of schools for mavo, havo and vwo (the three levels of General Secondary Education) by means of development of curricula with background. The teacher receives in the PLON materials cues, guidelines for structuring, evaluating and restructuring educational processes in physics and for fitting the physics curriculum in the total school curriculum. Some hypothetical and interrelated project goals, stated at this moment, are: a variety of learning methods, sufficient alternatives for the teachers, account of individual differences between pupils in ability and interest, development of active participation and creativity of pupils, distinction between common minimum goals (objectives for all pupils) and individual goals, and attainment of social and affective goals.

First clients of PLON are teachers and pupils of schools mentioned above. None the less PLON wants to make materials, parts of which may be contributed after some modification to education for children of 12-16 years with very divergent levels of intelligence and home background. PLON is responsible for constructing and testing experimental curricula in close cooperation with teachers of trial schools. During the curriculum development there also will be meetings and conferences with teachers of non-trial schools and written communications. PLON has to think about an innovation plan, but is not responsible for the implementation of the project.

During and after the experimental development as we see it, evaluation is a permanent necessity. Evaluation here in the general sense of collecting empirical evidence for decision making. It starts even before it is tried out in the classroom, for instance, a survey to teachers as an element in the process of stating project goals. It concerns goal based as well as goal free evaluation, product as well as process evaluation, formative and summative evaluation. This evaluation probably will not be comparative.

Reason: update content & method, change in philosophy'	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: -	Adm 1	
		Wr 1	
		Sch 1	
		Res 1	
		TEd 1	
		Trial 15	

Initiator(s): G.H.  
Frederik, Commission to  
Modernize Dutch Physics  
Curricula  
Research:  
PLONex 740308, page 4

RENOVATION OF CHEMISTRY  
CURRICULA (CMLS)

D.P. den Os, Director

Governmental Committee for the  
Renovation of Chemistry Curricula  
Burmirastraat 1, Th. Hague  
Netherlands

1970-1976

Gov

See ICh Report(s): 8

Ages: 6-18, tchr ed

Lang: Dutch

Subj: chem

Approach: discipline-centered, integrated

Ability: avg, avg+

Eval Meth: achievement, lab, oral &  
standardized tests; tchr jdgmts

Testing: term & unit tests

Cont Resp: admin directed, tchr guided

Envir: classroom, lab

Exper: C1 12+ 2-12 I

Lec ✓

Sem

Disc

Indep

Lab ✓

Fld

Dem ✓

Sim

TV

A/V

Printed Materials:  
experimental text  
tchr manuals

The overall project purpose is a renovation of chemistry curricula, specifically dedicated to a new system of secondary schools ("mammoth law"), and the introduction of chemistry, as part of a science curriculum, into primary education (up to age of 16). Some specific objectives include: development of total systems of texts, tests and final examinations; developing and testing chemistry didactics for different age and intelligence groups; and in-service training of chemistry teachers.

As final examinations of the different school types are centralized and supervised by the Netherlands government, the recommendations of the commission will be applied to the total educational system in the Netherlands. The current work is part of a seven year plan ending in 1976-1977.

Reason: update content &  
method, develop new  
course

Adopt:(partial)

Tchr Ed: conducts work-  
shops; provides guides  
& consultants

Initiator(s): Royal  
Netherland Chemical  
Society & Association  
of Science Teachers

Pers: FT PT NRT

Adm 1 1

Wr 2

VSch 1

Res 1

TEd 25 60

Trial

Publ: 5,000  
copies repro-  
duced insti-  
tutionally by  
offset (\$300/  
10 students)

Descriptive References:

Chemists Week 16. April 19, 1974. (In Dutch).

Research:

Interim Report 1968-1970 (In Dutch). Government Printing Office, Netherlands.

Interim Report 1970-1973 (In Dutch). In print..

VAN A TOT Z, WERKBOEKEN DER  
WISKUNDE (MATHEMATICAL COURSE  
FOR SECONDARY EDUCATION) (A-Z)

P.M. van Hiele,  
Director

H.N. Schuring  
Paradijsstraat 93  
Voorburg  
The Netherlands  
Tel: 070-986042

1968-  
J. Muusses  
Publisher,  
Purmerent, Holland

See ICh Report(s): 8,7

Ages: 12-19	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Dutch	Lec ✓	texts
Subj: math	Sem	tests
Approach: discipline-centered	Disc	
Ability: all	Indep ✓	
Eval Meth: achievement tests	Lab	
Testing: unit	Fld	
Cont Resp: tchr guided	Dem	
Envir: classroom	Sim	
	TV	
	A/V ✓	

The project objective was to write a course in modern mathematics for use in all types of institutes for general secondary education in the Netherlands, especially comprehensive schools. A new element in the course is that prior to being placed into a special stream all children have to work through a basic program and to supplement this with an additional program for self-determination.

The principle of learning underlying this project is called "telescoped reteaching." We start with a new part of the course at the moment the students can recognize, through earlier experiences, the scheme.

In 1973 the entire course for the general secondary education was completed. Textbooks for secondary technical education have been completed up to the third grade. As a result of our experiences working with the textbooks, the whole course is now undergoing revision. In the future we have plans for a math course for elementary school and kindergarden.

Objective tests have been developed by the Research Institute of Applied Psychology (R.I.T.P.).

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: repro-
Initiator(s): -	Tchr Ed: provides guide books	Adm	duced commer-
		Wr 6	cially
		VSch 1	
		Res	
		TEd	
		Trial	

#### Descriptive References:

Wansink, J.H. Didactische Orientatie voor wiskundeleraren II.

#### Research:

van Hiele, D. - Geldof. De didaktiek van de Meetkunde in de eerste klas van het V.H.M.O.

van Hiele, P.M. De problematiek van het inzicht.

van Hiele, P.M. Begrip en Inzicht.

## PRIMARY TEACHING OF MATHEMATICS

Zbigniew Semadeni, Director

See ICh Report(s): none

Commission on Mathematics Teaching

Institute of Mathematics

Polish Academy of Sciences

ul. Sniadeckich 8, 00-950 Warszawa,  
Poland

1972-

Gov: State

Tel: 29-01-92 Warszawa

Ages: 5-11, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Polish	Lec	tchr manuals
Subj: math	Sem	activity sheets
Approach:* discipline, centered, conceptual	Disc	texts
Ability:* avg, all, avg+	Indep	
Eval Meth:* tchrs jdgmts. achievement tests	Lab	
Testing:* unit & individual	Fld	
Cont Resp:* tchr guided & directed,	Dem	
material directed	Sim	
Envir:* classroom sch library & grounds	TV	
	A/V	

The objectives of this project were: 1) To develop methods of teaching mathematics at primary level, with special emphasis on topics not included in usual curricula, (e.g. naive probability, computer-directed way of treating mathematical problems). 2) To organise an international symposium in Warsaw in August 1975.

Reason: update content & method, develop new course, publication	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: conducts workshops	Adm	1
		Wr	2
Initiator(s):		VSch	
Z. Semadeni		Res	5
		TEd	
		Trial	

No references given

**THE SYSTEMATIC TEACHING OF  
PROBABILITY**

E. Fischbein, Director

See ICh Report(s): 8,7,6

Institut of Psychology  
Str. Frumoasa 26  
Bucharest, Romania  
Tel: 507960

1968-1973  
Gov

Ages: 10-15, tchr ed	Exper: CI 12+ 2-12 I	Printed Materials:
Lang: Romanian	Lec ✓ ✓	lab books
Subj: math	Sem	
Approach: discipline-centered, conceptual, discovery	Disc ✓ ✓	
Ability: all	Indep	
Eval Meth: achievement tests, tchr jdgmts	Lab ✓ ✓ ✓	
Testing: unit	Fld	
Cont Resp: -	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

According to Piaget and Inhelder the concept of probability is spontaneously acquired at the stage of formal operations as a synthesis between operations and chance. A research concerning the development of probabilistic thinking carried out in 1965-1966 by our team in the Institut of Psychology from Bucharest led us to the following hypothesis: the above mentioned synthesis doesn't in fact take place, because only the rational, deductible aspects of reality are present in contemporary education.

This explains why adults who are of an age where the fundamental schemes of thinking are already stabilized meet enormous difficulties in learning probability and statistics. Consequently we suggested that knowledge of chance aspects and probabilities should be introduced in school education as early as possible.

In 1968 a teaching project concerning probability concepts in 10 year old children was begun in Bucharest. The major goal of the teaching procedure was to create opportunities for children to form a body of correct probabilistic intuitions, by acting effectively in probabilistic-statistic situations such as: estimating and comparing chances, counting outcomes, comparing empirical frequencies with theoretical deduced probabilitics etc.

In 1970 the project was extended to include 20 classes and about 700 10-12 year old pupils. The project continued with the same children and teachers in 1971 and 1972. The main concepts taught were: possible, certain and impossible events; simple and compound events; the concepts of relative frequency and probability; elementary combinatorics; the probability of A B and A B; conditional probability. We wrote especially adapted booklets for pupils.

The project was evaluated by class tests at the end of each group of lessons. The results indicate that pupils are very motivated to this branch of Mathematics. In many respects younger pupils are even more receptive than older pupils. Consequently the Ministerium of Education has made the decision to include probabilities in the new experimental programs of mathematics teaching in Romania starting in the sixth grade.

Reason: change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: 200 copies
	Tchr Ed: provides guides & consultants	Adm	reproduced
Initiator(s): E. Fischbein, J. Barbat, J. Manzat		Wr 1	institutionally
		VSch	by mimeograph
		Res 3 2	
		TEd	
		Trial 18	

**Descriptive References:**

- Fischbein, E., I. Pampu and J. Minzat. 1967. L'intuition probabiliste chez l'enfant, Enfance (Paris).
- Fischbein, E., J. Pampu and J. Minzat. 1970. Comparison of ratios and the chance concept in children. Child Development. 41(2).
- Fischbein, J. Pampu and J. Minzat. 1962. Initiations aux probabilités a l'élémentaire. Educational Studies in Mathematics. 2. Holland.

CANARY ISLANDS MATHEMATICS  
PROJECT (C.I.M.P.)

Julían B. Caparrós Morata, Director

Dr. Fleming - 10 (Escaleritas)  
Las Palmas De Gran Canaria  
Canary Islands, Spain

1966-  
Private

See ICh Report(s): 8,7,6,5

	Exper:	Cl	12+	2-12	I	
Ages: 4-15	Lec	✓	✓	✓		Printed Materials:
Lang: Spanish	Sem					programmed units
Subj: math	Disc	✓	✓	✓	✓	activity sheets
Approach: discovery	Indep	✓	✓	✓	✓	Non-Print Materials:
Ability: all	Lab					records
Eval Meth: lab tests	Fld					games
Testing: unit & individual tests	Dem					models
Cont Resp: tchr guided, student & material	Sim					lab equipment
directed	TV					
Envir: lab	A/V					

The CIMP was born out of the desire to raise the education of children to a point of excellence demanded today by modern technology and the conscience of man. Its stated purpose is to create a general conscience about scientific methods for the learning of modern mathematics stressing learning vs. teaching, experimentation vs. verbalism, structural methods vs. verbal ones, logic learning vs. drills, and development of creativeness in children.

The project set out to first educate the teachers in new teaching techniques and learning theory. Information on many curricula around the world was gathered, material organized, written, and implemented in a small classroom. After use and revision, the program went into effect on a large scale. The project uses all possible structured materials. It also uses situational pedagogy and stimulates the capacity of inventiveness of the children.

Reason: update content & method, change in philosophy	Adopt: 4 tchrs, 300 students, 6 schools	Pers: FT PT NRT	Publ: -
	Tchr Ed: provides consultants	Adm	
Initiator(s): J.B.C. Morata, M. Encarnación, J.M. Moreno		Wr	
		VSch	not
		Res	answered
		TEd	
		Trial	

Descriptive References:

Conceptos de Matematica. Journal of Structural Learning.

DEVELOPMENT & CORRESPONDING  
ANALYSIS OF CURRICULA FOR CONTIN-  
UING SCHOOLS IN ZUG (ENTWICKLUNG  
UND BEGLEITENDE ANALYSEN DES  
CURRICULUMS DER WEITERBILDUNGSSCHULE  
ZUG (EBAC-WS)

Forschungszentrum-FAL  
Pädagogisches Institut,  
Universität, Perolles 6,  
CH-1700 Fribourg,  
Switzerland  
Tel: 037 229470

1971-1975  
Gov: Dept of Ed  
of Funding Zug;  
Swiss National  
Foundation

Bruno Santini, Director

See ICh Report(s): none

Ages: 17-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: German	Lec 2 1	objectives
Subj: biol, chem, phys, math, soc sci, health, working technique, German, philosophy	Sem Disc 1	overview newsletters
Approach: * integrated, interdisciplinary	Indep 2 1	curriculum guide
Ability: avg	Lab 2 1	
Eval Meth: * achievement & oral tests, tchr jdgmts, student q're	Fld 1	
Testing: unit	Dem 1 2	
Cont Resp: tchr directed & guided, student directed	Sim	
Envir: classroom	TV 1	
	A/V ✓	

In this project ABEC-WS, a curriculum is planned for a new school of two years, opened in 1972. This school which follows the last obligatory school year (9th grade), purports especially to prepare for nursing schools, schools of social work and others of this type. Among the problems studied are the formulation and analyses of objectives, construction of integrated subject area curricula, and the evaluation of curriculum and school planning.

Reason: planning of a new type of school	Adopt: (partial) 15 tchrs, 40 students, 1 sch	Pers: FT PT NRT	Publ: 200 copies reproduced institution- ally by offset
Initiator(s): Dept of Ed of Zug, Research Center- FAL	Tchr Ed: conducts work- shops, provides consultants	Adm 1 Wr VSch 1 Res 1 TEd Trial	

Descriptive References:

Weiterbildungsschule Zug. Tu: schweizer schule. 1973. 60: 509-526.



**SCHULMATHEMATIK UND ALLGEMEINE  
LERNZIELE (SL)**

E. Kramer, Director

See ICh Report(s): none

Rehhagstrasse 1  
4410 Liestal  
Schweiz  
Switzerland

Tel: 061 91 37 14

1964-

Gov

Ages: 6-14, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: German	Lec 1	texts
Subj: math	Sem	programmed units
Approach: discipline-centered	Disc 2	tchr manuals
Ability: avg	Indep 3	tests
Eval Meth: achievement tests	Lab	
Testing: unit	Fld	
Cont Resp: * tchr guided, material directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

Swiss children attend a comprehensive public school from the ages of 6 to 11 (in some cantons from the ages of 6 to 10, in others from 6 to 12). Generally there exist 3 different levels for the next years of compulsory education. Our textbooks are constructed for the first 5 years of elementary school, with heterogenous classes and great gaps between student groups of the same class; for the first 4 years of High School (Gymnasium) with students above average, who intend either to achieve a baccalaureat or want to enter university.

In the worksheets for students we use several different methods to introduce one single mathematical notion. The student gets a restricted set of materials: logic blocks, colored rods (by Cuisenaire), two colored discs. In addition he constructs some materials himself. The organization of the learning process depends on the subject. General information is usually given to the whole class. Some instructions or problem solving is recommended to be performed in groups of 4 to 6. Some other instruction is given individually (in upper degrees).

The psychological background is mainly based upon the work of Piaget. We try to develop mathematical thinking in its compositive, associative and reversible aspects. We further look for an appropriate position of mathematical education with regards to general education objectives. The student is expected to develop some general abilities of behavior besides special mathematical capacities, like social integration, judging of values, solving of conflicts, etc.

The textbooks and the whole curriculum are subject to permanent evaluation and change. The textbooks are to be revised periodically, at least every 5 years. For the future we are planning to design the textbook differently for 3 levels starting from the fifth year of school. We are cooperating with other German speaking pilot groups in various cantons in order to get some coordination.

Reason: * update content, change in philosophy	Adopt: 600 tchrs, 12,000 students, 60 schools	Pers: FT PT NRT	Publ: (\$65/10 students)
Initiator(s): E. Kramer	Tchr Ed: conducts work- shops; provides manuals	Adm 1 Wr 6 6 VSch 6 Res 1 TEd 1 Trial 100	

**Descriptive References:**

- Polya, G. 1938. Wie sucht man die Losung mathematischer Aufgaben. Acta Psychologica Bd. 4, 113-170.
- Legrand, L. and W. Picard, u.a. 1967. L'enseignement des mathematiques modernes. Le courrier de la Recherche Pedagogique. No. 31.
- Wyss, H. 1971. Die Revolution geht ubers Rechenbuch hinaus. Weltwoche No. 11, 15. Marz.

**Research:**

- Wertheimer, M. 1945. Productive Thinking
- Bruner, I.S., R.R. Olver and R.M. Greenfield. 1966. Studies in Cognitive Growth. A Collaboration at the Center for Cognitive Studies.
- Fletcher, T.J. 1965. Some Lessons in Mathematics - A Handbook on the Teaching of 'Modern' Mathematics.

**SCIENCE TEACHING DEVELOPMENT  
PROJECT**

Zekai Baloglu, Director

See ICh Report(s): 8

Fen Projesi  
Yuksek Ogretmen Okulu  
Besevler - Ankara  
Turkey

Tel: 134239-234494

1971-1974

Gov, Foundation

Ages: 15-17	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Turkish	Lec ✓	texts
Subj: biol, chem, phys, math	Sem ✓	lab books, tests
Approach: discipline-centered, inquiry	Disc ✓	supplementary books
Ability: all	Indep ✓	tchr manuals
Eval Meth:* achievement & oral tests, tchr jdgmts, lab tests	Lab ✓	Non-Print Materials:
Testing: term	Fld	filmloops
Cont Resp: administratively directed	Dem	films
Envir:* classroom, lab	Sim	lab equipment
	TV	
	A/V	

The overall project purpose was to improve science education in Turkish high schools and normal schools and initiate an improvement in science education in Turkey. The project was also designed to adapt modern curriculum materials for use in Turkish secondary schools and to educate and train teachers in the use of these materials.

Reason: change in philosophy	Adopt: 2,959 tchrs, 106,638 students, 189 schools	Pers: FT PT NRT	Publ: 30,000
Initiator(s): Ministry of Education, TUBITAK	Tchr Ed: provides guidebooks	Aim 8 14 Wr VSch 150 Res TEd Trial	copies repro- duced institu- tionally by offset (\$10/10 students)

**Descriptive References:**

Baloglu, Z. Studies on the renovation of science and mathematics programs in secondary education.

Improvement of Science Education in Turkey. (Country report).

Report on the research project (BAYG-E-23) of Modernization of education of mathematics and science in the secondary education.

COMPUTER-BASED INSTRUCTION  
AS A TOOL FOR PEDAGOGICAL RESEARCH

Karl Eckel, Director

D-6000-Frankfurt-90  
Schloßstr. 29  
Frankfurt, West Germany

Tel: 0611-771047

1972-1975  
Foundation

See ICh Report(s): none

Ages: 13-15

Lang: German

Subj: phys

Approach: discipline-centered, discovery

Ability: avg

Eval Meth: achievement tests, tchr jdgmts

Testing: unit

Cont Resp: tchr guided

Envir: lab

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:  
texts

Non-Print Materials:  
computer programs

The project goals are: 1) To demonstrate that computer instruction is better able to be checked against than is teacher instruction; 2) Preparation by computer instruction is able to be better checked against computer instruction; 3) To develop a didactic speech program.

Reason: -

Adopt: 44 students

Pers: FT PT NRT Publ: -

Initiator(s): -

Tchr Ed: no special  
preparation required

Adm

Wr

VSch

Res

TEd

Trial

not  
answered

Descriptive References:

Instruction with the Computer (I)

Instruction with the Computer (II)

Volume 1. Free Answer Analysis and Didactic Program Improvement

Volume 2. Answer Documentation

# ECOLOGY IN SCHOOLS

G. Eulefeld, Director

See ICh Report(s): none

23 Kiel

IPN, Olshausenstr 40/60  
Germany

Tel: (0431) 880-3135

1973 -

Gov: Fed & Local,  
Foundation

Ages: 2-20	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: German	Lec ✓ ✓	programmed units
Subj: * biol, chem, social sciences, earth-space, phys	Sem	activity sheets
Approach: interdisciplinary, process, conceptual, inquiry, discovery	Disc ✓ ✓ ✓	tchr manuals
Ability: all	Indep ✓ ✓ ✓	tests
Eval Meth: * standardized tests, tchr jdgmts, student questionnaire	Lab ✓ ✓ ✓	objectives
Testing: unit pre-post testing	Fld ✓ ✓ ✓ ✓	overview
Cont Resp: tchr directed & guided, student & material directed	Dem ✓ ✓	Non-Print Materials:
Envir: community, school grounds, classroom, sch library, lab	Sim ✓ ✓ ✓	slides, filmloops
	TV	filmstrips
	A/V ✓ ✓	overhead transpar- encies, games models

Up to now ecology has been a topic of biological instruction. In recent years, however, other aspects of ecology have been taken into consideration under the heading "Environmental Pollution". The necessary integration at the level of persons and relevant subjects has not followed. Students have been left to integrate biological, chemical, social and economic knowledge by themselves.

The general task of this curriculum project is the development of a detailed concept for teaching ecology. The position of Man, in this project, is to be considered from two points of view: on one hand he is part and object of the ecosystem, on the other he is its outside controller, who can influence the system intelligently.

Several products are planned, addressed to different groups. In the first and second phase, analysis of literature and general reflections will be published for specialists in science education. In the third phase, materials for teachers and students which can be used directly in schools will be prepared.

An instructional conception, founded on psychological theories and empirical investigations on "motivation and group structure", is being developed for the advancement of intrinsic motivation and cooperation in group instruction. The instructional conception will be introduced in science instruction in the "Sekundar-Stufe I" (grades 5-10). It will be tested also in a number of IPN curriculum units other than ecology.

Reason: update content & methods, change in philosophy, develop new course	Adopt: - Tchr Ed: -	Pers: FT PT NRT Adm 1 Wr 6 VSch Res 6 TEd Trial	Publ: -
Initiator(s): W. Burger, G. Eulefeld, H. Haft, W. Isensee, J. Lehmann, B. Marquardt, K. Schelke			

## Descriptive References:

Eulefeld, G. 1973. Ein Unterrichtsentwurf zur Ökologie der Gewässer für die 6. Klassenstufe als Beitrag zum Thema Umweltschutz. Praxis der Naturwissenschaften (Biologie). 22: 315-328.

ENTWICKLUNG EINES NATURWISSENSCHAFTLICH  
ORIENTIERTEN PRIMARSCHULCURRICULUM (DE-  
VELOPMENT OF A NATURAL SCIENCE ORIENTED  
PRIMARY SCHOOL CURRICULUM)

Hans Tutken, Director

See ICh Report(s): none

Ages: 5-8

Lang: German

Subj: biol, chem, phys

Approach: integrated

Ability: all

Eval Meth: oral tests

Testing: unit

Cont Resp: tchr directed

Envir: classroom

Padagogisches Seminar der  
Universität - Arbeitsgruppe  
für Unterrichtsforschung  
34 Göttingen Kreuzberggring 24  
Western Germany  
Tel: (0551) 39 7184

1970-1978  
Stiftung  
Volkswagen-  
werk

Exper: C1 12+ 2-12 I

Printed Materials:  
tchr manuals

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

No narrative provided by project

Reason: develop new  
course

Adopt: (partial) 24 Schrs,  
520 students, 8 schools

Pers: FT PT NRT

Adm 1

Wr 7

VSch 7 1

Res 7

TEd 7

Trial 24

Publ: repro-  
duced commer-  
cially

Initiator(s):  
H. Tutken

Tchr Ed:\* provides manuals,  
conducts workshops

Descriptive References:

Tutken, H. 1974. Naturwissenschaftlich orientierten Primarschulcurriculum, in  
K. Frey u. K. Blomsdorf (Editors) Integriertes Curriculum Naturwissenschaft der  
Sekundarien Stufe I. Weinheim/Basel.



INVESTIGATION OF THE METHODOLOGY  
AND STRATEGY FOR THE CONSTRUCTION  
OF INTEGRATED SCIENCE CURRICULUM

Peter Haussler and Karl Frey,

Directors

See ICh Report(s): 8

Institut Furdie Padagogik der  
Naturwissenschaften an der  
Christian-Albrechts-Universitat  
Kiel

2300 Kiel 1, OlshausenstraÙe 40/60  
West Germany

1971 -

Ages: -  
Lang: -  
Subj: -  
Approach: -  
Ability: -  
Eval Meth: -  
Testing: -  
Cont Resp: -  
Envir: -

Exper: C1 12+ 2-12 I  
Lec  
Sem  
Disc not  
Indep answered  
Lab  
Fld  
Dem  
Sim  
TV  
A/V

This research oriented project is aimed at developing instruments and theoretical models which can be used in the construction and evaluation of science curriculum. The project team has multidisciplinary backgrounds: psychology, pedagogy, sociology, biology, chemistry, physics. The organization of the project has so evolved in the last two years that the following five components can be seen as the major areas of endeavor: Component 1 - Analysis of Science Curriculum (CMAS). An instrument, the Curriculum Materials Analysis System, has been developed and tested which can be used in quantifying and systematising school science curricula. It uses the form of a differentiated system of categories with predetermined, alternative responses which make possible the analysis of curriculum material. Component 2 - Integrated Science Curriculum. The aim of this project is to work out the basic structures for the construction and implementation of integrated science curricula. These strategies will allow one to judge critically the several approaches to integration and to point out the consequences for the curriculum sequence. Component 3 - Cognitive Operations and Learning Processes in Solving Science Problems. Student cognitive operations and learning processes are being analyzed using the RASCH model, and generalizations of this model, to show how the independent solving of scientific problems can be made easier for the student. RASCH models were chosen particularly from among others, because evidence, which is derived using this procedure is, in a definite way, in spite of consideration of individual differences, independent of the specific samples of students and problems from which it is gained. Component 4 - Components of a Curriculum Theory. Most of the work topics are treated in connection with the empirical projects of the Institute. Component 5 - Motivation in Science Instruction. Using the theory of intrinsic motivation, especially D.E. Berlyne's theory of "conceptual conflict", an attempt to identify the inherent motivating properties of scientific topics has been made.

Reason: -

Adopt: -

Pers: FT PT NRT Publ: -

Initiator(s): -

Tchr Ed: -

Adm  
Wr  
VSch not  
Res answered  
TEd  
Trial

Descriptive References:

Frey, K. and P. Haussler (Hrsg.): Integriertes Curriculum Naturwissenschaft: Theoretische Grundlagen und Ansätze. Weinheim, Basel (Beltz Verlag).

Frey, K. and K. Blansdorf (Hrsg.): Integriertes Curriculum Naturwissenschaft der Sekundarstufe I: Projekte und Innovations-strategien. Weinheim, Basel (Beltz Verlag).



Ages: 10-12	Exper: C1 12+ 2=12 I	Printed Materials:
Lang: Germ	Lec ✓	tchr manuals
Subj: * chem, phys, tech, biol	Sem	tests
Approach: * inquiry, conceptual process, interdisciplinary	Disc ✓ ✓	objectives
Ability: all	Indep ✓	sheets for training
Eval Meth: achievement tests	Lab ✓	Non-Print Materials:
Testing: unit	Fld	slides
Cont Resp: tchr guided	Dem ✓ ✓	films
Envir: * classroom, lab	Sim	lab equipment
	TV	
	A/V	

One project objective is to introduce innovation to the teaching of chemistry in all types of West German schools for the 5th and 6th grade by developing a curriculum which adapts chemistry teaching to the interests and curiosities of the students originating from their everyday life in a scientific and technical environment. In addition to being implemented, the curriculum is also meant for stimulation of similar developments and activities elsewhere. The curriculum is planned and developed for science. The specific objectives of each teaching unit are stated in behavioral terms and attainment is assessed by corresponding test items. Each grade level is subdivided into 4 teaching units covering about 17 sessions.

Compared with the traditional school syllabus, the curriculum starts at lower grades.

The Development and evaluation of the project is organized in three stages: planning stage, revision stage, final trial. In each stage (varying from stage to stage) several methods, listed below, are used for evaluation: Criterion-referenced tests (pre- and post-tests), classroom observation by staff members, teachers' reports, questionnaires or tests of students' attitudes, interests and motivation.

The phase-out of the project is planned for 1974.

Reason: change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: 8,000
	Tchr Ed: no special preparation required	Adm 1	copies repro-
		Wr 3	duced commer-
Initiator(s): K. Hecht, J. Weninger, K.H. Gaertner		VSch 1	cially by
		Res 1	offset (\$80/
		TEd	10 students)
		Trial	60

#### Descriptive References:

- Gaertner, K.H. 1971. Die Entwicklung und Grundkonzeption des IPN Curriculum Chemie für die Orientierungsstufe. Der Chemieunterricht. 2, H.2, S.4.
- Gaertner, K.H., und Th. Toczyewski. 1973. Fächerübergreifende Aspekte im IPN Curriculum Chemie für die Orientierungsstufe. Naturwissenschaften im Unterricht. 6, S. 248.
- Baertner, K.H., und W. Hampe. 1971. Die Unterrichtseinheiten des IPN Curriculum Chemie für das 5. Schuljahr. Der Chemieunterricht. 2, H.2, S. 13.

#### Research:

- Goke, H., und K.H. Gaertner. 1971. Schulleistungstests beim IPN Curriculum Chemie für die Orientierungsstufe. Der Chemieunterricht. 2, H. 2, S. 34.
- Wegener, B. 1973. Gegenüberstellung von Interessen und Leistungen von Schülern beim Unterricht mit dem IPN Curriculum Chemie für die Orientierungsstufe. In: Schmidt, H. (Hrsg): Zur Didaktik der Physik und Chemie - Probleme und Perspektiven - Hannover. S. 181-195.
- Wegener, B. 1973. Schülerbefragung als Teil der formativen Evaluation des IPN Curriculum Chemie C.1. Der Chemieunterricht. 4, H.3, S. 25.

IPN-CURRICULUM CHEMIE 8/13  
(GYMNASIUM)

Johann Weninger, Director

See ICh Report(s): 8

Institut für die Pädagogik der  
Naturwissenschaften an der  
Universität Kiel  
23 Kiel, Olshausenstraße 40/60  
Germany

1968-1977

Gov, Foundation

Tel: (0431) 8803164

Ages: 14-19	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: German	Lec ✓	texts
Subj:* chem, phys	Sem	lab books
Approach: integrated, inquiry, discovery	Disc ✓	activity sheets
Ability: gymnasium	Indep	tchr manuals
Eval Meth:* tchr jdgt, achievement tests,	Lab	tests
student questionnaire	Fld ✓	Non-Print Materials:
Testing: unit	Dem ✓	slides
Cont Resp: tchr guided	Sim	overhead
Envir: classroom, lab	TV	transparencies
	A/V	models
		lab equipment

The overall project purpose is the innovation of chemistry teaching by developing a curriculum which enables the students to understand and master their chemical and technological environment by acquainting them with basic concepts and skills.

The instruction as envisaged starts from the phenomena and leads step by step to the hypotheses which enable an interpretation of the observed phenomena. The phenomena are presented in such a selection and succession that the abilities thus obtained in the learning process by the students serve as provisions and basis for their understanding of subsequent presented phenomena. The instruction pays attention to the occurrence of misconceptions and takes care to replace those with more correct ideas. It is problem-oriented, thus evoking questions on the part of students and motivating them to active participation in subsequent lessons. The program has been tested three times with approximately 2000 students.

The aspects of science teaching which are not sufficiently clarified in objective and conceptual respects and the areas of scientific terminology which can be better differentiated will be investigated in conjunction with curriculum development for the "Gymnasium". Further investigation will be concerned with how the difficulties regarding the mathematization of scientific problems and the computation of scientific tasks can be overcome. In order to assure the efficiency of this work, the results will be presented to standardization boards such as the "Ausschuß für Einheiten und Formelgrößen im Deutschen Normenausschuß". A basic goal of this work is to insure that the didactical requirements of both concept-terminological definitions and the further development of theory quantities are taken more into consideration.

It is planned to continue the project: expected conclusion 1977.

Reason:* change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: 2000
Initiator(s):	Tchr Ed: conducts workshops; provides manuals & guides	Adm 1	copies reproduced institutionally by offset
J. Weninger, W. Dierks		Wr 1 1	
		VSch 1	
		Res 1	
		TEd	
		Trial	15

#### Descriptive References:

Weninger, J., und W. Dierks. 1967. Zur geplanten Arbeit der Abteilung Chemie des Instituts für die Pädagogik der Naturwissenschaften an der Christian-Albrechts-Universität Kiel. MNU 20, S. 153.

Weninger, J., und W. Dierks. 1970. Chemieunterricht heute und morgen. MNU 23, S. 129-137.

Pfundt, H., und J. Weninger. 1972. Zu einem neuen Chemie-Lehrgang für Gymnasien. Christiana Albertina, Heft 14, S. 60-66.

#### Research:

Lang, M. 1973. Zur Messung der von Schülern erfaßten Bedeutung naturwissenschaftlicher Termini. IPN-Arbeitsberichte. 8.

## IPN CURRICULUM PHYSIK 5/8

Contact: Physics Group

See ICh Report(s): 8

Institut für die Pädagogik der  
Naturwissenschaften (IPN)  
Abteilung Physikdidaktik 23 Kiel  
Olshausenstr 40/60 West Germany  
Tel: (0431) 8803147

1968-  
Volkswagen-  
Stiftung,  
Gov: Fed & State

Ages: 10-14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: German	Lec ✓	activity sheets
Subj: phys	Sem	tchr manuals
Approach: discipline-centered, conceptual	Disc ✓	tests
Ability: all	Indep	objectives
Eval Meth:* achievement tests, tchr jdgmts	Lab ✓	Non-Print Materials:
Testing: unit	Fld	slides
Cont Resp: tchr directed	Dem ✓	overhead
Envir: classroom	Sim	transparencies
	TV	lab equipment
	A/V	

The project has two main objectives. First, physics teaching materials should be tried out and published for the purpose of initiating school syllabus changes, since physics is seldom taught in grades 5 and 6 of schools in the Federal Republic. Secondly, the curriculum was meant as a means of providing a basis for research on physics teaching.

The main goal of implementation is to provide physics teaching close to the everyday experiences of the students and to allow for numerous student experiments. The curriculum is mainly concept oriented. The main concepts are energy, the electric circuit, and control and feedback.

The materials have been developed through three trial stages by IPN staff and school-based teachers. The trials were evaluated by student tests, class observations and teacher feedback. The materials then were published commercially in a trial edition. This edition is being used in about 120 schools with 15,000 students. Based on IPN investigations about the use of the materials, a revised edition for grades 5 and 6 of the four types of German schools (Hauptschule, Realschule, Gymnasium, Gesamtschule) is being printed.

Research has been conducted along several lines. There have been studies on the structuring of physics knowledge, on retention, and on problem solving. These studies were mainly based on written student tests, and most of them were done as papers for university exams (teacher exams and doctoral theses). Other studies deal with the effects of publishing the curriculum: tracing influences of the curriculum on students, teachers, teacher trainers, textbook authors, state curriculum planners and educational researchers. These studies indicate a more complex influence of the curriculum than initially envisioned. The results are being used for revision of the materials and for project planning of the second part (grades 9 and 10) of the curriculum.

Reason: develop new course	Adopt: 75 tchrs, 2,300 students, 15 schools	Pers: FT PT NRT	Publ: 15,000
Initiator(s): S.V.		AcM ✓	copies repro-
Aufschnaiter, H. Niedderer	Tchr Ed: provides manuals & consultants	Wr 2 2	duced insti-
		VSch 1	tutionally by
		Res 3	offset
		TEd	
		Trial 1 20	

## Descriptive References:

Ernst, Klott, Vorlag, Stuttgart. 1971. Physik im 5, und 6, Schuljahr. Der Physikunterricht. 1.

Ernst, Klott, Vorlag, Stuttgart. 1971. IPN Physiktests. Der Physikunterricht. 5.

Niedderer, H. 1971. Die erprobungsorientierte Strategie ber der Entwicklung dos IPN Curriculum Physik. Bildung uns Erziehung. 24.

## Research:

Niedderer, H. 1973. Untersuchung von Schulerfähigkeiten durch Analyse physikalischer Sachstrukturen und Anwendung eines probabilistischen Testmodells. IPN-Arbeitsberichte. Kiel, No. 2.

Duit, R. 1973. Über langzeitliches Behalten von Verhaltensdispositionen in einem Spiral-curriculum. IPN Arbeitsberichte. Kiel, Nr. 5.

Heyner, W. 1972. Das Lösungsverhalten von Schulern bei Physikaufgaben, analysiert mit dem Rasch-Modell. Doctoral Thesis, K 1 University.

Ages: 14-16, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: German	Lec ✓	supplementary books
Subj: physics	Sem	programmed units
Approach: * discipline-centered, process, interdisciplinary, conceptual	Disc ✓	activity sheets
Ability: all	Indep	tchr manuals
Eval Meth: * achievement tests, tchr jdgmts	Lab ✓	tests, overview
Tes ing: unit	Fld ✓	Non-Print Materials:
Cont Resp: * tchr & student guided	Dem	audiotape
Envir: * classroom	Sim ✓	lab equipment
	TV	
	A/V ✓	

This curriculum is planned as the continuation of the IPN Physics Curriculum (grades 5 to 8). The change in project philosophy, however, justifies a description separate from the grade 5 to 8 curriculum.

As in the former curriculum, an attempt has been made to keep teaching content close to student experiences and to allow for student experiments. The guiding concepts are energy, the electric circuit, and feedback and control. Although the curriculum is still discipline oriented, with physics the backbone of the course, aspects of other disciplines are being integrated. The unit on models integrates epistemology, the units on electronics, on feedback and control, and on nuclear energy include aspects of the social sciences, and the units on electronics and on energy integrate economics. The units are process as well as concept oriented. The materials are produced in a way allowing flexible use and, in many cases, student choices. The practicability is tested by field testing.

The curriculum is meant not only for direct classroom use, but it is hoped that it can be used as raw material for other curriculum development groups who could use the basic structure and content with other content of their choice. In addition, the materials are meant for generalized teacher training not just for the specific IPN material. The project is still in the planning stage. It is hoped to ensure diversification of use by diversification of the printed products.

Research related to the curriculum deals, among other topics, with psychology of instruction (in conjunction with the unit on models), with intrinsic motivation and group cooperation (along with the unit on electronics), with attitudes and attitude changes (concerning nuclear energy plants) and with implementation problems.

Reason: * change in the philosophy, develop new course, publication	Adopt: 10 tchrs, 250 students, 3 sch	Pers: FT PT NRT	Publ: 50 copies
	Tchr Ed: provides manuals, guides, consultants	Adm ✓	reproduced
Initiator(s): H. Niedderer, H. Bürger, E. Kircher, H. Meyerbröcker, J. Walter, K. Mie, J. Lehmann, H. Härtel, K. Jaeckel, H. Schreiner		Wr 4 5	institutionally
		VSch 3	by offset
		Res 5	
		TEd	
		Tral 9	

References in preparation

**MODELS OF AN INTEGRATIVE MULTI-PERSPECTIVE INSTRUCTION IN PRIMARY SCHOOL EDUCATION**

G.G. Hiller, Director

See ICh Report(s): 8

CIEL - Project - Research Center  
Pädagogische Hochschule Reutlingen  
POB 680  
D - 7410 Reutlingen, West Germany  
Tel: W-GER-07121 - 38145/33500

1971-1975

Foundation:  
Volkswagenwerk  
(Hannover);  
Publisher (Ernst-Klett); Participating Schools

Ages: 6-11, tchr ed	Exper: CI 12+ 2-12 I	Printed Materials:
Lang: German	Lec	texts, lab books
Subj:* social sciences, technology, biol, chem, phys, math	Sem	activity sheets
Approach: interdisciplinary	Disc	tchr manuals
Ability:* avg+, avg, slow learner	Indep	overviews
Eval Meth: tchr jdgmts, student q're	Lab	newsletters
Testing: -	Fld	Non-Print Materials:
Cont Resp:* tchr guided, tchr & student directed	Dem	slides, overhead
Envir:* classroom, community	Sim	transparencies,
	TV	audiotape, games,
	A/V	models

Since September 1971 our group (former primary school teachers and professors of education) has developed in cooperation with about 20 teachers and their classes and the Ernst-Klett-Verlag Stuttgart 8 curriculum packages for six to eleven year old children. Each of these packages thematizes a special social institution representing itself an important function of the modern social system: school (education); post-office (public service); birthday (festival); supermarket (trade); soda-water production (production); Commission of technical control (traffic); children's room (habitation); and play-house (leisure). Two more packages have been produced by two other groups using the same theoretical principles as we used: television (mass-media) and election (politics).

Each of these packages contain multi media materials for pupils and a guide-book for teachers containing a lot of ideas for planning concrete lessons. The purpose of these materials is to initiate an instruction which is able to reconstruct children's reality under the following aspects: science; political interest and constitution; and personal relevance and responsibility.

On one hand, we try to introduce a difficult but relevant conception into elementary school instruction, while on the other hand we hope to fascinate pupils as well as teachers and encourage the latter to find their own ways of representing reality for children. Therefore our Curriculum elements are neither based on a special theory of learning nor do they translate any theory of instruction step by step.

In the course of this year our packages will be published in a trial edition. In 1975 and 1976 special implementation and evaluation-investigation programs shall be carried out.

Reason: change in philosophy, develop new course	Adopt:(partial) 20 tchrs, 500 students, 10 schools	Pers: FT PT NRT	Publ: 3,000
Initiator(s): K. Giel, G.G. Hiller	Tchr Ed: conducts workshops	Adm 1 1	copies repro-
		Wr 6 1	duced commer-
		VSch 1	cially (\$200/10
		Res 2	students)
		TEd	
		Trial	

No references given



NATURWISSENSCHAFTLICHER UNTERRICHT IN DER GRUNDSCHULE (NUG) (NATURAL SCIENCE INSTRUCTION IN THE PRIMARY SCHOOL)	Gesamthochschule (University) Kassel 3500 Kassel, Heinrich-Plett-Strasse 40 West Germany Tel: 0561 - 4821	1969-1975 Stiftung Volkswagenwerk, Diesterweg- Verlag
--	--	---

K. Spreckelsen, Director

See ICh Report(s): 8,7

Ages: 7-10

Lang: German

Subj:\* phys, chem

Approach:\* discipline centered, conceptual, inquiry, process, discovery, integrated

Ability: all

Eval Meth: achievement tests, tchr jdgmts

Testing: unit

Cont Resp: tchr directed

Envir: classroom lab

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc ✓

Indep

Lab

Fld

Dem ✓

Sim

TV

A/V

Printed Materials:

tchr manuals

overview

Non-Print Materials:

lab equipment

The overall purpose of the project is the reform of the so-called "sachunterricht" of the German elementary school. The NUG-project is the first attempt to construct a science curriculum for the German elementary school including the conceptual frame of "structure of the discipline". The approach of our project is based on three "conceptual schemes": 1) the particle-structure of matter, 2) interaction, and 3) conservation. The building-up of these schemes occurs in a four-year course in the fields of physics and chemistry using a "spiral-curriculum" arrangement of teaching units. Our main goal is to interpret the schemes as ways of "looking at" things, phenomena, and nature.

The project has attempted to develop very detailed teacher's guides in order to permit each elementary school teacher to implement the course in the classroom. Correspondingly, it is hoped that consultant services will not be required. In exceptional circumstances, teachers may contact project headquarters. Preservice training takes place at Hochschule.

Our plans for the future are to implement the last teaching unit and to continue the research on transfer properties of conceptual schemes with regard to elementary school children.

Reason: develop new course	Adopt: 300 tchrs, 10,000 students, 200 schools	Pers: FT PT NRT Adm 1 3 Wr 2 3 1 V Sch 3 Res 1 30 TEd Trial 100	Publ: 150,000 copies repro- duced commer- cially by off- set & linotype (\$18/10 students)
Initiator(s): K. Spreckelsen	Tchr Ed: provides guidebooks		

#### Descriptive References:

Spreckelsen, K. 1970. Strukturelemente der Physik als Grundlage ihrer Didaktik. Naturwissenschaften im Unterricht. 18: 418.

Spreckelsen, K. 1970. Strukturbetonender naturwissenschaftlicher Unterricht auf der Grundstufe. Die Grundschule, 2. Heft 3, S.28.

Spreckelsen, K. 1971. Didaktische Konzeptionen für einen naturwissenschaftlichen Unterricht in der Grundschule. Die bayerische schule, 24. 83 ff., 105 ff., 131 ff.

#### Research:

Adler, W. 1973. Einflüsse auf den Lernerfolg im naturwissenschaftlichen Unterricht in der Grundschule. Naturwissenschaften im Unterricht, 21. 56-62.

Ergebnisbericht in: Tutken, H., and K. Spreckelsen (Hrsg.): Der Konzeptdeterminierte Ansatz. Schriftenreihe Naturwissenschaftlicher Unterricht in der Grundschule, Band 3. Diesterweg-Verlag Frankfurt. (Not yet published)

PROGRAM NATURWISSENSCHAFTEN  
(PROGRAM NATURAL SCIENCE)

Karl Frey, Director

See ICh Report(s): none

June Pittman

IPN an der Universität Kiel

D2300 Kiel 1

Olshausenstrasse 40/60, Germany

Tel: -

1972-1974

Gov

Ages: * 5-6	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: German	Lec	activity sheets
Subj: science	Sem	tchr manuals
Approach: * process, conceptual, interdisciplinary	Disc	tests, objectives
Ability: all	Indep	overview
Eval Meth: * achievement tests, tchr judgts, oral tests	Lab	Non-Print Materials:
Testing: individual	Fld	filmstrips
Cont Resp: * tchr & material directed	Dem	audiotape
Envir: * classroom, lab	Sim	games
	TV	manipulative
	A/V	materials

This program is an adaptation and translation of the A Level of Individualized Science (constructed at the Learning Research and Development Center, U. of Pittsburgh, Pittsburgh, Pa.) The major work of the translation and adaptation was done by J. Pittman and H. Schmerkotte in conjunction with the Projektgruppe Kleinkindforschung at the Pädagogische Hochschule Rheinland in Cologne. The first trials of the curriculum, in two kindergartens in the Cologne area, began early in 1974 and will continue through 1975.

The inclusion of instruction in science in the primary levels of education in the Federal Republic of Germany is now beginning to gain recognition. There have been few organized implementation plans and less research into the feasibility and/or value of science in the early years of school. The IPN is a supra-regional institute, financed by the federal government and the Land Schlesweg-Holstein, with the responsibility for basic research in science education, curriculum construction, and implementation of curriculum in the schools. This study will be carried out within the framework of a larger project seeking to clarify a model for the Vorschule (the year before 1st grade.) The larger project is directed by Dr. G. Kochansky of the Pädagogische Hochschule Flensburg and involves research in several curriculum areas, such as reading, music, sport, etc.

The overall objectives of this study are to determine: (a) if science is a realistic portion of the curriculum for 5 year olds in a Vorschule setting, and (b) if an individualized learning system can be effectively used with young children.

The Program includes a complete teacher training package (developed by Research for Better Schools in Philadelphia, Pa. and adapted and translated in Cologne) which introduces the teacher both to the methodology and the content of the program. The children work both individually and in small groups with the teacher. The emphasis on individualized and small group learning with the concurrent emphasis on student self-direction and self-evaluation introduces relatively unexplored concepts into curriculum work in Germany.

Reason: trial of the adapted and translated curriculum with 5 year olds	Adopt: -	Pers: FT PT NRT	Publ: 300 copies
	Tchr Ed: conducts work- shops; provides manuals & consultants	Adm 1	reproduced
		Wr	institutionally
		VSch 1	by offset
Initiator(s): K. Frey, J. Pittmann		Res 1	(\$125/10
		TEd	students)
		Trial 12	

No references given



CURSO EXPERIMENTAL DE  
MATEMÁTICA (3<sup>er</sup> año)

Reynaldo Ocerin, Director

See ICh Report(s): none

- DINEMS, Cordoba 831,  
Buenos Aires, Argentina  
- INEC, Avda Madero 235  
7<sup>o</sup> Piso, Buenos Aires,  
Argentina

1971-1972

Gov: Fed

Ages: 15	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Sp	Lec 3	programmed units
Subj: math	Sem 2	supplementary books
Approach: discipline-centered	Disc 1	texts
Ability: all	Indep	
Eval Meth:* achievement & oral tests	Lab	
Testing:* unit, term	Fld	
Cont Resp:* tchr & administratively	Dem	
directed	Sim	
Envir:* classroom, sch grounds	TV	
	A/V	

This project originated in the announced "educational reform" which included 5 years of the primary level, 4 years of the intermediate level and 3 years of the middle level. The fundamental purpose was to establish a new mathematics curriculum for the first year of the middle level. Foremost was a strong algebraic accent between the introduction to the student of the basic structures (groups, sets, bodies, spaces, vectors) with the initiation of the student into the application of the axiomatic method. The trial took place in the school years of 1971 and 1972 in five secondary schools, with the participation of 7 professors and 120 students. In spite of the excellent disposition of the teaching personnel the results were not satisfactory and demonstrated the total impossibility of their generalization.

The general objectives of the middle level were: development of the intellectual functions of the educator that lead to the formation of rational thought, by means of methodic observation, analysis and synthesis, induction and deduction, generalization, etc.; development of the creative capacity and the scientific spirit; comprehension of the importance of mathematics and its utility as an auxiliary instrument for other disciplines; acquisition of basic knowledge of language and mathematical theories with actual plans of operation; methodic use of general structures with systematic integration of the nucleus of mathematical knowledge into everyday life and in relation to scientific, cultural, and technological aspects of the real world; ability in arithmetic and algebraic calculation and in the design and interpretation of graphs or diagrams; and, preparation in order to continue higher studies.

Reason:* update content & method, develop new course	Adopt: -	Pers: FT PT NRT	Publ: 80 copies reproduced by mimeograph
Initiator(s): Dirección Nacional de Educación Media y Sup. (DINEMS)	Tchr Ed:* conducts workshops, provides consultants	Adm 2 Wr VSch 2 Res TEd Trial	

Descriptive References:

Matemática. 1972. (Aporte del INEC a la Enseñanza de la matemática). Buenos Aires: Publicación del INEC Avda Madero 235 7<sup>o</sup> Piso.

Research:

Informes del grupo de trabajo conductor del ensayo del 15 de marzo de 1972 y del 9/3/1973. Expediente 9567/71 del registro del Ministerio de Cultura y Educación.

CURSO EXPERIMENTAL DE  
MATEMATICA (3<sup>er</sup> año)

Reynaldo Ocerin, Director

See ICh Report(s): none

- DINEMS, Cordoba 831,  
Buenos Aires, Argentina  
- INEC, Avda Madero 235  
7<sup>o</sup> Piso, Buenos Aires,  
Argentina

1971-1972

Gov: Fed

Ages: 15	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Sp	Lec 3	programmed units
Subj: math	Sem 2	supplementary books
Approach: discipline-centered	Disc 1	texts
Ability: all	Indep	
Eval Meth:* achievement & oral tests	Lab	
Testing:* unit, term	Fld	
Cont Resp:* tchr & administratively	Dem	
directed	Sim	
Envir:* classroom, sch grounds	TV	
	A/V	

This project originated in the announced "educational reform" which included 5 years of the primary level, 4 years of the intermediate level and 3 years of the middle level. The fundamental purpose was to establish a new mathematics curriculum for the first year of the middle level. Foremost was a strong algebraic accent between the introduction to the student of the basic structures (groups, sets, bodies, spaces, vectors) with the initiation of the student into the application of the axiomatic method. The trial took place in the school years of 1971 and 1972 in five secondary schools, with the participation of 7 professors and 120 students. In spite of the excellent disposition of the teaching personnel the results were not satisfactory and demonstrated the total impossibility of their generalization.

The general objectives of the middle level were: development of the intellectual functions of the educator that lead to the formation of rational thought, by means of methodic observation, analysis and synthesis, induction and deduction, generalization, etc.; development of the creative capacity and the scientific spirit; comprehension of the importance of mathematics and its utility as an auxiliary instrument for other disciplines; acquisition of basic knowledge of language and mathematical theories with actual plans of operation; methodic use of general structures with systematic integration of the nucleus of mathematical knowledge into everyday life and in relation to scientific, cultural, and technological aspects of the real world; ability in arithmetic and algebraic calculation and in the design and interpretation of graphs or diagrams; and, preparation in order to continue higher studies.

Reason:* update content & method, develop new course	Adopt: -	Pers: FT PT NRT	Publ: 80 copies reproduced by mimeograph
Initiator(s): Dirección Nacional de Educación Media y Sup. (DINEMS)	Tchr Ed:* conducts workshops, provides consultants	Adm 2 Wr VSch 2 Res TEd Trial	

Descriptive References:

Matemática. 1972. (Aporte del INEC a la Enseñanza de la matemática). Buenos Aires: Publicación del INEC Avda Madero 235 7<sup>o</sup> Piso.

Research:

Informes del grupo de trabajo conductor del ensayo del 15 de marzo de 1972 y del 9/3/1973. Expediente 9567/71 del registro del Ministerio de Cultura y Educación.

ENSEÑANZA ACTUALIZADA DE LA  
QUIMICA - FIRST & SECOND  
COURSES

Reynaldo Ocerin, Director

See ICh Report(s): none

Instituto Nacional para el  
Mejoramiento de la Enseñanza  
de las Ciencias (INEC)  
Av. Eduardo Madero 235 - 7º piso  
Buenos Aires, Argentina

tel: 30-5295

-  
\*Gov, Partici-  
pating Schools

Ages: 16 and 17	Exper: *C1 12+ 2-12 I	Printed Materials: *
Lang: Sp	Lec	lab books
Subj: chem	Sem	tests
Approach: * inquiry, discovery, conceptual	Disc 2	questionnaires &
Ability: all	Indep 4	problems
Eval Meth: * achievement, lab & oral tests,	Lab 1	Non-Print Materials:
tchr jdgmts	Fld	lab equipment
Testing: unit	Dem 3	
Cont Resp: tchr guided	Sim	
Envir: * lab, classroom	TV	
	A/V	

Since March 1970 an experimental project, Actualized Teaching of Chemistry, has been applied to the 4th and 5th years of the Bachelor's Degree curriculum. This project was developed cooperatively by the National Administration of Middle and Higher Education and the National Institute for Improvement of Teaching the Sciences. Its objectives are: 1) to better the teaching-learning process of chemistry both qualitatively and quantitatively; and 2) to integrate the cultural spirit of the students with knowledge of chemistry which can be utilized in further activities.

The course consists of 90 hours of class theory and practice. The themes are distributed in "blocks of subjects" and include exercises and numerical problems, guides for experimental work of the students and methodology guides.

In the first course of chemistry topics include elementary physical chemistry, fundamentals of inorganic chemistry and introduction to analytical chemistry. In the second course covalent bonding is emphasized along with stress on the characteristics of the carbon atom and functions, isomers and mechanisms of reactions. This project was initiated in 1970, in only 14 colleges and was extended year by year, finally totaling 108 colleges, distributed in the Federal Capital and 18 provinces. Its continued evaluation and its extension is projected in the near future.

Reason: * develop new course, Adopt: (partial)	Pers: FT PT NRT	Publ: 1,500
update content & method	Adm 2	copies repro-
Initiator(s): INEC	Wr 8	duced insti-
Tchr Ed: * conducts work-	VSch 6	tutionally by
snoops, provides	Res 3 2	mimeograph
consultants	TEd 4	
	Trial 95	

Research:

Investigación evaluativa del Proyecto.

HEALTH EDUCATION (Educación para la Salud)

Reynaldo Ocerin, Director

See ICh Report(s): none

Instituto Nacional para el Mejoramiento de la Enseñanza de las Ciencias  
Buenos Aires, Argentina

Tel: 30-5295

1972-

Gov, Participating Schools

Ages: 16	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Sp	Lec	lab books
Subj: biol	Sem 2	tests
Approach:* inquiry, discovery, process, conceptual	Disc 3	questionnaires & problems
Ability: all	Indep 5	
Eval Meth: lab achievement & oral tests, tchr jdgmts	Lab 1	Non-Print Materials:
Testing: unit	Fld	lab equipment
Cont Resp: tchr guided	Dem 4	
Envir:* lab, classroom, community	Sim	
	TV	
	A/V	

The contents of the Health Education curriculum were established by a work group composed of representatives of the Health and Education Sectors of the respective Ministries of Education and Social Welfare. The objectives of the course are: to learn the relationships between man and his environment; to understand the characteristics of the personal growth and vital development of the student; to learn how to protect the health of the student and his family and social group in the face of aggressive factors; to learn the advisable sanitary conditions at each step of life; and to obtain a general view of the intervening factors in the appearance of illness and accidents in order to adopt positive postures that benefit the student and the groups with which he associates.

Reason:* change in philosophy, develop new course, update content & method	Adopt:(partial)	Pers: FT PT NRT	Publ: -
Initiator(s): R. Ocerin, A. Hernaiz	Tchr Ed: conducts workshops, provides consultants	Adm 2	
		Wr 8	
		VSch 6	
		Res 3 2	
		TEd 4	
		Trial 30	

No references given

**INTRODUCTORY PHYSICAL SCIENCE  
(I.P.S.)**

Heraclio Ruival, contact

See ICh Report(s): none

Instituto Nacional para el  
Mejoramiento de la Enseñanza  
de las Ciencias (INEC)  
Av. Eduardo Madero 235 - 7º piso -  
Buenos Aires, Argentina

1968-  
Gov, Partici-  
pating Schools

Tel: 30-5295

Ages: 15	Exper: C1 12+ 2-12 I	Non-Print Materials:
Lang: Sp	Lec	lab equipment
Subj: chem, phys	Sem	
Approach:* inquiry, discovery, conceptual	Disc 2	
Ability: all	Indep 4	
Eval Meth:* achievement, lab & oral tests,	Lab 1	
tchr jdgmts	Fld	
Testing:* unit, term	Dem 3	
Cont Resp:* tchr & student directed	Sim	
Envir:* lab, classroom	TV	
	A/V	

In 1968 the National Institute for the Improvement of Teaching of the Sciences (INEC) considered the possibility of initiating an experiment destined to replace the traditional contents of the course Elements of Physics and Chemistry of the 3rd year.

The specialized group on the topic of Physics of the I.N.E.C. decided to utilize for such trial the course, Introduction to the Physical Sciences (IPS), in order to learn whether its focus and methodology was the best suited to the prerequisites needed before the first encounter of the student with the systematic and ordered development of an experimental science.

The character of this project is such that it gives to each student, besides the orientation of the professor, the possibility of comparing his results with those of the entire class, performing the experimental data with critical thinking and enabling him to obtain conclusions and generalizations.

This project gives enormous importance to the comparison of experiments by groups of students. It was indispensable to equip the pilot colleges and institutes involved in the trial with the required material for the experiment that the personnel of I.N.E.C. designed and developed.

In 1969, the personnel of the Pedagogical Evaluation Division of the I.N.E.C. produced the necessary instruments to carry out the evaluation of the results obtained to that date. The evaluation and its conditions were published by the I.N.E.C.

Since seeing the positive conclusion of the evaluation of this Project, its adoption at the pertinent level within our actual education system is justified and the continued expansion of its implementation is foreseen.

Reason:* develop new	Adopt: -	Pers: FT PT NRT	Publ: 6,000
course, update method		Adm 2	books repro-
Initiator(s): H. Ruival	Tchr Ed:* conducts work-	Wr	duced commer-
	shops; provides guides	VSch 4	cially by
	& consultants	Res 3	linotype
		TEd 4	
		Trial 30	

**Research:**

Investigación evaluativa del proyecto.

PILOT PROGRAM OF BIOLOGY I: Instituto Nacional para el  
 "LIVING THINGS IN THEIR ENVIRON- Majoramiento de la Enseñanza  
 MENT" (Programa Piloto de Biología de las Ciencias  
 I: "Los Seres Vivos en su ambiente") Buenos Aires, Argentina

1969-  
 Gov: Fed,  
 Participating  
 Schools

Reynaldo Ocerin, Director

Tel: 30-5295

See ICh Report(s): none

Ages: 12	Exper: C1 12+ 2-12 1	Printed Materials:*
Lang: Sp	Lec	lab books
Subj: biol	Sem	field guides
Approach:* inquiry, discovery, process,	Disc 3	tests.
conceptual	Indep 5	questionnaires &
Ability: all	Lab 1	problems
Eval Meth:* lab, achievement & oral tests,	Fld 2	Non-Print Materials:
tchr jdgmts	Dem 4	lab equipment
Testing: unit	Sim	
Cont Resp: tchr guided	TV	
Envir:* lab, classroom	A/V	

The first course of Biology destined for the First Year of middle teaching, has its antecedents in the results of the First National Symposium on Teaching Science, held in Córdoba in October 1968. The program of this course is the result of a careful elaboration in successive steps, namely: 1) study and elaboration of personal projects presented by each of the professors participating in the Methods Seminar of the Sixth National Course of Biology - Second Level; wording and editing of definitive projects by the work groups; analysis, elaboration and unification of these projects under the direction of the assessors of I.N.E.C. and the inspectors of DINEMS; and preparation of the general plan of the Course, of the experimental program and of the Plan de Unidades Didácticas.

Specific objectives of the course are to: acquire actual biolotical information; promote interest for the ecology and for preservation of the biological equilibrium; receive training in the use of instruments and in the collection of natural material; and develop the capacity to apply the scientific method.

Reason:* change in philoso-	Adopt:(partial)	Pers: FT PT NRT	Publ: reproduced
phy, develop new course,		Adm 2	institutionally
update content & method	Tchr Ed: conducts work-	Wr 8	by mimeograph
	shops, provides	VSch 6	
Initiator(s): R. Ocerin,	consultants	Res 3 2	
A. Hernaiz		TEd 4	
		Trial 69	

No references given

PILOT PROGRAM OF BIOLOGY II: "THE  
DIVERSITY OF LIVING THINGS"  
(Programa Piloto de Biología II:  
"La Diversidad de los Seres Vivos")

Institute Nacional para el  
Mejoramiento de la Enseñanza  
de las Ciencias  
Buenos Aires, Argentina

1970-  
Gov, Partici-  
pating Schools

Reynaldo Ocerin, Director

Tel: 30-5295

See ICh Report(s): none

Ages: 13	Exper: Cl 12+ 2-12 1	Printed Materials:*
Lang: Sp	Lec	lab books
Subj: biol	Sem	field guides
Approach:* inquiry, discovery, process,	Disc 3	tests
conceptual	Indep	questionnaires &
Ability: all	Lab 1	problems
Eval Meth:* lab, achievement & oral tests,	Fld 2	
tchr jdgmts	Dem 4	Non-Print Materials:
Testing: unit	Sim	lab equipment
Cont Resp: tchr guided	TV	
Envir:* lab, classroom	A/V	

The course of Biology for the Second Year is the continuation of that applied experimentally in the First Year in 1969. The program is elaborated in successive steps, namely: study and selection of personal projects presented by the professors participating in the Methods Seminar of the Sixth National Course of Biology - Second Level (1969); preparation of a trial project in charge of the inspectors of DINEMS and the assessors of INEC who acted as coordinators during the cited Methods Seminar; and discussion of contents and activities of the basic documents.

The objectives of the course are: to continue to modify student learning situations in order to acquire maximum information; to continue training in management of field and laboratory situations and in the collection and preservation of material; to intensify the applications of the scientific method; to make habitual the recognition of the similarities in the diverse forms of living things; to understand the diversity of the plant and animal kingdoms with the unity they follow on the path of evolution; and to know the morphology, physiology, reproduction, biological cycles and behavior of living organisms.

Reason:* change in philosophy, develop new course, update method & content	Adopt:(partial)	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: conducts workshops, provides consultants	Adm 2	institutionally
		Wr 8	by mimeograph
Initiator(s): R. Ocerin, A. Hernaiz		VSch 6	
		Res 3 2	
		TEd 4	
		Trial 43	

No references given



PILOT PROGRAM OF BIOLOGY III:  
"STRUCTURES & FUNCTIONS OF  
ORGANISMS"(Programa piloto de  
Biología III: "Estructura y  
Funcionamiento de los Organismos")

Institute Nacional para el  
Mejoramiento de la Enseñanza  
de las Ciencias  
Buenos Aires, Argentina  
Tel: 30-5295

1971-  
Gov, Partici-  
pating Schools

Reynaldo Ocerin, Director

See ICh Report(s): none

Ages: 14	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Sp	Lec	lab books
Subj: biol	Sem	field guides
Approach:*inquiry, discovery, process,	Disc 3	tests
conceptual	Indep 5	questionnaires &
Ability: all	Lab 1	problems
Eval Meth:* lab, achievement & oral tests,	Fld 2	Non-Print Materials:
tchr jdgmts	Dem 4	lab equipment
Testing: unit	Sim	
Cont Resp: tchr guided	TV	
Envir:* lab, classroom	A/V	

The course of Biology for the Third Year of the basic cycle is a continuation of the courses applied in the First Year in 1969 and in the Second Year in 1970. The program was developed in various steps, similar to those followed by the Course of Biology of the Second Year work. Specific objectives of the course are: to know the plants and animals functionally; to compare the functions of plants and animals with similar functions in man; to continue the training in the use of science instruments and in the collection of natural material; and to intensify the application of the scientific method.

Reason:* change in philoso-	Adopt:(partial)	Pers: FT PT NRT	Publ: reproduced
phy, develop new course,	Tchr Ed: conducts tchr	Adm 2	institutionally
update content & method	workshops, provides	Wr 8	by mimeograph
Initiator(s): R. Ocerin,	consultants	VSch 6	
A. Hernaiz		Res 3 2	
		TEd 4	
		Trial 35	

No references given

**PILOT PROGRAM FOR BIOLOGY IV:**  
**"INTEGRATION, CONTINUITY & EVOLU-**  
**TION OF LIVING THINGS"** (Programa  
 Piloto de Biología IV: "Integración,  
 Continuidad y Evolución de los seres  
 vivos")

Instituto Nacional para el  
 Mejoramiento de la Enseñanza  
 de las Ciencias  
 Buenos Aires, Argentina  
 Tel: 30-5295

1972-  
 Gov, Partici-  
 pating Schools

Reynaldo Ocerín, Director

See ICh Report(s): none

Ages: 15	Exper: C1 12+ 2-12 I	Printed Materials:*
Lang: Sp	Lec	lab books
Subj: biol	Sem	field guides
Approach:* inquiry, discovery, process,	Disc 3	tests
conceptual	Indep 5	questionnaires &
Ability: all	Lab 1	problems
Eval Meth:* lab, achievement & oral tests,	Fld 2	Non-Print Materials:
tchr jdgmts	Dem 4	lab equipment
Testing: unit	Sim	
Cont Resp: tchr guided	TV	
Envir:* lab, classroom	A/V	

The course of Biology for the Fourth Year of the bachelor's degree is a continuation of the courses that were applied in the First Year in 1969, in the Second Year in 1970, and in the Third Year in 1971. The specific objectives are: to make customary the comprehension of the integration, continuity and evolution of living organisms; to study the regulation and coordination of life functions of plants and animals and to compare them with similar ones in man; to apply the principle laws of genetics to simple biological problems; to understand the mechanisms of evolution as applied to plants, animals, and man; and to understand the place of man in the biosphere and his responsibility in the conservation of natural resources.

Reason:* change in philoso-	Adopt:(partial)	Pers: FT PT NRT	Publ: reproduced
pphy, develop new course,	Tchr Ed: conducts work-	Adm 2	institutionally
update content & method	shops, provides	Wr 8	by mimeograph
Initiator(s): R. Ocerín,	consultants	VSch 6	
A. Hernaiz		Res 3 2	
		TEd 4	
		Trial 9	

No references given

**VERBAL & MATHEMATICAL REASONING  
TESTS**

Avda. Madero 235 - 7° piso -  
Buenos Aires, Argentina

Director: -

Tel: 30-0875

See ICh Report(s): none

Ages: 14-16

Exper: Cl 12+ 2-12 I

Lang: Sp

Lec

Subj: -

Sem

Approach: -

Disc

Ability: -

Indep

not

Eval Meth: -

Lab

answered

Testing: -

Fld

Cont Resp: -

Dem

Envir: -

Sim

TV

A/V

The elaboration and application of a Verbal and a Mathematical Reasoning Test were undertaken in 1972. This task was carried out by the Instituto Nacional para el Mejoramiento de la Enseñanza de las Ciencias (INEC) and by the Centro de Investigaciones en Ciencias de la Educación (CICE). These tests were devised in order to judge the mental ability of college students (Ciclo Básico del Nivel Medio) between 14 and 16 years old.

The Verbal Reasoning Test was divided into 3 formats of 40 items each and the Mathematical Reasoning Test into 5 formats of 20 items each. The items included the curricular content corresponding to the last grade of primary school and the first three years of secondary school. The division into formats was due to psychological reasons (not to give long tests which lower the performance) and objective-type items with 4 alternatives each, one of which and only one is right, were used.

The administration of the "test version" was carried out with teachers (local co-ordinators) and pupils throughout the whole country. The pupils' average scores in both language and mathematics, corresponding to the 3rd year Ciclo Básico, as well as their father's trade and educational level was asked for their background. Around 1091 pupils took part in the Verbal Reasoning Test and 1590 in the Mathematical Reasoning Test. In the first test the higher and lower scores obtained were 10 and 35, the higher and lower possible scores being of 120 and 0. The second test scores were 12 and 98 on a scale ranging from 0 to 100.

The statistical analysis of the items was based on Fan Scales, in order to compute the degree of difficulty and discriminative capacity. The reliability coefficients of both Tests were very high (.88) and significant at .01 level.

Future activities include obtaining official authorization for the administration of a final version in order to carry out a random national sample.

Reason: -

Adopt: -

Pers: FT PT NRT Publ: -

Initiator(s): -

Tchr Ed: -

Adm

Wr

VSch not

Res answered

TEd

Trial

**Descriptive References:**

International Newsletter. ETS. October 1973.

**CARIBBEAN MATHEMATICS  
PROJECT (CMP)**

Desmond R. Broomes, Director

See ICh Report(s): none

University of the West Indies  
School of Education, P.O. Box 64  
Bridgetown, Barbados  
West Indies

Tel: 02098

1971-1975

UWI, UNESCO,  
CEDO

Ages: 11-15, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: math	Sem	activity sheets
Approach.* conceptual, process	Disc ✓ ✓ ✓ ✓	tchr manuals, tests
Ability: all	Indep	behavioral objec-
Eval Meth.* achievement and readiness	Lab ✓ ✓ ✓ ✓	tives, overview
tests, student q're	Fld	charts, workbooks
Testing: pre-tests, unit tests	Dem	Non-Print Materials:
Cont Resp.* tchr guided, administratively	Sim	filmstrips
& student directed	TV	filmloops, films
Envir.* classroom sch grounds	A/V	slide tape, games
	work-	models
	books ✓ ✓ ✓ ✓	lab equipment

The fundamental aim of the Project is to improve the teaching and learning of mathematics. This aim is pursued through activities which combine aspects of curriculum development: production of pupils' materials and teacher training. The objectives of these activities are stated both in terms of materials to be produced and distributed and in terms of skills of teaching and curriculum development to be left with the teachers involved.

The main activities which characterize the way the strategies of the Caribbean Mathematics Project have been put into operation are: round table meetings of consultants and project coordinator; large workshops where participants from different territories sense the community of problems and cooperatively work out solutions; small workshops where new teaching behaviors and curriculum skills are planned, devised, and practiced; production workshops; action research where individual teachers in their own classrooms experiment with teaching strategies and materials; and school visits by consultants.

The Project is working to produce pupils' materials for the first three years of mathematics in secondary school. First Year materials consist of a set of eight modules (or units) from which the teacher can choose certain ones to meet the needs of his pupils as individuals, as small groups, or as a class. The modules are not sequential, and can be chosen to fit most schools' syllabuses. Second Year materials are being developed according to a plan set out in "Scope and Sequence Year 2." These materials take two forms: the 'box', a kit of items designed to promote a laboratory-style of teaching; and the 'book' another approach to the same topics for pupils with greater verbal ability. For the Third Year program, an environmental approach is envisaged in which pupils would study mathematics through an investigation of local industry and commerce.

Reason: update content & methods, develop new course	Adopt: (partial) 120 tchrs, 9000 students, 40 sch	Pers: FT PT NRT	Publ: 5,000
		Adm 3 1	copies repro-
		Wr 3 1	duced insti-
		VSch 3 1	tutionally by
Initiator(s): B.J. Wilson, R.M. Nicholson	Tchr Ed: conducts work-shops; provides manuals, films, consultants	Res 3 1	mimeograph &
		TEd 3 1	offset (\$8/10
		Trfal	120 students)

**Descriptive References:**

Broomes, D.R., T.L. Schroeder, and R.D. Payne. April 1974. Mathematics, Curriculum, and Evaluation: Caribbean Experiences. Educational Development International.

**WEST INDIAN SCIENCE CURRICULUM  
INNOVATION PROJECT/C  
(WISCIP/C)**

Director: -

The School of Education  
University of the West Indies  
P.O. Box 64, Bridgetown  
Barbados, West Indies

1970-1975

Gov, CEDO

See ICh Report(s): 8

Ages: 11-14	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	lab books
Subj: biol, chem, phys	Sem	tchr manuals
Approach: integrated, conceptual, discovery	Disc 2	tests
Ability: average	Indep	objectives
Eval Meth: achievement & standardized tests, tchr jdgmts	Lab 1	
Testing: term & unit	Fld	
Cont Resp: tchr guided	Dem 3	
Envir:* lab, classroom, sch grounds	Sim	
	TV	
	A/V	

This science curriculum project which was first developed in Trinidad aims to introduce modern discovery-based science teaching methods in English speaking Caribbean Junior Secondary Schools. It has as its specific objectives: preparation of teachers' guides and other visual aids for the course; piloting innovations in science teaching; training of non-graduate teachers involved in the project; ecological approach to biology teaching; and pupil involvement at all stages of the course. Every lesson is written out in detail for a three year course for teachers with very meager qualifications and ill-equipped science rooms.

Under the support of the British Center for Educational Development Overseas (CEDO) and the University of the West Indies, this project, under the name of Caribbean Regional Science Project (CRSP), has had further development and extension throughout the Caribbean.

Reason: change in philosophy, develop new course	Adopt: 200 tchrs, 20,000 students, 80 schools	Pers: FT PT NRT	Publ: 400
Initiator(s): A.J. Mee, P.S. Adey	Tchr Ed: conducts workshops, provides manuals	Adm 1 1	copies repro-
		Wr 1 5	duced commer-
		VSch 1 3	cially by
		Res	mimeograph
		TEd	\$120/10
		Trial 150	students)

No references given

GRUPO DE ESTUDOS DO ENSINO  
DA MATEMATICA (GEEM)

Oswaldo Sangiorgi, Director

See ICh Report(s): 7

Universidade Mackenzie

Rua Itambe, 135

Sao Paulo 3,

S.P., Brasil

Tel: 256-6611- R.308

1961 -

Gov:State, Pri-  
vate, Publisher,  
Memberships

Ages: tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Portuguese	Lec 1	tchr manuals
Subj: math	Sem ✓	newsletters
Approach: discipline-centered	Disc 2	
Ability: average	Indep ✓	
Eval Meth: tchr jdgmts	Lab	
Testing: -	Fld	
Cont Resp: administratively & tchr	Dem ✓	
directed	Sim	
Envir: classroom	TV ✓	
	A/V	

The overall project purpose is to improve the teaching of mathematics in high schools and elementary schools, through better curricula, better teaching methods and better-prepared teachers. The objectives of the project are: 1) to help school teachers to increase their knowledge of mathematics by offering summer courses, in-service training seminars and group discussions; 2) to provide texts aimed at improving the background in mathematics of school teachers. The books can also be used by better secondary students; 3) to work with educational authorities toward better mathematics curricula for state schools; and 4) to cooperate with any group interested in the improvement of school mathematics.

Reason: update method, change in philosophy, develop new course	Adopt: - Tchr Ed: conducts work- shops; provides manuals, guides & consultants	Pers: FT PT NRT Adm 1 1 Wr 5 VScn Res TEd Trial	Publ: reproduced institutionally by offset
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Initiator(s):

O. Sangiorgi,

G. Springer, B. Castrucci,

L.H.J. Monteiro, L.B. Sanchez,

R. Watanabe

No references given

INTEGRATED SCIENCE  
(CIENCIA INTEGRADA)

Myriam Krasilchik, Director

CECISP - C.P. 2089  
Sao Paulo  
Brasil

1972-1974

Gov: Fed

See ICh Report(s): none

Ages: * 15,16	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Portuguese	Lec ✓	texts
Subj: biol, chem, phys, earth-space, math, tech, social sciences	Sem ✓	tchr manuals
Approach: integrated	Disc ✓	tests
Ability: avg	Indep	objectives
Eval Meth: * standardized, lab & achievement tests, student q're	Lab ✓	overview
Testing: -	Fld ✓	charts
Cont Resp: tchr directed	Dem ✓	Non-Pring Materials:
Envir: * classroom, lab community	Sim ✓	games
	TV	models
	A/V	lab equipment

In Brasil, high school science education has consisted of courses in the traditional disciplines: Physics, Chemistry and Biology. The new education law requires that all high school students learn skills that will provide them with the ability to perform as "middle level" technicians in job categories determined by the Federal Council of Education. This requirement renders impractical the offering to all high schools a sufficient number of basic science classes to permit a year of study in each discipline. In order to avoid many students acquiring the distorted view of science that results from an option to choose one course in physics, chemistry or biology, the Science Project decided to allocate resource to the Sao Paulo Science Center to develop new materials for teaching Integrated Science.

In this program, the basic curriculum will be accomplished without the traditional divisions of science and will allow the inclusion of other disciplines such as anthropology, psychology, geology, social sciences, etc.

The program consists of students text, teacher's guide, laboratory material, audio-visual material, and joint objective texts and exercises. Its educational goals are to enable students: to learn the basic concepts of science and their implications in the modern world; to develop problem-solving abilities; to analyze the interaction between man and the environment; and to receive basic scientific information so that they know the fundamental principles of this branch of knowledge. Topics include: the major scientific advances; the materials used by man; living things and man; the energy used by man; human population; and, man and science. The new materials were planned to meet the needs of high school students who will probably follow a curriculum containing no additional science courses.

Experience indicates that the unification of basic scientific concepts by students does not occur. Such unification must occur if we are to have a community of people educated in scientific explanations and capable of producing scientists who can analyze and resolve the complex problems facing us.

Reason: update method, change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: conducts work- shops, provides guides	Adm 2	
Initiator(s): M. Krasilchik, N.M. Cleffi		Wr 9	
		VSch	
		Res 1	
		TEd	
		Trial	

No references given



INTEGRATED SCIENCE FOR RECENTLY  
ALPHABETIZED ADULTS

Plinio Ugo Menghini dos  
Santos, Director

FUNBEC  
Caixa Postal 2089  
São Paulo, Brazil

1973-1974

Gov

See ICh Report(s): none

Ages: adults	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Portuguese	Lec	texts
Subj: electricity & math	Sem	tchr manuals
Approach: integrated	Disc	Non-Print Materials:
Ability: -	Indep	lab equipment
Eval Meth: tchr jdgmts	Lab           ✓           ✓	
Testing: -	Fld	
Cont Resp: tchr guided	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

The project originated from FUNBEC's intention of offering to MOBRAL (Government alphabetization entity) an assistance to the teaching of sciences. The goal of the project is the teaching of science to recently alphabetized people, within a program of integrated education. The project is almost entirely self-instructive teaching, depending a minimum on the instructor.

The project is composed of the following material: 1) text-book of experiments for students; 2) guide-books for teachers; 3) materials applied to the areas of sanitary health and electricity. The methodology applied in the development of contents encompasses a specific objective: the analysis of actual and concrete situations within the student's experience background, corresponding to problems that are significant to both the student and the community. After this introductory analysis, the student is compelled to effect experiments using our material and/or texts and pictures. An evaluation covering the whole national area will be effected, taking into account regional differences throughout the country, so as to obtain trustworthy results.

Reason: change in philosophy	Adopt: 50,000 tchrs, 1,500,000 students	Pers: FT PT NRT	Publ: repro- duced by offset (\$12/10 stu- dents)
Initiator(s): FUNBEC	Tchr Ed: provides guides	Adm 5 Wr 7 VSch 2 Res 2 TEd 2 Trial 2	

No references given

PROYECTO DE PERFECCIONAMIENTO EN  
SERVICIO, CIENCIAS NATURALES  
(P.P.S.-c.n.)

Alexis Labarca Carranza, Director

Centro de Perfeccionamiento  
Experimentacion e Investigaciones  
Pedagogicas  
Lo Baruechea, Santiago 10, Chile  
Tel: 489-698-34

1969-1976  
Gov: Ministry  
of Education

See ICh Report(s), 8,7

Ages: 10-13, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Sp	Lec	supplementary books
Subj: biol, chem, phys	Sem	programmed units
Approach: * process, conceptual	Disc	tchr manuals
Ability: all	Indep	tests
Eval Meth: * lab & achievement tests,	Lab	objectives
tchr jzmts	Fld	overview
Testing: unit	Dem	newsletters
Cont Resp: administratively directed	Sim	
Envir: * classroom, sch grounds	TV	
	A/V	

The Chilean curricular reform started in 1965 has been especially drastic in mathematics and natural sciences. A new course has been developed for grades 5 to 8. This course is process oriented, following the teaching philosophy pioneered by the American Association for the Advancement of Science. The emphasis is on activities designed to develop the student's basic skills in the fundamental processes.

P.P.S. is an inservice training course that combines the advantages of a correspondence course with some of the advantages of programmed instructional materials. P.P.S. includes the following characteristics: 1) it reaches any teacher involved in science teaching at grades 5 through 8; 2) teachers keep working with their students during the course; 3) teachers participating in the course are organized into local groups. These groups are directed and oriented by a supervisor specially prepared in summer courses.

Materials delivered to teachers provide: 1) self instructional materials designed to develop in the teacher the basic skills in the scientific processes; 2) analysis and commentaries on the hierarchical process and on ways to evaluate the student's progress in developing process skills; 3) self-instructional materials to insure that the teacher will be adequately prepared before initiating a given learning situation with his students; 4) teaching guides for each learning situation; 5) evaluation materials, both for the teacher and his students.

The Ministry of Education sponsored research that was conducted by professor Guillermo Brio to evaluate the P.P.S. project.

Reason: change in philosophy	Adopt: 3,000 tchrs, 240,000 students, 650 schools	Pers: FT PT NRT	Publ: 50,000
Initiator(s): A.L.		Adm 2	copies repro-
Carranza, B.Y. Nola,	Tchr Ed: provides	Wr 4 2	duced insti-
H.M. Muñoz, J.A. Jaramillo	manuals, guides & consultants	VSch 20 10	tutionally by
		Res 1 2	mimeograph &
		TEd 2 120 2	offset
		Trial 600 60	

Descriptive References:

Arancibia, Labarca, Muñoz, Yanković. Julio 1969. Proyecto de Perfeccionamiento en Servicio. Revista de Educacion. 18. Santiago, Chile.  
Muñoz, M. Sept 1970. Science Education in Other Countries. Science Education News. Washington: AAAS.

Research:

Arancibia, Labarca, Muñoz, Villarroel, Yanković. 1971. Una investigacion preliminar sobre rendimiento, desercion e irradiacion del Proyecto PPS. Resumen de Trabajos del II Encuentro de Investigacion Educacional. Santiago: CPEIP.  
Briones, G. and E. Agloui. March 20, 1974. Evaluation de un Proyecto de Perfeccionamiento (Proyecto PPS de Ciencias Naturales). Centro de Perfeccionamiento y Departamento de Sociologia de la U. de Chile. CPEIP.

BIOLOGIA: EL HOMBRE Y SU  
AMBIENTE  
Gabriel Roldán, Director  
See ICH Report(s): 8,7,6,5,4

Universidad de Antioquia  
Departamento de Biología  
Medellín - Colombia  
South America  
Tel: 330-599, ext 361

1967-1969  
University,  
Publisher

Ages: 16-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Sp	Lec ✓	texts
Subj: biol	Sem	supplementary books
Approach: inquiry, discovery	Disc ✓	tchr manuals
Ability: average	Indep	newsletters
Eval Meth: tchr jdgmts, student q're	Lab ✓	Non-Print Materials:
Testing: term	Fld ✓	lab equipment
Cont Resp: tchr guided	Dem	
Envir: lab, outdoors	Sim	
	TV	
	A/V	

The main objectives of the program were: To produce materials with a content and a philosophy that make students do biology rather than listen to biology; to encourage teachers to use the inquiry methods in the teaching process; to train teachers to use the laboratory for scientific experimentation, rather than for "cook-book" type repetition; to train teachers in conducting field trips for the purpose of introducing the scientific method and making students aware of their responsibility to their environment; to help the students understand the present biological problems.

The project was based on a translation and adaptation of the BSCS Green Version. The group that worked on this project believed that teachers understand the program best after a period of training in the philosophy and methodology of science. They put emphasis on how to teach rather than on what to teach.

The project has not been officially evaluated yet, but its great acceptance in Latin America indicates its success. In Puerto Rico and in Colombia it is the official biology text for secondary schools.

A two volume textbook and a teacher's guide have already been published. This summer the Teacher's Handbook (Manual para el Profesor de Biología) will be published during the last two years we have been publishing Actualidades Biológicas a journal devoted to the teaching of biology.

In the future we plan to produce a textbook more adapted to the tropics.

Reason: update methods, change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: conducts work-	Adm 1	institutionally
Initiator(s):	shops	Wr 1 2	& commercially
H. Gomez, F. Heredia		VSch	(\$4/volume)
		Res	
		TEd	
		Trial	6

#### Descriptive References:

BSCS Newsletter No. 47. P.O. Box 930, Boulder, Colorado.

Actualidades Biológicas. Nos. 1-6. Apartado aereo 1226, Medellin, Colombia.

UNIVERSITY OF THE WEST INDIES  
SCIENCE EDUCATION CENTRE, MONA,  
JAMAICA (MONA)

A. D. Turner, Director

See ICh Report(s): 8

Science Education Centre  
c/o Department of Physics  
University of the West Indies  
Mona, Kingston 7, Jamaica

Tel: 92-76661, ext 273

1969-1973

\*Independence  
Foundation of  
Philadelphia,  
Gov.

Ages: 12-15	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: biol, chem, phys, earth-space	Sem	tchr manuals
Approach: integrated, inquiry, discovery	Disc	field guides
Ability: average	Indep	tests
Eval Meth: achievement tests, tchr jdgmto	Lab	overview
Testing: yearly	Fld	newsletters
Cont Resp: admin directed, tchr guided	Dem	
Envir:* lab, classroom sch grounds & library	Sim	
	TV	
	A/V	

MONA is a three year course of integrated science for average pupils aged 12-15 years, which received trials between 1970-1973. The first cycle was completed in 1973; second cycle trials were carried out with grades 7 and 8. Schools were high (selective) and junior secondary, and teachers varied between experienced University graduates and recent teachers' college graduates. The content material was based on the Jamaica draft syllabus 1969. The primary objective of the project was to provide teacher guidance, a suggested teaching sequence and printed resource material. A secondary objective was to give guidance to the national curriculum committee on syllabus revision.

The MONA project worked closely with the Caribbean Regional Science Project based at UWI, Cave Hill, Barbados. Future developments depend on the utilization of the draft materials by the Jamaica Science curriculum committees. The Science Education Centre, Mona is now involved in a project for slow learners at grade 7-9. The Science Education Centre continues to provide a loan and advisory service to schools and teachers, to mount, or provide facilities for, in-service courses and produces occasional publications and a regular Newsletter.

Reason:* update method & content	Adopt:(partial)	Pers: FT PT NRT	Publ: 50 copies reproduced
	Tchr Ed: provides guides & consultants	Adm 2	
Initiator(s): W. Wright, R. Murray, J. Figueroa		Wr 2	
		VSc <sup>h</sup> 2	
		Res 2	
		TEd 2	
		Trial 20	

#### Descriptive References:

WISCIP - see entry under Caribbean Regional Science Project

MONA - Annual Reports of Science Education Project, Faculties of Education and Science, 1969-70; 1971-72; 1972-73. Science Education Centre, Dept of Physics, UWI, Mona, Kingston 7, Jamaica, West Indies.

#### Research:

Annual Report of Science Education Project. 1969-70.

Adey, Reay and Turner. March 1973. Evaluation of New Junior Secondary Science Curricula in the Caribbean Interim Report. School of Education, UWI.

Reay and Turner. Jan 1973. The Teaching of Science in Jamaica, Grades 7-9. A Report Based on Trials of Integrated Science Curricula. School of Education, UWI.

**CURRICULUM RESOURCES INFORMATION  
BANK PROJECT (CRIB)**

Reg A. Roberts, Director

Wellington Junior High School  
13120 - 127 Street  
Edmonton, Alberta, Canada  
Tel: (403) 455-8884

1968-

Edmonton Public  
School Board

See iCh Report(s): 8,7

Ages: 12, 14, tchr ed	Exper:*C1 12+ 2-12 I
Lang: Eng	Lec
Subj: biol, phys	Sem 4
Approach:* conceptual, process, inquiry	Disc 3
Ability: avg	Indep
Eval Meth:* achievement & lab tests,	Lab 1
tchr jdgmts	Fld
Testing: pre & post tests for each concept	Dem 2
Cont Resp:* tchr directed & guided,	Sim
admin directed	TV
Envir:* lab, classroom sch library	A/V 5

The Curriculum Resources Information Bank (CRIB) Project is developing a series of curriculum data banks to assist teachers with lesson preparations. The assistance is not a prescription of what a teacher should do but rather it is a number of suggestions a teacher may wish to select from in order to present a science idea or concept. A major finding of "data bank assisted" lesson preparation has been an improvement in the quality of lesson materials offered to our students.

A data bank is small enough to be kept in one drawer of a filing cabinet, yet it contains hundreds of curriculum suggestions which are recorded on 8" x 10" keysort cards. For three of the five years physical science data banks have been in junior high school classrooms across the city. Last September revised data banks were placed in thirty-eight junior high schools. Representatives from the schools together with teachers and administrators from school districts outside of Edmonton attended a workshop prior to receiving a data bank. They were shown the mechanics of retrieving information and how the materials may assist them to develop their science programs.

The objectives of CRIB are: 1) to apply information storage, retrieval and dissemination techniques to curriculum, instruction and evaluation in science teaching, 2) to determine the dynamics and evolution of a data bank operation for which a prototype can be developed for other disciplines, 3) to make information available to teachers on as many alternatives as possible in curriculum, instructional materials and methods, and evaluation in science, 4) to enable a greater diversification of curriculum in junior high school science, 5) to enhance individualization of instruction on the basis of the extensive alternatives with regards to learning modes and student abilities, 6) to promote the professional involvement of teachers in curriculum development and curriculum change.

The CRIB Project is cooperating with the Calgary Separate School Board to develop a life science data bank. Much of the life science material will be ready for teachers by September 1974. Plans have been made to develop an earth science data bank but present resources are insufficient to allow work to begin.

Reason: compile tchr prepared materials into easily accessible resource resources	Adopt: 50 tchrs, 1500 students, 10 sch	Pers: FT PT NRT Adm .5 Wr .1 V Sch Res TEd Trial	Publ: 50 copies reproduced by mimeograph
Initiator(s): M.A. Nay, G. Gaye, R. Davidson, W. Phare, D. Armstrong, R. Melnychok, D. Thomas, R. Roberts	Tchr Ed:* conducts workshops; provides guidebooks & consultants		

**Descriptive References:**

Roberts, R.A. April 1973. The Curriculum Resources Information Bank Project.

Learning Resources. Chesswood House Pub. Ltd: Toronto, Ontario.

Nay, M.A. April 1972. The Development of Resources Information Bank for Science. School Science and Mathematics.

EDMONTON JUNIOR HIGH SCHOOL  
PROCESS-APPROACH PROJECT

Marshall A. Nay, Director

See ICh Report(s): none

Department of Secondary Education  
University of Alberta  
Edmonton, Alberta  
Canada T6G 2G5

Tel: (403) 432-4371

1965 -

University &  
Alberta Advi-  
sory Committee  
on Ed. Studies

Ages: 13-15, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec ✓	activity sheets
Subj: biol, chem, phys, earth-space	Sem ✓	tchr manuals
Approach:* process, inquiry, discovery,	Disc ✓	programmed units
conceptual, discipline centered,	Indep ✓	field guides
integrated	Lab ✓	tests
Ability: average	Fld ✓	objectives
Eval Meth:* achievement & lab tests,	Dem ✓	
tchr jdgmt	Sim	
Testing: unit, individual	TV	
Cont Resp: tchr & materials directed	A/V ✓	
Envir:* lab, classroom, sch library & grounds, community		

The main purpose of this project was to initiate change in the mode of science teaching at the junior high school level so that students could gain a better understanding of and skill in "the process of science." Towards this end a process-approach model was developed which is an amalgam of several features of Science - A Process Approach, Schwab's theory on the structure of the disciplines, our perception of the nature of scientific inquiry, and the realities and traditions of science teaching. Using this model the development of a three-year sequence of junior high science courses was launched, covering life science, earth-space science and physical science. These courses are based on behavioral objectives in both the content and process dimensions, and emphasize learning experiences and evaluation procedures which are geared to the achievement of these objectives.

Substantial progress has been made in developing the three courses, but none have been completed. However, the materials that have been produced have been used widely by teachers in the Edmonton area. Materials are being revised continually and new ones are being developed.

The overall impact of the project has not been determined. However, two research studies have been made by graduate students of the implementation of our process-approach curricula and their efficacy in developing the process skills of students. One was a comparative study (see references) in which there were no significant findings in favor of our approach. We conjectured that the teachers' comprehension of and skill in using our materials was at least partly accountable for this result. In a follow-up study it was found that the claims made by most teachers in regard to teaching the processes of science were at variance with their classroom practice as observed by external evaluators.

Reason:* change in philosophy, update method	Adopt:(partial) 200 tchrs, 5,000 students, 50 sch	Pers: FT PT NRT	Publ: 300 copies
		Adm 2	reproduced
		Wr 15	institutionally
Initiator(s): M.A. Nay, R. Melnychuk	Tchr Ed:* provides man- uals & consultants, con- ducts workshops	VSch 5	by mimeograph
		Res 3	
		TEd 5	
		Trial 10	

Descriptive References:

Nay, M.A., and Associates. 1971. A Process Approach to Teaching Science. Science Education. 55(2): 197-207.

Research:

Mokosch, E. 1969. The Development and Evolution of a Process Approach to the Teaching of Junior High Science. Doctoral Dissertation, University of Alberta, Edmonton.  
Powley, D. 1971. Teaching for Process in Scientific Inquiry. M.Ed. Dissertation, University of Alberta, Edmonton.



**PATTERNS OF ENQUIRY PROJECT  
(POEP)**

Menahem Finegold, Director

See ICh Report(s): none

Department of Curriculum  
Ontario Institute for Studies in  
Education  
252 Bloor Street West  
Toronto, Ontario M5S 1V6, Canada  
Tel: (416) 923-664, ext 640

1969-  
University

Ages: 14-19, tchr ed	Exper:* Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: biol, chem, phys, general science	Sem	tchr manuals
Approach: interdisciplinary, conceptual, inquiry	Disc 2 1	tests
Ability: avg, avg+	Indep	overview
Eval Meth: achievement tests, tchr jdgmts	Lab	Non-Print Materials:
Testing: -	Fld	slides
Cont Resp: tchr directed	Dem	films
Envir: classroom	Sim	videotape
	TV	
	A/V	

The Patterns of Enquiry Project is involved in the development of secondary school science teaching materials and has developed four teaching units which are meant to be introduced into existing science programs for periods of 4-6 weeks. Units have been developed in optics, honey bee behavior, plant nutrition, and hominid evolution. The major goal of the unit is for the student to understand the character of scientific enquiry. This goal is attained in a unique manner by having students analyze actual scientific research reports. A significant feature of the materials is the provision made for the student to understand the status of competing knowledge claims in research.

The teaching methodology appropriate to these materials is intended to actively engage students in substantive analysis. The teacher assumes the role of leader in a group discussion of an original research report. He asks questions which concern the researcher's problem, assumptions, interpretations, facts considered as evidence, often unarticulated conceptions which guide research, and outcomes. The student responds to these questions by providing arguments with supporting evidence from the research paper itself. The student is made to realize that in providing evidential arguments for claims made he mirrors an important aspect of scientific enquiry. One of the primary roles of the teacher is that of an evaluator of student arguments.

The units are in the trial stage and have been field-tested successfully with approximately 40 teachers and 2000 students. Observation has shown that the quality of experience generated through the use of the materials, while dependent on the teacher's skill in discussion, can foster the development of the skills of in-depth recovery of meaning in research reports, and this has recently been borne out in a case-study analysis of enquiry discussion. Two of the units are to be published during 1974-75, and the remaining two in the following year.

Reason: change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: 500 copies
Initiator(s): F.M. Connelly	Tchr Ed: conducts workshops; provides manuals, guides, films, consultants	Adm 1 Wr 2 VSch 2 Res 1 TEd Trial 40	reproduced institutionally by mimeograph

**Descriptive References:**

Orbit 11. 1972. pp 3-7.

The Crucible. 4(6), March 1973; 4(7), May 1973; 4(8), June 1973; 5(1), Sept 1973; 5(6), April 1974.

Patterns of Enquiry and Conceptual Knowledge Structures in the Curriculum. 1973. An informal publication of the Department of Curriculum. Toronto: The Ontario Institute for Studies in Education.

**Research:**

Connelly, F.M. 1968. Conceptual Structures in Ecology with Special Reference to the Enquiry Curriculum in Ecology. Unpublished Ph.D. Dissertation, University of Chicago.

Finegold, M. 1974. The Character of Classroom Discussion of Original Research Reports as a Mode of Instruction in Physics. Unpublished Doctoral Dissertation, University of Toronto.

Clipsham. Organizing an Enquiry Curriculum for the Study of Issues at the Science-Society Interface. Doctoral Dissertation in progress, University of Toronto.



**TURN ON SCIENCE PROGRAM FOR  
NATIVE INDIAN STUDENTS WITH A  
FOCUS ON VALUES (TOSP)**

**R.M. Kalra, Director**

**20895 Camwood Avenue  
Maple Ridge  
British Columbia, Canada**

**Tel: (604) 467-2701**

**1970-1974**

**Univ (Ed Res  
Inst of B.C.)**

**See ICh Report(s): none**

		Exper: Cl 12+ 2-12 I	Printed Materials:
Ages: 12-16		Lec ✓ ✓	texts
Lang: Eng		Sem ✓	tchr manuals
Subj: biol, chem, phys		Disc ✓	overview
Approach: interdisciplinary, integrated, process, inquiry, discovery		Indep	
Ability: avg+, slow		Lab ✓	
Eval Meth: lab, oral and standardized		Fld ✓	
tests, tchr jdgmt, student questionnaire		Dem ✓	
Testing: weekly, unit, individual		Sim ✓	
Cont Resp: tchr guided, student & material directed		TV A/V	

**Envir: community, classroom, sch library**

The course outline for TOSP includes such topics as: an introduction to Our Scientific World including contributions of native Indian people to science; Man's Interference with Nature with reference to water and air pollution, psychic drugs and alcohol; Plant Nutrition; Native Indian Scientific Knowledge; Medical Technology; and Space Exploration. The students also participate in a science fair, special programs, and special projects.

The evaluation procedure suggested involves a "no failure" concept.

		Pers: FT PT NRT			Publ: 600 copies reproduced commercially by offset
Reason: change in philosophy, develop new course, publication	Adopt: - Tchr Ed: conducts work- shops; provides manuals, guide books and con- sultants	Adm	2	3	
		Wr	2	3	
		VSch	3	4	
		Rcs	3	2	
		TEd	25	5	

**Descriptive References:**

Kalra, R.M. Innovations in Teaching. (booklet) Published by Canadian Teacher's Federation, Ottawa.

Kalra, R.M. Science Education for Native Indian Students (Project). Educational Research Institute of British Columbia, Vancouver.

Kalra, R.M. Science Education for North America's Most Original Stepchildren. Star Award Publication, NSTA, Washington, D.C.

TURN ON CHEMISTRY PROGRAM FOR  
NON-SCIENCE MAJOR STUDENTS (TOCP)

R.M. Kalra, Director

20895 Camwood Avenue  
Maple Ridge  
British Columbia, Canada

Tel: (604) 467-2701

1973-1974

Xerox Corp,  
Dept of Ed of  
Victoria

See ICh Report(s): none

	Exper: C1	12+	2-12	I	Printed Materials:
Ages: 16-17	Lec	✓			lab books
Lang: Eng	Sem		✓		activity sheets
Subj: chem	Disc		✓		overview
Approach: discipline-centered	Indep		✓		
Ability: avg, avg+, slow learner	Lab		✓		
Eval Meth: achievement, lab, & standardized tests, tchr jdgmts, student q're	Fld		✓		
Testing: unit, individual	Dem		✓		
Cont Resp: tchr & student directed	Sim				
Envir: community, lab	TV				
	A/V				

The overall project purpose is to provide a terminal chemistry course for non-science majors and low achievers by illustrating the role chemistry plays in their everyday life and its application to the local community and to industry. The curriculum is organized into units each of which is related to some significant aspect of the environment. Each unit is essentially a major problem of everyday life to which chemistry may contribute an intelligent basis for human adjustment. Each unit includes only a few principles or generalizations of chemistry.

The organization, in part at least, is in the form of problems or projects to insure education in problem solving, which is the nature of chemistry. The distribution of time and emphasis to the various units is determined by the total functional social value of the unit, its "teachability" and "learnability", the teachers' and pupils' interest in the unit, the local significance of the unit, and its value to other units of the course. The laboratory work is included as an integral part of the problem solving and, therefore, has the characteristics of experience and de-emphasizes illustrative or conformatory work.

The units cover: our Chemical World; (the chemist's work, the world around us, contributions of scientists); Fundamentals of Chemistry (symbol and valence, atomic structure, mole concept, acids, bases, salt); Environmental Chemistry (air and water pollution and purification); Chemistry in Home and In Farming; Psychic Drugs; Chemistry and Medical Technology; Space Explorations; and Chemistry is Fun (Christmas and Easter demonstrations, a chemical fair, etc.). Each unit first describes content, references, and objectives. The text of the units appear under four column headings: 1) Content (e.g.: use of bleach); 2) Equipment (e.g.: beaker, bleach); 3) Activities (e.g.: students purify the water by adding bleach to it); and 4) Evaluation (e.g.: students write a report on water purification methods used in their community).

Reason: change in philosophy	Adopt: 1 tchr, 30 students, 1 school	Pers: FT PT NRT	Publ: -
Initiator(s): -	Tchr Ed: provides manuals & consultants	Adm	
		Wr	
		VSch	not
		Res	answered
		TEd	
		Trial	

Descriptive References:

- Kalra, R.M. Chemistry Teaching in a Developing Country. Journal of Canadian Chemical Education, Ottawa.
- Kalra, R.M. Curriculum Development in Chemistry in British Columbia. Journal of Canadian Chemical Education, Ottawa.

AAAS SCIENCE SUPPLEMENT  
ENVIRONMENTAL EDUCATION  
ENRICHMENT ACTIVITIES

Environmental Education  
Austin Independent School District  
Austin, Texas 78752

1971 -  
Participating  
Schools

Contact: M.T. McLean

See ICh Report(s): none

Ages: 6-11	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary
Subj: biol, chem, phys, technology, social sciences	Sem	activities
Approach: interdisciplinary	Disc	
Ability: all	Indep	
Eval Meth: lab tests	Lab	
Testing: individual	Fld ✓	
Cont Resp: administratively directed	Dem	
Envir: community, school grounds	Sim	
	TV	
	A/V	

The general objectives of the suggested activities are: to create awareness of the natural materials and processes occurring in the school neighborhood; to promote observation of the interactions and changes occurring in the neighborhood environment; to promote consideration for the time involved in natural processes and cycles; to promote appreciation for the dependence of people on natural resources and processes.

Reason: update content	Adopt: -	Pers: FT PT NRT	Publ: 500 copies
Initiator(s): M.T. McLean	Tchr Ed: provides guides	Adm	reproduced in-
		Wr 2	stitutionally
		VSch	by mimeograph
		Res	
		TEd	
		Trial	

No references given.

**ACTIVITIES IN SCIENCE (AIS)**
**Alfred Casler, Director**
**See ICh Reports: 8,7**
**Ages: -**
**Lang: Eng**
**Subj: biol, chem, phys, earth-space, health**
**Approach: \* discovery, discipline centered**
**Ability: special: EMR**
**Eval Meth: tchr jdgmts**
**Testing: individual**
**Cont Resp: \* administration, tchr directed**
**Envir: \* classroom, sch grounds, community**
**Los Angeles City Unified**
**School District, Box 3307**
**Los Angeles, California 90054**
**Tel: (213) 687-4629**
**Exper: C1 12+ 2-12 I**
**Lec**
**'em**
**Disc ✓**
**Indep ✓**
**Lab**
**Fld ✓**
**Dem ✓**
**Sim**
**TV**
**A/V**
**1967 -**
**State Gov,  
Participating  
Schools**
**Printed Materials:**
**text booklets**
**activity sheets**
**tchr manuals**
**Non-Print Materials:**
**tapes**
**lab equipment**

**Objectives:** Provide EMR pupils with the opportunities to learn basic science concepts relevant to their lives, including health, safety, and human physical development; Provide EMR pupils with opportunities to understand and adjust to the physical environment; Provide teachers with the necessary background and specially designed materials needed to implement this program with EMR pupils.

**Unique Characteristics:** Series of science activity kits available to teachers on loan, delivered to teachers on request and picked up later; Kits all self-contained and designed to be used in a non-science classroom; Each kit includes individual copies of consumable lesson booklet for each pupil; Complete series of kits for elementary, junior high, and senior high.

**Major Principles of Learning:** Pupil involvement, activity, relevant topics.

**Evaluation:** Internal evaluation only; Evaluation forms sent with each kit and returned by teachers, these include critiques and suggestions for revisions as well as accounts of how well the kits worked.

**Impact:** Almost no lab activity-centered science done in EMR classes prior to this program. With the program, almost every classroom has science activities at least periodically.

**Plans for the Future:** Expansion of all levels of the program with constant writing of new kits; Development of field trips to augment program, agriculture and gardening opportunities at regional science centers.

Reason: update method, change in philosophy, develop new course	Adopt: 356 tchrs, 5200 students, 213 schools	Pers: FT PT NRT	Publ: 2000
Initiator(s): A. Casler, D. McLaren	Tchr Ed: conducts work- shops; provides manuals & consultants	Adm 3 Wr 1 VSch 1 Res 1 TEd 1 Trial 15	copies repro- duced institu- tionally by mimeograph & offset (\$40/ 10 students)

**Descriptive References:**
**California Science Teacher's Association Journal. Feb 1974.**
**Learning Magazine. Oct 1974.**

**ADAPTING SCIENCE MATERIALS  
FOR THE BLIND (ASMB)**

Herbert D. Thier, Director

Lawrence Hall of Science  
University of California  
Berkeley, California 94720

Tel: (415) 642-4541

1969-1973

Gov. American  
University

See ICh Report(s): 8

Ages: 4-14; tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng: (Braille, large print)	Lec	lab books
Subj: biol, chem, phys, earth-space	Sem	tchr manuals
Approach: process, conceptual, inquiry, discovery	Disc ✓	overview
Ability: all	Indep	newsletters, charts
Eval Meth: tchr jdgmt, student q're	Lab	Non-Print Materials:
Testing: individual	Fld	slides, films,
Cont Resp: tchr guided, material directed	Dem	games, models, lab equipment
	Sim	
	TV	
Envir: classroom, visual center	A/V	

The ASMB Project has taken the ungraded, materials-centered life and physical science programs of the Science Curriculum Improvement Study (SCIS) and adapted them for children with visual impairment.

The teaching strategy is for these children to explore selected and adapted science materials. They are encouraged to investigate, to discuss what they observe, and to ask questions. The teacher has two functions: to be an observer who listens to the children and notices how well they are progressing in their investigations, and to be a guide who leads the children to see the relationship of their findings to the key concepts of science. The teacher must carefully review the suggestions accompanying each page of the regular teacher's guide and continually evaluate the page of the regular teacher's guide and continually evaluate the situation for the particular visually impaired child or children who are involved.

The adaptation allows the visually impaired child to participate along with his sighted classmates in a laboratory setting. ASMB adaptations for each unit include a modified SCIS Teacher's Guide, student manuals in large print or braille, and special equipment for classroom investigations. The equipment is durable and easily manipulated and is, therefore, suitable for children with other physical handicaps. Equipment may be purchased in kits or as individual items.

Because individual situations have varying requirements, the ASMB staff will help implement the program. In addition, teachers and teacher trainers can become acquainted with the approach and use of the materials through workshops and visits to the Lawrence Hall of Science.

Reason: change in philosophy, integration of visually impaired with sighted peers	Adopt:(partial) 24 tchrs, 120 students, 12 schools	Pers: FT PT NRT	Publ: 100 copies reproduced institutionally by offset (\$200/yr/10 students)
Initiator(s): H.D. Thier, R. Knott, M. Montgomery, M. Linn, K.E. Cooper	Tchr Ed: conducts workshops; provides manuals, guidebooks, films, & consultants	Adm 1 Wr 3 VSch 3 Res 2 TEd 2 Trial 10	

**Descriptive References:**

Cooper, K.E., and H.D. Thier. April 1974. Do You Have to See it to Believe It? Learning. 54-55.

Laboratory Science for Visually Handicapped Elementary School Children. June 1971. New Outlook for the Blind. 190-194.

Thier, H.D., and D. Hadary. Dec 1973. We Can Do It Too. Science and Children. 7-9. Research:

Linn, M.C. 1972. An Experiential Science Curriculum for the Visually Impaired. Exceptional Children. 39: 37-43.

Linn, M.C., and R. Peterson. 1973. The Effect of Direct Experience with Objects on Young Children. Journal of Research in Science Teaching. 10: 83-90.

Struve, N.L., D. Hadary, H.D. Thier, and M.C. Linn. 1974. The Effect of an Experiential Science Curriculum...on Manipulation Skills. Exceptional Children. 40: 516-517.

ADVANCED GENERAL MATHEMATICS AND  
APPLIED BUSINESS INDUSTRIAL  
MATHEMATICS (AGM-III & ABI Math IV)

Mathematics Consultant  
801 Rutledge Building  
Columbia, South Carolina

1967-1969

Gov

Contact: William B. Hynds

Tel: (803) 758-2652

See ICh Report(s): 8,6

Ages: 16-17	Exper: C1 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec	tchr manuals
Subj: math	Sem	activity sheets
Approach: discipline-centered, discovery	Disc ✓	overview
Ability: average	Indep	
Eval Meth:* tchr jdgmts, achievement tests	Lab ✓	Non-Print Materials:
Testing: term	Fld	overhead
Cont Resp: tchr guided	Dem	transparencies
Envir:* classroom, community	Sim	lab equipment
	TV	
	A/V	

Advanced General Mathematics III, once an experimental Title III course in Richland School District 1, has been approved as a credit course by the State Board of Education. Content areas include Slide Rule, Ratio and Percentage, Informal Geometry, Introductory Trigonometry, and Probability Patterns--with extensive application.

Not a traditional General Mathematics course, Advanced General Mathematics III consists of 136 lesson outlines for the teacher and worksheets for students. The course relies heavily on discovery learning, student participation, and visual aids.

A-B-I Mathematics IV, intended for high school seniors, was developed in Richland School District 1 as a sequel to Advanced General Mathematics III. It is currently offered in ten South Carolina high schools and has been approved as a credit course by the State Board of Education.

Flow charts and calculators are used extensively as students complete vocationally-oriented instructional units. There are twelve such units including such topics as Steel Fabrication, Home Planning and Construction, Soil Conservation and Forestry, Tool and Die, and Textiles. Students are not expected to complete all twelve units; they can choose the units of greatest interest to them. All units include the application of ratios, geometry, and trigonometry. A teacher's guide offers suggestions for introducing each unit. Students then work individually or in small groups to complete the unit--the teacher acting as a resource person to help students over trouble spots.

Reason: develop new course	Adopt: 78 tchrs, 3,200 students, 78 schools	Pers: FT PT NRT Adm 2 1 Wr 14 VSch Res TEd 4 Trial 5	Publ: repro- duced commer- cially by offset (\$30/10 students)
Initiator(s): -	Tchr Ed:* conducts work- shops; provides consultants		

Descriptive References:

Hynds, W.B. Spring 1970. Meaningful Math for High School. South Carolina Schools. 14-15.

**AMERICAN POLITICAL  
BEHAVIOR (APB)**

Howard Mehlinger, Director

See ICh Report(s): none

Social Studies Development  
Center  
1129 Atwater  
Indiana University  
Bloomington, Indiana 47401  
Tel: (812) 337-3838

1966-1971

Gov:USOE, Ginn  
& Company Pub-  
lisher

Ages: 14-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: social sciences	Sem	activity sheets
Approach: discipline-centered, inter- disciplinary, conceptual, inquiry, discovery	Disc ✓	tchr manuals
Ability: all	Indep	tests, objectives
Eval Meth: achievement tests	Lab ✓	overview, charts
Testing: term, unit	Fld	Non-Print Materials:
Cont Resp: program specified	Dem ✓	films, overhead
Envir: classroom	Sim ✓	transparencies
	TV	games
	A/V ✓	
	Games ✓	

American Political Behavior is a high school civics program developed by Howard Mehlinger and John Patrick at the Social Studies Development Center, Indiana University. The program was supported by a grant from the U.S. Office of Education. The program is available to the schools through Ginn and Company.

The program was begun as an effort to create an alternative to legal-institutional approaches to high school civics and American government courses. APB features a "behavioral approach" to the study of politics. Through the program students acquire knowledge of the broad range of factors that affect the political behavior of ordinary citizens and public officials. Students also acquire knowledge of and skill in applying the inquiry skills that best represent a social science approach to the study of politics.

Reason: update content & method, change in philosophy, develop new course & publica- tion	Adopt: -	Pers: FT PT NRT	Publ: 400,000
	Tchr Ed: conducts work- shops; provides manuals and consultant services	Adm 2	copies publish- ed commercially
		Wr 2	by linotype
		VSch 2	(\$60/10 stu- dents)
		Res 1	
Initiator(s): S. Engle		TEd 2	
		Trial 80	

**Descriptive References:**

The Use of 'Formative' Evaluation in an Experimental Curriculum Project: A Case in the Practice of Instructional Materials Evaluation. 1971. Social Education. 35.

The Impact of an Experimental Course, American Political Behavior, on the Knowledge, Skills, and Attitudes of Secondary School Students. 1972. Social Education. 36.

**Research:**

Report to the U.S. Department of Health, Education, and Welfare, Office of Education, entitled, Report of the High School Curriculum Center in Government.



**AMERICAN POLITICAL  
BEHAVIOR (APB)**

Howard Mehlinger, Director

See ICh Report(s): none

**Social Studies Development  
Center**  
1129 Atwater  
Indiana University  
Bloomington, Indiana 47401  
Tel: (812) 337-3838

1966-1971

Gov:USOE, Ginn  
& Company Pub-  
lisher

Ages: 14-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: social sciences	Sem	activity sheets
Approach: discipline-centered, inter- disciplinary, conceptual, inquiry, discovery	Disc ✓	tchr manuals
Ability: all	Indep	tests, objectives
Eval Meth: achievement tests	Lab ✓	overview, charts
Testing: term, unit	Fld	Non-Print Materials:
Cont Resp: program specified	Dem ✓	films, overhead
Envir: classroom	Sim ✓	transparencies
	TV	games
	A/V ✓	
	Games ✓	

American Political Behavior is a high school civics program developed by Howard Mehlinger and John Patrick at the Social Studies Development Center, Indiana University. The program was supported by a grant from the U.S. Office of Education. The program is available to the schools through Ginn and Company.

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Reason: update content & method, change in philosophy, develop new course & publica- tion	Adopt: -	Pers: FT PT NRT	Publ: 400,000
	Tchr Ed: conducts work- shops; provides manuals and consultant services	Adm 2	copies publish- ed commercially
		Wr 2	by linotype
		VSch 2	(\$60/10 stu- dents)
		Res 1	
		TEd 2	
Initiator(s): S. Engle		Trial 80	

**Descriptive References:**

The Use of 'Formative' Evaluation in an Experimental Curriculum Project: A Case in the Practice of Instructional Materials Evaluation. 1971. Social Education. 35.

The Impact of an Experimental Course, American Political Behavior, on the Knowledge, Skills, and Attitudes of Secondary School Students. 1972. Social Education. 36.

**Research:**

Report to the U.S. Department of Health, Education, and Welfare, Office of Education, entitled, Report of the High School Curriculum Center in Government.

# ANTHROPOLOGY CURRICULUM PROJECT

M.J. Rice, Director

See ICh Report(s): 8,7

University of Georgia

107 Dudley Hall

Athens, Georgia 30602

Tel: (404) 542-7265

1964 -

Gov:Fed(OE)

University

Ages: 5-17	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	texts
Subj: anthropology	Sem	supplementary books
Approach: * discipline centered, conceptual	Disc ✓	programmed units
Ability: all	Indep ✓	activity sheets
Eval Meth: achievement tests, student questionnaire	Lab	tchr manuals
Testing: unit, individual	Fld	tests, overview
Cont Resp: administratively directed	Dem	Non-Print Materials:
Envir: * classroom, school library, community	Sim	films
	TV	audiotape
	A/V	

The Anthropology Curriculum Project was funded by the United States Office of Education in 1964, as part of Project Social Studies. Federal funding terminated in 1968, but curriculum development and research have continued with support from the College of Education.

The original goal of the Project was a sequential curriculum in Anthropology for grades 1-7. Specific objectives have included 1) development of systematic instructional materials in anthropology for the elementary grades; 2) provision of a conceptual scheme for cross cultural studies; and 3) development of a curriculum which enables the student to reach a more complete understanding of his own culture through the study of other cultures. The uniqueness of the Project, then, stems from its subject matter and its stress on the teaching of anthropology in the elementary grades. In recent years the Anthropology Curriculum Project has broadened its objectives to include the development of materials for the upper middle and high school grades.

The Project units are based on various learning theories. They are tested and evaluated by graduate students in the Department of Social Science Education as part of the doctoral dissertation.

Plans for the future include development of materials on cultural change in Mexico and the United States, using a socio-historical approach.

Reason: develop new course	Adopt:(partial)	Pers: FT PT NRT	Publ: reproduced
	1000 tchrs, 27,000 students, 360 schools	Adm 3	institutionally
Initiator(s): M.J. Rice		Wr 3	by offset &
W.C. Bailey	Tchr Ed: provides manuals, guides, & consultants	VSch 3	mimeograph
		Res 3	
		TEd	
		Trial	

## Descriptive References:

Bailey, W.C. 1968. Anthropology in the Elementary School. Scholastic Teacher.

Rice, M.J. 1970. Pilot Project: Anthropology Curriculum Project. Grade Teacher. 166-170.

Rice, M.J., and W.C. Bailey. 1965. A Sequential Curriculum in Anthropology for Grades 1-7. Social Education.

## Research:

Frech, W.P., Jr. 1973. The Effects of the Anthropology Curriculum Project Material, The Concept of Culture, On the Ethnocentric Attitudes of Specific Fourth Grade Children. Unpublished Doctoral Dissertation, University of Georgia.

Rice, M.J., and W.C. Bailey, Sept 1972. The Development of a Sequential Curriculum in Anthropology, Grades 1-7. Final Report: Dept. of Health, Education and Welfare Project No. 2-D-031, Grant No. OEG-4-72-0017.

Rice, M.J., B.R. Barnes, and E.U. Clawson. Sept 1972. The Effect of the Position of Organizers on the Learning of Structured Anthropology Materials in Grades Three and Six. Final Report: Dept. of Health, Education and Welfare, Project No. 2-10-031, Grant No. OEG-4-72-0017.

**THE ARITHMETIC PROJECT  
COURSE FOR TEACHERS**

David A Page, Jack Churchill,  
Directors

Education Development Center  
55 Chapel Street  
Newton, Massachusetts 02160  
Tel: (617) 969-7100

1958-1973

University of  
Illinois, NSF,  
Ford, EDC,  
Carnegie

See ICh Report(s): 8,7,6,5,4,3

Ages: tchr ed (grades 1-8)

Lang: Eng

Subj: math

Approach: discipline centered, process,  
conceptual, inquiry, discovery

Ability: all

Eval Meth: teacher jdgmt

Testing: none

Cont Resp: \* tchr directed & guided

Envir: classroom

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

	✓	✓	✓	
	✓	✓	✓	✓
			✓	✓
	✓	✓	✓	

Printed Materials:

overview

newsletters

text booklets

supplementary book-  
lets

Non-Print Materials:

films

The Arithmetic Project has prepared a self-contained course based on films and written materials for teachers of grades 1 through 8. It is designed for use as a 10- or 20-session program for groups of 20 or more participants and can be conducted entirely by local school or university personnel.

The central theme of the project is that the study of mathematics should be an adventure, requiring and deserving hard work. Children who grasp some of the inherent fascination of real mathematics while they are in elementary school are well on the way to success in further study of mathematics and science. Students who are not to continue a formal study of mathematics deserve a taste of the subject that is at least as appealing. Toward this aim, the course presents significant mathematical ideas which are interesting to both teachers and students and which can easily be adapted to many grade levels and to a variety of teaching and learning styles.

Course participants watch films of classes of children, solve sequences of problems, discuss their own and alternative strategies for finding answers, and become attuned to sources of wrong answers and ways to handle them. Early in the course, participants are urged to develop problem sequences and lesson plans and to try out the ideas they are learning with their own classes.

The program has been used effectively with both teachers and those preparing to be teachers. As of Spring 1974, over 100 school systems and colleges have offered the course; in some locations the program has been given several years in succession. Until a commercial publisher is selected, the Project's course will continue to be distributed by Education Development Center (EDC) in Newton, Massachusetts.

Reason: develop new  
course

Adopt: 3,000 tchrs,  
100 schools

Pers: FT PT NRT

Publ: 5,000

Initiator(s): D.A. Page,  
J. Churchill

Tchr Ed: provides manuals,  
guidebooks, films, &  
consultants

Adm 4

Wr 13 5

VSch 13

Res

TEd 13

Trial 10

copies repro-  
duced institu-  
tionally by  
offset

**Descriptive References:**

Jorgensen, P.S. March 1970. Film Series for Use in the University of Illinois Arithmetic Project Institute for Elementary School Teachers. American Mathematical Monthly. 322-323.

Rising, G.R. Nov 1973. Reviewing and Viewing. The Arithmetic Teacher. 606-607.  
University of Illinois Arithmetic Project Institute for Elementary Teachers. Source-book of Elementary Curricula, Programs, and Projects. Far West Laboratory for Educational Research and Development. 282-284.

**AUDIO-TUTORIAL BIOLOGY IN  
THE SECONDARY SCHOOL**

Kenneth H. Bush, Director

West Lafayette High School  
Leslie Avenue & Grant Streets  
West Lafayette, Indiana 47906

1969-1972

Private

See ICh Report(s): 8

Tel: (317) 743-9502, ext 32

Ages: 13 & 14	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lcc	✓ supplementary books,
Subj: biol	Sem	✓ activity sheets,
Approach: discipline-centered, process	Disc	✓ teacher manuals,
Ability: all	Indep	✓ tests, objectives,
Eval Meth: achievement & oral tests,	Lab	✓ scripts, study guide
tchr jdgmt, student questionnaire	Fld	✓
Testing: term, unit, individual	Dem	✓ Non-Print Materials:
Cont Resp: tchr & student directed,	Sim	✓ slides
tchr guided	TV	
Envir: community, classroom, lab	A/V	✓

Systems Approach to Biology (SAB) is a unique Audio-Tutorial (A-T) program of introductory biology which employs the concept of learning for mastery. In SAB, current ideas, concepts and principles of biology have been packaged in modular units to allow the instructor flexibility in scheduling and students the opportunity of self-pacing. Students are directed by an easy-to-follow flow chart through a variety of learning activities which help them to proceed individually toward accomplishment of the stated objectives for each module. There are over 300 performance objectives in the program and instructors may conveniently add objectives to any module in order to tailor the program to their own students. The availability of tape script guides, materials lists, and suggested carrel and demonstration setups simplifies implementation of the program.

A unique feature of the SAB materials is their potential to be used with any general biology textbook. The topics are treated in such a manner as to allow the instructor to determine the degree of sophistication. Minimum direction is given to students on inquiry activities. Students are encouraged to alter, or amplify laboratory experiments or even devise new inquiries.

The program includes a series of optional value discussions on provocative topics. These topics are timely, relevant, and serve to fuse the cognitive materials of the program with the affective thinking of the student. A new concept is the use of students to teach other students, which is an extremely valuable plus factor where teaching assistants are not available. This feature is of particular advantage to the single teacher situation where team teaching is not practiced.

Further information may be obtained from: Diversified Educational Enterprises, 1201 Western Drive, West Lafayette, Indiana 47906, Phone (317) 463-6077.

Reason: update content & method, change in philosophy & publication	Adopt: 28 tchrs, 3000 students, 14 schools	Pers: FT PT NRT	Publ: - copies
Initiator(s): K.H. Bush, C.L. Smiley, R.N. Hurst, D.L. McGaw	Tchr Ed: provides manuals, & consultants	Adm 4 Wr 4 VSch Res 4 TEd Trial	produced commercially (\$160/10 students)

**Descriptive References:**

Smiley, C.L., K.H. Bush, and D.L. McGaw. Feb 1972. An A-T Program in High School Biology. The American Biology Teacher. 34(2).

Smiley, C.L., K.H. Bush, and D.L. McGaw. March 1973. Student Involvement in the Systems Approach to Biology. The American Biology Teacher. 35(3).

Trizenberg, H., ed. 1972. Individualized Science - Like It Is. Washington, D.C., National Science Teachers Association.

**Research:**

Bush, K.H. 1974. The Effect of Three Testing Procedures on Achievement and Attitudes of First Year Biology Students. Unpublished Doctoral Dissertation, Purdue University.

Smiley, C.L. 1973. A Comparative Study of Compulsory versus Non-Compulsory Attendance in Secondary Biology Using "Systems Approach to Biology" Program as the Method of Teaching. Unpublished Doctoral Dissertation, Purdue University.

**BILINGUAL CONTINUOUS PROGRESS  
MATHEMATICS (BCPM)**

Contact: James Perry

See ICh Report(s): none

Southwest Educational  
Development Laboratory  
211 E 7th Street  
Austin, Texas 78701

Tel: (512) 476-6861

1971-1973

Gov: State

Ages: * 6 & 7	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp	Lec	text booklets,
Subj: math	Sem	tchr manuals,
Approach: * conceptual, process	Disc	tests, overview,
Ability: all	Indep not	objectives
Eval Meth: achievement & standardized	Lab answered	Non-Print Materials:
tests	Fld	filmstrips
Testing: individual	Dem	audiotapes
Cont Resp: * tchr and material directed	Sim	games
Envir: classroom	TV	
	A/V	

BCPM is a complete first year of basic mathematics instruction for children at the developmental level usually associated with six-year-olds.

The program: 1) offers a choice between two languages of instruction--Spanish and English; 2) does not depend on the pupil's reading ability; 3) allows each child full participation in mathematics instruction at his own level and pace from the time he enters first grade; 4) presents all instruction as well as all tests in an aural-visual mode; 5) includes a Readiness Area to prepare the child to work with the program; and 6) introduces mathematical ideas through games.

Because the key to effective implementation of the program is a thorough familiarity with the materials involved, a self-training manual is provided to assist teachers with a plan of organization and management of the BCPM program. The manual is comprehensive, illustrated, and self-contained. It includes suggestions for classroom management, differentiated staffing (including the use of peer tutors), a plan for organization, instructions for setting up a math center, instructions for constructing and playing of games, and an assignment chart--a complete sequential listing of minimal assignments for each lesson. Answer keys are also provided.

The program has been through three testing cycles since the materials were initially used in first grade classrooms in the summer of 1971. In each cycle, detailed formative information on each activity was collected and these data were used to revise and strengthen the program. The result of this effort is an individualized mathematics curriculum of proven effectiveness.

Teachers and aides who used BCPM materials with their pupils reported very positive perceptions of the staff orientation activities, the amount of pupil learning observed, the instructional objectives of the program, and the pupil measures incorporated into the curriculum. All respondents indicated that they would like to continue using the BCPM program the following year.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: repro-
Initiator(s): W. Stenning, S. Lujan, B. Mejia	Tchr Ed: conducts work-shops, provides manuals and consultants	Adm	duced commer-
		Wr 3 2	cially
		VSch 2 2	(\$160/10
		Res 3 1 2	students)
		TEd 2	
		Trial 11	

No references given

**BILINGUAL CONTINUOUS PROGRESS  
MATHEMATICS (BCPM)**

Contact: James Perry

See ICh Report(s): none

Southwest Educational  
Development Laboratory  
211 E 7th Street  
Austin, Texas 78701

Tel: (512) 476-6861

1971-1973

Gov: State

Ages: * 6 & 7	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp	Lec	text booklets,
Subj: math	Sem	tchr manuals,
Approach: * conceptual, process	Disc	tests, overview,
Ability: all	Indep not	objectives
Eval Meth: achievement & standardized tests	Lab answered	Non-Print Materials:
Testing: individual	Fld	filmstrips
Cont Resp: * tchr and material directed	Dem	audiotapes
Envir: classroom	Sim	games
	TV	
	A/V	

BCPM is a complete first year of basic mathematics instruction for children at the developmental level usually associated with six-year-olds.

The program: 1) offers a choice between two languages of instruction--Spanish and English; 2) does not depend on the pupil's reading ability; 3) allows each child full participation in mathematics instruction at his own level and pace from the time he enters first grade; 4) presents all instruction as well as all tests in an aural-visual mode; 5) includes a Readiness Area to prepare the child to work with the program; and 6) introduces mathematical ideas through games.

Because the key to effective implementation of the program is a thorough familiarity with the materials involved, a self-training manual is provided to assist teachers with a plan of organization and management of the BCPM program. The manual is comprehensive, illustrated, and self-contained. It includes suggestions for classroom management, differentiated staffing (including the use of peer tutors), a plan for organization, instructions for setting up a math center, instructions for constructing and playing of games, and an assignment chart--a complete sequential listing of minimal assignments for each lesson. Answer keys are also provided.

The program has been through three testing cycles since the materials were initially used in first grade classrooms in the summer of 1971. In each cycle, detailed formative information on each activity was collected and these data were used to revise and strengthen the program. The result of this effort is an individualized mathematics curriculum of proven effectiveness.

Teachers and aides who used BCPM materials with their pupils reported very positive perceptions of the staff orientation activities, the amount of pupil learning observed, the instructional objectives of the program, and the pupil measures incorporated into the curriculum. All respondents indicated that they would like to continue using the BCPM program the following year.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: repro-
Initiator(s): W. Stenning, S. Lujan, B. Mejia	Tchr Ed: conducts work-shops, provides manuals and consultants	Adm	duced commer-
		Wr 3 2	cially
		VSch 2 2	(\$160/10
		Res 3 1 2	students)
		TEd 2	
		Trial 11	

No references given



**BIOLOGICAL SCIENCES CURRICULUM  
STUDY (BSCS)**

William V. Mayer, Director

P. O. Box 930  
Boulder, Colorado 80302

Tel: (303) 666-6558

1959-

\*Gov, Publisher,  
Foundation

See ICh Report(s): 8,7,6,5,4,3

Ages: 5-18, college, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials
Lang: Eng, local adaptations & translations in over 40 countries	Lec	texts, lab books, supplementary
Subj: biol, natural sciences, humanities	Sem	books, programmed
Approach: * discipline-centered, interdisciplinary, inquiry	Disc	units, tchr manuals, field guides,
Ability: * avg, specials, EMH, slow learners, avg+	Indep	objectives, over-
Eval Meth: varies	Lab	views, newsletters, charts
Testing: varies	Fld	Non-Print Material
Cont Resp: varies	Dem	slides, filmstrips, filmloops, films, overhead transpar-
Envir: varies	Sim	encies, videotape, slide tape, audio-
	TV	tape
	A/V	

The charge to BSCS, when organized by the American Institute of Biological Sciences, was to seek improvement of biological education at all levels. That is still and probably will remain its goal.

If BSCS has a unique characteristic among curriculum projects, it is perhaps its commitment to a continuing responsibility for improving its materials, for bringing out new materials, and for responding to changing requirements of the educational system. Or perhaps the unique feature is that BSCS has been able to find support for such efforts. The BSCS introductory biology textbooks (the Blue, Green, and Yellow Versions) are in their third editions (1973). While these books are directed to high schools, materials are either available or under development for elementary schools (K-6 Elementary Science Project), middle schools (Human Sciences Project), colleges and universities (Minicourses), as well as special education courses (Me Now and Me and My Environment), an advanced high school course (Interaction of Experiments and Ideas), and an alternative introductory course (Patterns and Processes). A great variety of other material--films, slides, laboratory investigations, self-instruction guides, and programmed studies, for example--has also been prepared or is under development.

It is evident, from the array of BSCS publications listed, that an underlying principle of the organization is an emphasis on producing materials for use in the schools. Another basic principle, and in fact one of the nine major themes threaded through much of the material, is the attempt to help students understand and appreciate the nature of scientific inquiry and the structure of science.

The immediate future for BSCS holds another three or four years of work on projects presently underway, provided funding becomes available. Beyond that, because there is always a need for improvement in education, BSCS will probably continue to fill a niche in that overall effort.

Reason: * update content & method, develop new course	Adopt: unable to estimate	Pers: FT PT NRT	Publ: repro-
		Adm	duced com-
Initiator(s): AIBS, H. Cox, O. Tippo	Tchr Ed: * provides manuals, guides, films & consultants; conducts workshops	Wr	mercially by
		VSch	offset &
		Res	linotype
		TEd	
		Trial	

**Descriptive References:**

BSCS Newsletter 45. Nov 1971. Contains the most recent listing of journal articles and other reference sources on BSCS.

BSCS Newsletter 37. Nov 1969. Contains a reference list of books, articles, reviews, and research papers on BSCS from 1965 to 1969.



**BIOLOGICAL SCIENCES CURRICULUM  
STUDY ELEMENTARY SCHOOL SCIENCE  
PROJECT (BSCS-ESSP)**

**BSCS  
P.O. Box 930  
Boulder, Colorado 80301**

**1972-1976**

**Publisher**

**Richard R. Tolman, Director**

**Tel: (303) 666-6558**

**See ICh Report(s): none**

<b>Ages: 5-11</b>	<b>Exper: C1 12+ 2-12 I</b>	<b>Printed Materials:</b>
<b>Lang: Eng</b>	<b>Lec</b>	lab books, activity
<b>Subj: biol, chem, phys, earth-space,</b>	<b>Sem</b>	sheets, tchr man-
<b>math, soc sci, health, lang arts, art</b>	<b>Disc</b>	uals, tests,
<b>Approach: interdisciplinary</b>	<b>Indep not</b>	objectives,
<b>Ability: all</b>	<b>Lab answered</b>	newsletters
<b>Eval Meth: achievement, lab &amp; oral tests,</b>	<b>Fld</b>	<b>Non-Print Materials:</b>
<b>tchr jdgmts</b>	<b>Dem</b>	slides, filmloops,
<b>Testing: unit, individual</b>	<b>Sim</b>	audiotapes, games,
<b>Cont Resp: tchr directed &amp; guided</b>	<b>TV</b>	models, lab
<b>Envir: community, classroom, sch grounds</b>	<b>A/V</b>	equipment
<b>and library</b>		

The BSCS Elementary School Science program was initiated in the fall of 1971. It is a hands-on, activity-centered, multimedia program. Suggested dialogues and strategies are included for teachers with little preparation in science, but the experienced elementary school science teacher will find ample freedom to interject his or her own teaching style. Many multidisciplinary aspects are built into the program to tie in with mathematics, language arts, reading, art and social studies. Ample provision is also made for a wide variety of individualized student projects. During the 1972-73 school year a portion (part of grades four and five) of the program was field-tested. Feedback obtained during the field tests was incorporated into the revised materials which were given to J.B. Lippincott company in the fall of 1973 for commercial publication.

Pilot tests of the sixth-grade materials were conducted in four elementary classes during the 1972-73 school year. Teachers participating in the trials were selected from schools near the University of Victoria in British Columbia, where the supervisor of the program at that time was a member of the faculty. Fourth, fifth, and sixth-grade materials (scheduled for commercial release in the fall of 1975) will be tested at selected sites across the United States and in British Columbia during the 1973-74 school year. The experimental K-3 materials will be written during the summer of 1974 and pilot-tested during the 1974-75 school year. The final K-3 materials are scheduled for commercial release in 1977.

<b>Reason: publication</b>	<b>Adopt: still in</b>	<b>Pers: FT PT NRT</b>	<b>Publ: will be</b>
	<b>development</b>	<b>Adm 2</b>	<b>reproduced</b>
<b>Initiator(s):</b>	<b>Tchr Ed: provides manuals,</b>	<b>Wr 14</b>	<b>commercially</b>
<b>R.R. Tolman,</b>	<b>guidebooks &amp; films; no</b>	<b>VSch 3</b>	
<b>D.D. Daus</b>	<b>preparation required</b>	<b>Res 1 2</b>	
		<b>TEd 2</b>	
		<b>Trial 40</b>	

**Descriptive References:**

**None yet available**

**Research:**

**All are in-house**

**BIOLOGICAL SCIENCES CURRICULUM  
STUDY (BSCS) HUMAN SCIENCES  
PROGRAM (HSP)**

James T. Robinson, Director

See ICh Report(s): 8

Biological Sciences Curriculum  
Study  
P.O. Box 930  
Boulder, Colorado 80302  
Tel: (303) 666-6558

1971-1976

Gov: (NSF)

Ages: 11-13	Exper: CI 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: biol, social sciences, behavioral sciences	Sem	tchr manuals
Approach: interdisciplinary	Disc	newsletters
Ability: all	Indep	charts
Eval Meth: tchr jdgmts,	Lab	Non-Print Materials:
Testing: -	Fld	slides
Cont Resp: student directed	Dem	filmloops
Envir:* classroom, community, school grounds	Sim	slide tape
	TV	audiotape
	A/V	

The Biological Sciences Curriculum Study, with the support of the National Science Foundation, is developing an interdisciplinary Human Sciences Curriculum for three years of study for eleven- to thirteen-year-olds.

The goals of Human Sciences differ from conventional science programs in that materials for the curriculum are provided to enhance cognitive, personal, social, and moral development. Students are encouraged to develop their own competencies, ideas, and interests by selecting the curriculum materials that they decide are of value.

The curriculum framework and the project's ultimate alternative to subject matter organization for curricula were derived from a large collection of student questions and concerns that the project developed by discussions with early adolescents, psychologists, teachers, and from the literature. These questions were reduced to a small, stable structure by devising the concept of "generic questions." The four generic questions that seem to subsume the great majority of student questions and concerns are: Why do things change? Why do living things act as they do? What determines who gets what? and, What is normal?

Interface areas of the biological and social sciences were developed to subsume knowledge from these disciplines that could serve as subject matter and ways of knowing. These interface areas, or interdisciplinary themes, are: continuity and change; competition, accommodation, and cooperation; and equality and inequality. Major ideas and concepts from the sciences subsumed within the themes serve as sources for the substantive aspects of the curriculum materials.

Five sixth-grade modules were tested in twenty-one classrooms in 1973-74. Five seventh-grade modules will be tested in 1975-76. An Introductory Package and Demonstration module for use in sixth-grade classes are available for purchase.

Formative evaluation of the materials is being utilized for revision prior to commercial release. Plans for commercial release have not been completed to date.

Reason:* change in philosophy, create interdisciplinary program	Adopt: (test) 21 tchrs, 700 students, 7 schools	Pers: FT PT NRT	Publ: 25 copies reproduced by offset
	Tchr Ed: conducts workshops; provides guides, self-study	Adm 1 2	
		Wr 70	
		VSch 6	
		Res	
Initiator(s): W.V. Mayer, J.T. Robinson		TEd 6	
		Trial 21	

**Descriptive References:**

Robinson, J.T. In Press. A Theoretical Framework for Multidisciplinary Science Curricula for Early Adolescents. School Sciences and Mathematics.

Why Human Sciences? Feb 1973. BSCS Newsletter. 50: 4-10.

Human Sciences, The Sixth Grade Program. In Press. BSCS Newsletter.

**Research:**

Biological Sciences Curriculum Study. 1973. Human Sciences: A Developmental Approach to Adolescent Education. Boulder, Colorado: BSCS.

**BIOLOGICAL SCIENCES CURRICULUM  
STUDY INVESTIGATING YOUR ENVIRON-  
MENT: BSCS ENVIRONMENTAL MODULE**

Box 930  
Boulder, Colorado 80302  
Tel: (303) 666-6558

1970-1974  
Gov: Fed(USOE,  
NIE)

Jay E. Anderson, Director

See ICH Report(s): 8

Ages: 14-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: biol, chem, social sciences	Sem	tchr manuals
Approach: interdisciplinary, inquiry	Disc	student handbook of
Ability: all	Indep	investigative
Eval Meth: self-evaluation by student	Lab	techniques
Testing: none	Fld	
Cont Resp: student directed	Dem	
Envir: community, sch grounds & library,	Sim	
classroom, lab	TV	
	A/V	

This project is an instructional module designed to support unbiased, student-formulated investigations of questions about the student's environment. Because the module emphasizes personal experience in decision making and because the level of sophistication of individual investigations depends on the student's background, the materials are appropriate for a wide spectrum of students.

The module requires a minimum of six or seven weeks of class time, assuming five, 45- to 60-minute classes per week. Because the approach is inherently open-ended, the curriculum can be easily adapted to a 12-week or semester framework. Similarly, the materials can be readily adapted to a variety of course settings and educational situations.

The instructional materials consist of a Student's Handbook, a series of paperback collections of Student Resource Papers, and a Teacher's Handbook. The Student's Handbook is primarily a collection of techniques for studying a variety of environmental problems, including air and water quality, land use, populations, environmental impact of technology and development, and noise. Selected articles from the scientific, technical, and popular literature, rewritten as necessary for high school use, make up the Student Resource Papers.

Emphasis in the Teacher's Handbook is placed on strategies for implementing the materials and suggestions for assisting individuals or small groups in planning and carrying out their investigations. The teacher's role is one of a facilitator and fellow-investigator.

Reason: change in philosophy, develop new course	Adopt:(partial) 30 tchrs, 750 students, 15 schools	Pers: FT PT NRT	Publ: reproduced commercially by offset
Initiator(s): W.V. Mayer	Tchr Ed: provides manuals & consultants	Adm 1 2 Wr 1 1 VSch 3 Res TEd Trial 6	

**Descriptive References:**

Anderson, J.E. 1974. The BSCS Environmental Module: An Experience in Problem Solving. In press, School Science and Mathematics. To be published in the Nov or Dec 1974 issue.

Investigating Your Environment. Sept 1973. BSCS Newsletter. 52:14-15.

BIOLOGICAL SCIENCES CURRICULUM  
STUDY - ME AND MY ENVIRONMENT (MAME)  
(Life Sciences: A BSCS Special  
Education Program)  
William V. Mayer, BSCS Director & Roy O. Gromme, EMH Director  
See ICh Report(s): 8

P.O. Box 930  
Boulder, Colorado 80302  
Tel: -

1971-1975  
Gov: Fed(USOE/  
BEH),  
Hubbard Scien-  
tific Company

Ages: 13-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: * environ, biol, chem, phys,	Sem	activity sheets
earth-space	Disc 2 3	tchr manuals
Approach: discipline centered, inter-	Indep	objectives
disciplinary, process, inquiry	Lab 1 1 1	newsletters
Ability: special: EMH	Fld 3 3 3	charts
Eval Meth: lab & oral tests, tchr jdgmt	Dem 3	Non-Print Materials:
student questionnaire, cognitive devel-	Sim 2 2	slides, filmstrips,
opment and processes test	TV	filmloops, over-
Testing: individual	A/V 1 1	head transparencies,
Cont Resp: tchr guided	Games 2 2	slide tape, games
Envir: * classroom sch grounds, community,		
resource people		

The BSCS embarked on the task of producing life science materials for the educable mentally handicapped (EMH) in the summer of 1969. The project to develop the curriculum was originally funded by the Division of Research, Bureau of Education for the Handicapped, United States Office of Education. The project was charged with writing, field testing, evaluating, and disseminating learning programs and materials in the life sciences for populations of EMH children in our schools.

Both ME NOW and ME AND MY ENVIRONMENT are student-centered activity programs that contain very little written materials for the students. The essential teaching materials are assembled into a teaching kit which, together with the comprehensive instruction manual, make it easy for the teacher to provide the student with carefully sequenced activities that range from the simple to the complex. Both programs utilize an inquiry strategy ("discovery" approach) in developing their sequences of activities. If knowledge is acquired, at least in part, through an inquiry strategy, then the student should be able to use elements of that strategy in acquiring further information and solving future problems.

The broad aims of ME AND MY ENVIRONMENT include the development within each child: of a sense of identity as a person who has some degree of control over his environment; of a success syndrome; of an interest that could become a hobby or avocation over a lifetime; of a sense of relationship and empathy with other living things; and of an understanding of environmental conditions that will lead to a sense of responsibility for the environment and actions that protect or improve it.

Reason: develop new	Adopt: unknown	Pers: FT PT NRT	Publ: repro-
course, science for		Adm 1 3	duced commer-
Jr. High EMH did not	Tchr Ed: provides	Wr 4 30	cially (\$310/
exist	programmed manuals	VSch 2	10 students/yr)
Initiator(s): M.H. Kennedy		Res 2 5	
		TEd 10	
		Trial 35	

#### Descriptive References:

BSCS Newsletter 46, 50 & 55. 1972-74. Published by Biological Sciences Curriculum Study, P.O. Box 930, Boulder, Colorado 80302.

Steel, J.M. 1974. The Relationship of Developmental Level with Science Performance: A Case for an Alternative to IQ Grouping of Mildly Retarded Children. Paper presented at the 1974 Annual Meeting of the American Educational Research Association.

#### Research:

Steele, J.M. June 1973. Arranging Field Tests: Characteristics of Sites and Students. Formative Evaluation Report 1, BSCS.

Steele, J.M. Dec 1973. Assessing Student Abilities and Performance: Year 1. Formative Evaluation Report 2, BSCS.

Steele, J.M. Reviews, Revisions, and Data Collection Procedures. Formative Evaluation Report 3, in preparation, BSCS.

BIOLOGICAL SCIENCES CURRICULUM  
STUDY - ME NOW (ME NOW)  
(Life Sciences: A BSCS Special  
Education Program)  
William V. Mayer, BSCS Director & Roy O. Gromme, EMH Director  
See ICh Report(s): 8

P.O. Box 930  
Boulder, Colorado 80302  
Tel: (303) 666-6558

1969-1972  
Gov: Fed (USOE/  
BEH),  
Hubbard Scien-  
tific Company

Ages: 10-14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books,
Subj: biol	Sem	activity sheets,
Approach: * discipline centered, process,	Disc 2	tchr manuals,
inquiry	Indep	tests, charts,
Ability: special: EMH	Lab 1	objectives,
Eval Meth: achievement, lab and oral	Fld	newsletters
tests, tchr jdgmt	Dem 1	Non-Print Materials:
Testing: unit, after each activity (1-3	Sim	slides
days)	TV	filmloops
Cont Resp: tchr guided	A/V 1	models
Envir: * classroom, sch grounds, commun-		
ity, resource people		

The BSCS embarked on the task of producing life science materials for the educable mentally handicapped (EMH) in the summer of 1969. The Project to develop the curriculum was originally funded by the Division of Research, Bureau of Education for the Handicapped, United States Office of Education. The project was charged with writing, field testing, evaluating, and disseminating learning programs and materials in the life sciences for populations of EMH children in our schools.

Both ME NOW and ME AND MY ENVIRONMENT are student-centered activity programs that contain very little written materials for the students. The essential teaching materials are assembled into a teaching kit which, together with the comprehensive instruction manual, make it easy for the teacher to provide the student with carefully sequenced activities that range from the simple to the complex. Both programs utilize an inquiry strategy ("discovery" approach) in developing their sequences of activities. If knowledge is acquired, at least in part, through an inquiry strategy, then the student should be able to use elements of that strategy in acquiring further information and solving future problems.

The broad aims of ME NOW include the development of interests, skills, and positive attitudes; the provision of challenging intellectual activity commensurate with the student's ability; the enhancement of life through heightened observation, curiosity, self-confidence, and creative self-expression; the development by the student of a level of social maturity and emotional stability that can lead to increased vocational proficiency, realistic self-concept, creative self-expression, and effective assimilation into the community; and the application of knowledge to the tasks of everyday life.

Reason: develop new	Adopt: unknown	Pers: FT PT NRT	Publ: reproduced
course; science for	Tchr Ed: provides	Adm 1 3	commercially
EMH did not exist	programmed manual	Wr 2 20	
Initiator(s):		VSch 4 2	(\$260/10 stu-
M.H. Kennedy		Res 2 10	dents/yr)
		TEd 10	
		Trial 54	

#### Descriptive References:

BSCS Newsletters 38 and 43. Published by Biological Studies Curriculum Study, P.O. Box 930, Boulder, Colorado 80302.  
Steele, J.M., and N. Boekel. Sept 1972. Science Education for the Exceptional Child. Focus on Exceptional Children. 4(4).

#### Research:

Robinson, J.T., and R.R. Tolman. Sept 1970. A Formative Evaluation of ME NOW Unit I, Digestion and Circulation. Boulder, Biological Sciences Curriculum Study, ED 043182.  
Tolman, R.R. Dec 1972. Final Report, Project No. 1520-75. A Formative Evaluation of ME NOW, Life Sciences for the Educable Mentally Handicapped, Biological Sciences Curriculum Study, ED 071263.

**BIOLOGICAL SCIENCES CURRICULUM  
STUDY MINICOURSE DEVELOPMENT  
PROJECT**

P.O. Box 930  
Boulder, Colorado 80303  
Tel: (303) 666-6558

1971-1974  
Gov: Fed(NSF)

William V. Mayer, Director

See ICh Report(s): none

Ages: 18-20	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	study guides
Subj: biol	Sem	tchr guides
Approach: discipline centered, process, inquiry, discovery	Disc ✓	Non-Print Materials:
Ability: average, average +	Indep ✓	slides
Eval Math: achievement, lab & oral tests;	Lab ✓	filmstrips
tchr jdgmt, student questionnaire	Fld ✓	filmloops
Testing: individual	Dem ✓	films
Cont Resp: material directed	Sim	audiotape
Envir: learning center	TV	models
	A/V ✓	lab equipment

A minicourse is a unit of subject matter considered to be a coherent entity of content, such as: water relations in plants, mitosis, diversity of animals, and so on. The instructional strategy for the project will be the audio-tutorial approach. Materials for a series of multifaceted learning experiences are structured for each minicourse, and the student controls the rate and intensity of his study.

In 1961, Dr. S.N. Postlethwait began using audiotaped discussions to supplement the instruction in his freshman botany course at Purdue University. During the next decade, he developed his audio-tutorial (A-T) approach, which is structured primarily around a self-instructional learning program.

Early in the 1970's, Dr. Postlethwait and his assistants began the design and development of instructional materials for minicourses. Purdue University was awarded a three-year grant from the National Science Foundation to produce minicourses for a core program in undergraduate biology. The current cooperative effort of Purdue and the BSCS will continue to implement the ideas set forth originally and to make a large "pool" of minicourse materials available for use in a great many contexts.

Minicourse materials are typically designed for use by one or two students, but can be used by a larger group. The length of minicourses varies from those requiring a relatively short time to those that involve several hours of student study. They can be used individually as small courses or combined in a variety of different sequences to constitute the basic components of a larger conventional course. They may also be used for supplementary or remedial studies.

Reason: develop new course, publication	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially
Initiator(s): S.N. Postlethwait	Tchr Ed: provides manuals & guidebooks	Adm 2 Wr 8 VSch 1 Res 1 TEd Trial 12	

**Descriptive References:**

BSCS Newsletter #52. Sept 1973.

**Research:**

For research reports write to: Dr. S.N. Postlethwait, Minicourse Development Project, Purdue University, Lafayette, Indiana.



BIOMEDICAL INTERDISCIPLINARY  
CURRICULUM PROJECT (BICP)

Leonard Hughes, Director

1947 Center Street  
Berkeley, California 94704

Tel: (415) 642-3582

1968-1978

Gov: Fed(NSF),  
Foundation

See ICH Report(s): none

Ages: 16-18, tchr ed

Lang: Eng

Subj: biol, chem, phys, math, tech, soc sci,  
physiology, medicine, computer science

Approach: interdisciplinary, integrated,  
conceptual

Ability: avg, avg+

Eval Meth: achievement tests, tchr jdgmts,  
student questionnaire

Testing: unit

Cont Resp: tchr directed

Envir: community, classroom, lab

Exper: Cl 12+ 2-12 I

Lec

✓

Sem

Disc

Indep

Lab

✓

Fld

✓

Dem

Sim

TV

A/V

Printed Materials:

texts, lab books

tchr manuals

tests, objectives

overview

newsletter

Non-Print Materials:

overhead

transparencies

games

lab equipment

The goal of the BICP is to develop a two-year, eleventh- and twelfth-grade curriculum which will prepare and motivate students for entry into courses of study leading to one of the many diverse careers in the health and medical field. However, should a student choose not to pursue a career in this field, he or she will be adequately prepared for other educational choices.

The curriculum occupies four classroom periods each day. Two are devoted to laboratory science, and one each to mathematics and social science. Although each course is taught separately, the curriculum is broadly interdisciplinary, with each discipline drawing upon and supporting the others whenever possible. Within the science course, basic concepts in biology, chemistry and physics are presented in the context of health and medical problems. The application of concepts is stressed and students become involved in investigating fundamental physiological and biochemical processes.

The mathematics portion approximates the standard, college-prep course in that it devotes attention to linear, quadratic, exponential and trigonometric functions. However, greater attention is given to the application of mathematics and to such topics as error analysis, statistics and the analysis and presentation of data collected in the other courses, particularly the science laboratory.

The social science curriculum focuses on problems which depend for their solution on an understanding of the individual and his relationship to a social milieu. Areas of study include social epidemiology with respect to public health issues, cultural value systems as they relate to the understanding and solution of health problems, and cross-cultural analyses of the incidence of disease and disability.

Throughout the curriculum students become aware of the career possibilities of selected medical and health professions.

The curriculum is being trial tested in six California high schools, with more extensive, nation-wide implementation planned for 1975 through 1978.

Reason: develop new  
course

Adopt: -

Pers: FT PT NRT

Adm

Wr

VSch 4

Res

TEd

Trial 18

Publ: 400 copies  
reproduced  
commercially  
by offset

Initiator(s): J. French,  
W. Bicknell

No references given



BI-STATE PROJECT FOR THE  
IMPROVEMENT OF IN-SERVICE TEACHER  
EDUCATION THROUGH SCIENCE

John R. Shinpoch, Director

Tarkio College  
13th and McNary  
Tarkio, Missouri 64491

Tel: (816) 736-4131

1967-1971

\*Gov, Partici-  
pating schools

See ICh Report(s): 8, 7

Ages: adult, tchr ed.

Lang: Eng

Subj: -

Approach: \* inquiry, discovery,  
conceptual, process

Ability: all

Eval Meth: standardized tests,  
student q're

Testing: individual

Cont Resp: -

Envir: \* classroom, sch library

Exper: Cl 12+ 2-12 I

Lec ✓ ✓

Sem

Disc ✓ ✓

Indep

Lab ✓

Fld ✓ ✓

Dem

Sim

TV ✓

A/V

The objectives of this project were to improve science programs and instruction in the elementary schools of the area by developing: an in-service program capable of improving teachers' attitude toward the teaching of science; a procedure by which local schools can improve their total science program; and an in-service program capable of increasing teachers knowledge and skills in science.

The project consisted of the following activities: conducting a four week orientation program for fifty-nine elementary teachers; providing specialized consultant service during the summer and academic year; providing science materials for participating teachers and their students; providing video-tape for teacher self-evaluation; providing teachers with information and materials from many national programs in elementary science; visiting teachers in their classrooms; holding small group meetings; and gathering as a group at project headquarters once each month during the school year.

One Hundred Forty Six elementary teachers from 24 school districts completed from 4 to 10 weeks of in-service work in science. Implementation of Science Curriculum Improvement Study, Science A Process Approach and Elementary Science Study varied from full implementation grades 1-6 to a single classroom in a school. Approximately \$500.00 per teacher was expended for elementary science materials over a three year period. Schools where more than fifty percent of the teachers participated have continued the program as a school. Where very few teachers participated full implementation did not occur, although many of the participants continue to use one of the above science programs. The in-service program has been completed but consultant help in science is available through Tarkio College, Tarkio, Missouri.

Reason: update method

Adopt: 90 tchrs, 3000

students, 18 sch

Initiator(s):

J.R. Shinpoch

Tchr Ed: conducts work-  
shops, provides manuals,  
guides, films & con-  
sultants

Pers: FT PT NRT

Adm 2

Wr

VSch 5

Res 1

TEd 5

Trial

Publ: (\$10/10

students)

No references available

BOSTON COLLEGE MATHEMATICS  
INSTITUTE (BCMI)  
Stanley J. Bezuska, Director

Boston College  
Chestnut Hill, Massachusetts  
02167  
Tel: (617) 969-0100, ext 2235

1957 -  
Gov: Fed(NSF);  
University,  
Publisher

See ICh Report(s): 8,7,6,5,4,3

Ages: 5-19, tchr ed

Lang: Eng

Subj: math

Approach: discipline centered, process,  
conceptual, inquiry, discovery

Ability: all

Eval Meth: tchr jdgmts, student  
questionnaire

Testing: (in developmental stages)

Cont Resp: tchr directed & guided,  
materials directed

Envir: classroom, lab

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

texts

supplementary books

activity sheets

tchr manuals

overview

Non-Print Materials:

audiotape

The Mathematics Institute at Boston College was formed as a unit distinct from the Mathematics Department in 1957. At present the Institute functions in four areas: instruction, research, production of material and consultation services.

Instruction: During the 1973-1974 year, the Institute, in conjunction with the National Science Foundation, sponsored three separate programs for teachers of mathematics. They were: a Leadership Development Project which was a special academic year of full time study whose ultimate goal was to develop leaders in the community of secondary mathematics teachers; an In-Service Institute which was a part time course of study for secondary mathematics teachers; and a Summer Institute in Mathematics which operated concurrently with the University's Summer Session.

Research: The Mathematics Institute is committed to a number of research projects. Some of the teaching staff together with a limited research staff are carrying out investigations in at least six distinct areas. In some instances the research undertaken is preliminary to the preparation of a formal proposal for funded support.

Production of Materials: Since its inception one of the goals of the Mathematics Institute has been to provide the teacher of mathematics with innovative materials to test in the classroom. Recently experimental texts on transformation geometry and calculus have been completed. Other materials underway will treat the uses of the geoboard and enrichment topics for motivation and drill. The Director and one Staff member currently are associated with two school publishers in the preparation of a basal mathematics program for grades 1-8 and a supplemental skill package.

Consultation Services: The Director of the Institute maintains a flexible schedule to permit travel to school districts and groups locally and out of state during the school year. During school holidays and the summer months the Director and/or Staff conduct intensive workshops and seminars for teachers of grades 1-12.

Reason:* develop new	Adopt: -	Pers: FT PT NRT	Publ: 10,000
course, update content		Adm 2	copies repro-
& method, change in	Tchr Ed: conducts work-	Wr 3	duced institu-
philosophy, publication	shops, provides	VSch 2	tionally &
Initiator(s):	consultants	Res 4	commercially by
S.J. Bezuska		TEd 6	offset
		Trial 12	

Descriptive References:

Journal of Research in Science Teaching. 1964. 2: 335-344.

**BROAD SPECTRUM ENVIRONMENTAL  
EDUCATION PROJECT**

Clair Bemiss, Director

705 Avocado Avenue  
Cocoa, Florida 32922

Tel: (305) 636-6543

1971-1974

Gov: (ESEA  
Title III)

See ICH Report(s): none

Ages: 5-18, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: environmental ed	Sem	activity sheets
Approach: interdisciplinary, conceptual, inquiry	Disc ✓ ✓	tchr manuals
Ability: average	Indep ✓ ✓	field guides
Eval Meth: standardized tests, student q're	Lab ✓ ✓	tests
Testing: pre & post-testing	Fld ✓ ✓	Non-Print Materials:
Cont Resp: tchr guided	Dem ✓	slides
Envir: community, sch grounds & library, classroom, lab	Sim ✓	overhead transpar- encies
	TV	games
	A/V ✓ ✓	

The objective of this project was to produce interdisciplinary learning materials for students in grades K-12 which would resolve critical learner needs in the area of environmental education. These needs have been previously identified as the development of values necessary for the adoption of suitable behavior toward the environment; employment of techniques of acceptable social interaction which may lead to environmental problem resolution; acquisition of knowledge of the inter-relationships of both natural and man-made aspects of the environment; and motivation to directly participate in solving environmental problems.

Teacher teams were utilized to produce these materials. These teams, selected from classroom teachers in the public and private schools in Brevard County and working under the direction of project staff members, produced interdisciplinary environmental education materials for grades K-12. These materials were tested in the classrooms in Brevard County during 1973-74. Experimental and Control groups were selected; all students were given a battery of pre and post tests. Results were analyzed and reported. The materials which were found to be effective were submitted for validation.

Reason: develop new course	Adopt:(partial) 75 tchrs, 2000 students, 22 schools	Pers: FT PT NRT	Publ: 250 copies reproduced institutionally & commercially by offset.
Initiator(s): Brevard County School Board	Tchr Ed: conducts workshops; provides manuals, guides & consultants	Adm 1 Wr 3 20 VSch 2 Res 20 TEd 3 Trial 75	

**Descriptive References: (ERIC Documents)**

Supplemental Resource Guide in Environmental Education for Elementary Teachers. ED 065 353.

Teachers Curriculum Guide for Field Ecology, Revised Edition. ED 067 299.

Teachers Environmental Resource Unit: Consumer Resources Idea Handbook. Ed 067 300.

Teachers Environmental Resource Unit: Industry: Iron/Steel and Pulp Paper. ED 067 301.

Teachers Environmental Resource Unit: The Automobile. ED 067 302.

Teachers Environmental Resource Unit: Energy and Power. ED 067 303.

Social Studies Resource Units. ED 067 304.

The Curious Entanglement of Law, Politics, and the Environment. ED 068 339.

**BUILDING EDUCATIONAL BRIDGES  
BETWEEN SCIENCE AND THE  
HUMANITIES**

Rensselaer Polytechnic Institute  
Troy, New York 12181  
Tel: (518) 270-6439

1971 -  
Gov:NSF

Contact: V.L. Parsegian

See ICh Report(s): 8

Ages: 19-20	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	texts
Subj: biol, chem, phys, social sciences, art, religion	Sem ✓ ✓	
Approach: interdisciplinary, integrated, conceptual	Disc ✓ ✓	
Ability: all	Indep ✓ ✓	
Eval Meth: optional	Lab	
Testing: optional	Fld	
Cont Resp: tchr directed & guided, material directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

This is a multidisciplinary project designed to develop teaching materials and approaches that interrelate the physical, biological, social sciences and the humanities and fine arts, for use in courses of study that may be incorporated in the third and fourth years of college curricula. The general plan is to develop key topics, case studies, and questions that have lifelong significance and interest, and to utilize these for promoting common understanding and "dialogue" among students having varied professional interests.

The project proposes to develop teaching materials in the form of books, reports and films on a sufficient number of themes to permit an instructor to select portions for a one-semester or two-semester course. Questions for class discussion are key features of the course. The treatment of each theme (book or report) should stand on its own, although there will be cross-references between themes to avoid outright duplication of materials.

The premise underlying this project is that the students will be college juniors or seniors majoring in science, engineering, social sciences, languages, fine arts or any other field. Therefore every effort must be made to present topics in simple albeit substantial form. The themes selected for study will be the kinds that "touch" or emerge from each person's interests whether he is a professional engineer, artist, social scientist or thoughtful citizen.

Reason: change in philosophy, develop new course	Adopt: - Tchr Ed: -	Pers: FT PT NRT Adm Wr VSch not Res answered TEd Trial	Publ: -
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No references given

**CALCULATORS IN GENERAL MATH**

Contact: Gene Catterton

See ICh Report(s): 7,6

P.O. Box 69

Wynne, Arkansas 72396

Tel: (501) 238-2558

1967-1969

Gov

Ages: 14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts, tchr
Subj: Math	Sem	manuals
Approach: process	Disc	
Ability: slow	Indep	
Eval Meth: standardized tests	Lab	✓
Testing: unit	Fld	✓
Cont Resp: tchr directed	Dem	
Envir:* lab, community	Sim	
	TV	
	A/V	

The major goals of this project were to (1) develop material using "local self interest" problems to be used with the lower one-third of any ninth grade population and (2) use this material in a mathematics laboratory equipped with calculators.

Problems were developed using letterhead invoices from local business firms. Many of the students had never been able to relate to mathematics and could not see its use in their own lives. By using local letterhead stationery or invoices (many brought in by the students) the students could relate the use of mathematics to their everyday experiences.

The project was in operation for three years supported by Federal Funds. At the conclusion of the project an outside evaluator was employed to evaluate the results. His overall conclusion was that the achievement of the participants was significant. The participants gained one month in achievement for each month they were in the program. Until these students were involved in this project they had averaged gaining only five months in achievement for each period of nine months.

The project continued to operate with local funds through 1972-73 or as long as the material was available. The Arkansas State Department published and printed 10,000 copies which were used in 1972-73. The material is now out of print and there are no plans to print it again.

Reason: develop new course	Adopt: --	Pers: FT PT NRT	Publ: 10,000
	Tchr Ed: no special preparation required	Adm 1	copies repro-
Initiator(s): G. Catterton		Wr 6	duced institu-
		Vsch 5	tionally
		Res 6	(\$2500/10 stu-
		TEd 6	dents)
		Trial 6	

No references given

CEMREL, INC. COMPREHENSIVE  
SCHOOL MATHEMATICS PROGRAM -  
ELEMENTARY COMPONENT (CSMP)

Burt Kaufman, Director

610 East College Street  
University City Complex  
Carbondale, Illinois 62901

Tel: (618) 549-5356

1967 -

Gov: Fed (NIE) &  
Participating  
Schools

See ICh Report(s): 8,7,6

Ages: 6-12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books,
Subj: math	Sem	programmed units,
Approach: discipline centered, process,	Disc ✓	activity sheets,
conceptual, inquiry, discovery	Indep ✓	tchr manuals, over-
Ability: all	Lab	view, newsletters
Eval Meth: achievement & standardized	Fld	Non-Print Materials:
tests, tchr jdgmt, student questionnaire	Dem	films, slide tape,
Testing: individualized	Sim	audiotape, games
Cont Resp: tchr guided, material directed	TV	
Envir: classroom	A/V ✓	

The CSMP elementary program is based on a humanistic philosophy as opposed to a concentration on highly pre-specified goals. A picture language, consisting of large and colorful arrow diagrams, introduces the notions of functions and relations as early as kindergarten--no formal language is required. The feasibility and desirability of this approach has been adequately demonstrated by the work of Mme. Frederique Papy, of the Belgian Center for the Pedagogy of Mathematics. A "pedagogy of situations," captures imaginations in story situations providing ample opportunity for intellectual interaction among children. Extensive use is made of the Papy Minicomputer, a simple cardboard calculating device that gives children experience with non-trivial arithmetic problems. Teacher-directed lessons are supplemented by independent study involving individualized workbooks, audio tapes, manipulatives, worksheets, and games. As reading vocabulary develops, increasing emphasis is placed on independent study, in the form of "activity packages." The lessons and activities involve language and logical thinking, relations and functions, combinatorics, algebraic structures, geometry, arithmetic calculation, and probability and statistics. The 1973-74 extended pilot test (EPT) of kindergarten and first grade (K-1) materials involved 30 school systems in various locations across the country. Each subsequent year, the EPT will advance one year into the curriculum and start new K-1 programs. The ultimate goal is to produce a new curriculum from kindergarten to twelfth grade; the intermediate goal is kindergarten through sixth grade.

Reason: * develop new	Adopt: (partial) 350	Pers: FT PT NRT	Publ: 10,000
course, change in	tchrs, 10,000 students,	Adm 6	copies repro-
philosophy	100 schools	Wr 10	duced insti-
	Tchr Ed: conducts work-	VSch 14	tutionally &
Initiator(s): B. Kaufman	shops; provides manuals,	Res 3 1	commercially
	films, & consultants	TEd 4	by Xerox &
		Trial 350	offset (\$58/
		Other 12	10 students)

No references given

CEMREL, INC. COMPREHENSIVE  
SCHOOL MATHEMATICS PROGRAM -  
ELEMENTS OF MATHEMATICS (CSMP-EM)  
Burt Kaufman, Director

610 East College Street  
University City Complex  
Carbondale, Illinois 62901  
Tel: (618) 549-5356

1966 -  
Gov: Fed(NIE) &  
Participating  
Schools

See ICh Report(s): 8,7,6

Ages: 12-18	Exper: *Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: math.	Sem 2	supplementary books
Approach: * discipline centered,	Disc 1 3	tchr manuals
conceptual, discovery	Indep	tests
Ability: average +	Lab	
Eval Meth: * tchr jdgmt, achievement	Fld	
tests	Dem	
Testing: * unit, individual	Sim	
Cont Resp: * administration & tchr directed TV		
Envir: classroom	A/V	

The EM program is a secondary (7-12) program for students with excellent reading ability and who are in the top 10-15% of the school population. The EM program consists of 13 books representing a wide variety of mathematical fields. As the present CSMP elementary program is extended to secondary grades the EM program will become a sub-program of the total CSMP curriculum.

Reason: * develop new	Adopt: (partial)	Pers: FT PT NRT	Publ: 60,000
course, update content	32 tchrs, 10/4 students,	Adm 2	copies repro-
& method, change in	26 schools	Wr 11	duced institu-
philosophy, publication	Tchr Ed: conducts work-	VSch	tionally by
	shops, provides manuals	Res	offset (\$50/
		TEd	10 students)
		Trial 10	
		Other 4	

No references given



CENTER FOR THE DEVELOPMENT OF  
ENVIRONMENTAL CURRICULUM (CDEC)

4284 Center Street  
Willoughby, Ohio 44094

1971-1974

Dennis M. Wint, Director

Tel: (216) 946-1223

Gov: Fed (ESEA  
Title III)

See ICh Report(s): none

Ages: 7-18; tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: environmental ed	Sem	overview
Approach: -	Disc	newsletters
Ability: average	Indep varies	Non-Print Materials:
Eval Meth: tchr jdgmts	Lab	slidetape
Testing: -	Fld	
Cont Resp: * administratively directed,	Dem	
tchr guided	Sim	
Envir: community, school grounds,	TV	
classroom	A/V	

CDEC was initially funded for the purpose of developing an interdisciplinary environmental education curriculum for grades K-12 for Ohio schools. During the first year of the project, CDEC was concerned with developing the framework and design of the curriculum. In addition to the development of a statement of philosophy and major project objectives, portions of the elementary units were written.

The second year involved the development, piloting, evaluation, and revision of the elementary curriculum materials. A total of 70 classroom teachers representative of five socio-cultural communities (urban, suburban middle class, suburban upper class, rural, and non-public) participated in the piloting which took place between October 1, 1972 and March 1, 1973. In addition, 16 environmental experts responded to the quality of the materials. Materials were submitted on May 1, 1973, to the Ohio Department of Education for printing and publication. Also during the second year, Volume I of the Annotated Catalog of Environmental Learning Resources was developed and printed. Copies of this have been sent to every school building in Ohio.

The third year involved the development, piloting, and evaluation of the secondary curriculum. Thirty-five teachers and environmental experts prepared the environmental units between October 1, 1973 and December 1, 1973. Following the writing phase, 110 pilot teachers from urban, suburban and rural communities piloted the program between February 1, 1974 and April 1, 1974. The results of the pilot test and the recommendations of a panel of experts were used to revise the units. Volume II of the resource catalog was also developed during the third year of the project.

The project was developed the following elementary units: Environmental Learning Experiences: K-2, 3 & 4, and 5 & 6. The units for both junior and senior high school are divided into Environmental Learning Experiences in Bio-Physical Disciplines and in Socio-Cultural Disciplines.

Reason: develop new	Adopt: (partial) 200 tchrs,	Pers: FT PT NRT	Publ: 15,000
course	5,000 students, 24 school	Adm 1	copies repro-
	districts	Wr 5	duced by offset
Initiator(s): D.M. Wint	Tchr Ed: minimal prepar-	VSch 5	
	ation required	Res	
		TEd 5	
		Trial 200	

Descriptive References:

Staff, W.B. The Concept of Environmental Education. Journal of Environmental Education.

Roth, P.E. Fundamental Concepts for Environmental Management Education. Journal of Environmental Education.

Research:

Menesini, M.M. The Environmental School. Educational Consulting Service, Orinda, California.

Environmental Education Program. Toledo public Schools, Toledo, Ohio.

**CENTER FOR URBAN RESEARCH  
IN ENVIRONMENTAL STUDIES (CURES)**

**Tee Greer, Director**

**Rm 210, Lindsey Hopkins Bldg  
1410 N. E. Second Ave  
Miami, Florida 33132**

**Tel: (305) 350-3306**

**1972-**

**Gov: Fed**

**See ICh Report(s): none**

<b>Ages:</b> 10-17, tchr ed	<b>Exper:</b> Cl 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang:</b> Eng	Lec	field guides
<b>Subj:</b> biol, chem, phys, earth-space, social sciences	Sem	newsletters
<b>Approach:</b> interdisciplinary, process, conceptual, inquiry, discovery	Disc	<b>Non-Print Materials:</b>
<b>Ability:</b> all	Indep	slides
<b>Eval Meth:</b> tchr jdgmts	Lab	audiotape
<b>Testing:</b> -	Fld	models
<b>Cont Resp:</b> tchr guided	Dem	
<b>Elvir:</b> community, school library	Sim	
	TV	
	A/V	

Funded by the Environmental Education Act and operated by the Dade County Schools, CURES represents an interdisciplinary approach to the study of urban problems. The project enables students to engage in problem-centered learning experiences outside the classroom.

Goals and objectives for the Center for Urban Research in Environmental Studies were determined by a group of science and environmental education teachers working with the Social Studies and Science Education Consultants. Members of the Dade County Public Schools Ecology Advisory Committee contributed ideas which were incorporated.

Dade County is a rapidly growing area and is becoming more "urban" every day. Young people need not only to be aware of the many problems facing an urban area, but also need to have basic knowledge and scientific facts to support social and political action required for proper planning and regulation of communities. The urgency of preserving a livable urban environment for young people was the motivation for becoming involved in this type project.

During the first two years of the project's operation, the CURES staff served over 4500 students in 40 different schools. Field studies focusing on virtually every type of urban environmental problem were conducted on such sites as water treatment plants, sewage treatment plants, solid waste disposal facilities, airports, parks, recycling centers, power plants, and residential neighborhoods from the ghetto to the new community.

Following the completion of the federal funding phase of the project, it is anticipated that the Dade County Schools will assume full responsibility for the financing and operation of the project.

<b>Reason:</b> update method, develop new course	<b>Adopt:</b> (partial) 30 tchrs, 2500 students, 20 schools	<b>Pers:</b> FT PT NRT	<b>Publ:</b> repro-
<b>Initiator(s):</b> H. Stanton, H. Ehrhard	<b>Tchr Ed:</b> provides films, consultants	Adm 2	duced insti-
		Wr 4	tutionally by
		VSch 2	mimeograph &
		Res 2	offset
		TEd	(\$150/10
		Trial	students)

**Descriptive References:**

Slack, G. April 1974. Toward Understanding the Faucet. American Education.  
10: 17-23.

**CHEMICAL BOND APPROACH  
(CBA)**

Laurence E. Strong, Director

Department of Chemistry  
Earlham College  
Richmond, Indiana 47374

Tel: (317) 962-6561, ext 309

1958-1965

Gov: NSF

See ICh Report(s): 7,6,5,4,3,2

Ages: * 16, 18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng. Sp, Portuguese, Japanese	Lec	texts
Subj: chem	Sem	lab books
Approach: discipline-centered, conceptual, inquiry	Disc ✓	supplementary books
Ability: all	Indep ✓	tchr manuals
Eval Meth: achievement & lab texts	Lab ✓	tests
Testing: -	Fld	newsletters
Cont Resp: tchr guided, material directed	Dem	charts
Envir: classroom, lab	Sim	
	TV	
	A/V	

The decision to develop a new chemistry course for high school students stemmed from conferences of college and high school teachers held in the summer of 1957 at Reed College and in the summer of 1958 at Wesleyan University.

The goal of the project was to develop a course that would introduce chemistry as a modern science emphasizing chemical change and molecular structure. The text, Chemical Systems is divided into five parts. Part One considers the nature of chemical change with emphasis on the interaction of substances in a system. Part Two develops a basis for understanding how atoms interact to form structures by considering the experimental evidence that atoms are electrical structures. In Part Three two mental models, the charge cloud model and the atomic orbital model are introduced. These models are used to explain structures of molecules and crystals. Part Four deals with covalent, metallic and ionic substances and Part Five with chemical equilibrium and the rate of reactions.

Throughout Chemical Systems, emphasis is placed on ideas and experiments, both of which are necessary in an effective study of chemistry. Stress is placed on operational and conceptual definitions and on how to think about chemical reactions.

A companion volume Investigating Chemical Systems includes a series of carefully prepared and evaluated laboratory investigations. The major aim of the laboratory program is to develop the relationship between theoretical and experimental chemistry by the experimental investigations of ideas and concepts in the laboratory. This is accomplished by having the student conduct investigations in the laboratory which involve ideas and concepts discussed in the classroom.

Self-instructional programs on the Charge Cloud Model and on Electrostatics and Potential Energy are available from Earlham College. The text, laboratory guide, teachers' guides and examinations are available from the Webster Division of McGraw-Hill.

Reason: update content & method	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially by linotype
	Tchr Ed: -	Adm 2	
Initiator(s):		Wr 15	
L.E. Strong, L.B. Clapp,		VSch 1 4	
H.A. Neidig, A.H. Livermore,		Res 4	
M.K. Wilson		TEd	
		Trial 200	

**Descriptive References:**

Livermore, A.H. and F.L. Ferris. Dec 7, 1972. The Chemical Bond Approach Course in the classroom. Science. 138(3545): 1077-1080.

Heath, R.W. and D.W. Stickell. Sept 1963. CHEM and CBA Effects on Achievement in Chemistry. The Science Teacher. 30(5).

CHEMICAL EDUCATION MATERIAL  
STUDY (CHEM STUDY)

George C. Pimental,  
David W. Ridgway, Directors

Lawrence Hall of Science  
University of California  
Berkeley, California 94720

1959-1963  
Gov: Fed(NSF)

See ICh Report(s): 8,7,6,5,4,3,2

Ages: 16-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr, Sp, Russ, Chin, Hebrew,	Lec 5	texts, lab books,
Icelandic, Hindi, Gujarati, Italian,	Sem	programmed units,
Japanese, Korean, Persian, Portuguese,	Disc 2	tchr manuals,
Thai, Turkish	Indep 6	tests, newsletters
Subj: chem	Lab 1	Non-Print Materials:
Approach: discovery	Fld	filmstrips
Ability: average	Dem 3	filmloops
Eval Meth:* achievement tests, tchr	Sim	films
jdgmt, lab & standardized tests	TV	overhead transpar-
Testing:* term, unit	A/V 4	encies
Cont Resp: tchr directed		
Envir:* lab, classroom		

In 1959 a committee of the American Chemical Society recommended that new curricula be developed, based upon experiments and devoting less time to descriptive chemistry. Beginning in 1960 chemistry professors and high school teachers, working together, with extensive classroom tryout, over a period of three years, developed the course.

CHEM Study goals differ greatly from those of traditional courses. These differences are reflected in the content of the course, in the relationship between laboratory and discussion, in the teaching methods, and in the skills that can be sought in testing. The content of the course has more orientation toward unifying principles and how they are drawn from experimental facts and less emphasis on the facts themselves. The activities in the laboratory are intimately built into the pedagogy, with careful attention to timing so the discussion can draw on relevant student experience. Teaching is less authoritarian -- it stimulates discovery - it encourages the student to think and question. Evaluation is based on the student's ability to solve problems and not on memorization. The impact of CHEM Study can be observed in changes brought about in college entrance examinations, since the advent of CHEM Study; in the significant proportion of the student population taking CHEM Study and by the changes noted by authors of current college chemistry textbooks who recognize the effects of CHEM Study upon students entering colleges.

The materials have been translated into 16 foreign languages. While no new materials are being developed at the present time, translations of the materials into other foreign languages continue.

Reason: update content	Adopt: 8,000 tchrs,	Pers: FT PT NRT	Publ: 1,400,000
& method, change in	400,000 students,	Adm 5 17	copies repro-
philosophy, develop	5,000 schools	Wr 4 23	duced commer-
new course		VSch 12	cially by
Initiator(s): G.T. Seaborg	Tchr Ed: provides manuals,	Res 20	offset &
G.C. Pimental, L. Malm,	guidebooks, films, and	TEd 25	linotype
J.A. Campbell,	consultants	Trial 110	
D.W. Ridgway			

Descriptive References:

Chem Study - Its Background - Its Influence - Its Revisions. April 1971. Canadian Chemical Education.

Chem Study - Its Impact and Influence. Jan 1970. The High School Journal. No. 4.

Chem Study - Knowledge of Chemistry. Nov 1972. Science Activities.

Research:

Merrill, R.J., D.W. Ridgway. 1969. The Chem Study Story. San Francisco: W.H. Freeman and Company.

Troxel, V.A. 1968. Analysis of Instructional Outcomes of Students Involved with Three Courses. Doctoral Dissertation, University of Iowa.

**CHEMICAL TECHNICIAN  
CURRICULUM PROJECT (ChemTeC)**

Robert Pecso, Director  
Contact: K. Chapman, Assoc. Dir.  
See ICh Report(s): none

American Chemical Society  
1155 - 16th Street, N.W.  
Washington, D.C. 20036  
Tel: (202) 872-4593

1969-1972  
Gov

Ages: 17-20	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts & lab books,
Subj: chem, tech	Sem	tchr manuals
Approach: discipline-centered	Disc	Non-Print Materials:
Ability: avg	Indep	films, videotape
Eval Meth: lab tests & tchr jdgmt	Lab     ✓             ✓	
Testing: varies	Fld	
Cont Resp: tchr directed	Dem	
Envir: lab	Sim	
	TV	
	A/V	

The ChemTeC project was designed to prepare a curriculum and the instructional materials for a two-year post-high school program to prepare individuals for direct employment as chemical technicians. Emphasis is placed upon laboratory work.

The textual products are designed to create a high level of interest in students who would traditionally be in the middle half of high school graduating classes. A conversational presentation style is used that has proven to be very understandable to students. Instructions for experiments are an integral part of the text presentation.

A philosophy of "give the student a reason to want to learn theory" was used to guide development of the test. As a result, order of topic presentation is different from the traditional order used for chemistry instruction. A spiral approach is used to provide reinforcement and avoid placing too great a demand on students at too early a point in the program.

The program was tested in pilot colleges and revised prior to preparation of the commercial product. The texts are in use in high schools and two-year and four-year colleges throughout the United States.

Reason: develop new course	Adopt: --	Pers: FT PT NRT	Publ: 1500 copies reproduced commercially by offset (\$400/10 students)
Initiator(s): R. Pecso, K. Chapman	Tchr Ed: no special preparation required	Adm 1 1 Wr 25 VSch 1 Res TEd Trial 18	

**Descriptive References:**

Pecso, J. 1973. Chemistry.  
Chapman. 1972. Journal of Engineering Education.  
Chemical and Engineering News. July 1969. 14:9.  
Chemical and Engineering News. Sept 1970. 14:38-40,42.  
Chemical and Engineering News. Nov 1970. 16:7-8.

Terry Shoemaker, Director

See ICh Report(s): 7

Ages: 12-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: math	Sem	
Approach: process	Disc	
Ability: slow	Indep	
Eval Meth: tchr jdgmt	Lab     /   /   /   /	
Testing: varies	Fld	
Cont Resp: tchr guided	Dem     /   /	
Envir: classroom	Sim             /   /	
	TV	
	A/V	

The COLAMDA Teacher Idea Cards and COLAMDA Student Activity Packets are the result of efforts by over 100 teachers (1968-71) in the Denver area and edited by Terry Shoemaker in 1973. This effort was coordinated and funded through USOE Title III project from 1968 to 1971 entitled Committee On Low Achievers in Mathematics-Denver Area (COLAMDA). The aim of this project was to prepare non-textbook type materials for aiding the teacher of and students who were low achievers in mathematics at the secondary level.

A "Low Achiever" was defined as any student who scored more than two grade levels below his actual grade level in mathematics achievement. Therefore, the packet may be used quite effectively from about the fourth grade level through senior high school. With very little revision, however, many of the activities are being successfully used even into the primary grades.

The materials are frequently called the "COLAMDA Packet" and were written by teachers and field tested over the three year period of the project. They were originally written so as to not duplicate any previously published materials. All are activity oriented and require student involvement. The packet consists of basically two things; the teacher idea cards (5 x 8 cards) and student activity sheets (8 1/2 x 11 black on white sheets). Included in the packet of student activity sheets are; COLAMDA performance objectives and tests, numerical and alphabetical listings of activities, and some printed card decks.

The materials are designed to serve as extensive supplementary material, not to replace the classroom textbook. The materials have been very successful in providing varied activities for use in teaching basic mathematical concepts and skills.

The COLAMDA Packet can be purchased through the Northern Colorado Educational Board of Cooperative Services.

Reason: change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: repro-
	Tchr Ed: conducts work-	Adm     5	duced by mimeo-
	shops; provides con-	Wr       250	graph & offset
Initiator(s): 200 tchrs	sultants	VSch     5	(\$100/10 stu-
		Res	dents)
		TEd       20	
		Trial     250	

No references given



COMMITTEE ON THE UNDERGRADUATE  
PROGRAM IN MATHEMATICS (CUPM)

D. W. Bushaw, Director

P.O. Box 1024  
Berkeley, California 94701

Tel: (415) 527-2363

1958 -

Gov: Fed(NSF)

See ICh Report(s): 8

Ages: 16	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	studies &
Subj: math	Sem	recommendations
Approach: * discipline-centered, integrated	Disc	
Ability: all	Indep not answered	
Eval Meth: -	Lab	
Testing: -	Fld	
Cont Resp: -	Dem	
Envir: -	Sim	
	TV	
	A/V	

The Committee on the Undergraduate Program in Mathematics (CUPM) is a standing committee of the Mathematical Association of America. Of the various professional organizations of mathematicians of the MAA is the one concerned with collegiate level mathematics. CUPM is the agency through which this concern is implemented in the area of curriculum.

Through the Committee itself and a variety of Panels formed to study specific problems, CUPM has issued over the years a series of reports representing the recommendations of the best available experts on a wide range of curricular and pedagogic issues. The dissemination and discussion of these reports, with a view to the implementation of their recommendations, where appropriate, has been a major facet of CUPM's activities as well. These efforts played a significant role in the rapid evolution of undergraduate mathematics curricula that took place during the past twenty years and which is a continuing process.

Reason: * update content and methods	Adopt: -	Pers: FT PT NRT	Publ: 3,000-
Initiator(s): standing committee of the Mathematical Association of America	Tchr Ed: provides guide- books and consultants	Lm 8 1 25 Wr 30 VSch 20 Res TEd Trial	10,000 copies of each report reproduced institutionally by offset

Descriptive References:

Duren, W.L. 1966. CUPM, The History of an Idea. American Mathematical Monthly.

Compendium of CUPM Reports. Mathematical Association of America (to appear).



COMMUNITY ENVIRONMENTAL  
STUDY PROGRAM (CESP)

Edward Hessler, Director

5400 Glenwood Avenue  
Minneapolis, Minnesota 55422

Tel: (612) 544-8971

1971-1974

Gov: Fed

See ICh Report(s): none

Ages: 5-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets,
Subj: biol, soc sci, home ec, Eng	Sem	tchr manuals, tests
Approach:* interdisciplinary, discovery, process	Disc	
Ability: all	Indep	✓ ✓
Eval Meth: tchr jdgmt	Lab	
Testing:* individual, unit	Fld	✓ ✓ ✓ ✓
Cont Resp:* student, tchr & material directed, tchr guided	Dem	
Envir:* community, school grounds, classroom	Sim	
	TV	
	A/V	

The overall intent of the project is to develop a "model" which can be used by students, teachers and community members to develop environmental education study materials useful to and adaptable by others, that result from experiences in the local community and its environment. We have worked with teachers and community residents in five somewhat diverse communities. The communities have been urban, suburban and rural (rurban) in make-up.

Special education is an important dimension of CESP and one of our intents has been to involve special education teachers and students in real experiences and investigations in the communities around their schools. During the three years of the project we have worked primarily with teachers from special stations and teachers of special education students in self-contained classrooms in regular schools.

The major emphasis the first two years of the project was on the production of teacher developed materials which focus on local communities and also learning how to work with school staffs in increasingly viable, facilitative and helping ways. The third year of the project we have continued to produce teacher developed materials but in addition to this, we have also spent much of our time working with school groups in these districts to develop a plan for maintaining a community environmental oriented program after federal funding ceases in June.

Materials produced by the project include Breaking Into Your Community, an activity and process series, emphasizing land use, planning, lifestyles, energy, transportation, action and community assignments and Helping Teachers to Find and Use Communities for Learning, a workshop series describing general workshop, materials development and program planning processes used in the project.

Reason:* change in philosophy, develop new courses, update methods	Adopt: 25 tchrs, 625 students, 4 schools	Pers: FT PT NRT	Publ: 200-500
Initiator(s): M.J. Naylon	Tchr Ed: conducts workshops, provides consultants	Adm 1 1	copies repro-
		Wr 147	duced commer-
		VSch 3	cially by
		Res	mimeograph
		TEd 3	& xerox
		Trial 147	(\$50/10 stu-
			dents)

Descriptive References:

- Myshak, R.J. 1971. Community Environmental Studies Program. IPN Symposium, Kiel, Germany. 355-366.
- Hessler, E. 1972. Community Environmental Study Program. National Symposium Methods Learning Environmental Science.
- Naylon, M.J. 1972. Environmental Studies and the Community Council, National Symposium Methods Learning Environmental Science.
- Research:
- Evaluation Reports. Educational Management Services, 4510 West 77th Street, Minneapolis MN 55435.

COMPUTER ASSISTED INSTRUCTION  
LABORATORY IN MATHEMATICS &  
SCIENCE (CAI)

Thomas A. Hartley, Jr.,  
Director

7618 Wyandotte Street  
Room 214  
Kansas City, Missouri 64114

Tel: (816) 363-4482

1967 -

Gov: Fed

See ICh Report(s): 8,7,6

Ages: 11-13

Lang: Eng

Subj: chem, phys, earth-space, math

Approach: interdisciplinary

Ability: all

Eval Meth: standardized tests,  
student questionnaire

Testing: term

Cont Resp: tchr directed

Envir: lab

Exper: CI 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Computer

Printed Materials:

objectives,  
overview

Non-Print Materials:

games, computer  
programs

In its six years of existence in the Kansas City School District, Computer Assisted Instruction (CAI) has provided individualized instruction in math and science for over 4000 students at the junior high school level. To provide this individualized instruction the CAI staff of teachers has developed over 65 computer-based lessons. This includes lessons that are either remedial or enrichment in nature.

When a student completes the series of basic math lessons, he is then given enrichment lessons in math and science. He is allowed some choice of enrichment lessons in this phase. Most of the CAI lessons developed by our staff have primarily used the strategy of drill and practice, tutorial dialogue or some combination of these.

Until this year all CAI activities were carried on at one junior high school with the IBM 1500 instructional system with 16 student terminals. In 1974 the 1500 system was replaced by a centralized computer (IBM 370/135) which simultaneously handles administrative data processing along with 23 CAI with this system to eight junior highs with a total of 64 terminals.

Evaluation of CAI in the Kansas City School District indicates that students using CAI in addition to their regular classroom instruction make significantly greater progress in basic math skills and concepts in comparison with either national norms or with comparable groups of students having the same teachers but not having CAI.

Reason: update content & Adopt: 12 tchrs,  
methods, change in phil- 1000 students,  
osophy, develop new 2 schools  
course  
Tchr Ed: conducts work-  
shops

Pers: FT PT NRT

Adm 1

Wr 3

VSch

Res

TEd

Trial

Publ: repro-  
duced by  
mimeograph  
(\$700/10 stu-  
dents)

Initiator(s); Kansas  
City Mo. Sch. District,  
J. Hazlett, G.E. Wesner,  
F. O'Neal

Descriptive References:

O'Neal, F. March 1970. The Role of Public Schools in Computer Assisted Instruction.  
Educational Technology.

Research:

Hartley, T.A., Jr. Report on Changes in Numerical Ability for Bingham Eighth Grade  
Students as Measured by the D.A.T. for the 1972-73 School Year.

**COMPUTER-BASED EDUCATION  
(C-BE)**

John J. Allan III and  
J.J. Lagowski, Directors

The University of Texas at Austin  
Engineering Lab Building, 413  
Austin, Texas 78731

Tel: (512) 471-4191

1972-1975

Gov:Fed(NSF)

See ICh Report(s): none

Ages: college	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	supplementary books,
Subj: technology, social sciences	Sem	tchr manuals, tests,
Approach: interdisciplinary	Disc	objectives, charts,
Ability: average, average +	Indep ✓	overview, news-
Eval Meth:* student questionnaire, lab	Lab ✓	letters
& standardized tests, tchr jdgmt	Fld	
Testing: varies	Dem	Non-Print Materials:
Cont Resp:* tchr guided, material &	Sim ✓	slices
student directed	TV	games
Envir:* classroom, lab	A/V	computer programs

Project C-BE is a four-year project with a \$1.3 million NSF budget which began in January, 1972. The effort is also receiving sizeable contributions from The University of Texas at Austin. The goal is to study the effects of computer-based instruction at a typical large university.

The Project is the first coordinated, massive assault using computer-based techniques ever attempted at one university. Professors in many fields, including such areas as various fields of engineering, chemistry, psychology, mathematics, physics, zoology, economics, home economics, architecture, and biology are participating in the experiment.

Today, the typical professor is being swamped by ever-increasing numbers of students, and yet the students are very much in need of individualized instruction. With the use of the computer as a supplement to course material, the teacher can give the students much more individualized instruction, because he will have more time to actually interact with the students. Computer-based instructional techniques will assist the instructor in teaching large classes material which is more and more sophisticated. The computer is being used in both lecture and laboratory situations.

In order to make the above changes a reality, Project C-BE must accomplish four goals which the National Science Foundation has set. First, the Project must identify common concepts that apply to many areas of computer-based education. Second, methods of evaluating the economic and teaching effectiveness of using the computer as a basis for higher education also must be developed. Third, an administrator considering initiating computer-based techniques in his institution must know the pedagogical and financial investment his school would have to make. And, the fourth goal is to point out what must be present before computer-based materials can be transferred easily from one institution to another.

Reason: update method	Adopt: 36 profs, 48 tching assts, 3,000 students, 5 schools	Pers: FT PT NRT Adm 13 Wr 27 VSch Res 27 TEd Trial 27	Publ: repro- duced institu- tionally by offset
Initiator(s): J.J. Allan III & J.J. Lagowski			

**Descriptive References:**

General Information on PROJECT C-BE (Part I). (EP-1/2/24/72).

General Information on PROJECT C-BE (Part II). (EP-2/10/1/72).

Allan, J.J., III, and J.J. Lagowski. Eighteen Months of PROJECT C-BE. (EP-17/7/11/73).

COMPUTER ORIENTED MATERIALS  
PRODUCTION FOR UNDERGRADUATE  
TEACHING (COMPUTE)

Kiewit Computer Center  
Dartmouth College  
Hanover, New Hampshire 03755

1971-1975  
Gov:Fed(NSF)

Arthur W. Luehrmann, Jr.,  
Director

Tel: (603) 646-2643

See ICh Report(s): 8

Ages: college	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: biol, chem, phys, earth-space, math, technology, social sciences, economics, geography, urban studies	Sem	lab books
	Disc ✓	supplementary books
	Indep ✓	tchr manuals
Approach: discipline centered	Lab ✓ ✓	newsletters
Ability: all	Fld	
Eval Meth: lab tests, tchr jdgmts	Dem ✓	
Testing: term	Sim ✓	
Cont Resp: tchr guided	TV	
Envir: classroom, lab	A/V	

COMPUTE is designed to effect educational change by providing high-quality course material at the undergraduate level in support of computer uses in instruction. The project solicits proposals on a national basis for writing projects in specific discipline areas. It does not support the research and development of new teaching techniques, but seeks to identify existing, successful uses of computing and provide the resources necessary to document a teacher's experience in such a way that it can be enjoyed by others. The project provides up to 2 months summer salary, plus partial travel and housing costs, for an author (i.e., an active teacher) to come to Dartmouth to write discipline-oriented textual material. Secretarial, editorial and programming support is provided by permanent and temporary staff to prepare material for publication. Exposition is aimed chiefly at students, but additional material directed at potential instructors is also provided. If an author writes well, he is further rewarded with royalties on his sales.

COMPUTE also seeks to change the fundamental attitude of publishers toward computer-dependent teaching material by demonstrating that there is a market for this product which is sufficiently large and has adequate growth potential to merit commercial support. The project seeks an exclusive publishing contract for all its texts in order to ensure a product identity which will be useful in developing the market and in assessing the value of this model for developing instructional material.

Reason: update method, publication	Adopt: unknown	Pers: FT PT NRT	Publ: reproduced
		Adm 2 1	institutionally
Initiator(s): T.E. Kurtz, A.W. Luehrmann	Tchr Ed: provides manuals & guides; or no special preparation required	Wr 7 VSch Res TEd Trial	& commercially by mimeograph & offset.

Descriptive References:

Morton, A.K. Oct 1972. Project COMPUTE: Objectives, Rationale, Procedures. ACM Science Bulletin. 6(4).

Luehrmann, A.W. Sept 1973. Reading, Writing, Arithmetic, and Computing. In Proceedings, Educational Technology Symposium, SUNY Stony Brook.

**CONCEPTUALLY ORIENTED PROGRAM IN  
ELEMENTARY SCIENCE (COPES)**

Morris H. Shamos, Director

See ICh Report(s): 8,7,6,5,4

New York University  
4 Washington Place  
Room 261  
New York, New York 10003

Tel: (212) 598-3734

1965-1974

Gov: Fed(USOE,  
NSF); New York  
University  
School of Ed

Ages: 5-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: biol, chem, phys, earth-space	Sem	tests
Approach: * integrated, conceptual,	Disc 1 2	overview
inquiry, discovery	Indep	newsletters
Ability: all	Lab 1 2	
Eval Meth: assessment instruments,	Fld	
tchr jdgmt	Dem	
Testing: unit	Sim	
Cont Resp: tchr guided	TV	
Envir: * classroom, sch grounds, community	A/V	

The COPES program, a product of a project at New York University concerned with elementary science curriculum, is based upon selected "great ideas" or conceptual schemes in science. The ultimate goal is to help develop scientific literacy -- by developing an understanding of the nature of matter (both animate and inanimate) in terms of a few basic conceptual schemes. Each concept, each conceptual scheme is presented in a K-6 spirally structured learning sequence with the purpose of contributing to this understanding. The concepts are organized in hierarchical fashion which is both scientifically and pedagogically logical.

The COPES curriculum is highly explorative and action-centered. Almost all activities require that explorations of a nonreading nature be carried out by individual or groups of children. The curriculum is presented in the form of a series of Teacher's Guides for K through Grade 6. There is no material written for children. All activities are designed to use materials readily available locally or from supply houses familiar to the elementary school. The guides contain detailed descriptions of the sequence of activities to be performed, the materials required and the worksheets to be provided the children.

At present the Teacher's Guides K-6 (preliminary edition) are published and distributed by New York University's Center for Educational Research. (51 Press Building, New York, NY 10003). One single concept booklet, suitable for Grade 3 and above (Water-Mix Experiments) is published by American Science and Engineering. (20 Overland Street, Boston MA 02215).

Reason: develop new course	Adopt: 125 tchrs, 3,000 students, 10 schools	Pers: FT PT NRT Adm 1 3 Wr 6 6 VSch 5 Res 2 5 TEd 4 Trial 2 45	Publ: 2,000 sets (K-6) repro- duced institu- tionally by offset (\$15/10 students)
Initiator(s): M.H. Shamos, J.D. Barnard	Tchr Ed: * provides man- uals & consultants; conducts workshops		

**Descriptive References:**

Barnard, J.D. Nov 1971. COPES The New Elementary Science Program. Science and Child-  
ren. 9: 9-11.

Barnard, J.D. Spring 1971. The Conceptual-Scheme Rationale in Science Education. New York University Educational Quarterly. II: 24-30.

Shamos, M.H. Jan 1966. The Role of Major Conceptual Schemes in Science Education. The Science Teacher. 33(1): 27-30.

**Research:**

Nevarez, M.A. 1971. A Comparison of Three Methods of Oral Presentation of Science Activities to Fourth Grade Spanish Speaking Children. Unpublished doctoral dissertation, New York University.

Feerst, F. 1972. A Comparison of Two Methods of Enriching a Science Curriculum So As to Change the Attitudes of Children Towards the Relevance of Science. Unpublished doctoral dissertation, New York University.

Ukens, L.L. 1972. The Relationship Between Certain Structure-of-Intellect Abilities and Achievement in a Selected Sequence from the Conceptually Oriented Program in Elementary Science. Unpublished doctoral dissertation, New York University.

CONSERVATION CURRICULUM  
IMPROVEMENT PROJECT (CCIP)

Albert H.H. Dorsey, Director

J.G. Ferguson Publishing Company  
100 Park Avenue  
New York, New York 10017

1965-1968

Baruch  
Foundation

See ICH Report(s): 8,7,6,5

Age: 6-18	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec	supplementary books
Subj: biol, earth-space, social sciences,	Sem	tchr manuals
chem, phys, home-economics	Disc 1 4 3	
Approach: interdisciplinary, conceptual,	Indep 1 1	
inquiry, discovery	Lab 2	
Ability: all	Fld 2 1 2	
Eval Meth:* achievement, lab & oral tests,	Dem 3	
tchr jdgmts, project	Sim 4 3 4	
Testing: unit	TV	
Cont Resp: tchr guided	A/V	
Envir:* school grounds, community,		
classroom, lab		

This project has developed a series of eight curriculum guides which suggest an approach to the teaching of conservation as an integral part of various subject matter areas at all levels of education. These guides, in the areas of general science, biology, social studies, home economics and outdoor education, are under the general title People and Their Environment - Teachers' Curriculum Guide to Conservation Education. The objectives of the project are: 1) to develop guides for integrating conservation education into the total school program; 2) to provide background knowledge and to elucidate the principles of teaching conservation for the inexperienced teacher; 3) to provide interdisciplinary materials for the teaching of conservation in a variety of contexts; and 4) to develop a cooperative program for schools and other interested groups to establish better conservation practices. The guides may be purchased from the J.G. Ferguson Publishing Company, 100 Park Avenue, New York, New York 10017.

Reason:* develop new	Adopt: -	Pers: FT PT NRT	Publ: reproduced
units, update context	Tchr Ed: -	Adm 1	commercially
& method		Wr 34	
		VSch	
Initiator(s):		Res	
J.C. Holler, J. Ott,		TEd	
A.H.H. Dorsey		Trial 2000	

Descriptive References:

The Science Teacher. April 1967.



COOPERATIVE CURRICULUM  
IMPROVEMENT PROGRAM -  
BIOLOGY (BioCO-TIE)

J.P. Jordan, Director

See ICh Report(s): 8

Room 205 BRB Building  
Colorado State University  
Ft. Collins, Colorado 80523

Tel: (303) 491-5593

1971-1974

Gov: Fed(NSF);  
Kettering, Sloan  
& Boettcher  
Foundations

	Exper:	Cl	12+	2-12	I	Printed Materials:
Ages: 19	Lec	✓	✓	✓		lab books
Lang: Eng, Sp	Sem					tchr manuals
Subj: biol	Disc	✓	✓	✓		Tests
Approach: * conceptual, integrated	Indep			✓	✓	objectives
Ability: all	Lab	✓	✓	✓	✓	course outlines
Eval Meth: * achievement tests, student questionnaire	Fld	✓	✓	✓		Non-Print Materials:
Testing: * unit, term	Dem	✓	✓	✓		slides, overhead
Cont Resp: tchr directed	Sim	✓	✓	✓		transparencies,
Envir: * classroom, lab	TV	✓	✓	✓	✓	videotape, models,
	A/V	✓	✓	✓	✓	lab equipment

Project BioCO-TIE is a cooperative arrangement between Colorado State University and thirteen junior college campuses in the state designed to assist the junior colleges in providing the second year of the Core Curriculum in Biology as developed at CSU. It provides supplementary material which will allow for easy transferability of students into the advanced biology programs at CSU and at other four-year institutions in the state. The program is organized around a steering committee involving both CSU and junior college personnel. Direction and control of classes will remain in the hands of local college faculty members. Assistance to junior colleges may range from simple lecture outlines to full support including supplies for laboratory experiments.

Use of briefing and debriefing conferences have proven effective in the two-way exchange of philosophies, techniques and for providing teachers with the most recent results of research in the various subject areas. In addition, they are utilized for the purpose of disseminating media efficiently to the users.

Under the leadership of Dr. Douglas Sjogren, evaluation activities are proceeding to: (a) determine the effectiveness of the BioCO-TIE system for dissemination of scientific and technical information, and (b) examine the viability of the procedures used to evaluate the system.

Plans for the future include the commercial packaging of three biology sessions for widespread use. These packages include Population and Community Biology, Cell Biology, and Developmental Biology which have all been utilized on an experimental basis by CSU and the two-year colleges involved in the project.

Reason:	Adopt:	Pers:	FT	PT	NRT	Publ:
facilitate transfer between institutions	30 tchrs, 1,000 students, 14 schools	Adm		6		reproduced institutionally by offset.
		Wr		11		
		VSch		3		
Initiator(s): J.P. Jordan, G.J. Johnson, W. Gore, F.J. Vattano, N.P. Davis	Tchr Ed: conducts workshops; provides manuals, guides, consultants, slides & videotape	Res				
		TEd		17		
		Trial		23		

**Descriptive References:**

BioCO-TIE: The Genesis of a Cooperative Curriculum Improvement Program. 1973. College Science Teaching. 2(4): 25.

Johnson, G.A., and D.W. Hess. April 1971. BioCO-TIE: A Cooperative Approach to the Second Year Core in Biology. Southwestern and Rocky Mountain Division, American Association for the Advancement of Science.

Johnson, G.A. June 1971. Instructional Media, Colorado State University and Community Colleges. National Association of Colleges and Teachers of Agriculture, National Meeting.

**Research:**

Sjogren, D., and H. Cross. May 1973. Evaluation Report #1.

Wittman, R., D. Sjogren, and H. Cross. Fall 1973. Follow-up of Junior and Community College Transfers to CSU.

Wittman, R., D. Sjogren, and H. Cross. April 1974. Internal Evaluation of BioCO-TIE-BCT 201.



COOPERATIVE ENVIRONMENTAL  
EDUCATION PROJECT (CEEP)  
Lawrence Liggett, Director

Environmental Education Center  
13 Veterans Drive  
Oteen, North Carolina 28805  
Tel: (704) 298-3707

1971-1974  
Gov: Fed

See ICh Report(s): none

Ages: 12, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	activity sheets,
Subj: environmental ed	Sem	tchr manuals
Approach: discipline centered, inter-	Disc ✓	field guides
disciplinary, integrated	Indep ✓	overview
Ability: all	Lab ✓	newsletters
Eval Meth: achievement & standardized	Fld ✓	Non-Print Materials:
tests, student questionnaire	Dem ✓	slides
Testing: term	Sim ✓	slide tape
Cont Resp: administration, tchr and	TV	
student directed	A/V	
Envir: community, sch grounds, classroom,		
sch library, lab		

The mission of the Environmental Education Center is to foster within sixth graders in participating school populations of Western North Carolina knowledge about and positive attitudes towards the environment and man's role in the environment.

The major objectives of the project are as follows: 1) to help participating sixth graders become more informed about the environment and man's relationships with it; 2) to create among participating sixth graders positive attitudes toward the environment and man's relationships with it; and 3) to develop among the teachers of participating sixth graders a competence to educate their students about the environment and man's relationships with it.

The Cooperative Environmental Education Project will undertake four major activities to achieve its stated goals: 1) a case study of each participating school will be undertaken; 2) an in-service teacher education workshop will be held for participating sixth grade teachers; 3) an in-classroom consultant services program will be instituted in each of the participating sixth grade teachers' classrooms; and 4) an evaluation session will be held with staff, teachers, and students participating to determine significant changes in the future operation of the project.

External evaluation of the project involves a complete testing program of all participating teachers and students and contains control group data. Baseline data has been gathered from over 1800 students. Preliminary results of tests with teachers indicates that teacher attitude increased significantly at the .025 level and teacher knowledge also showed an increase at the .025 level of significance.

Reason: update content & method, change in philosophy	Adopt: 100+ tchrs	Pers: FT PT NRT	Publ: 500 copies
Initiator(s): Madison County Schools	Tchr Ed: conducts workshops, provides manuals, guidebooks, films, & consultants	Adm' 1 Wr 4 VSch 4 Res 1 1 TEd 4 Trial 70	reproduced institutionally by mimeograph

No references given

COOPERATIVE GENERAL SCIENCE  
PROGRAM (CGSP)

O.P. Puri, Director

Clark College  
Atlanta, Georgia 30314

Tel: (404) 523-3538

1966-1971

Gov and Private

See ICh Report(s): 8,7

Ages: college	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	texts, lab books,
Subj: biol, chem, phys, earth-space, math	Sem	tchr manuals, tests,
Approach: integrated	Disc ✓ ✓	newsletters
Ability: all	Indep	Non-Print Materials:
Eval Meth: achievement & lab tests, tchr	Lab ✓ ✓	overhead transpar-
jdgmt, student questionnaire	Fld	encies, videotape
Testing: individual	Dem ✓ ✓	
Cont Resp: tchr directed & guided	Sim	
Envir: classroom, lab	TV	
	A/V ✓ ✓	

The program developed by CGSP consists of a one semester course in Physical Science and a one semester course in Life Sciences. The Physical Science segment of this program has been completed and final versions of materials have been published. The Life Sciences materials are being revised for publication in 1974.

There is no question about the fact that our Science program, carried out over the past eight years, has materially strengthened the curriculum of the cooperating institutions, i.e., Clark, Morehouse, Morris Brown and Spelman Colleges. Several other colleges share equally in the academic offerings of this program each academic year. A certain uniformity of programs and learning situation makes it possible for students in each college to receive good teaching from qualified teachers all working together in a single program conceived and administered within a context of unity of purpose and well thought out preconceived goals.

The task of bringing the materials of science to the attention of liberal arts majors gives ample opportunity to observe the need of teaching to individual student differences. Our students have backgrounds so varied and goals so diverse that some serious effort must be made to accommodate the materials and the presentation of the materials to these students as we find them rather than wait or hope they change in any significant way in the direction of uniformity.

We are always on guard to determine and evaluate the opinions of students about the affairs of the project, because the attitude of students determine to a great extent how well they learn the new materials. We are convinced of the value of a separate science course for liberal arts majors and feel that such a course should concentrate on developing an understanding of the conceptual aspects of science. We find that the multimedia approach, viewing sessions, and field trips to be effective in stimulating interest among many of our students, and we have found that students learn more easily when laboratory apparatus is ample and pertinent to past or projected experiences of the student.

Reason: change in philosophy, develop new courses, publication	Adopt: -	Pers: FT Pf NRT	Publ: repro-
	Tchr Ed: provides manuals, guides, films & consultants	Adm 1	duced commer-
		Wr 5	cially (\$100/
		VSch 2	10 students)
Initiator(s): O.P. Puri		Res 2	
		TEd	
		Trial 20	

Descriptive References:

The Physics Teacher. Sept 1971. 9(6): 320-323.

Research:

The Physics Teacher. Sept 1971. 9(6): 348-349.

CORE-COURSE FOR COLLEGE SCIENCE  
MAJORS CONTAINING PHYSICS, CHEM-  
ISTRY AND BIOLOGY

Arnold D. Pickar, Director

See ICh Report(s):

Department of Physics  
Portland State University  
Box 751  
Portland, Oregon 97207  
Tel: (503) 229-3812

1967-1969

Gov: Fed(HEW-OE)

Ages: 18-20	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	overview
Subj: biol, chem, phys	Sem	charts
Approach: integrated	Disc ✓	
Ability: all	Indep ✓	
Eval Meth: achievement and lab tests	Lab ✓	
Testing: weekly	Fld	
Cont Resp: team directed	Dem ✓	
Envir: classroom, lab	Sim	
	TV	
	A/V	

This course is intended for the serious science students who would profit from enrolling in introductory courses in biology, physics, and chemistry. It is intended that completion of the combined 2 year course will prepare the student to undertake a major in any of these three disciplines or in pre-medicine or pre-dentistry. Among the advantages envisioned for the student are increased efficiency and flexibility in the use of his course-hour load. This course is not intended for general education or liberal arts majors.

Reason: update method, change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: -	Adm	institutionally
Initiator(s):		Wr	& commercially
A.D. Pickar,		VSch not	by offset &
A. Levinson,		Res answered	linotype
D. Malcom		TEd	
		Trial	

Descriptive References:

BioScience. 1970. 20: 4814.

Pickar. A.D. Feb 1970. Core Course for Science Majors Combining Material from Physics, Chemistry, and Biology. American Journal of Physics. 38(2): 255-264.

Research:

Office of Education: Final Report Project 7-I-063.

Office of Education: Final Report Project 6-8468.

**CRYSTAL LAKE OUTDOOR EDUCATION  
PROGRAM**

N. Ziemer, Director

330 N. Main Street  
Crystal Lake, Illinois 60014

Tele: (815) 459-5557

1967-

Participating  
Sch

See ICh Report(s): none

Ages: 5-18	Exper: C3 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr	Lec ✓	tchr manuals
Subj: biol, chem, phys, earth-space,	Sem ✓	field guides
math, tech, soc sci, art, music,	Disc ✓ / ✓	tests
p.e., language arts	Indep	overview
Approach: interdisciplinary, conceptual,	Lab ✓ / ✓	newsletters
inquiry, discovery	Fld ✓	
Ability: all, slow learner, special ed	Dem ✓ / ✓	Non-Print Materials:
Eval Meth: oral tests, tchr jdgmts,	Sim ✓	slides
student q're, interest inventories	TV ✓ / ✓	overhead trans-
Testing: end of resident program	A/V ✓	parancies
Cont Resp: tchr guided, student directed		videotape
Envir: community, sch grounds, classroom,		games
sch library or resource center, lab		models
		lab equipment

Included in the Crystal Lake Outdoor Education program are instruction, study and discussion of current problems and needs in the conservation of natural resources, including but not limited to, air pollution, water pollution, the effect of excessive use of pesticides, preservation of wilderness areas, forest management, and protection of wildlife, and humane care of domestic animals.

The most important characteristic of outdoor education is, of course, that it is carried on IN the outdoors. Outside the classroom, pupils may be brought into direct sensory relationship with a multitude of productive learning situations.

Many classroom teachers in School District 47 use outdoor education activities to lay the groundwork for systematic study in the classroom and laboratory. They may use the techniques of outdoor education, when appropriate, to teach subject matter heretofore unknown or to enrich subject matter already acquired by their pupils.

Reason: update methods	Adopt: (partial) 150	Pers: FT PT NRT	Publ: repro-
Initiator(s):	tchrs, 800 students,	Adm 1	duced by
School District #47	12 sch	Wr	offset
	Tchr Ed: conducts work-	VSch	
	shops; provides manuals,	Res	
	guides, films, consul-	TEd	
	tants	Trial 1 Aide	

No references given

**CUYAHOGA HERITAGE PROJECT,  
NORTHEAST OHIO**

Joseph H. Chadbourne,  
Director

See ICh Report(s): none

Institute for Environmental  
Education  
8911 Euclid Avenue  
Cleveland, Ohio 44106  
Tel: (216) 791-1775

1971 -  
Gov, Private,  
University,  
Foundation,  
Publisher, &  
Participating  
Schools

Ages: 13-20, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: environmental ed	Sem	field guides
Approach: interdisciplinary, integrated, process	Disc ✓	overview
Ability: all	Indep	newsletters
Eval Meth: varies	Lab ✓	
Testing: varies	Fld ✓	
Cont Resp: tchr and student directed, tchr guided	Dem	
Envir: community, classroom	Sim	
	TV	
	A/V	

The goal of the project is to prepare a cadre of teachers in Northeast Ohio public and independent schools who can train other teachers and their students to use community concerns as a focus for classroom study. Teacher training and curriculum development occurs through a series of graduate courses taught by the Institute for Environmental Education extension staff on behalf of the accrediting institution, Cleveland State University. The courses prepare teachers to design their own community studies, develop a process approach with students as investigatory team and create "contractual" relationships with community agencies to provide them a needed and valuable environmental service.

The whole program is designated a National Demonstration Project by the U.S. Office of Environmental Education. The Project commences its third year July 1, 1974. The Project welcomes visitors; member teachers and students conduct workshops throughout the United States; their curriculum guides and activities are written and distributed by the non-profit Institute for Environmental Education as the "Environmental Education Guide Series".

Teachers and students train together as teams; work in their own communities, each in a unique response to perceived needs; some members group as a network to provide technical information to local, state, and federal environmental service agencies.

Students acquire precareer skills in research procedures, a working knowledge of their community's problems and political organization, broad experiences in collaborating with professionals, a sense of school as a place to acquire problem-solving tools, recognition from the community, a deep appreciation of the teaching role in education, and a real grasp of the interrelatedness of themselves with other people, organisms, and the natural and manmade environment.

Reason: change in philosophy, publication	Adopt: ..	Pers: FT PT NRT	Publ: 8,000 sets
Initiator(s): J.H. Chadbourne, A. McGowan, T.W. Offutt	Tchr Ed: conducts workshops, provides guide-books and consultants	Adm 2 1 Wr 1 VSch 2 Res TEd 2 Trial 50	reproduced institutionally & commercially by offset & linotype

**Descriptive References:**

Cleaning up the Cuyahoga. Dec 1973. Scholastic Teacher.

Drums along the Cuyahoga. Jan-Feb 1973. American Education.

The Institute for Environmental Education. Environmental Education Guide Series.

Institute for Environmental Education, Code A: 8911 Euclid Ave, Cleveland, Ohio 44106.  
Research:

Series of studies listed in the Environmental Education Guide Series, available on request from the Institute for Environmental Education, 8911 Euclid Ave, Cleveland, Ohio 44106.

**CUYAHOGA HERITAGE PROJECT,  
NORTHEAST OHIO**

Joseph H. Chadbourne,  
Director

See ICh Report(s): none

Institute for Environmental  
Education  
8911 Euclid Avenue  
Cleveland, Ohio 44106  
Tel: (216) 791-1775

1971 -  
Gov, Private,  
University,  
Foundation,  
Publisher, &  
Participating  
Schools

Ages: 13-20, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: environmental ed	Sem	field guides
Approach: interdisciplinary, integrated, process	Disc ✓	overview
Ability: all	Indep	newsletters
Eval Meth: varies	Lab ✓	
Testing: varies	Fld ✓	
Cont Resp: tchr and student directed, tchr guided	Dem	
Envir: community, classroom	Sim	
	TV	
	A/V	

The goal of the project is to prepare a cadre of teachers in Northeast Ohio public and independent schools who can train other teachers and their students to use community concerns as a focus for classroom study. Teacher training and curriculum development occurs through a series of graduate courses taught by the Institute for Environmental Education extension staff on behalf of the accrediting institution, Cleveland State University. The courses prepare teachers to design their own community studies, develop a process approach with students as investigatory team and create "contractual" relationships with community agencies to provide them a needed and valuable environmental service.

The whole program is designated a National Demonstration Project by the U.S. Office of Environmental Education. The Project commences its third year July 1, 1974. The Project welcomes visitors; member teachers and students conduct workshops throughout the United States; their curriculum guides and activities are written and distributed by the non-profit Institute for Environmental Education as the "Environmental Education Guide Series".

Teachers and students train together as teams; work in their own communities, each in a unique response to perceived needs; some members group as a network to provide technical information to local, state, and federal environmental service agencies.

Students acquire precareer skills in research procedures, a working knowledge of their community's problems and political organization, broad experiences in collaborating with professionals, a sense of school as a place to acquire problem-solving tools, recognition from the community, a deep appreciation of the teaching role in education, and a real grasp of the interrelatedness of themselves with other people, organisms, and the natural and manmade environment.

Reason: change in philosophy, publication	Adopt: ..	Pers: FT PT NRT	Publ: 8,000 sets
Initiator(s): J.H. Chadbourne, A. McGowan, T.W. Offutt	Tchr Ed: conducts work- shops, provides guide- books and consultants	Adm 2 1 Wr 1 VSch 2 Res TEd 2 Trial 50	reproduced in- stitutionally & commercially by offset & linotype

**Descriptive References:**

Cleaning up the Cuyahoga. Dec 1973. Scholastic Teacher.

Drums along the Cuyahoga. Jan-Feb 1973. American Education.

The Institute for Environmental Education. Environmental Education Guide Series.

Institute for Environmental Education, Code A: 8911 Euclid Ave, Cleveland, Ohio 44106.  
Research:

Series of studies listed in the Environmental Education Guide Series, available on request from the Institute for Environmental Education, 8911 Euclid Ave, Cleveland, Ohio 44106.

**DARTMOUTH SECONDARY SCHOOL  
COMPUTER PROJECT**

Thomas E. Kurtz, Director

See ICH Report(s): 7,6

Kiewit Computer Center  
Dartmouth College  
Hanover, New Hampshire 03755

Tel: (603) 646-2643

1967-1970  
Gov:Fed(NSF)

Ages: 12-17, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj:* computing, math, physics, biol,	Sem	newsletters
chem, earth-space, tech, social sciences	Disc	
Approach: conceptual	Indep	
Ability: all	Lab	
Eval Meth:* student questionnaire,	Fld	
tchr jdgmt	Dem	
Testing: none	Sim	
Cont Resp: tchr directed	TV	
Envir:* school library & grounds,	A/V	
classroom		

The secondary school project demonstrated that with a two-week introduction, teachers could be trained to establish successful computer programs in eighteen public and private schools connected via telephone to the computer at Dartmouth College. Students in these schools used the computer in a broad range of courses.

Eight student booklets and a final report are currently available from the Document Center, Kiewit Computation Center, Dartmouth College, Hanover, New Hampshire 03755.

Reason:* update methods, change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: conducts work-	Adm 1	institutionally
Initiator(s): T.E. Kurtz,	shops; provides manuals,	Wr 18	& commercially
J.M. Nevison	guides & consultants	VSch 1	by mimeograph
		Res	& offset
		TEd	
		Trial	72

**Descriptive References:**

Danver, J., and J. Nevison. 1973. The Dartmouth Secondary School Project. AFIPPS Spring Joint Computer Conference.

**Research:**

Nevison, J. The Computer as Pupil: The Dartmouth Secondary School Project. Final Report, Kiewit Computation Center, Dartmouth College, Hanover, New Hampshire 03755.



**A DEMONSTRATION OF AN IMPROVED  
SCIENCE CURRICULUM FOR UNDER-  
ACHIEVING STUDENTS (DISCUS)**

Robert Cronin, Director

Contact: Larry Paulk

See ICh Report(s): 7

Supervisor of Program Development

Duval County School Board

1450 Flagler Avenue

Jacksonville, Florida 32207

Tel: (904) 398-3831

1966-1970

Gov: Fed & Local;  
University

Ages: 13-15	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	lab books
Subj: biol, chem, phys, earth-space	Sem	tchr manuals
Approach: integrated, discovery	Disc	
Ability: slow	Indep	Non-Print Materials:
Eval Meth: achievement & standardized	Lab	overhead transpar-
tests, student questionnaire	Fld	encies
Testing: term, unit	Dem	videotape
Cont Resp: administration, tchr directed	Sim	lab equipment
Envir: classroom, lab	TV	
	A/V	

The purposes of the pilot project were (1) to develop science materials and approaches uniquely suited to challenge the educationally disadvantaged, (2) to demonstrate the use of science as a tool in encouraging educationally disadvantaged youth to participate in learning and communicating, and (3) to assess the effectiveness of the program in terms of changes in the attitudes and behaviors of the pupils in the experimental classroom. The basic premises of this project were that by having students participate in activities using "concrete" materials as a basis for developing concepts and language facility, and by having teachers work with these youths in ways that enhance their self-respect, the students' attitude toward the school and toward their teachers would be improved; furthermore, that from the classroom experiences in which the pupils use methods of scientific thought would come the knowledge, skills, and attitudes to enable them to cope more effectively with their everyday experiences.

A Training Program for teachers was provided by In-Service courses and by two Cooperative College-School Science Improvement (CCSSI) Grants from the National Science Foundation. The training program was assessed by means of video tapes in experimental and control classrooms. The results showed that students of the treated teachers were more self directed in meaningful activities and that the trained teachers spent less time in talking and lecturing than the non-trained teachers. The treated groups achieved better than the non-treated groups and had a better attitude toward themselves, their peers, their teachers and the school. Likewise, those groups taught by trained teachers achieved more and also had a better attitude toward themselves, their teachers and the school.

Changes in teacher and student personnel of the schools in Duval County prevented the continuation of the project. However, those teachers trained in the program are still teaching according to the approaches and using many of the student activities.

Reason: update content & method, change in philosophy	Adopt:(partial) 15 tchrs, 1350 students, 15 sch	Pers: FT PT NRT	Publ: 100 sets
Initiator(s): C. Cronin, R. Cronin, L. Paulk, N. Gilmore, N.E. Bingham	Tchr Ed: conducts work-shops, provides manuals, guidebooks, & consultants	Adm	reproduced
		Wt	90
		VSch	4
		Res	
		TEd	4
		Trial	60

**Descriptive References:**

- Bingham, N.E. and C.H. Cronin. Nov 1968. A Success-Oriented Program for the Educationally Deprived. The Science Teacher. 35(8).  
Bingham, N.E., C.R. Cronin, and L. Paulk. June 1970. DISCUS, A Demonstration of an Improved Science Curriculum for Underachieving Students. School Science & Mathematics. 527-542.

**Research:**

- Bridges, C.M., Jr., N.E. Bingham, and M.M. Green. 1973. Evaluation of the Cooperative College-School Science Improvement Program to Prepare Teachers to Teach the DISCUS Program. Science Education. 67(2).  
Bingham, N.E. April 1968. A Demonstration of the Role of Science in the Programs of Educationally Deprived Children in Grades 7-9. Science Education. 52(3).  
Bingham, N.E., et al. May 1974. Science for Underachieving Youth. To appear in School Science and Mathematics. 74(5).

DESOTO ENVIRONMENTAL  
LEARNING LABORATORY (ELL)  
William S. Stanko, Director

Environmental Learning Laboratory  
P.O. Box 820  
Arcadia, Florida 33821

1972-1975  
Gov

See ICh Report(s): none

Ages: 11-13  
Lang: Eng  
Subj:\* biol, earth-space, ecology  
Approach: integrated  
Ability: all  
Eval Meth:\* lab & achievement tests  
Testing: term & unit exams  
Cont Resp: tchr directed  
Envir: community, outdoor lab

Exper: C1 12+ 2-12 I  
Lec 50  
Sem  
Disc 50  
Indep  
Lab 50  
Fld 50  
Dem  
Sim  
TV  
A/V

Printed Materials:  
activity sheets  
field guides  
Non-Print Materials:  
slides  
overhead transparencies

The DeSoto County Environmental Learning Laboratory (ELL), operated in conjunction with the DeSoto Middle School, is an innovative approach to teaching the Science of Ecology. Referred to by the students as the Outdoor Classroom, the ELL is truly a classroom without walls.

Instruction in the ELL provides the student with a true "hands on" learning experience in the real world. Students explore and interact with nature while learning about the plant and animal life indigenous to the area. Emphasis is placed upon the complex and delicate balance of nature and the role of each and every living thing in this balance. This is accomplished by investigating the various eco-systems that exist in the area, such as the Oak Hammock, Wet Lowlands, Flood Plains, etc. The role of each organism in a particular eco-system is stressed, including such things as the importance of green plants as the only natural food factories, the role of decay organisms in renewal of soil nutrients, the necessity of insects for plant reproduction, the function of herbivores in the food chain, and the purpose of predators are but a few examples. Students are made aware of the disastrous effects that can occur when the eco-system is disrupted. Finally, the role of man as the top predator and ultimate consumer is stressed, together with his unique ability to alter his environment.

Throughout the program the students are made aware of the complex interrelationship between man and his environment. Present ecological problems resulting from unwise land development and use, together with the accompanying environmental pollution are considered. The overall goal of the project is to develop in the student a high degree of environmental awareness together with an environmental ethic. It is hypothesized that only through full understanding and appreciation of man and his environment together with a deep sense of responsibility toward nature, will our future leaders (today's students) be able to make the wise decisions necessary to save our environment from total destruction.

Reason: change in philosophy, develop new course	Adopt: 50 tchrs, 1,000 students 1 school	Pers: FT PT NRT Adm 1 Wr 3 VSch 3 Res 3 TEd Trial	Publ: reproduced institutionally by mimeograph
Initiator(s): J.A. Reynolds, S.W. Brewer	Tchr Ed:* provides guides & films; conducts workshops		

No references given

# DEVELOPING MATHEMATICAL PROCESSES (DMP)

Thomas A. Romberg, Director

See ICh Report(s): 7,6

Wisconsin Research and  
Development Center  
1025 W. Johnson Street  
Madison, Wisconsin 53706  
Tel: (608) 263-4282

1967-1976

Gov:Fed (OE,  
NIE, NSF),  
State;  
Publisher

Ages: 5-11	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓ ✓	texts, lab books,
Subj: math	Sem ✓	activity sheets,
Approach:* process, problem-solving, discipline centered	Disc ✓	tchr manuals, tests,
Ability: all	Indep ✓ ✓	objectives, over-
Eval Meth:* achievement, oral, & lab tests, tchr jdgmts	Lab ✓	view, newsletters.
Testing:* unit, individual, term	Fld	Non-Print Materials:
Cont Resp: tchr directed	Dem ✓ ✓ ✓	filmstrips
Envir: classrooms	Sim	films
	TV	games
	A/V	lab equipment

DMP is a child-oriented mathematics program that is developed from the basic assumption that an elementary mathematics program should be mathematically, pedagogically and psychologically sound. DMP is mathematically sound because mathematics is approached through measurement; the content includes not only the arithmetic of the rational numbers, but also geometry, statistics and probability; and the ability to solve problems is enhanced by becoming skilled in basic operations. DMP is pedagogically sound because children have an opportunity to learn about their world while actively investigating and studying the mathematical aspects of their environment; teachers are able to use and understand the program since they helped write, tried out and reacted to each topic; the program is designed for use in a framework of Individually Guided Education (IGE). Since children learn in different ways and at different rates, IGE emphasizes assessment and evaluation of each child's progress and needs so that he may be grouped with others who are ready for the same objectives. DMP is psychologically sound because children are active learners, not passive receivers of knowledge. DMP was deliberately constructed to have children actively explore their world. Children are motivated in DMP through a problem-solving approach, through variety, and by providing means of keeping track of each pupil's progress.

These assumptions on the soundness of DMP are not mutually exclusive; they are intended to complement each other. For example, the measurement approach to mathematics lends itself more readily to an activity-oriented program than to a standard textbook program. The inclusion of geometric topics provides variety, a key to motivation. Also, teachers are expected to modify activities for their children, keeping in mind the objectives of the topic. We believe that professional teachers are the key to children's success in learning mathematics. The program will be only as good as teachers make it and adapt and modify it to the needs of their children.

Reason: update method, change in philosophy	Adopt: (partial) tchrs, 30,000 students, 150 schools	Pers: FI PT RRT Adm 1 2 Wr 7 1 VSch 3 Res 4 TED Trial Eval 1	Publ: repro- duced commer- cially (\$9/10 students)
Initiator(s): T.A. Romberg, H. Fletcher	Tchr Ed: conducts work- shops, provides manuals, guidebooks, films & consultants		

## Descriptive References:

- Harvey, J.G., and T.A. Romberg. 1973. Educational Res. in Math. at the Univ. of Wisconsin. Journal for Research in Mathematics Education. 4(4): 243-250.
- Hull, R.E. April 1974. Selecting an Approach to Indiv. Education. In Continuation of the Dissemination/Implementation of Individually Guided Education. Madison, Wisconsin: Wisconsin Research & Development Center for Cognitive Learning.
- Romberg, T.A., and M. Montgomery. 1973. Developing Mathematical Processes: A Different Kind of Individualized Program. Individualized Instruction & Individualized Learning. M. Mohan and R. Hull, eds. Chicago: Nelson-Hall Company.
- Research: Montgomery, M.E. 1973. The Interaction of Three Levels of Aptitude Determined by a Teach-Test Procedure with Two Treatments Related to Area. Journal for Research in Mathematics Education. 3(4): 271-278.
- Romberg, T.A., and L.E. Gilbert. 1972. The Effect of Training on Length on the Performance of Kindergarten Children on Nonstandard But Related Tasks. Journal for Research in Mathematics Education. 3(2): 69-75.

DEVELOPMENT OF A SELF-STUDY  
PHYSICS PROGRAM IN A MULTI-  
DISCIPLINARY BASIC SCIENCE  
COURSE FOR SCIENCE MAJORS

Self-Study Physics (Knowledge  
for Use)  
3066 S.W. Flower Terrace  
Portland, Oregon 97201

1968-1970  
University

Philip R. Pennington, Director  
See ICh Report(s): 7

Tel: (503) 244-9122

Ages: college	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	tests
Subj: phys	Sem	objectives
Approach: integrated	Disc	
Ability: all	Indep ✓	Non-Print Materials:
Eval Meth: oral tests	Lab ✓	slides
Testing: individual	Fld	
Cont Resp: material directed	Dem ✓	
Envir: school library	Sim	
	TV	
	A/V	

"The development of a self-study physics program in a multi-disciplinary basic science course for science majors" and the "student-designed" learning materials were extensions of Pickar's Core Course for (Science) Majors. The original course was a lamination of physics, chemistry, and biology. The extension converted to PSI: self-paced, mastery required and proctored, and then to inclusion of student-designed units and of reference organization rather than a single pre-determined sequence. This program was discontinued at Portland State University. The results of this work have just been reorganized into the Knowledge for Use project.

Reason: change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: -	Adm 1	
Initiator(s): P.R. Pennington		Wr	
		VSch	
		Res	
		TEd	
		Trial	
		Proctors 6	

Descriptive References:

Pickar, A. 1970. Core Course for Science Majors Combining Materials from Physics, Chemistry and Biology. American Journal of Physics. 38: 255.  
Keller, F.S. 1968. Good-bye Teacher... Journal of Applied Behavioral Analysis. 1: 79.

DEVELOPMENT OF A ZOOMOBILE  
WILDLIFE TEACHING LABORATORY

Seymour Sitkoff, Gerald Garner,  
Directors

See ICh Report(s): none

Science Office  
Instructional Planning Division  
Los Angeles Unified School  
District, Room A-319  
450 N. Grand Avenue  
Los Angeles, California 90012  
Tel: (213) 687-4285

1974 -

Gov: Fed(ESEA  
III); Private,  
Participating  
Schools

Ages: 5-13	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp	Lec	activity sheets,
Subj: biol	Sem	tchr manuals,
Approach: process, conceptual	Disc ✓	tests, objectives,
Ability: all, special: physically handi- capped	Indep ✓ ✓	overview, charts
Eval Meth: achievement tests, tchr jdgmts	Lab ✓ ✓	Non-Print Materials:
Testing: unit	Fld	slides, overhead
Cont Resp: administration, tchr & community directed	Dem	transparencies, lab
Envir: school grounds, classroom	Sim	equipment
	TV	
	A/V	

Two major aspects of the need for developing the mobile units are: first, pupils within urban areas have limited opportunities to travel to locations where 1) they may observe and study various forms of animal life that are native to California as well as other geographical areas, and 2) they may further understand the relationship of these animals to their respective environments and to man. The second aspect concerns the need to provide pupils with interesting approaches to learning.

The unit provides: 1) instruction at schools to both large and small groups of students; 2) a dynamic learning situation where the student is actively involved in observing and studying various aspects of animal life; 3) instructional materials to be used in the classroom both preceding and following the visit; 4) orientation for teachers in both science content and methodology pertaining to animal life.

The mobile unit includes volunteer docent teachers and a driver who is also an animal caretaker. Instruction is related to: 1) animal life in California and other areas; 2) the inter-relationships of animal and plant life; 3) the preservation of certain endangered species. Instructional materials including study prints, references, and filmstrips are provided for study prior to the visit of the mobile unit. Kits of materials are used by students following the visit. An example of this is a "kit of living things" containing small animal cages and student instructional materials.

Evaluation methods include the following: 1) selection and use of appropriate instruments for evaluating pupil achievement in science; 2) completion of an evaluation form by teachers of participating classes following the presentations; 3) periodic teacher surveys in a longitudinal study to determine changes in classroom teaching of science content and methodology as a result of exposure to the unit; 4) a self-evaluation form to be completed by the teachers attached to the mobile unit for the purpose of improving the mobile unit lessons.

The mobile animal unit will be developed and implemented during the 1974-75 school year. It is anticipated that the unit will visit a total of 75 elementary and junior high schools during the first year of operation. Each school visit comprises 1-2 days.

Reason: broaden pupil experience	Adopt: 375 tchrs, 34,427 students, 75 schools	Pers: FT PT NRT	Publ: will be reproduced by mimeograph & offset (\$11/ 10 students)
Initiator(s): S. Sitkoff, G. Garner	Tchr Ed: conducts work- shops, provides manuals and guidebooks	Adm 2 Wr 12 VSch 50 Res 1 TEd 8 Trial 1048 Other 2	

No references available



**EARTH AND SPACE SCIENCE  
IMPROVEMENT PROJECT (ESSIP)**

William H. Bolles, Director

Pennsylvania Department of Education 1970-1973  
Box 911  
Harrisburg, Pennsylvania 17126  
Gov  
Tel: (717) 787-7300

See ICh Report(s): 8

Ages: 13-18

Lang: Eng

Subj: earth-space

Approach: integrated

Ability: all

Eval Meth: -

Testing: -

Cont Resp: -

Envir: field

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tchr guide

The purpose of Earth and Space Science is to bring about those student behaviors which will be indicative of a broad understanding of man's physical environment of both earth and space together with an awareness of the consequences which could result from changes which man may effect. The individual aims of the course are: 1) teachers should insure that the basic principles of geology, oceanography, astronomy and meteorology are learned and the interrelationships of these fields understood; 2) students should become aware of the intellectual challenge, and the demand for trained personnel, in various earth and space sciences; 3) students should be guided toward applications of the concepts and principles learned to the interpretation of environmental problems and phenomena encountered in daily life; 4) teachers should encourage students to go beyond memorized descriptions of phenomena and to probe for explanations; 5) students should develop a general understanding of the vital economic and deep esthetic significance of their physical environment together with an attitude of responsibility for natural resource utilization and wise use of land; 6) students should have the opportunity to work individually upon a problem which will give them experience in the utilization of the scientific method of problem solving; and 7) students should be made to realize that science is not a static body of knowledge, but is constantly changing as new facts are discovered.

Obviously, Earth and Space Science as a distinct discipline does not exist. The specific scientific fields of geology, oceanography, astronomy, and meteorology all deal so closely with the immediate physical environment of man that they readily lend themselves to an interdisciplinary course of study on the secondary school level. The earth and space sciences also rely heavily upon basic concepts of physics, chemistry and biology. In replacing general science this course places new emphasis upon the principles of the basic sciences.

Teachers are urged to stress the interdisciplinary nature of the earth and space sciences to the best of their ability and to the degree that their students can understand these interactions. While student involvement is certainly recommended, caution is also suggested in regard to laboratory exercises that consume large amounts of time and have questionable educational outcomes. The posing of pertinent questions, and the ensuing class discussion, also involves the student and is an excellent teaching method. The guide contains many questions which can be used to start students thinking and moving toward greater understanding of concepts they are studying.

Reason: update content  
& methods; develop new  
course

Adopt: -

Tchr Ed: provides guides

Wers: FT PT NRT

Wch

Res

TEd

Tri

Publ: reproduced  
commercially

Initiator(s): -

No references available

EARTH SCIENCE CURRICULUM  
PROJECT (ESCP)

Contact: William H. Matthews, III

See ICH Report(s): 8,7,6,5,4,3,  
2,1

Education Director  
American Geological Institute  
5205 Leesburg Pike  
Falls Church, Virginia 22041

Tel: (703) 379-2480

1963-1967

Gov: NSF

Ages: * 14, 13, 15, 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: * Eng, Sp, Korean, Arabic, Portuguese, Turkish, Italian	Lec ✓	texts, lab books,
Subj: earth-space	Sem ✓	supplementary books,
Approach: * inquiry, integrated, inter-disciplinary	Disc ✓ ✓	tchr manuals,
Ability: all, average	Indep ✓	field guides, tests,
Eval Meth: * achievement, lab & standardized tests, tchr jdgmts	Lab ✓ ✓ ✓	newsletters
Testing: * unit, weekly, term	Fld ✓ ✓	Non-Print Materials:
Cont Resp: tchr guided	Dem ✓	slides, filmstrips,
Envir: * lab, classroom, sch grounds, community	Sim	films, overhead
	TV	transparencies,
	A/V	models, lab
		equipment

ESCP developed Investigating the Earth, an interdisciplinary earth science course for use with students in the 7 to 10 grade range. The course materials for Investigating the Earth are experience-centered, with emphasis on student inquiry. Laboratory exercises are an integral part of the textbook. These exercises require students to spend a large part of their time designing, performing, and interpreting investigations. Very few detailed instructions are provided so that students and teachers will be free to do some creative thinking. To supplement the text, there are 10 single-topic field study guides, among them, Field Guide to Soils and Field Guide to Lakes. A reference series was also developed on such topics as "Selected References on Earth Science Courses" and "Topographic Maps and How to Use Them."

Investigating the Earth, the teacher guide, and the field study guides are published by Houghton Mifflin Company and the reference series is available directly from the American Geological Institute. Five films: Toward Inquiry, How Solid is Rock?, Reflections on Time, Controversy Over the Moon, and The Ways of Water, are available from Encyclopaedia Britannica Educational Corporation in Chicago, Illinois. A sixth film, Men at Bay, is available from King Screen Corporation in Seattle, Washington.

Reason: update control & method	Adopt: -	Pers: FT PT NRT	Publ: repro-
Initiator(s): R.L. Heller, C. Roy, R. Stevenson	Tchr Ed: provides manuals, guides, films, & consultants	Adm 12 Wr 80 VSch 3 Res 1 TEd Trial 180	duced commercially by linotype

Research: Romey and Thompson. Nov 1973. Evaluation of NSF Funded ESCP Inservice Institutes. Journal of Geological Education.



**EARTH SCIENCE TEACHER  
INSERVICE PROGRAM**

Fred L. Beyer, Director

See ICh Report(s): none

Television Services  
Division of Educational Media  
Dept. of Public Instruction  
Raleigh, North Carolina 27602

Tel: (919) 829-4725

1969-1971

Gov: State

Ages: tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals,
Subj: earth-space, methods	Sam	newsletters
Approach: * discipline-centered,	Disc 5	Non-Print Materials:
integrated, conceptual, inquiry	Indep	videotape
Ability: avg	Lab 2	
Eval Meth: student questionnaire	Fld 3	
Testing: --	Dem 4	
Cont Resp: * administratively directed,	Sim	
tchr guided	TV 1	
Envir: school library	A/V	

The teacher in-service television series consists of thirty-two black and white videotaped thirty-minute programs for teachers. It was designed for teachers assigned to teach Earth Science who have little or no training in the subject area.

Teachers met in seminar groups with a leader. After viewing each program they participated in group activities which they designed with the help of their seminar leader.

Completion of the thirty-two sessions provided three hours of non-college certificate renewal credit. Completion was based primarily on participation at the discretion of the seminar leader.

The series is available from the Department of Public Instruction. Terms are negotiable.

Reason: update methods, change in philosophy	Adopt: --	Pers: FT PT NRT	Publ: 500 cop-
	Tchr Ed: --	Adm 1	ies, reproduc-
Initiator(s): P. Taylor		Wr 1	ed by offset
		Vsch 1	
		Res	
		TEd 1	
		Trial	

No references given

**EARTH SCIENCE TEACHER PREPARATION  
PROJECT (ESTPP)**

John F. Thompson, Director

See ICh Report(s): 8

Education Director  
American Geological Institute  
5205 Leesburg Pike  
Falls Church, Virginia 22041  
Tel: (703) 379-2480

1970-1973

Gov:(NSF)

Ages: * tchr ed, 12-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: psychology-education	Sem	activity sheets
Approach: psychological	Disc	tchr manuals
Ability: all	Indep varies	newsletters
Eval Meth: -	Lab	charts
Testing: -	Fld	Non-Print Materials:
Cont Resp: cooperative tchr-student	Dem	games
Envir: varies	Sim	
	TV	
	A/V	

The Earth Science Education Program began as an agency charged with creating an up-to-date earth science curriculum based on a guided inquiry model. ESTPP grew out of ESCP as an attempt to deal directly with teachers and teacher trainers in helping to create more humane and open learning environments.

The overall project purpose is to work toward open learning environments and the development of teachers who are able to function affectively as facilitators of learning in student-centered instructional systems. The specific objectives are to create curriculum materials that lead teachers and students into a more trusting, open relationship, and to foster teacher training and liberal education programs that stress development of individualized, student-centered programs in which students are given responsibility for their own learning.

The teacher's role is viewed as that of facilitator of learning and counselor rather than a presenter of information or manager. Teacher and student are both viewed as whole human beings with multiple interests and with individual uniqueness which must be given a chance to develop under conditions of trust and love. The target population of ESTPP includes college teachers, teaching assistants, and teacher trainers as well as prospective elementary and secondary teachers.

Reason: change in philosophy	Adopt: 30 tchrs, 1,000 students, 15 schools	Pers: FT PT NRT	Publ: 2,500
Initiator(s): W.D. Romey, J.F. Thompson, R.Y. Joko	Tchr Ed: conducts workshops; provides consultants	Adm 3 1 Wr 3 1 VSch 3 1 Res 3 1 TEd 3 10 Trial 100 50	copies reproduced commercially by linotype

No references given

**ECO-CURRICULUM DEVELOPMENT  
& LEARNING LABORATORY**

Robert Larson, Director

See ICh Report(s): none

Eco-Lab  
RR #1, Box 550A  
Cheyenne, Wyoming 82001

Tel: (307) 634-3152

1971-1974

Gov: Fed

Ages: 5-20, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: bio!, chem, phys, earth-space, math, technology, social sciences, Eng, art	Sem	field guides
Approach: interdisciplinary	Disc	Non-Print Materials:
Ability: all	Indep	games
Eval Meth: achievement tests	Lab	
Testing: unit	Fld	/ / /
Cont Resp: tchr guided, student directed	Dem	
Envir: sch grounds, classroom	Sim	
	TV	
	A/V	

The major goal of the "Eco-Curriculum Development and Learning Laboratory Project", Laramie County School District, Cheyenne, Wyoming, was to initiate the development of environmental curriculum materials for grades K-12. An Eco-Laboratory was developed as a center for project activities, an environmental center for the community, and as an indoor-outdoor learning center for students. The curriculum development process was implemented through three teacher in-service programs for elementary, junior high and senior high teachers. Emphases were upon developing environmental knowledge and attitudes in teachers and upon the writing and try-out of curriculum activity units in classrooms. In-service teachers were pre and post evaluated for growth toward specific objectives.

Forty of 159 curriculum activities were tested for effectiveness. Thirty-eight of the 40 proved effective when statistical tests were applied to pre-post evaluation data. These and the remaining activities were included in four environmental activities booklets which were distributed to all schools in the district. Supplementary guides to grasses and flora of the area, as well as an environmental study area handbook were supplied to teachers for the planning of outdoor activities.

The Eco-Lab was visited extensively by lay citizens, teachers, service clubs, and school classroom groups. Guided tours were provided for visitors and as field experiences for classes. An Eco-Library and Environmental Education Resource Center with a classification and distribution system for the schools and community was included in the lab facility.

A community advisory committee functioned effectively in support of the project from its inception until the end of Title III funding period. Members represented local, state and federal government agencies, civic clubs, teachers and students of all school levels. The committee provided input, helped solve problems and secured financial, material and labor donations to the project and the Eco-Laboratory facility.

Reason: develop new course	Adopt:(partial) 45 tchrs, 800 students, 16 schools	Pers: FT PT NRT	Publ: 250 copies reproduced institutionally by mimeograph
Initiator(s): W. Hirst, R. Larson	Tchr Ed: provides guides & consultants	Adm 1 Wr 30 VSch Res 1/2 TEd 1 Trial 30	

No references given ..

**EDUCATIONAL RESEARCH COUNCIL  
MATHEMATICS PROGRAM (ERCMP)  
(Formerly GCMF)**

John F. Mehegan, Director

See ICh Report(s): 8,7,6,5,2

Ages: 5-12

Lang: Eng

Subj: math

Approach: \* inquiry, discovery,  
discipline centered

Ability: all

Eval Meth: \* achievement tests, tchr  
jdgmt

Testing: \* individual, unit

Cont Resp: \* tchr directed & guided

Envir: classroom

Mathematics Department  
Educational Research Council  
of America  
614 Superior Avenue  
Cleveland, Ohio 44113  
Tel: (216) 696-8222, ext 241

1959 -

Private,  
Foundation,  
Participating  
Schools

Exper: \* Cl 12+ 2-12 I Printed Materials:

Lec 3 2 1

Sem

Disc 3 2 1

Indep 1

Lab 3 2 1

Fld

Dem

Sim

TV

A/V 3 2 1

texts  
tchr manuals  
objectives  
overview  
newsletters

Non-Print Materials:  
filmstrips  
games  
lab equipment

The aim of the mathematics program of the Educational Research Council is that all educable pupils will attain these overall goals by the time they leave high school: 1) the ability to analyze problems, especially those that are quantifiable and whose solution is within their range of intelligence, and solve them by applying the appropriate mathematical concepts and skills; 2) the ability to compute commensurate with their needs; 3) the ability to perceive and apply geometrical relationships and to understand and use geometric terminology needed in everyday life; 4) the ability to apply measurement concepts and skills and interpret measurement data; 5) an appreciation of the importance of learning, in general, and of mathematics, in particular, in everyday life; and 6) a feeling of self-confidence and positive self-image relative to the mathematical situations that they must contend with on the job, in the market place, and at home. These goals should be attained to a degree that is sufficient to give the learner a feeling of well-being and of worth to himself and to his fellowman.

The ERCMP is a mathematics learning system with many components: 1) test materials, in consumable format, with entering and terminal behaviors specified; 2) a combination of diagnostic and achievement tests; 3) diversified learning materials-games, manipulatives, filmstrips, and problem-solving investigations; and 4) comprehensive teacher guides with reduced pupil pages, suggested teaching techniques, and a wealth of discovery-producing activities. The ERCMP is a product of research carried out in participating schools of the Educational Research Council of America (ERCA). The ERCMP has been completed through grade 6, and the continuation into grades 7 and 8 has been begun. The ERCMP in its developmental stage, is published by the ERC in Cleveland, Ohio.

Reason: update content & method, change in philosophy, develop new course	Adopt: 730 tchrs, 22,000 students, 10 schools	Pers: FT PT NRT Adm 2 Wr 7 VSch 7 Res 7 TEd 7 Trial 860	Publ: 772,623 copies repro- duced institu- tionally & commercially by offset & linotype
Initiator(s): G.H. Baird	Tchr Ed: conducts work- shops, provides manuals and consultants		

**Descriptive References:**

ERC Reports. Educational Research Council of America, 614 Superior Avenue, N.W.,  
Cleveland, Ohio 44113.

**EDUCATIONAL RESEARCH COUNCIL  
(ERC) UNIFIED SCIENCE PROGRAM**

Gary D. Day, Director  
See ICh Report(s): 8,7,6

ERC Science Department  
Educational Research Council  
of America  
614 West Superior Avenue  
Cleveland, Ohio 44113

1971 -  
ERC

Tel: (216) 696-8222

Ages: 13-20	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts, lab books,
Subj: biol, chem, phys, earth-space,	Sem ✓	programmed units,
math, tech, soc sciences, psychology,	Disc ✓	tchr manuals,
humanities	Indep ✓	tests, objectives,
Approach: interdisciplinary, process,	Lab ✓	overview, charts
conceptual, inquiry	Fld ✓	
Ability: all	Dem ✓	Non-Print Materials:
Eval Meth: achievement, lab & oral tests,	Sim ✓	slides, films,
tchr jdgmt	TV ✓	audiotape, games,
Testing: unit, individual	A/V ✓	lab equipment
Cont Resp: tchr guided, student directed		
Envir: community, sch grounds & library,		
classroom, lab		

The ERC Unified Science Program is a multiyear program of modular Units being developed for Grades 7 through 12. The program is designed to be flexible in two ways: each Unit may take from five to nine weeks, or the Units may form a complete course of study or be used as parts of existing courses (Biology, Physics, etc.). Schools interested in participating in the field trials of these materials are invited to request further information.

Our overall goal is to help every student develop scientific literacy. Major components of the program are the development of major concepts of science, an understanding of the interaction of science and society, and an awareness of the usefulness of science in the students' daily lives.

Each Unit contributes to the development of one or more concepts that unify the sciences and emphasizes skill development through activities with high student interest. Unit themes already developed and classroom-tested are: Questioning, Perception, Instrumentation, Data Analysis, Experimentation, Change, Systems, Energy Sources, Ecosystems, Equilibrium, Patterns, and Projects. Our plans are to develop sufficient Units for six years of study.

At the beginning of each Unit, the whole class does an Introductory Activity that introduces students to the Unit theme and the objectives. Then each student may choose to do two or more Alternate Activities from a bank of about eight. In the Generalizing Activity, students first share their experiences from the Alternate Activities. They then summarize the Unit in a whole class activity.

Other materials included in the program are Resource Activities, Audiovisual Materials, Student Self-Checks, Unit Tests, and Teacher's Guide.

Reason: change in philosophy, develop new course	Adopt: 13 tchrs, 700 students, 5 schools	Pers: FT PT NRT	Publ: 2000 copies/unit reproduced institutionally (ERCA) by off-set (\$60/10 students)
Initiator(s): G.H. Baird, J. Dye, A.H. Blankenship,	Tchr Ed: conducts workshops, provides manuals & consultants	Adm 1 Wr 6 VSch 3 Res 2 TEd 3 Trial 18	
No references given			

EDUCATIONAL RESOURCES  
INFORMATION CENTER (ERIC)

Charles Hoover, Director

National Institute of Education  
Office of Dissemination & Resources  
Washington, D.C. 20208

1966 -  
Gov:NIE

See ICH Report(s): 5

Tel: (202) 254-5555

Ages: tchr ed, researchers

Lang: Eng

Subj: biol, chem, phys, earth-space,  
math, technology, social sciences

Approach: -

Ability: all

Eval Meth: -

Testing: -

Cont Resp: -

Envir: -

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc not

Indep answered

Lab

Fld

Dem

Sim

TV

A/V

ERIC (Educational Resources Information Center) is a nationwide information system designed to serve the educational community. It gives easy access to resources that will help educators keep abreast of new developments in their fields and it can be used to develop more effective educational programs. ERIC collects, screens, abstracts and indexes current educational documents. These documents are abstracted and indexed in Research in Education (RIE), a monthly publication distributed by the Superintendent of Documents. The ERIC system also indexes current journal articles for Current Index to Journals in Education (CIJE). It furnishes copies of most of the documents listed in RIE at nominal cost through the ERIC Document Reproduction Service (EDRS). ERIC also prepares interpretive summaries, research reviews, bibliographies, and analytical papers on critical educational topics.

Funded by the National Institute of Education, the ERIC network currently consists of a central staff, contractors, and 16 decentralized clearinghouses, each focusing on a special area of concern to educators.

The system consists of the following clearinghouses: Career Education; Counseling and Personnel Services; Reading and Communication Skills; Educational Management; Handicapped and Gifted Children; Languages and Linguistics; Higher Education; Information Resources; Junior Colleges; Early Childhood Education; Rural Education and Small Schools; Science, Mathematics, and Environmental Education; Social Studies/Social Science Education; Teacher Education, Tests, Measurement, and Evaluation; and Disadvantaged. Science, Mathematics and Environmental Education ERIC is at Ohio State University.

Reason: keep educators

Adopt: -

Pers: FT PT NRT Publ: -

informed of new develop-  
ments, develop more  
effective educational  
programs

Tchr Ed: -

Adm

Wr not

VSch answered

Res

TEd

Trial

Initiator(s): -

No references given

EKISTICS, A GUIDE FOR THE  
DEVELOPMENT OF AN INTERDISCIPLINARY  
ENVIRONMENTAL EDUCATION CURRICULUM

Rudolph J.H. Schafer, Director

See ICh Report(s): none

Ages: 5-18

Lang: Eng

Subj: environmental ed

Approach: interdisciplinary

Ability: all

Eval Meth: -

Testing: -

Cont Resp: -

Envir: -

Environmental Education  
California State Department  
of Education  
721 Capitol Mall  
Sacramento, California 95814  
Tel: (916) 445-0361

-  
Gov

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

In 1968 the California State Legislature wrote into the Education Code a requirement that all elementary and secondary schools provide instruction in the wise use of natural resources and protection of the environment in all appropriate grade levels and subject areas, grades one through twelve. In keeping with the spirit of Senate Bill 1, the legislation provided a broad mandate for an interdisciplinary conservation-environmental program in the schools, and yet provided a high degree of flexibility through which local educators could develop programs suited to the specific needs of the students they serve.

In its role of statewide leadership in the field of education, the State Department of Education has a responsibility to assist local educational agencies in translating legislative mandates into action. This publication, Ekistics - A Guide for the Development of an Interdisciplinary Environmental Education Curriculum, was developed with this responsibility in mind. Through it, we have tried to provide a structure and guidelines through which local educators may develop a curriculum suited to local needs that will meet the state education requirements in this subject area. The concepts developed here take the study of conservation and environmental protection far beyond the traditional notions of nature study and superficial appreciation of the out-of-doors. When one moves into the areas of the social sciences, arts, and humanities, which once were considered unrelated, the outlines of a curriculum begin to emerge that not only will help children understand their interdependence with the natural world, but will help them develop the skills, attitudes, and knowledge necessary to understand and solve environmental problems.

Reason: -

Adopt: -

Pers: FT PT NRT Publ: -

Initiator(s): -

Tchr Ed: -

Adm

Wr

VSch

Res

TEd

Trial

not  
answered

Descriptive References:

Ekistics, A Guide for the Development of an Interdisciplinary Environmental Education Curriculum. Bureau of Publications, California State Department of Education, Sacramento, California 95814.



ELEMENTARY SCHOOL SCIENCE  
PROJECT  
Stephen P. Diliberto, Director

University of California  
4533 Tolman Hall  
Berkeley, California

1959-1966  
Gov: NSF

See ICh Report(s): 1

Ages: 7-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	units
Subj: biol, phys, chem, math	Sem	
Approach: -	Disc	
Ability: avg	Indep	
Eval Meth: objective testing,	Lab ✓	
tchr jdgmts	Fld	
Testing: -	Dem	
Cont Resp: -	Sim	
Envir: -	TV	
	A/V	

The Elementary School Science Project was organized in 1959 and discontinued in 1966. The project was conceived to make it possible for scientists at the University of California to contribute to the science program of the elementary school.

Throughout its existence, the major activity of the project was the development of units of study in specific areas of science. The common aim of these units was to acquaint children with scientific facts, concepts and methods. Although pedagogical techniques vary somewhat from unit to unit - both because of the topic and because of the individual attitude of the scientists developing the unit - the typical unit involves much experimentation by the children.

Besides its normally greater use of experiment, project material differs from much conventional material in being largely unconcerned with technological applications of science. Rather than show how science contributes to our comfort, the aim is to show how science contributes to our understanding.

Though clearly designed to demonstrate scientific method, the science material of the project was not organized according to the scientific technique or process employed. Instead it was organized according to the scientific subject matter treated. By permitting extended periods of study in particular areas of science, such an organization brings the children into contact with scientific facts and concepts of greater importance and substance. It is also felt to provide a better context in which to demonstrate scientific method, since significant scientific investigations by the children are then feasible.

The teaching units developed by the project are directed to the typical child who has neither a special interest in science nor an unusual aptitude for academic studies. The aim is to acquaint such a child both with information about his environment which is appropriate to his needs and interests and with modes of thought which are applicable to his life.

In addition to science units, the project also developed material in applied mathematics. The chief function of the latter material is to develop the mathematics needed by children in the project science program or any comparable program.

Reason: -	Adopt: -	Pers: FT PT NRT	Publ: -
Initiator(s):	Tchr Ed: -	Adm	
L. Brewer, C. Camp,		Wr	
S.P. Diliberto,		VSch	not
A.C. English, A.S. Fischler,		Res	answered
R.I. Macy, H.L. Mason, C.T. O'Konski,		TEd	
N. Pace, P. St. Lawrence, L. Scott,		Trial	
R.C. Stebbins, R. Wallace			

No references given

ELEMENTARY SCHOOL SCIENCE  
PROJECT (ESSP-USU)

Walter Saunders, Director

See ICh Report(s): 7,6,5,4,3,2

UMC 28

Department of Secondary Education  
U.S.U., Logan, Utah 84322

Tel: (801) 752-4100 ext 7385

1963-1967

Gov

Ages: 6-7

Lang: Eng

Subj: biol, chem, phys

Approach: discovery

Ability: all

Eval Meth: tchr jdgmts

Testing: -

Cont Resp: tchr guided

Envir: sch grounds, classroom

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc ✓

Indep

Lab ✓

Fld ✓

Dem ✓

Sim

TV

A/C

Printed Materials:

tchr manuals

Project was terminated during the trial testing stage in 1967.

Reason: develop new course Adopt: -

Initiator(s): J. Wood,

A.L. Braswell

Tchr Ed: provides  
manuals

Pers: FT PT NRT

Adm

Wr ✓

VSch ✓

Res

TEd ✓

Trial

Other ✓

Publ: 5,000

copies repro-  
duced by  
mimeograph

Descriptive References:

Wood, J.K. 1964. A Science Program for the Elementary Grades. Journal of Research in Science Teaching. 2:323-327.

Wood, J.K. Nov 1964. Elementary Science in the First Grade. American Journal of Physics. 32(11): 830-831.

**ELEMENTARY SCIENCE STUDY (ESS)**

Adeline Naiman, Director

See ICh Report(s): 8,7,6,5,4,3,2,1

Education Development Center

55 Chapel Street

Newton, Massachusetts 02160

Tel: (617) 969-7100

1961-1971

Gov:Fed (NSF)

Ages: 2-14	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr, Sp	Lec	supplementary books
Subj: biol, chem, phys, earth-space, math, music	Sem / ✓	activity sheets
Approach: discovery	Disc	tchr manuals
Ability: all	Indep ✓	overview, charts
Eval Meth: tchr jdgmts	Lab ✓	newsletters
Testing: -	Fld ✓	Non-Print Materials:
Cont Resp: tchr guided	Dem	filmloops
Envir: community, sch grounds, classroom	Sim	films
	TV	lab equipment
	A/V ✓	

Development of materials for teaching science from kindergarden through eighth grade started on a small scale in 1960. The work of the project has since involved more than a hundred educators in the conception and design of the units of study. At every stage of development, ideas and materials were taken into actual classrooms, where children helped shape the form and content of each unit before it was released to schools.

The overall purpose of the project is to enrich every child's understanding, rather than to create scientific prodigies or direct all children toward scientific careers. Rather than beginning with a discussion of basic concepts of science, ESS puts physical materials into children's hands from the start and helps each child investigate through these materials the nature of the world around him. Careful attention is given to all materials used so that all equipment looks like materials which are normally accessible to children in their own environment and not imposingly "scientific."

Over 55 separate ESS science units have been used successfully in middle-class suburban and low socio-economic areas, large cities and small towns, and a great variety of different situations.

Reason: change in the philosophy, develop new course, publication	Adopt: over 3,000,000 students	Pers: FT PT NRT	Publ: repro-
	Tchr Ed: provides manuals, guides, films, consultants	Adm 2 1	duced commer-
Initiator(s): F. Friedman, J. Zacharias, P. Morrison, W. Weston, C. Wolcott		Wr 25 5	cially
		VSch	
		Res	
		TEd	
		Trial 100's	

**Descriptive References:**

The Elementary Science Study--A History. 1973. Education Development Center.

The ESS Reader. 1970. Education Development Center.

A Working Guide to the Elementary Science Study. 1971. Education Development Center.

**Research:**

MACE Study of Elementary Science Programs. 1974.

**ELEMENTARY SCIENCE TEACHER  
TRAINING (ESTT)**

James V. Connor, Director

Natural Science Department  
Allentown College  
Center Valley, Pennsylvania 18034  
Tel: (215) 282-1100

1968-1975

Gov:Fed

See ICh Report(s): 8

Ages: 18-20, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp	Lec ✓	texts, lab books,
Subj: biol, chem, phys, earth-space, humanities	Sem ✓	programmed units,
Approach: interdisciplinary, integrated, process, conceptual, inquiry, discovery, historical	Disc ✓	activity sheets,
Ability: average	Indep ✓	tchr manuals,
Eval Meth: achievement, lab & oral tests, tchr jdgmt, student questionnaire	Lab ✓	objectives,
Testing: term, unit, individual	-Fld ✓	overview
Cont Resp: tchr guided, student & material directed	Dem ✓	Non-Print Materials:
	Sim	audiotape
	TV	
	A/V ✓	
Envir: classroom, sch library, lab		

The overall project purpose has been to develop a two-to-four semester course in science that would emphasize the humanistic interrelations of science and society as well as the method and content of newly developed programs in the United States and Great Britain for elementary school science. These would include such projects as COPEs, ESS, S-APA, SCIS, NUFFIELD JUNIOR SCIENCE, SCIENCE 5/13. The specific objective of the project is to provide elementary teachers with the science content and methods that would allow any of the newly developed programs to be easily implemented.

As a course for present and future elementary science teachers, the scientific concepts are placed in an historical framework so that they can be developed without other science course prerequisites. Laboratory work is stressed and part of this content is drawn from the newer elementary programs and so placed that this inquiry is done and discussed before being treated in class. It is humanistic in approach in that it focuses on the major figures in science as true individuals and emphasizes the inter-connection of science and the humanities.

The program has been tested by five teachers and about 550 students over the last four years at Allentown College. It is now in trial edition testing (1972-1975) by the Lehigh Valley Association of Independent Colleges and the Lehigh Regional Consortium, comprising ten southeastern Pennsylvania Colleges under the auspices of Lehigh University, Bethlehem, Pa.

After the trial edition, a final edition will be made available nationally in 1975. At this time a Spanish edition will also be available for use in Latin America.

Reason: update content & method, change in philosophy, develop new course	Adopt:(partial) 10 tchrs, 600 students, 10 schools	Pers: FT PT NRT	Publ: (\$100/10 students)
Initiator(s): J.V. Connor	Tchr Ed: conducts work- shops; provides manuals, guidebooks, consultants; no special preparation required	Adm 1 1 Wr 1 3 VSch 1 Res 1 TEd 1 2 Trial 10	

**Descriptive References:**

A Humanistic Approach to Elementary Science Teacher Training. UNESCO: Report on U. of Md. ICSU Conference of April 1973.

**Research:**

Connor, J.V. 1974. Development and Evaluation of A College Text: A Humanistic Approach to Physical Science. ERIC: Columbia Teachers College Doctoral Thesis.

ENGINEERING CONCEPTS CURRICULUM  
PROJECT - MAN AND HIS TECHNOLOGY  
(ECCP-MHT)

John G. Truxal, Emil J. Piel,  
Directors

College of Engineering  
State University of New York  
at Stony Brook  
Stony Brook, New York 11790  
Tel: (516) 246-8420

1971 -

Gov: Fed(NSF),  
University,  
Foundation,  
Publisher

See ICh Report(s): none

Ages: 18-20, adult, tchr ed

Lang: Eng

Subj: biol, math, technology, social  
sciences

Approach: interdisciplinary, integrated  
process, inquiry

Ability: all

Eval Meth: achievement & oral tests,  
tchr jdgmt, student questionnaire

Testing: term, individual

Cont Resp: tchr guided, material  
directed

Envir: community, school grounds &  
library, classroom, lab

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

texts, activity  
sheets, tchr manuals,  
tests, objectives  
overview, newsletters

Non-Print Materials:

overhead transpar-  
encies, videotape,  
audiotape, games,  
lab equipment

Man and His Technology is a course for liberal arts majors in college. It was developed from the high school course: The Man-Made World.

The basic text is similar to the original secondary school text with the exception that there are no high school type laboratory exercises, and there are discussion questions at the end of each chapter which are more closely related to the interests of college students

The course has been taught to approximately 6,000 students during the period of its trial.

Reason: change in phi-  
losophy, develop new  
course, publication

Initiator(s):

J.G. Truxal, E.J. Piel

Adopt: 30 tchrs, 3,000  
students, 25 schools

Tchr Ed: conducts work-  
shops; provides consul-  
tants, no special prepar-  
ation required

Pers: FT PT NRT

Adm

Wr

VSch

Res

TEd

Trial

Media

1

2

2

2

2

60

1

Publ: 10,000

copies repro-  
duced commer-  
cially by off-  
set (\$100/10  
students)

No references given

**ENGINEERING CONCEPTS CURRICULUM  
PROJECT - THE MAN-MADE WORLD  
(ECCP-TMW)**

John G. Truxal, Emil J. Piel  
Directors.

See ICh Report(s): 7,6,5,4

College of Engineering  
(Old Engr. Bldg., Room 214)  
State University of New York  
at Stony Brook  
Stony Brook, New York 11790

Tel: (516) 246-8420

1965 -  
Gov:Fed(NSF);  
Exxon, U.S.  
Steel;  
McGraw Hill

Ages: 15-18, tchr ed, adult ed

Lang: Eng, Japanese, Korean

Subj: biol, phys, math, tech, social  
sciences

Approach: interdisciplinary, integrated,  
process, inquiry

Ability: average, average+

Eval Meth: achievement, lab & standard-  
ized tests, tchr jdgmts, student  
questionnaire

Testing: unit, individual

Cont Resp: tchr guided, materials directed

Envir: community, school grounds & library

Hyper:	Cl	12+	2-12	I
ac	✓			
Sem			✓	
Disc	✓	✓	✓	
Indep			✓	
Lab			✓	
Fld	✓	✓	✓	✓
Dem	✓			
Sim	✓	✓	✓	✓
TV				
A/V	✓	✓	✓	✓

Printed Materials:  
texts, tchr manuals,  
tests, objectives,  
overview,  
newsletters  
Non-Print Materials:  
filmstrips, overhead  
transparencies,  
audiotape, games,  
lab equipment

The primary objective of The Man-Made World course is the development of technological literacy. This includes not only the learning of certain concepts such as modeling, decision-making, optimization, feedback, stability, etc., but also involves developing realistic attitudes about the strengths and limitations of technology and the problems involved in the interaction of technology and society.

The unique characteristics of the course are that first it is truly interdisciplinary cutting across the Sciences, Mathematics, and Social Science; and second that it is completely problem oriented. Cognitive learning in the course comes about through the study of problems which are relevant to secondary school students of the 1970's. One principle of learning that the project subscribes to is that textbooks are more useful as places to find suggestions for answers to student questions rather than as the sole motivator of those questions.

This problem-centered approach assumes an individual learns best when provided with a frame of reference for viewing the individual elements of a concept. To this end each concept is introduced with a laboratory activity and a general discussion of the concept before going into a set of examples directed at details in the conceptual framework.

Evaluation of the project has been accomplished by an independent agency, Psychological Corporation, and by intensive self study by students, teachers, school administrators and project staff. Plans for the future include developing additional activities and motivational problems relevant to the second half of the decade of the 70's as well as additional multi-media packages for individual and group learning.

Reason: change in	Adopt: 1,200 teachers,	Pers: FT PT NRT	Publ: 40,000
philosophy, develop	50,000 students,	Adm 1 1	copies repro-
new course	1,000 schools	Wr 3 30	duced institu-
Initiator(s):	Tchr Ed: conducts work-	VSch 2 4	tionally &
J.G. Truxal,	shops; provides manuals	Rer 2 2	commercially
E.E. David, Jr.,	and consultants	TEd 2 20	by offset &
E.J. Piel		Trial 60 100	linotype
			(\$100-\$500/10
			students)

**Descriptive References:**

Lanagan, T.P., and E.J. Piel. June 1972. Educational Technology in The Man-Made World. Journal of Educational Technology Systems. 1(1).

Liao, T., and E.J. Piel. Feb 1970. Let's Get Relevant. The Physics Teacher. Research:

Liao, T. Fall 1972. The Use of Analog Computer Simulation For Learning Modeling Concepts and Skills. Journal of Educational Technology Systems. 1(2).

**ENGINEERING CONCEPTS CURRICULUM  
PROJECT - TECHNOLOGY-PEOPLE-  
ENVIRONMENT (ECCP-TPE)**

John G. Truxal, Emil J. Piel,  
Directors

See ICH Report(s): none

College of Engineering  
State University  
Stony Brook, New York 11790

Tel: (516) 248-8420

1970 -  
Gov, SUNY,  
Nat. Acad. of  
Engineering,  
Exxon, U.S.  
Steel

	Exper: Cl 12+ 2-12 I	Printed Materials:
Ages: 12-16	Lec	activity sheets,
Lang: Eng	Sem	tchr manuals,
Subj: math, tech, social sciences, biol,	Disc	tests, objectives,
chem, phys, earth-space	Indep.	mini-course, over-
Approach: interdisciplinary, integrated,	Lab	view, newsletters
process, conceptual	Fld	Non-Print Materials:
Ability: average, slow	Dem	overhead transpar-
Eval Meth: l-b & oral tests, tchr jdgmts	Sim	encies, games,
Testing: student activity sheets	TV	models, lab equip-
Cont Resp: tchr directed & guided,	A/V	ment, slide/cassette
student directed		
Envir: community, sch grounds & library		

The Technology-People-Environment mini-courses were designed to provide an educational package to develop an understanding of the interaction of technology and society. The course emphasizes systems concepts as a frame of reference for decision-making in situations where there is no one right answer. It is assumed that reading and mathematics skills of the students are about fifth grade level but interest and intelligence levels are at ninth and tenth grade levels.

The basic philosophy of the course is that these academically unsuccessful students can develop an understanding of the many dimensions of modern technology if they are involved in activities which are fun and do not depend heavily on the written word and abstract mathematics. Since this student population was addressed, it was necessary to assume an irregular attendance pattern although longer range activities are introduced later in the course.

The Project staff and selected teachers will refine the activities and teacher materials based upon feedback from the 50 trial schools using TPE during the 73-74 academic year. The revised materials will be tested during the 74-75 academic year.

Junior High School materials will be developed during the 74-75 academic year and tested during the 75-76 academic year. Anyone interested in either of these developments should contact the project headquarters.

Reason: update method,	Adopt: 100 tchrs,	Pers: FT PT NRT	Publ: 1,000
change in philosophy,	4,000 students,	Adm 2	copies repro-
develop new course	100 schools	Wr 20	duced insti-
Initiator(s):	Tchr Ed: conducts work-	VSch 3	tutionally by
J.G. Truxal,	shops, provides manuals	Res 3	linotype
E.J. Piel, T.T. Liao	and consultants	TEd 25	(\$20-\$500/10
		Trial 50	students)

**Descriptive References:**

Materials Available From Engineering Concepts Curriculum Project Headquarters.  
ISTD 449 (Instructional Systems Technical Description). Technology Applications Pro-  
ject, P.O. Box 1028, Corvallis, Oregon 97330.



ENVIRONMENTAL CENTER FOR OUR  
SCHOOLS (ECOS)

Clifford A. Phaneuf, Director

See ICh Report(s): none

Ages: 8-12, tchr ed

Lang: Eng

Subj: environmental ed

Approach: \* discovery, conceptual,  
interdisciplinary

Ability: all

Eval Meth: achievement

Testing: 3 times/year

Cont Resp: \* administratively & tchr  
directed

Envir: park

Springfield Public Schools

195 State Street

Springfield, Massachusetts 01103

Tel: (413) 733-8161

1971-1973

Gov: Fed, State,  
Local; Partici-  
pating Schools

Exper: * C1 12+ 2-12 I	Printed Materials:
Lec	tchr manuals
Sem	activity sheets
Disc 3	objectives
Indep 2	overview
Lab	tests
Fld 1	newsletters
Dem 4	supplementary books
Sim	
TV	
A/V	

ECOS is an interdisciplinary environmental study program with its classroom a 745-acre city park containing all types of natural environments. Fourth, fifth and sixth graders are bussed to Forest Park for the opportunity to explore areas beyond their own homes and schools and relate them, in the activity-centered program, to expanding their environmental knowledge.

The fourth grade 3-day program studies a forest, pond and field community where the interdependence of living things and the vital role each member plays in maintaining ecological balance is the focus. The fifth grade 2-day program emphasizes community succession, adaptation and seasonal change. The sixth grade 3-day program, scheduled during winter months, teaches survival and man's responsibility toward his environment.

Each elementary school has grade level Ecology Kits, containing lesson material for pre-ECOS and post-ECOS activities. ECOS is also a training program for 300 classroom teachers, enabling them to carry on programs in their own school environment. Area colleges use the training facilities of ECOS for practice teaching and as a field observing experience in environmental education.

Parents participate enthusiastically with their children, giving the program the added dimension of being able to disseminate environmental awareness to a group most schools find difficult to reach.

Because of the success of this program, it is serving as a Diffusion Center for six school districts in Massachusetts. The ECOS program has served as a training program for teachers and administrators of six school districts and the ECOS staff has worked closely with diffusion community personnel in adapting this program to their special needs. Workshops are scheduled for adaptation of ECOS curriculum to diffusion community requirements.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced
Initiator(s): L.B. Ide, C.A. Phaneuf	Tchr Ed: * provides curriculum guides & films; conducts workshops	Adm 1 1	by mimeograph (\$59/10 students)
		Wr	
		VSch	
		Res	
		TEd	
		Trial	

No references given

## ENVIRONMENTAL EDUCATION

James M. Major, Director

See ICh Report(s): none

Paducah Public Schools

Tenth & Clark Streets  
Paducah, Kentucky 42001

Tel: (502) 442-6121

1966 -

Gov: Fed (Title  
III), Local

Ages: * 10, 15-17, 13, 6	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	field guides
Subj: biol, chem, phys, earth-space, math, tech, social sciences, Eng	Sem	objectives
Approach: * interdisciplinary, discovery, process, inquiry	Disc ✓	
Ability: all	Indep ✓	
Eval Meth: tchr jdgmts, student questionnaire	Lab	
Testing: -	Fld ✓	
Cont Resp: * tchr guided, student directed	Dem	
Envir: * sch grounds, community, sch library, lab, classroom	Sim ✓	
	TV	
	A/V	

The fundamental belief of our organization is that the child can and will learn much more outdoors, where the action is, than inside the four walls of a classroom. We have selected as our special objective the enrichment of our total curriculum by teaching the process of learning about our environment in the outdoors.

Our program has been directed specifically at the fifth grade student and the high school juniors and seniors who perform as assistant instructors at all levels. Secondly, the program is directed at the biology classes and the eighth grade earth science classes. Then the program expands to include all levels.

One of the most necessary parts of our program is the in-service training of teachers and high school student assistants. Both must know the area and the objectives before they take their students outside. A very important aspect of the project is to have the students learn by the discovery processes. The instructors lead the students to pose their own questions and then seek a solution in their own way.

The project, which includes outdoor labs on the school grounds of each elementary school and a resident stay at T.V.A.'s Land Between the Lakes Youth Station, has produced many wonderful experiences and changes of attitudes in both instructors and students. These changes and attitudes of parents toward the program are big items in our evaluation of the worth of the program. The impact of our project might be reflected in the fact that our program has been rated one of the ten best in the U.S. Our curriculum guide (now in its 5th edition) has been sold all over the U.S. and Canada as well as to some other foreign countries. It has been rated by many as the best of its kind.

Reason: change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: 800 copies
Initiator(s):	Tchr Ed: conducts work-shops, provides manuals	Adm	reproduced in-
M. McCullough,		Wr	stitutionally
J.M. Major, R.C. Colby,		VSch	by offset
C.A. Cissell, D. Crutchfield,		Res	(\$30-\$40/10
J. McCool, R. Farmer		TEd	students)
		Trial	100+

## Descriptive References:

Environmental Education - Objectives and Field Activities, 5th ed. 1974. Paducah Public Schools.

New Directions - New Dimensions - Curriculum and Staff Development. Kentucky Department of Education, Frankfort, Kentucky.

**ENVIRONMENTAL EDUCATION  
CURRICULUM DEVELOPMENT PROGRAM**

Isadore Inman, Jr., Director

See ICh Report(s): 8

St. Martin Parish School Board  
305 Washington Street  
P.O. Box 230  
St. Martinville, Louisiana 70582  
Tel: (318) 394-6261

1972-1975

Gov

Ages: 5-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	supplementary books
Subj: biol, chem, earth-space, social sciences	Sem ✓	tests
Approach: interdisciplinary	Disc	objectives
Ability: all	Indep	Non-Print Materials:
Eval Meth: achievement, lab & oral tests;	Lab ✓	slides
tchr jdgm, student questionnaire	Fld ✓	slidetape
Testing: term, unit	Dem ✓	games
Cont Resp: tchr directed	Sim	
Envir: community, sch grounds, & library, classroom, lab	TV	
	A/V ✓	

The St. Martin Parish Environmental Education Development is a process for developing environmental awareness, understanding and values through writing of environmental curriculum guides for implementing in existing curricula in the schools of St. Martin Parish. The encounters being written focus the attention of elementary and secondary youth on their environment and in a manner that would link relevant ecological, economic, social, technological, and political information. The guides are being written with behavioral objectives and a variety of environmental encounters the teacher may select to use in motivating students. Units such as ecology, soil, water, air, minerals, wildlife, noise, and pesticides will be included in the curriculum guides.

The goals of the program are: 1) to help students acquire a basic understanding of the natural and manmade component of the biophysical environment; 2) to understand man's relationship with his environment; 3) to acquire basic understanding of associated environmental problems; 4) to help students acquire strong feelings fundamental to developing a concern for the quality of the environment; and 5) to help students develop critical thinking and action skills necessary for them to help prevent and solve environmental problems.

The instruments devised for evaluation of the environmental program are as follows: 1) pre-test; 2) post-test; 3) questionnaires - a. self evaluation (student), b. self evaluation (inventory), c. rating scale (activities), d. teacher observation (on-going).

In the first year of the program (1972-1973), curriculum guides were written for grades 5, 6, 7, and 8. In the school year 1973-1974, curriculum guides were written for grades K-4 and 9-12. During the final year of the environmental program (1974-1975) emphasis will be placed on implementation of environmental materials into existing curricula in all St. Martin Parish schools.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: 500 copies reproduced by offset
Initiator(s): R. Calais, J. Wiltz	Tchr Ed: conducts workshops; provides manuals, guidebooks, films, & consultants	Adm 1 Wr 10 VSch 5 Res 10 TEd Trial 25	

**Descriptive References:**

Three Approaches to Environmental Education in the Schools. Summer 1973. The Journal of Environmental Education.

**Research:**

A New Role for American Education. U.S. Department of Health, Education, and Welfare. Marland, S.P. Environmental Education Cannot Wait.

Stapp, W.B. A Strategy for Curriculum Development and Implementation in Environmental Education.

**ENVIRONMENTAL EDUCATION  
CURRICULUM DEVELOPMENT PROGRAM**

Isadore Inman, Jr., Director

See ICh Report(s): 8

St. Martin Parish School Board  
305 Washington Street  
P.O. Box 230  
St. Martinville, Louisiana 70582  
Tel: (318) 394-6261

1972-1975

Gov

Ages: 5-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	supplementary books
Subj: biol, chem, earth-space, social sciences	Sem ✓	tests
Approach: interdisciplinary	Disc	objectives
Ability: all	Indep	Non-Print Materials:
Eval Meth: achievement, lab & oral tests;	Lab ✓	slides
tchr jdgm, student questionnaire	Fld ✓	slidetape
Testing: term, unit	Dem ✓	games
Cont Resp: tchr directed	Sim	
Envir: community, sch grounds, & library, classroom, lab	TV	
	A/V ✓	

The St. Martin Parish Environmental Education Development is a process for developing environmental awareness, understanding and values through writing of environmental curriculum guides for implementing in existing curricula in the schools of St. Martin Parish. The encounters being written focus the attention of elementary and secondary youth on their environment and in a manner that would link relevant ecological, economic, social, technological, and political information. The guides are being written with behavioral objectives and a variety of environmental encounters the teacher may select to use in motivating students. Units such as ecology, soil, water, air, minerals, wildlife, noise, and pesticides will be included in the curriculum guides.

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Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: 500 copies reproduced by offset
Initiator(s): R. Calais, J. Wiltz	Tchr Ed: conducts workshops; provides manuals, guidebooks, films, & consultants	Adm 1 Wr 10 VSch 5 Res 10 TEd Trial 25	

**Descriptive References:**

Three Approaches to Environmental Education in the Schools. Summer 1973. The Journal of Environmental Education.

**Research:**

A New Role for American Education. U.S. Department of Health, Education, and Welfare. Marland, S.P. Environmental Education Cannot Wait.

Stapp, W.B. A Strategy for Curriculum Development and Implementation in Environmental Education.

**ENVIRONMENTAL EDUCATION  
DEMONSTRATION PROJECT**

Donald French, Director

See ICh Report(s): none

Environmental Education Consultant

Topeka Public Schools

1601 Van Buren

Topeka, Kansas 66612

Tel: (913) 357-0351

1971-1974

Gov, Partici-  
pating Schools

Ages: 6-18, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	tchr manuals
Subj: environment education	Sem	field guides
Approach: interdisciplinary, process, conceptual, inquiry, discovery	Disc ✓ ✓	tests
Ability: all	Indep ✓ ✓	objectives
Eval Meth: achievement, lab & oral	Lab ✓ ✓	overview
tests, tchr jdgmts, student q're,	Fld ✓ ✓	Non-Print Materials;
interest inventories	Dem ✓	slides, overhead
Testing: unit pre & post testing	Sim ✓ ✓	transparancies,
Cont Resp: administratively & student	TV	audiotape
directed, tchr guided	A/V	models
Envir: community, sch grounds & library, classroom, lab		

No narrative provided by project

Reason: update content & methods, develop new course, develop integrat- ed environmental curricu- lum	Adopt: -  Tchr Ed: conducts work- shops; provides manuals, guides, films, consul- tants. No special preparation required.	Pers: FT PT NRT Adm 5 7 Wr 4 VSch 3 Res 3 TEd 4 Trial 450	Publ: 400 copies reproduced institutionally & by ERIC by mimeograph (\$ .69/10 students)
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Initiator(s): D. French,  
B. King, G. Clarkson,  
T. Whiteaker

No references given

**ENVIRONMENTAL INFORMATION  
PACKETS**

Jo Ann Musumeci, Director

See ICh Report(s): none

**Environmental Conservation  
Library**  
Minneapolis Public Library  
300 Nicollet Mall  
Minneapolis, Minnesota 55401  
Tel: (612) 372-66371972-1974  
Gov: Fed,  
Local (Public  
Library)

Ages: -	Exper: CL 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary
Subj: environment	Sem	
Approach: varies	Disc	
Ability: all	Indep not	
Eval Meth: varies	Lab answered	
Testing: varies	Fld	
Cont Resp: administratively directed	Dem	
Envir: varies	Sim	
	TV	
	A/V	

The Environmental Information Packets Project was designed to provide a source of environmental information to answer non-technical student and teacher requests sent to the library, as well as those sent to other environmental organizations which were not equipped to handle them. The information was to cover a broad range of topics, levels of interest and difficulty. It was to be loaned out instead of given away so as not to contribute to the solid waste problem, and to allow for updating.

The project is a collection of pamphlets, charts, reprints, government documents, and other types of non-book materials, covering twelve environmental topics. This material is contained in a 9 x 12 vinyl portfolio. Also included in each packet is a bibliography, a list of the materials in the packet with source and price, and a list of organizations and other sources dealing with the particular topic dealt with in that packet.

The materials were assembled in such a way as to encourage the user to compare information and come to his/her own conclusion about the specific environmental problem. The packets were loaned out over the entire state. Although the information was originally aimed at 4-9th grade levels, it was found that the packets served a variety of needs and age groups. The materials were most often used as background information for school work or personal reference questions, and as aids to selecting materials for library and teacher resource collections. Educators from other states have shown an interest in duplicating the project to provide similar services where the need exists.

The packets are being updated and at the completion of this phase, will be for sale for the convenience of organizations that can benefit from having them permanently on hand. They will continue to be available on a loan basis for the majority of users who prefer the convenience.

Reason: provide information service	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: no special preparation required	Adm 1	
Initiator(s):		Wr 1	
J. Copeland		VSch 1	
		Res 1	
		TEd	
		Trial	

No references given



**ENVIRONMENTAL INFORMATION  
PACKETS**

Jo Ann Musumeci, Director

See ICh Report(s): none

**Environmental Conservation  
Library**  
Minneapolis Public Library  
300 Nicollet Mall  
Minneapolis, Minnesota 55401  
Tel: (612) 372-66371972-1974  
Gov: Fed,  
Local (Public  
Library)

Ages: -	Exper: CL 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary
Subj: environment	Sem	
Approach: varies	Disc	
Ability: all	Indep not	
Eval Meth: varies	Lab answered	
Testing: varies	Fld	
Cont Resp: administratively directed	Dem	
Envir: varies	Sim	
	TV	
	A/V	

The Environmental Information Packets Project was designed to provide a source of environmental information to answer non-technical student and teacher requests sent to the library, as well as those sent to other environmental organizations which were not equipped to handle them. The information was to cover a broad range of topics, levels of interest and difficulty. It was to be loaned out instead of given away so as not to contribute to the solid waste problem, and to allow for updating.

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The packets are being updated and at the completion of this phase, will be for sale for the convenience of organizations that can benefit from having them permanently on hand. They will continue to be available on a loan basis for the majority of users who prefer the convenience.

Reason: provide information service	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: no special preparation required	Adm 1	
Initiator(s):		Wr 1	
J. Copeland		VSch 1	
		Res 1	
		TEd	
		Trial	

No references given



**ENVIRONMENTAL PLANNING WORKSHOPS  
FOR COMMUNITY LEADERS**

Ted F. Andrews, Director

See ICh Report(s): none

College of Environmental &  
Applied Sciences  
Governors State University  
Park Forest South, Illinois  
60466

Tel: (312) 534-5000

1972-1973

Gov:Fed

Ages: adult	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	newsletters
Subj: environmental planning	Sem ✓	Non-Print Materials:
Approach: interdisciplinary, integrated, process	Disc ✓	slides
Ability: -	Indep ✓	videotape
Eval Meth: student questionnaire, projects	Lab	computer simulations
Testing: -	Fld ✓	
Cont Resp: tchr & student directed	Dem	
Envir: community, classroom	Sim ✓	
	TV ✓	
	A/V	

Communities on the growing edges of metropolitan areas are plagued by a host of environmental problems relating to issues such as land use, preservation, and conservation, water supply, waste disposal, pollution, flooding, transportation, utilities, health care, schools, recreational facilities, and organizing for effective, planned growth. Residents and local officials may not recognize some of these problems until they have reached critical proportions. Most of these problems could be prevented or alleviated through inter-community planning and cooperation.

Inter-community planning for growth does not often occur. The reasons for this are not altogether clear. In many cases, it is because residents do not possess adequate knowledge, skills and techniques to plan effectively. In other cases, they may not be aware of the resources available to assist in dealing with present and future problems, nor do they recognize that their problems are shared by neighboring communities. However, the benefits of cooperative planning for growth are many. For these reasons, Governors State University's College of Environmental and Applied Sciences in conjunction with the WILLCO Council of Governments, will offer a series of model Environmental Planning Workshops for Community Leaders. In these Workshops, about 130 community leaders will work together to develop realistic approaches to resolving and preventing a broad range of environmental planning problems.

Reason: improve environmental Planning	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: -	Adm 2	
Initiator(s):		Wr	
T. F. Andrews,		VSch	
J. J. Gallagher,		Res	
H. Sievering,		TEd 4 10	
P. Leinberger		Trial	

No references given

**ENVIRONMENTAL SCIENCE STUDY  
CURRICULUM (ESSC)**

Wende Allen, Director

See ICH Report(s): none

ESEA Title III

P.S. Jones Junior High School  
Washington, North Carolina 27889

Tel: (919) 946-8266

1971-1974

Gov: Fed(USOE &  
ESEA Title III)

Ages: 12-15	Exper: CM 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts, lab books,
Subj: environmental ed	Sem	supplementary books,
Approach: interdisciplinary, integrated, inquiry, discovery	Disc 1 2	activity sheets,
Ability: all	Indep	tchr manuals, field
Eval Meth: achievement, lab and standardized tests, tchr jdgmt, student q're	Lab 2 1 3	guides, tests, objec-
Testing: unit, term, pre-post testing	Fld 1 2	tives, charts, cur-
Cont Resp: tchr directed & guided	Dem	riculum guides
Envir: community, sch grounds & library, classroom, lab	Sim 1 2	Non-Print Materials:
	TV	slides, overhead
	A/V 3 2 1	transparencies,
		slidetape, games,
		models, lab equip-
		ment

The major objectives of the curriculum materials we have developed are as follows: 1) for students to be cognizant of the importance of and need for a quality environment; 2) for students to know the political, social, and economic interrelationships and how they effect and affect the biophysical environment; 3) for students to demonstrate a sustained interest in maintaining a quality environment; and 4) for students to possess positive attitudes towards science and the study of science.

Briefly, our activities to achieve the objectives involve offering a series of six 12-week mini-courses from which each student selects three within one school year. Each course is aimed at a specific environmental problem or topic and throughout each course the students study not only the relevant facts concerning the problem, but also actively investigate means to solving this problem. Outdoor activities and community involvement are emphasized. The students receive a great deal of freedom in choosing their course of study.

External evaluation involves pre- and post-testing of students for attainment of project objectives. Internal evaluation is both objective (pre- and post-testing within each course) and subjective, for evaluating both the effectiveness of the curriculum materials and teaching methods and also the validity of each project objective.

Throughout the past three years students enrolled in ESSC have created numerous improvements to our school environment and catalyzed citizen action in the adult community. ESSC has been enthusiastically received by our students and will therefore be continued at P.S. Jones Junior High.

Reason: change in philosophy, develop new course	Adopt: 3 tchrs, 650 students, 1 school	Pers: FT PT NRT	Publ: 500 copies reproduced institutionally & commercially by offset (0-\$.20/10 students)
Initiator(s): M. Ramsey, W. Allen, W.P. Moffitt	Tchr Ed: conducts workshops; provides manuals, guidebooks, consultants; no special preparation required	Adm 1 Wr 6 VSch 4 Res 4 TEd 4 Trial 3	

**Descriptive References:**

A Directory of Projects and Programs in Environmental Education For Elementary and Secondary Schools. ERIC/SMEAC. 400 Lincoln Tower, Columbus, Ohio 43210.

ENVIRONMENTAL STUDIES PROGRAM  
(ESP)

Gordon J.F. MacDonald, Director

Murdough Center  
Dartmouth College  
Hanover, New Hampshire 03755  
Tel: (603) 646-2838

1970 -  
Gov: Fed(NSF),  
University

See ICh Report(s): 8

	Exper:	CI	12+	2-21	I	Printed Materials:
Ages: college	Lec		1			tests
Lang: Eng	Sem			✓		
Subj:* environ, biol, earth-space, technology, social sciences	Disc			✓	✓	Non-Print Materials:
Approach:* interdisciplinary, process	Indep				1	videotape
Ability: average	Lab					models
Eval Meth: oral presentations, achievement tests	Fld			✓		
Testing:* none or term	Dem					
Cont Resp:* tchr & student directed	Sim			✓		
Envir:* classroom, community, school library	TV					
	A/V	✓		✓		

The principal mission of the Dartmouth Environmental Studies Program is to provide an opportunity for undergraduates to assess the seriousness and complexity of environmental problems and to understand how these problems can be solved. The Program takes a broad view of what is meant by environment. Environment is not only pollution and its causes and cures. It is also a part of a continuing concern about resources both renewable and nonrenewable, energy, population and those qualities of life that are so difficult to quantify but are so important to human well-being.

The courses and project activities are oriented towards providing policy options and potential solutions to decision makers at the level of the College, the community, adjoining communities, States and the Federal Government. In addition the Program attempts to assist public education programs on environmental issues and to stimulate interdisciplinary research on environmental problems in the College and the professional schools.

The Environmental Studies Program was conceived and planned between 1965 and 1969. The planning process culminated in the "Working Conference on Undergraduate Education in Environmental Studies" which was held at Dartmouth in November 1969. The Conference, sponsored by the Dartmouth Bicentennial Year Committee and the Public Affairs Center, attempted to define what could be done within the context of an undergraduate program. Participants included four current, active members of the Environmental Studies faculty: James F. Hornig (Chemistry), William A. Reiners (Biology), Robert C. Reynolds, Jr. (Earth Sciences), and Frank Smallwood (Government). In addition a number of students took an active part, adding to the work of a number of distinguished contributors from outside the Dartmouth community. The original framework for the Environmental Studies Program is a result of the Conference.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: 500 copies
	Tchr Ed: -	Adm	reproduced by
Initiator(s): W. Reiners, F. Smallwood, G. Macinko		Wr	linotype
		VSch not Res answered	
		TEd	
		Trial	

Descriptive References:

Freeman Books for Life Scientists. Spring 1972.

Freeman. Man and The Environment. Spring 1971.

Commission on Undergraduate Education in the Biological Sciences. Environmental Education: Academia's Response.

**ESSENTIA: ENVIRONMENTAL  
STUDIES (ES)**

Robert Samples, Director

The Evergreen State College  
Olympia, Washington 98506

Tel: (206) 866-6570

1969-1974

Gov

See ICH Report(s): none

Ages: 5-20, tchr ed

Lang: Eng

Subj: biol, chem, phys, earth-space, math,  
technology, social sciences, art, human-  
ities, language arts

Approach: inquiry, discovery, interdisci-  
plinary

Ability: all

Eval Meth: tchr jdgmts

Testing: as needed

Cont Resp: tchr guided, student directed

Envir: community

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep 1

Lab 1

Fld

Dem

Sim

TV

A/V

Printed Materials:

activity sheets

tchr manuals

overview

newsletters

The Environmental Studies materials represent an interdisciplinary approach in all content areas at all grade levels. The title Environmental Studies relates primarily to the notion that the immediate environment of the student, the school, the school-ground, the community, are all legitimate for study. The materials are written for the teacher and are adaptable for use with nearly all curricular materials that currently exist.

Reason: -

Adopt: -

Pers: FT PT NRT

Publ: 20,000

Initiator(s): W. Bromery, Tchr Ed: conducts  
W. Romey, R. Samples workshops

Adm 3

Wr 4

VSch 4

Res 2

TEd 2

Tral 800

copies repro-  
duced commer-  
cially (\$1/10  
students)

Descriptive References:

Griffith, G. Jan-Feb 1972. Environmental Studies: A Curriculum for People. Science and Children.

Samples, R. Spring 1970. Toward the Intrinsic Biology Teacher. American Biology Teacher.

## ETHNO-SCIENCE

Carl Hime, Director

See ICh Report(s): none

Box 577

Many Farms,  
Arizona 86503

Tel: (602) 781-6389

1971 -

Gov: Fed,  
Bureau of  
Indian Affairs

Ages: 14-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Navajo	Lec ✓	activity sheets,
Subj: biol, earth-space,	Sem ✓	overview, resource
environ, anthropology	Disc ✓	paper, bibliography
Approach: interdisciplinary,	Indep ✓	Non-Print Materials:
integrated	Lab ✓	slides, overhead
Ability: all	Fld ✓	transparencies,
Eval Meth: achievement & lab	Dem ✓	audiotape, games,
tests, tchr jdgmt	Sim ✓	models
Testing: * unit, term	TV	
Cont Resp: tchr directed	A/V ✓	
Envir: community, sch grounds & library, classroom & lab		

The goals of the project are to integrate the cultural experiences of Navajo Indian students into the science curriculum and to develop instructional materials which reflect the essential harmony between the Navajo concepts of the environment and the general society's contemporary viewpoint of man in nature. This has meant using the cultural as well as physical environment of students as central to the curriculum process rather than as a peripheral concern as reflected in many bi-cultural education projects. Local community members' input is required for the developmental process and therefore the instructional materials themselves are oriented to local concerns and experiences. A broader concept of community interaction is also a part of the project. Considerable use is made of analogy and Navajo traditions as compatible with the modern Navajo culture. The viewpoint of culture and community as dynamic and evolving entities is reflected in the nature of the resource materials and their flexibility.

A set of materials transferrable to other school settings has not been produced, but a process for the development of such materials has been identified.

Future plans include development of additional materials using already collected resources and the writing and publication of the generalized development process.

Reason: change in philosophy	Adopt: (partial), 10 tchrs, 5 schools	Pers: FT PT NRT	Publ: 1000 cop- ies reproduced
Initiator(s): C. Hime, Arnold Gade, Assunta Gade, S. Erickson	Tchr Ed: provides guides & consultants	Adm 1 Wr 3 VSch 3 Res 3 TEd 3 Trial 3	institutionally by mimeograph (\$14/10 stu- dents)

## Descriptive References:

Snow, A. Oct 1972. Ethno-Science in American Indian Education. The Science Teacher. pp 30-32.

**EXPERIENCE IN OUTDOOR  
EDUCATION (EOE)**

Anthony Boyer, Director

See ICh Report(s): none

Summer Street  
Lanesborough, Massachusetts  
01237

Tel: (617) 443-0027

1966 -

Gov, Partici-  
pating Schools,  
Students

Ages: 5-12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓ ✓	supplementary books
Subj: biol, earth-space, math, social sciences, survival, art, English	Sem	activity sheets
Approach: interdisciplinary, integrated, process, conceptual, inquiry	Disc ✓ ✓ ✓	tchr manuals
Ability: all	Indep ✓ ✓ ✓	field guides
Eval Meth:* weekly, unit	Lab ✓ ✓ ✓	overview
Cont Resp: tchr guided; tchr, student & material directed	Fld ✓ ✓ ✓	Non-Print Materials:
Envir: school grounds & library, classroom, A/V outdoors	Dem ✓ ✓ ✓	slides
	Sim ✓ ✓ ✓	films
	TV	videotape
	A/V ✓ ✓ ✓	games
		lab equipment

The purpose of the project is to complement and enrich the content areas of the school curriculum with first-hand observation and multi-sensory experiences outside of the limitations of the classroom. It allows the child to become personally and actively involved in learning, and provides a wide variety of situations which will give depth and meaning to subject matter.

The project has the following unique features or characteristics: 1) encompasses all subject areas; 2) adventure in learning; 3) provides a highly stimulating setting; 4) reinforces abstract knowledge with concrete experience; 5) is in harmony with the child-centered, society-centered approach to learning; 6) offers an endless variety of resources and teaching techniques; 7) can re-establish the vital bond between man and his earth; 8) makes a child sensitive to his surroundings; 9) focuses attention on the aesthetic and ethical needs of children; 10) now involved in survival; 11) hope to have a winter environment study; and 12) planning to write up a handbook with past lesson ideas and future possibilities for outdoor education.

Reason: update content & method, develop new course	Adopt: 15 tchrs, 300 students, 2 schools	Pers: FT PT NRT	Publ: reproduced by mimeograph
		Adm 3	
		Wr 3	
		VSch 3	
Initiator(s): N. Anderson, G. St. Pierre	Tchr Ed: provides manuals, guides, films	Res 3	
		TEd 3	
		Trial 6	

Descriptive References:  
The Instructor. Oct 1968.

**EXPLORATIONS IN BIOLOGY (EIB)**

Paul G. Koutnik, Director

See ICh Report(s): 8

Mid-Continent Regional Educational

Laboratory

104 E. Independence Avenue

Kansas City, Missouri 64106

1968-1974

Gov: Fed (USOE,

NSF)

Tel: (816) 221-8686

Ages: 14-17

Lang: Eng, Hebrew

Subj: biol

Approach: inquiry

Ability: avg, avg+

Eval Meth: -

Testing: -

Cont Resp: -

Envir: -

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc not

Indep answered

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tests

The Explorations in Biology series is a set of eight simulated problem-solving instruments designed to measure cognitive inquiry skills. These instruments were initially developed in the period of 1969-72 at Mid-continent Regional Educational Laboratory. The set of skills measured by the EIB instruments were based largely upon the set of inquiry objectives delineated in Inquiry Objectives in the Teaching of Biology. (R.M. Bingham, Ed. 1969).

After 1972, the Explorations in Biology project was incorporated into the Inquiry Role Approach project of McREL. Rather than develop a series of instruments, emphasis was placed on refinement of one instrument. Changes in EIB-Topic 1 were executed to increase the usability (reduced from a two-booklet, 90 minute instrument to a one-booklet, 55 minute instrument) and more equally distribute items over the 14 objectives tested. The most recent version of the Exploration in Biology-Topic 1 is included in the commercially published Inquiry Role Approach materials (Silver Burdett Publishing Company, Morristown, New Jersey, 1974).

Validity and reliability studies of the EIB have been reported in the reports and papers listed below. It should be noted that use during the 1972-73 academic year indicated a coefficient of internal consistency (Cronbach alpha) of .87. Decisions regarding the further development of the remaining instruments in the EIB series have not as yet been made.

Reason: provide updated	Adopt: (partial)	Pers: FT PT NRT	Publ: 2000 cop-
evaluation materials for	15 tchrs, 1200 students,	Adm 1	ies repro-
inquiry-oriented biology	10 schools	Wr 1 3	duced commer-
curricula		VSch	cially by
Initiator(s):	Tchr Ed: no special	Res 2	offset
E.M. Koos	preparation required	TEd	
		Trial 12	

**Research:**

Koos, E.M. 1970, 1971, 1972. Reports on Developmental Studies of a Series of Measures of Inquiry Skill in Biology. Technical Reports Nos. 1, 2, & 4. Kansas City, Mo: Mid-continent Regional Educational Laboratory.

Koos, E.M., and J.Y. Chan. 1972. Criterion-Referenced Tests in Biology. Technical Report No. 3. Paper presented at the annual meeting of the American Educational Research Association. Chicago.

Seymour, L.A., and R.M. Bingham, et. al. 1973. Inquiry Role Approach Field Test Report. Kansas City, Mo: Mid-continent Regional Educational Laboratory. pp 48-52.



EXPLORING HUMAN NATURE (EHN)  
Anita Gil, Irven DeVore,  
& George Goethals, Directors

Social Studies Project  
Education Development Center  
15 Mifflin Place  
Cambridge, Massachusetts 02138

1970-1975  
Gov: Fed(NSF)

See ICh Report(s): none

Tel: (617) 868-5800

Ages: 16-18	Exper: Ci 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec	texts
Subj:* social sciences, biol	Sem	programmed units
Approach:* interdisciplinary, conceptual, inquiry, process	Disc 1	activity sheets
Ability: average	Indep 5	tchr manuals
Eval Meth:* group, student questionnaire, achievement tests, tchr jdgmts	Lab	tests
Testing: -	Fld 4	overview
Cont Resp:* tchr guided, student directed	Dem	charts
Envir:* classroom, community, sch library	Sim 3	Non-Print Mttterials:
	TV	films
	A/V 2	filmstrips
		games

This project is a cross-disciplinary program of study for high school students. The four units of a full-year course, Exploring Human Nature, are: Origins of Human Behavior, Childhood and the Community, Coming of Age, Managing Transitions, Individuals in Society.

From the fields of biology, anthropology, sociology, and psychology come perspectives and methods that students apply to fundamental questions about human behavior such as: In what ways is our behavior biologically based? and How do adults come to take on particular roles in their society? By exploring such questions from many points of view, using recent findings, theories, and data from the social and behavioral sciences, students deepen their understanding about themselves, gain insight into their relationship with their society, and strengthen their sense of connection to people from other cultures.

Cross-disciplinary programs ask teachers to become familiar with knowledge and methods outside their own field of study. This can be an exciting challenge--a chance for teachers to learn new subject matter, consider ideas from different points of view, try new teaching styles and methods, and extend their professional learning and development. Exploring Human Nature uses data methods typically relegated to the sciences and applies them to social questions. Thus, it draws on the expertise of both social studies and science teachers, providing an opportunity for collaboration that can lead to stronger professional relationships and understanding.

Learning approaches and classroom exercises are varied--small group work, class discussion, independent research, and exercises ranging from the Natural Selection Experiment to Designing a Community all contribute to the students' experience. For teachers, there are teachers' guides to each of the four units, evaluation strategies, background readings, and a series of workshops and seminars designed to familiarize them with the student materials and with the methodology of the various scientific disciplines drawn upon during the year.

Reason: update content & method, change in philosophy, develop new course	Adopt:(partial) -	Pers: FT PT NRT	Publ: 1500
Initiator(s): I. DeVore, P. Dow	Tchr Ed: conducts workshops; provides manuals, guidebooks, films, and consultants	Adm 1 2 Wr 6 2 VSch 6 Res 1 3 TEd 4 Trial 50 Film 1	copies reproduced institutionally by offset

#### Descriptive References:

Johnson, M. Nov 1973. A Report from the APA Clearinghouse on Precollege Psychology: Exploring Human Nature. Periodically. 3-4.

**EXPLORING NUMBER CONCEPTS (ENC)**

Dr. Randall, Director  
Contact: William G. Hazlett

See ICh Report(s): none

Southwest Educational  
Development Laboratory  
211 East 7th Street  
Austin, Texas 78701

Tel: (512) 476-6861

1973 - 1975

Gov

Ages: 5-6	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts, activity
Subj: math	Sem	sheets, tchr
Approach: process, conceptual, discovery	Disc K	manuals, objectives,
Ability: all	Indep gr 1	overview, charts
Eval Meth: lab tests, tchr	Lab	Non-Print Materials:
jdgmt, student questionnaire	Fld	filmstrips, audio-
Testing: unit, individual	Dem	tape, games
Cont Resp: tchr directed (K), material directed (1st gr)	Sim	
	TV	
	A/V	
Envir: classroom		

Exploring Number Concepts (ENC), a new mathematics program for young learners, is being developed by the Southwest Educational Development Laboratory as part of an Early Elementary Learning System.

Strengths that make it distinctive among mathematics programs available for kindergarten and Grade 1 children are that ENC provides for the following: continuous progress for each student, evaluation of individual performance, development of skills rather than emphasis on mathematical computation, development of the student's ability to solve problems, exploration of mathematical concepts in concrete ways before concepts are presented in abstract terms, success in learning mathematics by students who have not yet learned to read.

The program stresses that math is a useful tool for solving problems and for making decisions. It also recognizes that math is both a science and an art. It gives the pupil opportunities to be creative and original.

Through the language of math, the pupil comprehends and communicates ideas which might otherwise be beyond his reach. Math is "talked" as well as "worked" in Exploring Number Concepts in teacher-pupil interaction, pupil-pupil interaction, group activities, and discussions.

The approach of the ENC curriculum is affective and psychomotor as well as cognitive. One of the goals of the program is to enable children to respond "Math," when asked what they like best in school.

Reason: change in philosophy	Adopt: (pilot), 17 tchrs, 510 students, 8 schools	Pers: FT PT NRT	Publ: 10 (K) & 245 (gr 1) cop- ies reproduced institutionally (\$30(K) & \$150 (1st gr)/10 students)
Initiator(s): Randall	Tchr Ed: provides manuals, filmstrips & tapes	Adm 2 Wr 2 VSch 1 Res 1 TEd 1 Trial 17	

**Research:**

IPI Project by our Lab indicated lack of reading skills for Math in K-1.

**FOUNDATIONAL APPROACHES IN  
SCIENCE TEACHING (FAST)**

Francis M. Pottenger III,  
Director

University Laboratory School  
Science Department  
1776 University Avenue  
Honolulu, Hawaii 96822

1967-1976

Tel: (808) 948-7863

See ICh Report(s): 8,7

Ages: 12-17	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Lao	Lec ✓	supplementary books,
Subj: biol, chem, phys, earth-space, technology, social sciences	Sem ✓ ✓	programmed units,
Approach: interdisciplinary, integrated, inquiry, discovery	Disc ✓	activity sheets,
Ability: all	Indep ✓	tchr manuals, field
Eval Meth: achievement & lab tests, student jdgmt	Lab ✓	guides, tests, over-
Testing: unit	Fld ✓	view, newsletters
Cont Resp: tchr & student directed	Dem ✓	Non-Print Materials:
Envir: community, sch grounds & library, classroom & lab	Sim	overhead transpar-
	TV	encies, lab equip-
	A/V	ment

FAST is designed as a three-year sequential laboratory and field-centered science program for grades 6-10 which develops an understanding of foundational concepts and methodologies of the physical, earth, and biological sciences and relates these to the issues of Man's manipulation and use of his environment. It is appropriate for both terminal and continuing science education.

FAST is an integrated science program which retains the unique characteristics of the physical and ecological sciences. The mechanism used to achieve integration is called the relational study. In the relational study unit the student follows the flow of foundational concepts from their generation in the physical sciences to their instrumental employment in environmental studies. Each of the three levels of FAST terminates in a relational studies block of applied studies. Through this mechanism it is possible to see the input of the physical sciences and the ecological sciences into modern social decisions. The three applied studies for FAST 1, 2, and 3 (7th, 8th, and 9th grades) respectively are Air Pollution; World Energy Supply; and Population Pressures - Resource Depletion & Global Pollution.

Materials have presently been adapted to Pacific environments. FAST has developed a model set of experiments which permit adaptation to the specific environment of a particular school. Special laboratory equipment is of very simple construction, made by teachers or students of household discards. Most equipment and supplies are standard catalog items.

Internal evaluation to date has involved systematic collection of feedback from field consultants. External evaluation had been limited to an assessment of the professional validity of the materials produced to date.

Reason: -	Adopt:(partial) 105 tchrs,	Pers: FT PT NRT	Publ: reproduced
Initiator(s):	11,000 students, 51 sch	Adm 1 2	institutionally
F.M. Pottenger III,	Tchr Ed: conducts work-	Wr 3 2	by mimeograph
E. Demanche,	shops; provides manuals,	VSch 1	(\$4/10 students)
L.R. Brantley	guides & consultants	Res	
		TEd 11	
		Trial	

No references given

FUSE CENTER FOR UNIFIED  
SCIENCE EDUCATION  
Victor M. Showalter, Director

Box 3138  
University Station  
Columbus, Ohio 43210  
Tel: (614) 422-1053

1972 -  
Gov: Fed (NSF),  
University,  
Professional,  
Foundation

See ICH Report(s): 8

Ages: 5-20, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓ ✓ ✓	newsletters
Subj: biol, chem, phys, earth-space, social science	Sem ✓ ✓ ✓	guidelines
Approach: unified	Disc ✓ ✓ ✓	Non-Print Materials:
Ability: all	Indep ✓	videotape
Eval Meth: achievement tests, student questionnaire, interest inventories	Lab ✓	slide tape
Testing: unit, self-checks	Fld ✓	audiotape
Cont Resp: tchr guided, tchr & student directed	Dem ✓	games
	Sim ✓	
	TV ✓	
	A/V ✓ ✓ ✓	

Envir: community, school

The Center for Unified Science Education has a two-fold mission: 1) to disseminate the concept of unified science education and 2) to facilitate the development of high quality local unified science programs. Thus the products of the Center are not classroom instructional materials as such. The principal products are guidelines for the development of unified science programs and instructional units and prototypes of both. Unified science education is thus an approach to curriculum development by local teams of teachers who will be involved in teaching what they have developed.

The Center produces various packets and media packages. These are intended for use by teacher teams in exploring the concept of unified science education or in actually developing unified science courses. Since local curriculum development is emphasized, the final program in any given school or school district may well be unique. The programs vary in length and grade level, although most span two or more school years.

Even though the various unified science programs in existence differ in format, content, and grade level, they are united by a common belief that scientific literacy for all people is their main purpose and that science should be viewed as a holistic and humanistic endeavor. Most unified science programs aim to include all the sciences: physical, biological, behavioral, and social. However many are in a state of evolution toward this goal.

Reason: change in philosophy, develop new courses	Adopt: -	Pers: FT PT NRT	Publ: 300-5,000
Initiator(s):	Tchr Ed: conducts workshops; provides guide-books & consultants	Adm 1 3	copies reproduced commercially by
V.M. Showalter,		Wr 1 100	offset (\$100-
B. Thomson, R. Howe		VSch	\$200/10 stu-
		Res 3	dents)
		TEd 1 15	
		Trial 100	

Descriptive References:

Showalter, V., et al. Autumn 1973. Characteristics of the Unified Science Unit.

Prism II.

Showalter, V. Feb 1973. The FUSE Approach. The Science Teacher.

## GEOGRAPHY CURRICULUM PROJECT

M.J. Rice, Director

See ICh Report(s): 8,7

University of Georgia

107 Dudley Hall

Athens, Georgia 30602

Tel: (404) 542-7265

1967 -

University

Ages: 5-12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	text
Sub: geography	Sem	supplementary books
Approach: * discipline centered, conceptual	Disc ✓	programmed units
Ability: all	Indep ✓	activity sheets
Eval Meth: achievement tests, student questionnaire	Lab	tchr manuals
Testing: unit, individual	Fld	tests
Cont Resp: administratively directed	Dem	charts
Envir: classroom	Sim	
	TV	
	A/V	

The Geography Curriculum Project originated in 1967. It has the support of the College of Education at the University of Georgia, and the assistance of the Department of Geography in curriculum development. The overall goal of the Project is a sequential curriculum in geography for grades 1-7. More specifically, the Project is involved with the development of supplementary social studies units emphasizing the organizing concepts of the discipline of geography. The Geography Curriculum Project, then, has two unique characteristics--its systematic approach to concept development, and its emphasis on introducing the discipline of geography in the elementary grades.

Materials developed for the Geography Project are based on various learning theories. They are tested and evaluated by graduate students as part of the doctoral dissertation. Plans for the future include two new units--Functions of Cities and Transportation, the former to be available in Fall, 1974, and the latter in the early part of 1975.

Reason: develop new course	Adopt: (partial) 75 tchrs	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: provides manuals, guides & consultants	Adm 3	institutionally
Initiator(s): M.J. Rice		Wr 3	by offset &
		VSch 3	mimeograph
		Res 3	
		TEd	
		Trial	

## Descriptive References:

Imperatore, W.A. Nov 1967. The Conceptual Model: A Guide to Elementary Geography Content. Journal of Geography. LXVI: 414-416.

Rice, M.J. March 1970. Pilot Project. Grade Teacher. p. 52.

## Research:

Imperatore, W.A. 1969. Evaluation of a Conceptual Geography Unit for Kindergarten. University of Georgia, Athens, Georgia, Unpublished Doctoral Dissertation.

Pelletti, J.C. 1973. The Effectiveness of Graphic Roles in Geography Texts. University of Georgia, Athens, Georgia, Unpublished Doctoral Dissertation.

Steinbrink, J.E. 1970. The Effectiveness of Advance Organizers for Teaching Geography to Disadvantaged Rural Black Elementary Students. University of Georgia, Athens, Georgia, Unpublished Doctoral Dissertation.

GRAND RAPIDS MATHEMATICS  
LABORATORY PROJECT  
Lauren G. Woodby, Director

Department of Mathematics  
Michigan State University  
East Lansing, Michigan 48824  
Tel: (517) 353-6337

1967-1969  
Gov

See ICh Report(s): 5

Ages: tchr ed	Exper: C1 12+ 2-12 I	Non-Print Materials:
Lang: Eng	Lec	games
Subj: math	Sem ✓	lab equipment
Approach: discipline centered, discovery	Disc ✓	
Ability: all	Indep	
Eval Meth: achievement & lab tests	Lab ✓	
Testing: term	Fld	
Cont Resp: tchr directed	Dem	
Envir: lab	Sim	
	TV	
	A/V	

The purpose of this project was to provide laboratory learning experiences in mathematics for junior high school teachers so that these teachers, in turn, would try the laboratory approach in their classrooms.

Each weekly session was focused on some laboratory work and the related mathematical notions. The teachers gathered data, organized the data in graphic form where possible, and discussed the mathematics involved. Evaluation was done by means of the teacher's weekly log of activities supplemented by at least one observation in each teacher's classroom during the year. Commercial materials included geoblocks, cuisenaire rods, Dienes blocks, and an assortment of measuring instruments. An outdoor mathematics session was the final activity in the spring.

Reason: update methods	Adopt: -	Pers: FT PT NRT	Publ: -
Initiator(s): L.G. Woodby	Tchr Ed: conducts work-shops	Adm	
		Wr	
		VSch	
		Res	
		TEd	2
		Trial	

No references given

THE GUIDED DESIGN SYSTEM  
APPROACH --- ENVIRONMENTAL  
EDUCATION

Engineering Sciences Building  
West Virginia University  
Morgantown, West Virginia 26506

1971-1974  
Gov, University

Charles E. Wales, Director

Tel: (304) 293-4860

See ICh Report(s): 8

Ages: 15-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	textbooks
Subj: environmental	Sem	objectives
Approach: guided-decision making	Disc	
Ability: average	Indep	
Eval Meth: achievement & oral tests	Lab	
Testing: unit	Fld	
Cont Resp: tchr guided & materials	Dem	
directed	Sim	
Envir: classroom & school library	TV	
	A/V	

How do you make young people aware of the was in which their personal decisions affect the environment? Our answer is to help them learn how to use decision-making techniques so they can deal effectively with the environmental problems they will face throughout their lives. We believe we can teach both environmental concepts and decision-making skills through the Guided Design process developed at West Virginia University.

As the name implies, the Guided Design process involves guiding students through the solution of an open-ended problem. Each problem requires the students to think for themselves, think logically, gather and organize information, communicate and discuss ideas, use analysis, synthesis, evaluation and make decisions. To guide the students as they perform these complex intellectual operations, we have prepared printed "Instructions" and "Feedback". With a teacher available as "consultant", the students proceed through these materials on their own in four to seven-man design teams. Any new subject matter information required to solve the problem is gathered from community resources, textbooks, magazines, programmed instruction or other appropriate reference material.

Reason: change in philosophy	Adopt: 10 tchrs, 250 students, 10 schools	Pers: FT PT NRT	Publ: 400 copies reproduced institutionally by offset
Initiator(s): C.E. Wales	Tchr Ed: conducts workshops, provides manuals & consultants	Adm 1 Wr 4 VSch 1 Res TEd 1 Trial 2	

Descriptive References:

Colvin, S.T., D.A. Kilmer, and J.E. Smith. May 1972. Guided Design in Environmental Education. Engineering Education. 62(8).  
Wales, C.E., and R.A. Stager. Feb 1972. Guided Design: The Design of an Educational System. Engineering Education. 62(5).  
Stager, R.A., and C.E. Wales. March 1972. Guided Design: A New Concept in Course Design and Operation. Engineering Education. 62(6).

Research:

Feldhusen, J.F. March 1972. Guided Design: An Evaluation of the Course and Course Pattern. Engineering Education. 62(6).  
Tseng, M.A., and C.E. Wales. April 1972. Effect of a Guided Design Course Pattern on Student Personality Variables. Engineering Education. 62(7).



**GUIDED ENGINEERING DESIGN**

Charles E. Wales, Director

See ICh Report(s): 8

Engineering Science Building  
West Virginia University  
Morgantown, West Virginia 26506

Tel: (304) 293-4860

1969 - 1974

University &  
Foundation

Ages: 17-18

Lang: Eng

Subj: Tech

Approach: Guided Decision  
Making

Ability: avg

Eval Meth: achievement & oral  
tests

Testing: unit

Cont Resp: tchr guided &  
material directedEnvir: classroom & school  
library

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lib

Fld

Dem

Sim

TV

A/V

Printed Materials:  
tests, programmed  
units, objective

The Guided Design approach is a new concept in teaching and learning which places primary emphasis on the skilled performance of thinking and the complex process of decision-making. In class, students work in small groups to solve meaningful open-ended problems which require them to think logically, gather information, communicate ideas and use each of the decision-making steps. The students are guided through the solution of each design problem by a series of printed "Instruction-Feedback" pages, by their discussion with other students in their design team, and by the teacher, who acts as a consultant. The students do the thinking, they must make value judgments, and they play the role of the professional decision-maker.

In Guided Design, facts and concepts are treated as components required for the thinking process. Basic concepts are transmitted by an independent study device such as a text, audio-tutorial or, in this book, programmed instruction which is studied outside of class. Other required information is gathered by experimental work or from the library.

In the Guided Design system the prime role of the teacher is that of guide, prompter, manager and consultant. During class the teacher should plan to move from group to group listening, asking leading questions and encouraging the students to participate in the decision-making process. He should also exert some control over the flow of the project Instruction-Feedback pages, because students sometimes have a tendency to try to short-cut the decision-making process and ask for feedback before they have done an appropriate amount of thinking.

Reason: change in  
philosophyAdopt: 3 tchrs,  
400 students, 3 schools

Pers: FT PT NRT

Adm

Wr

VSch

Res

TEd

Trial

Publ: 4000 cop-  
ies reproduced  
commercially  
(\$120/10 stud-  
ents)

Initiator(s): C.E. Wales

Tchr Ed: conducts work-  
shops; provides manuals  
& consultants

2

10

**Descriptive References:**Wales, C.E., and R.A. Stager. Feb 1972. Guided Design: The Design of an Educational System. Engineering Education. 62(5).Stager, R.A., and C.E. Wales. March 1972. Guided Design: A New Concept in Course Design and Operation. Engineering Education. 62(6)**Research:**Feldhusen, J.F. March 1972. Guided Design: An Evaluation of the Course and Course Pattern. Engineering Education. 62(6).Tseng, M.A., and C.E. Wales. April 1972. Effect of a Guided Design Course Pattern on Student Personality Variables. Engineering Education. 62(7).

**HIGH SCHOOL GEOGRAPHY PROJECT:  
GEOGRAPHY IN AN URBAN AGE (HSGP)**

Salvatore J. Natoli,  
Fredric A. Ritter, Directors

Association of American Geographers  
1710 Sixteenth Street, N.W.  
Washington, D.C. 20009  
Tel: (202) 234-1450

1961-1970  
Gov,  
Foundation

See ICh Report(s): 6,7,6,5,4

Ages: 11 & 17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	text, overview
Subj: social sciences, geography	Sem	lab books, charts
Approach: discipline centered, inter-	Disc ✓ ✓	supplementary books
disciplinary, inquiry	Indep	activity sheets
Ability: all	Lab ✓ ✓ ✓	tchr manuals
Eval Meth: performance objectives	Fld ✓ ✓ ✓	field guides
Testing: varies	Dem ✓	objectives
Cont Resp: tchr guided	Sim ✓	newsletters
Envir: community, classroom	TV	Non-Print Materials:
	A/V ✓ ✓ ✓	filmstrips, overhead
		transparencies
		records, games
		models, lab equip-
		ment

Sponsored by the Association of American Geographers, HSGP received funds from various sources, including over \$2 million from the National Science Foundation, during a 10-year developmental period which ended in 1970. The materials are for a one-year, multi-media geography course intended particularly for the 10th grade, but with a potential for use at any point in the secondary social studies program. They focus on the themes of settlement and urban geography and utilize concepts from history, anthropology, sociology, political science, and economics. Varied student activities and many forms of educational media are employed in each of the six units, with the teacher acting primarily as a facilitator of learning. Evaluative data indicate positive results in both cognitive and affective domains.

A companion volume, The Local Community: A Handbook for Teachers complements the project materials and is both a supplementary teacher reference on geography and provides guidelines for field trips, student research and special projects.

Reason: develop new course	Adopt:(partial) 600 tchrs, 200,000 students, 500 schools	Pers: FT PT NRT	Publ: reproduced commercially (\$200/10 students)
Initiator(s): W. Pattison, N. Helburn	Tchr Ed: conducts workshops; provides manuals, guides, films & consultants	Adm 5 Wr 25 VSch 3 Res 5 TEd 3 Trial 700 700	

**Descriptive References:**

Anderson, J. Aug-Sept 1967. The High School Geography Project of the Association of American Geographers. New Viewpoints in Geography. Proceedings of a Conference for Teachers of Geography in the Caribbean, Mona, Kingston, Jamaica. pp 25-35.

Anderson, R.C. March 1966. High School Geography, Tetrospect and Prospect. Journal of Geography. 65(3): 103-108.

Beyer, B.K. Spring 1969. Curriculum Innovation in Geography--Implications for New York State Social Studies. Social Science Record. 6(2): 25-27.

**Research:**

Krug, M.M., J.B. Poster, and W.B. Gillies, III. 1970. High School Geography Project--An Evaluation. The New Social Studies. F.E. Peacock Publishers, Inc., Itasca, Ill. pp 88-112.

**HIGH SCHOOL POLITICAL SCIENCE  
CURRICULUM PROJECT. PRODUCT:  
COMPARING POLITICAL EXPERIENCES  
(CPE)**

Judith A. Gillespie,  
Howard Mehlinger and  
John Patrick, Co-Directors  
See ICh Report(s): none

Social Studies Development Center  
1129 Atwater,  
Indiana University  
Bloomington, Indiana 47401  
Tel: (812) 337-3838

1972-1977  
NSF

Ages: 17-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts, newsletters
Subj: social sciences	Sem	lab books
Approach: discipline-centered, conceptual, inquiry, political participation skills & experience	Disc ✓ ✓ ✓	activity sheets
Ability: all	Indep ✓ ✓ ✓	tchr manuals
Eval Meth: achievement, lab & standardized tests, tchr jdgmts, student questionnaire	Lab ✓ ✓ ✓	texts, objectives
Testing: unit tests, mastery quizzes	Fld ✓ ✓ ✓	overview, charts
Cont Resp: program specified	Dem ✓	simulations
Envir: school grounds & library, classroom, entire school setting	Sim ✓	Non-Print Materials:
	TV	slides, slide tape
	A/V ✓	overhead transparencies
		audio tape, games

The High School Political Science Curriculum Project is sponsored by the American Political Science Association through its Committee on Pre-Collegiate Education, with funds provided by the National Science Foundation. Project offices are located in the Social Studies Development Center at Indiana University. It is co-directed by Judith Gillespie, Howard Mehlinger and John Patrick.

New instructional materials are being developed to create an alternative approach to twelfth-grade American government courses, focusing on a comparative analysis of politics and featuring the use of the high school itself as a laboratory for testing propositions about politics. The main product of the Project will be a two-semester instructional program, entitled Comparing Political Experiences.

Materials produced will be conceptually oriented, interdisciplinary in content, and treat perennial problems and universal experiences in the life of mankind. Basic phenomena such as system change and maintenance, conflict, leadership, and decision making will be considered. The materials will be designed to be used either in conjunction with existing curricula or as new programs in political science education.

Reason: update content & method, change in philosophy, develop new course	Adopt: (partial) 25 teachers, 1,250 students 25 schools	Pers: FT PT NRT Adm 2 Wr 4 VSch 8 Res 1 1 TEd 3 Trial 25	Publ: repro- duced institu- tionally by offset
Initiator(s): J. Gillespie, H. Mehlinger, J. Patrick	Tchr Ed: provides manuals & consultants		

**Descriptive References:**

Teach About Politics in the 'Real' World -- The School. Social Education.  
Not Another Textbook! Developing and Evaluating Instructional Materials in a High School Political Education Project. Teaching Political Science.  
Instructional Uses of School Political Experiences. SSEC Newsletter.

**HUMANISTIC APPROACH TO NATURAL  
SCIENCE (HANS)**

James V. Connor, Director

Natural Science Department  
Allentown College  
Center Valley, Pennsylvania 18034

Tel: (215) 282-1100

1968-1975

Gov: Fed

See ICh Report(s): 8

Ages: 18-20, tchr ed

Lang: Eng

Subj: biol, chem, phys, earth-space,  
humanities

Approach: interdisciplinary, integrated,  
process, conceptual, inquiry, discovery,  
historical

Ability: average

Eval Meth: achievement, lab & oral tests;  
tchr jdgmt, student questionnaire

Testing: term, unit, individual

Cont Resp: tchr guided, student &  
material directed

Envir: classroom, sch library, lab

Exper:	C1	12+	2-12	I
Lec	✓			✓
Sem			✓	
Disc		✓		
Indep				✓
Lab	✓			✓
Fld		✓	✓	
Dem	✓			
Sim				
TV				
A/V				✓

Printed Materials:  
tests, lab books,  
programmed units,  
activity sheets,  
tchr manuals, over-  
view, objectives

Non-Print Materials:  
audiotape

The overall project purpose has been to develop an interdisciplinary course in science for the liberal arts major. The specific objectives were that the course be relevant, interesting, challenging and concerned with the main concepts and processes of science.

As a course for nonscientists at the college level, the scientific concepts are placed in an historical framework so that they can be developed without other science course prerequisites. Laboratory work is stressed and part of this content is drawn from the newer elementary programs and so placed that this inquiry is done and discussed before being treated in class. The program is humanistic in approach in that it focuses on the major figures in science as individuals and emphasizes the interconnection of science and the humanities.

The effectiveness of the materials has been evaluated over four years at Allentown College by the faculty of the colleges in the Lehigh Regional Consortium and by Columbia Teachers College. Before the external evaluation, a team of five participating teachers (a physicist, a chemist and three alternating biologists) evaluated the project each semester.

The program has been tested by five teachers and about 550 students over the last four years at Allentown College. It is now in trial edition testing (1972-75) by the Lehigh Valley Association of Independent Colleges and the Lehigh Regional Consortium, comprising ten southeastern Pennsylvania Colleges under the auspices of Lehigh University, Bethlehem, Pa.

After the trial edition, a final edition will be made available nationally in 1975. At this time a Spanish edition will also be available for use in Latin America.

Reason: update content & methods, change in philosophy, develop new course	Adopt:(partial) 10 tchrs, 600 students, 10 schools	Pers: FT PT NRT	Publ: 600 copies
	Tchr Ed: conducts work- shops; rprovides manuals, buides & consultants; no special preparation needed	Adm 1 1 Wr 1 3 VSch 1 Res 1 TEd 1 2 Trial 10	reproduced in- stitutionally by offset (\$100/10 stu- dents)

**Descriptive References:**

Connor, J.V. A Humanistic Approach to Elementary Science Teacher Training. UNESCO: Report on University of Maryland ICSU Conference of April 1973.

**Research:**

Connor, J.V. Sept 1974. Development and Evaluation of a College Text: A Humanistic Approach to Physical Science. ERIC: Columbia Teachers College Doctoral Thesis.

HUNTINGTON TWO  
Ludwig Braun, Director  
See ICh Report(s): none

College of Engineering  
State University of New York  
at Stony Brook  
Stony Brook, New York 11790

1968-1974  
Gov:Fed(NSF)

Tel: (516) 246-8418

Ages: 12-20	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	lab books
Subj: biol, phys, social sciences	Sem	supplementary books
Approach: discovery	Disc	tchr manuals
Ability: all	Indep	newsletters
Eval Meth: none	Lab	
Testing: none	Fld	
Cont Resp:* tchr guided, student & material directed	Dem	
Envir: computer	Sim     ✓     ✓     ✓     ✓	
	TV	
	A/V	

The Huntington Two (H<sub>2</sub>) Computer Project's goal is to develop high quality simulation programs to be used to enrich secondary school curricula in physics, biology and social studies. All H<sub>2</sub> simulations provide opportunities for learning by student participation and observation.

Familiarizing students with a computer in the practical area of simulation demystifies the computer while it shows its capabilities. Within each subject area, a unique use of simulation is possible. In physics, direct experience in the laboratory is often prevented due to the expense or delicacy of the equipment that is needed, as in high energy physics. Computer simulation of an experiment is as precise as the determined values of a physicist. For experiments in conservation and wildlife population management, herds of buffalo can be "killed" and "born" on the computer. Hundreds of years of time can be simulated allowing students to directly discover how the population of a species can be managed. In social studies, an introduction to the concept of "modeled" enriches student's understanding of the world. We stress that a simulation model is based on a particular perception of reality and that the model can be changed by the students themselves.

The Project's work has been received with enthusiasm by teachers around the country. At a midwestern university, computer students had leagues and championship playoffs using the simulation MARKIT, a game which engages two companies in one product competition.

During the 1974-75 academic year, H<sub>2</sub> will hold 20 two-day "Awareness Conferences" around the U.S. to accelerate the implementation of computer simulations in secondary schools. With more schools installing computers and computer-terminals, we hope that support will grow for the development of educational materials using the computer.

Reason: update method, develop new course	Adopt:(partial) 600 tchrs, 25,000 students, 400 schools	Pers: FT PT NRT	Publ: 50,000
		Adm     2	copies repro-
Initiator(s): L. Braun, M. Visich, Jr.	Tchr Ed: conducts workshops; provides manuals & films	Wr     1	duced commer-
		VSch     4	cially by off-
		Res	set (\$5/simula-
		TEd	tion package)
		Trial	
		Sim     1     4	

**Descriptive References:**

Visich, M., Jr., and L. Braun. The Use of Computer Simulations in High School Curricula. This paper is available through the Huntington Computer Project.

**Research:**

Huntington Computer Project Evaluation of Computer Simulation Materials, June 1973.

Dr. Emil J. Piel, Chairman. SUNY at Stony Brook.

IDEA-CENTERED LABORATORY  
SCIENCE (I-CLS)  
W.C. Van Deventer, Director

Department of Biology  
Western Michigan University  
Kalamazoo, Michigan 49001  
Tel: (616) 383-4997

1962-1972  
University

See ICh Report(s): 8,7

Ages: 12-14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr	Lec ✓ ✓	lab books, tchr
Subj: biol, chem, phys,	Sem	manuals, tests,
earth-space	Disc	objectives,
Approach: interdisciplinary,	Indep	overview
conceptual, inquiry	Lab ✓ ✓	
Ability: all, slow	Fld ✓ ✓	
Eval Meth: standardized tests,	Dem	
inquiry techniques tests	Sim	
Testing: unit	TV	
Cont Resp: tchr guided	A/V	
Envir: community, school		
grounds & library, classroom, lab		

The goal of the project has been to help students understand the point of view of a scientist, the kind of things that he does, and something of the kind of world he thinks he has found. There is no textual material or textbook for I-CLS. Ideas which cut across two or more fields of science are presented in the classroom-laboratory in brief form, and students are then taught about these ideas in terms of laboratory experiences directed toward them. The course is neither authoritarian nor purely inductive. The initiators and writers call it "guided inductive."

Teacher-made tests are developed from the questions asked by students at the end of each unit. On these tests students are asked to exhibit an understanding of relationships of these questions to the idea on which the unit was based. These Inquiry Technique Tests (ITT) are supplemented by standardized tests or other tests the teacher wishes to use for purposes of grading.

During a twelve-year period, the materials of I-CLS have been sent free to more than 4000 teachers in all fifty states and in 35 foreign countries. The program has been adopted, in whole or in part, by some 25 schools in the United States, Canada, Australia and West Germany. It has been used in the U.S. Armed Forces Dependents' Schools in the European Area. Many more individual teachers have used some of it in their classrooms.

Mimeographed units will continue to be available, sold at cost, by the project staff. It is hoped that a commercial publisher will show an interest. In the meantime, the development of a related "slow learner" program is in progress.

Reason: update method,	Adopt: (partial),	Pers: FT PT NRT	Publ: 10,000
change in philosophy,	100 tchrs, 5000 students,	Adm	1
develop new course	50 schools	Wr	3
		VSch	3
Initiator(s): W.C. Van	Tchr Ed: provides manuals	Res	5
Deventer, L. Duyser,	& consultants; no spec-	TEd	
S. Ketchel	ial preparation required	Trial	20
			(mimeograph (\$60/10 students))

#### Descriptive References:

Van Deventer, W.C. 1967-68. An Inquiry Approach to Interdisciplinary Seventh Grade Science. Journal of Research in Science Teaching. 5(4): 373-84.

A New Look at Inquiry in Junior High School Science. Spring 1969. The Science Teacher's Bulletin. Science Teachers Association of New York State, Inc. 35:29-35.

#### Research:

Van Deventer, W.C. Nov 1970. Evaluating Students' Understanding of Ideas in Junior High School Science. The Science Teacher. 37(8): 51-54.

Latchel, S.E., and W.C. Van Deventer. March-April 1973. A Method of Evaluating Science as Inquiry. Michigan Science Teachers Bulletin. 20(3): 3-10.



**IMPLEMENTATION OF THE NEW  
JERSEY STATE MASTER PLAN  
FOR ENVIRONMENTAL EDUCATION**

Edward J. Ambry, Director

The New Jersey State Council  
for Environmental Education  
Montclair State College  
Upper Montclair, New Jersey 07043

Tel: (201) 744-0362

1971 -

Gov: Fed (USOE)  
& State

See ICh Report(s): none

	Exper: C1	12+	2-12	I	Printed Materials:*
Ages: 5-20, tchr ed					newsletters
Lang: Eng	Lec	✓	✓		computer based
Subj:* environmental studies, social	Sem	✓	✓		resource units
sciences, biol, chem, phys, earth-space,	Disc	✓	✓		
math, tech, arts	Indep	✓	✓	✓	
Approach: interdisciplinary	Lab	✓	✓	✓	
Ability: all	Fld	✓	✓	✓	
Eval Meth: tchr jdgmt	Dem	✓	✓	✓	
Testing: varies	Sim	✓	✓	✓	
Cont Resp:* tchr guided & directed,	TV	✓	✓	✓	
student directed, computer prescribed	A/V	✓	✓	✓	
Envir: community, school grounds & library, classroom, lab					

The New Jersey State Council for Environmental Education was funded to implement a statewide master plan for environmental education under Title III, Section 306 of the Elementary and Secondary Education Act of 1965. The Council has placed a strong emphasis on the development of curriculum material to be stored in computer so that teachers could be assisted in planning environmental studies. This unique system of information storage and rapid retrieval is designed to assist teachers in curriculum planning and to direct class and individual student focus upon specific learner objectives. The teacher receives a Computer Based Resource Guide containing the objectives selected for the class and individual students, subject matter content, instructional activities, suggested supplemental references and materials, and suggested measuring devices for evaluation.

Reason: develop new	Adopt:(partial) 6000	Pers: FT	PT	NRT	Publ: 20,000
course	tchrs, 180,000 students,	Adm	2	2	copies repro-
Initiator(s): -	450 school districts	Wr	3	6	duced institu-
	Tchr Ed: conducts work-	VSch	2	4	tionally
	shops; provides manuals,	Res	1	2	
	guides, films, film-	TEd	2	6	
	strips & consultants	Trial		250	

**Descriptive References:**

- Ambry, E. June 1971. Model Program in New Jersey. Compact. 34-36.  
Ambry, E. Sept 1971. Weeding the Garden State. NJEA Review. 30-31.  
Ambry, E. Spring 1972. The New Jersey Story. The Title III Quarterly. 15-17.

**Research:**

- Hicken, J.E. 1965. An Experimental Analysis of the Effects on Pupil Achievement of Using an Electronic Computer in Individualizing Instruction Through Unit Teaching. Unpublished doctoral dissertation, State University of New York at Buffalo.  
Eisele, J.E. 1966. Using Resource Guides to Teach the Skills of Critical Thinking. Unpublished doctoral dissertation, State University of New York at Buffalo.  
Goldberg, M.J. 1966. Using a Resource Guide to Pre-Plan a Unit of Instruction. Unpublished doctoral dissertation, State University of New York at Buffalo.



INDEPENDENCE OUTDOOR  
LABORATORY

Charles T. Vizzini, Director

Charlotte-Mecklenburg Schools  
P.O. Box 149  
Charlotte, North Carolina 28201

1968-1971  
Gov:Fed(ESEA III)

See ICH Report(s): 8

Agex: 5-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	field guides
Subj: biol, earth-space, environmental	Sem	Non-Print Materials:
ed	Disc ✓	videotapes
Approach: interdisciplinary	Indep	
Ability: all	Lab	
Eval Meth: tchr jdgmts	Fld ✓	
Testing: -	Dem	
Cont Resp: tchr directed & guided	Sim	
Envir: outdoors	TV	
	A/V	

The objectives of this program can be divided into educational and cultural. The educational objectives are: to increase knowledge and understanding of our natural and man-made world; to foster sensitivity, perception, appreciation, and sound attitudes toward natural and human resources; and to develop, through direct experience in the outdoors, such skills as accurate observation, perception of interrelationships, the ability to "read the landscape", environmental concern, and the expression of creative and reflective thinking through writing, sketching, landscaping, and art. The cultural objectives are: to teach good outdoor manners and conduct, and thus help to curb vandalism and juvenile delinquency; to develop in young people a sense of appreciation, respect, and reverence for all living things; to promote better citizenship by stressing individual environmental responsibility and the need for individual action; and to develop an inner awareness of one's self and an interrelationship with others.

A packet of material containing a theme-understanding check list, development of theme, continuing activities, resource reference guide and information map, is available to the teacher three weeks prior to their field trip. After a teacher has pre-viewed the material, the check list is returned one week prior to the orientation with items checked for special emphasis. The one hour field trip is conducted with the assistance of two student or adult guides. After the field trip the resource teacher returns to the classroom for a follow-up session with the students. Each grade level visits a different part of the outdoor laboratory to alleviate repetition.

Reason: update method, change in philosophy	Adopt: 100 tchrs, 3,000 students, 35 schools	Pers: FT PT NRT	Publ: reproduced
		Adm 1	institutionally
Initiator(s): G. Templeton, A.P. Haywood, R. Ledford	Tchr Ed: conducts work- shops, provides guides & consultants	Wr VSch 1 Res TEd 1 Trial Volunteers 12	by mimeograph (\$25/10 students)

Descriptive References:

Hardy, C.A. and P.J. Cowan. May 1971. Environmental Education and the Elementary School. Science and Children. 8: 16-17.  
Sale, L.L. Oct 1970. Environmental Education in the Elementary School. North Carolina Education. pp 12,13,30,31.

**INDIVIDUALIZED CHEMISTRY (IC)**

P.A. Becht, Director

See ICh Report(s): none

P.K. Yonge Laboratory School

University of Florida  
Gainesville, Florida 32611

Tel: (904) 392-1526

1969-1974

Univ, Florida  
Ed Research &  
Development  
Council

Ages: 15-20	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	lab books
Subj: chem	Sem	supplementary books
Approach: conceptual	Disc	tchr manuals
Ability: all	Indep	tests
Eval Meth: written and oral tests,	Lab ✓ ✓	objectives
student questionnaire	Fld	
Testing: individual	Dem	Non-Print Materials:
Cont Resp: material directed	Sim	audiotape
Envir: classroom, sch library or	TV	
resource center, lab	A/V ✓	

A persistent problem of teachers is to individualize instruction so that all students are fully challenged and none experience undue failure and frustration. Over the past several years, consistent with its research role, P.K. Yonge Laboratory School has developed an individualized chemistry program aimed at solutions to the problem. Tentative results appear promising.

Since the emphasis is on completion of units at the student's own rate, there is no such thing as failure. Each guide sheet and laboratory activity identifies for the student and the teacher the changes in behavior that are to occur. The Individualized Chemistry course is divided into seven units: Introduction to Chemistry, The Inside Story of Chemistry, Microchemistry, Chemical Reactions and Energetics, Atomic and Molecular Theory, Biochemistry, and Nuclear Chemistry. Units I and II are required of all students and are self-paced but not individualized. Most students are able to complete these within from 10-14 weeks. Units III through VII are self-paced and individualized; i.e., a student is free to select from these units the ones which interest him the most and to pursue intensively or extensively. Time for the completion of these is determined by the student's competencies in and commitment to progressing through an individualized program.

Individualized Chemistry recognizes a wide range of needs, abilities and interests among students. In addition, because lack of reading skill is characteristic of many high school students, every effort has been made to provide a variety of media and laboratory experiences for obtaining information and solving problems.

Further, freedom to learn in an individual, creative manner is provided. Yet, the body of basic ideas, skills, and vocabulary essential to the study of chemistry has been identified and organized to provide a common experience for all students; however, each is free to proceed at his own rate through the appropriate guide sheets. Additional guide sheets help the student study in greater depths those areas of special interest to him.

Reason: update methods, change in philosophy	Adopt: 75 tchrs, 3,500 students, 50 schools	Pers: FT PT-NRT	Publ: 5,000
		Adm 2	copies repro-
Initiator(s): P.A. Becht, D.P. Altier	Tchr Ed: conducts work- shops; provides guides & consultants	Wr 3	duced institu-
		VSch 2	tionally by
		Res 1	offset (\$50/10
		TEd 2	students)
		Tral 22	

**Research:**

Individualized Chemistry - A Program Designed to Personalize Instruction in Chemistry.  
1973. Research Monograph #4, P.K. Yonge Lab School, University of Florida, Gainesville, Florida.

Individualized Instruction - Individualized Chemistry, A Case Study. Jan 1974.  
Florida Educational Research and Development (FERDC) Research Bulletin.

**INDIVIDUALIZED SCIENCE (IS)**  
(formerly IPI-Science)

Audrey B. Champagne,  
Leo E. Klopfer, Directors

Learning Research & Development  
Center  
3939 O'Hara Street  
Pittsburgh, Pennsylvania 15260

Tel: (412) 624-4820

1964-1976

Gov, Univ,  
Publisher

See ICh Report(s): 8,7

Ages: 5-14

Lang: Eng

Subj:\* biol, chem, phys, earth-space

Approach:\* inquiry, integrated, concep-  
tual, process

Ability: all

Eval Meth: achievement & lab tests

Testing: individual, diagnostic

Cont Resp:\* material & student

directed, tchr guided

Envir:\* classroom, lab

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

activity sheets,  
tchr manuals, tests,  
objectives, over-  
view, text booklets,  
lab booklets, read-  
ings, planning books

Non-Print Materials:

filmstrips, audio-  
tape, games, kits

The goal of this project has been the development of a comprehensively individualized elementary-school science program to serve children in present school grades K through 8. There are seven levels in the Individualized Science (IS) program, each of which consists of approximately one year's work in science. At this time, the first five levels of IS are completed and will be commercially available in school year 1974-75. The remaining two levels are being developed.

The science curriculum of IS is multifaceted in the sense that the science content incorporates many kinds of science learning. In addition to dealing with the concepts and conceptual schemes of science and its processes of inquiry, the science content of a contemporary science curriculum must attend to the social aspects of science, to the nature of scientific inquiry, to means for developing informed attitudes toward science and scientists, to information about the functioning of the human body, and to applications of science in everyday life.

Integrated with the IS science curriculum is an individualized-learning management system. This management system provides mechanisms for a child to help plan his or her science activities, to manage his or her own instructional materials, and to take part in the assessment of his or her learning.

The development cycle of IS includes extensive formative evaluation and field testing. These activities are carried out both at the Learning Research and Development Center, University of Pittsburgh, and in cooperation with Research for Better Schools, Inc., Philadelphia. The publisher of the IS program is Imperial International Learning Corp., Box 548, Kankakee, Illinois 60901.

Reason: develop new

course

Adopt:(partial) 1500

Tchr Ed: provides manuals  
& preparation unit

Initiator(s): Learning  
R & D Center, Univ. of  
Pittsburg; R. Glaser,  
W. Cooley

Pers: FT PT NRT

Adm

Wr

VSch

Res

TEd

Trial

Publ: 50,000

copies repro-  
duced commer-  
cially by off-  
set (\$25-\$45/10  
students)

**Descriptive References:**

An Individualized Elementary School Science Program. 1974. Theory Into Practice. 13: 136-148.

Individualized Science: Relevance for the 1970's. 1971. Science Education. 55: 441-448.

Formative Evaluation in Science Curriculum Development. 1974. Journal of Research in Science Teaching. 11.

**Research:**

A Report on Sex/Race Bias in Levels A through E of Individualized Science. Aug 1973. Research for Better Schools.

Individualized Science and Students' Attitudes Toward School and Science. Aug 1973. Research for Better Schools.

INDIVIDUALIZED SCIENCE  
INSTRUCTIONAL SYSTEM (ISIS)

Ernest Burkman, Director

The Florida State University  
415 North Monroe Street  
Tallahassee, Florida 32301

Tel: (904) 224-3001

1972-1978

Gov: Fed(NSF)

See ICh Report(s): none

Ages: 14-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts & lab booklets
Subj:* biol, chem, phys, earth-space	Sem	programmed units
Approach:* integrated, interdisciplinary	Disc	tchr manuals
Ability: all	Indep	tests
Eval Meth:* achievement & lab tests,	Lab	objectives
tchr jdgmt	Fld	newsletters
Testing: individual	Dem	
Cont Resp:* student and material directed	Sim	Non-Print Materials:
tchr guided	TV	audiotape
Envir:* lab, classroom	A/V	lab equipment
		games

When complete, the ISIS program will offer approximately 100 self-contained, mini-courses, together with a management scheme that will assist teachers in constructing curricula for different classes and/or different students. Each minicourse will entail about 15 class periods and will be independent of other ISIS minicourses.

The materials will be designed to facilitate individualized, self-pacing instruction to whatever extent individual teachers wish to implement such a course. Students can be given considerable choice in the scope and sequence of study. And within a minicourse, students will be able to bypass activities that lead to previously mastered objectives in order to concentrate on optional activities that diversify or delve deeper into the fundamental concepts.

A supplementary array of resource materials will provide remediation for any students lacking the basic (and assumed) entry behaviors required for the successful completion of a particular minicourse. In addition, to alleviate repetition among minicourses, some resource materials will separate out any new information common to several minicourses and provide it in one unit.

The first forty minicourses produced will be directed mainly towards the multidisciplinary needs of the average high school student. The core of each minicourse will be directed towards investigating science topics in a social or a technological setting. Minimal assumptions will be made about the mathematical and reading skills of the students. Later minicourses will provide a more theoretical framework to integrate the outcomes of earlier minicourses and to provide a background appropriate for college-bound and/or science prone students.

Reason: update content & methods, change in philosophy, develop new course	Adopt: in trial schools Tchr Ed: to be detailed later	Pers: FT PT NRT Adm 1 1 Wr 5 2 VSch 1 Res 2 TEd Trial 90 Artist 2	Publ: 1500 copies repro- duced institu- tionally and commercially by offset
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Initiator(s): E. Burkman,  
C. Swartz, J. DeRose

Descriptive References:

Burkman, E. Feb 1972. New Directions for the High School Science Program. The Science Teacher. 39(2): 42-44.

INDIVIDUALIZED SCIENCE  
INVESTIGATIONS (ISI)  
Gary Day, Donald G. Pegler,  
Directors

Allyn and Bacon, Inc.  
470 Atlantic Avenue  
Boston, Massachusetts 02210  
Tel: (617) 482-9220

1966-1974  
Private,  
Foundation,  
Participating  
Schools

See ICh Report(s): none

Ages: 15-20, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	lab books
Subj: biol, chem, phys, earth-space, psychology	Sem	supplementary books
Approach: integrated, process, inquiry	Disc	tchr manuals
Ability: * average, slow, average +	Indep	tests
Eval Meth: achievement & lab tests,	Lab	objectives
tchr jdgmt, student questionnaire	Fld	Non-Print Materials:
Testing: individual	Dem	lab equipment
Cont Resp: tchr guided, material	Sim	
directed	TV	
	A/V	
Envir: classroom, school library, lab		

ISI is an individualized and multidisciplinary laboratory science course which is consistent with science as well as with the changing nature of society.

During 1965-66 the Educational Research Council of America (ERCA) convened a large number of science teachers, administrators, and nationally known consultants to take a close look at the science curriculum. This group identified a need for a science course for those secondary school students who do not ordinarily elect science. They do not elect science for several reasons: 1) the student is below average and cannot cope with the normal science class; 2) the student lacks reading or math skills that are requisite for success in the usual science course - this group may include above-average-students who do not have an aptitude for math; and 3) the student who is above average in all subjects except science and does not want to pursue science as a livelihood.

The ERCA Science Department began to develop ERC Science Problems in the fall of 1966. Pilot materials were put into the schools in the fall of 1967. Writing of pilot materials continued into the 1968-69 school year. Feedback was obtained through interviews and correspondence with teachers and students, direct classroom observation, tests, questionnaires, and video-taped samplings. Revision of the materials was begun in the summer of 1970 and was based on the feedback which had been obtained. The revised program was renamed Individualized Science Investigations as this was more descriptive of the nature of the program.

Reason: develop new course	Adopt: 22 tchrs, 1250 students, 10 schools	Pers: FT PT NRT	Publ: repro- duced commer- cially (\$150- \$500/10 stu- dents)
Initiator(s): G.H. Baird, J. Dye A.H. Blankenship,	Tchr Ed: conducts work- shops; provides consul- tants	Adm 2 2 Wr 6 9 VSch 4 Res 2 TEd 6 Trial 8 32	

No references given

**INNER-CITY TEACHERS OF SCIENCE  
(ICTOS)**

Walter E. Massey, Director

Department of Physics  
339 Barus Holley  
Brown University  
Providence, Rhode Island 02912

Tel: (401) 863-2683

1971-1975

Gov: Fed  
(NSF)

See ICh Report(s): none

Ages: college, tchr ed  
Lang: Eng  
Subj: biol, chem, phys, math  
Approach: interdisciplinary,  
process, conceptual  
Ability: all  
Eval Meth: achievement, lab  
& oral tests; tchr jdgmts,  
student q're  
Testing: term, individual  
Cont Resp: tchr & student  
directed  
Envir: community, sch grounds  
& library, classroom, lab

Exper: Cl 12+ 2-12 I  
Lec  
Sem  
Disc  
Indep not  
Lab answered  
Fld  
Dem  
Sim  
TV  
A/V

Printed Materials:  
programmed units  
activity sheets  
tests  
objectives  
overview, news-  
letters

Non-Print Materials:  
films  
videotape  
audiotape  
lab equipment

The ICTOS program is designed to give future teachers a broad knowledge of the sciences as well as mastery in one field. This is essential for future teachers in the inner city since most schools cannot hire a person to teach one discipline only. These teachers must also be prepared to teach effective "General Science" courses.

Each ICTOS student takes a minimum number of introductory courses in Biology, Chemistry, Physics, Mathematics, and advanced courses in the discipline of specialization. Students may specialize in the teaching of Physics, Chemistry, Biology, or Mathematics, and each student takes at least five courses in the discipline of specialization. These courses stress the unity of the sciences and promote discussion of the role of science and technology in modern society. They are conducted in a laboratory-demonstration format which emphasizes student participation more than formal lectures, or in an individualized self-paced format a la the Keller plan; they familiarize the students with traditional and with recently developed secondary school science-curriculum materials (e.g., PSSC, PROJECT PHYSICS, IPS, BSCS, CHEMS); they provide for direct interaction with local high-school students and teachers. In addition to the basic science courses, students take a number of education courses, sufficient for teacher certification in practically all states.

The education courses are designed to get the students off the campus and into the "real world" by fostering a continued involvement with local high schools. The element of practical experience is a central feature of the ICTOS program. In each year, beginning with the introductory science courses of the freshman year, the student spends some time in local secondary schools working with students and teachers.

Reason: update method, develop model	Adopt: -	Pers: FT PT NRT	Publ: -
	Tchr Ed: provides consultants	Adm 2 Wr 5 VSch 6 Res TEd 3 Trial 25	
Initiator(s): W. E. Massey, H. Eschenbacher, L. Clapp, C. Lauro			

**Descriptive References:**

Massey, W. E. and H. F. Eschenbacher. Feb 1972. Training Science Teachers for the Inner City. The Physics Teacher. 10(2).



INQUIRY ROLE APPROACH (IRA)  
Richard M. Bingman, Director  
See ICH Report(s): 8,7

Mid-Continent Regional Educational  
Laboratory  
104 East Independence Avenue  
Kansas City, Missouri 64106  
Tel: (816) 221-8686

1968-1974  
Gov: Fed(USOE,  
NIE), Silver  
Burdett

Ages: 14-15, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec ✓	tchr manuals
Subj: biol	Sem ✓	tests
Approach: inquiry	Disc ✓	
Ability: * average +, all	Indep ✓	
Eval Meth: * lab, achievement & standard-	Lab ✓	
ized tests; student questionnaire	Fld ✓	
Testing: * individual, unit	Dem ✓	
Cont Resp: * student directed, tchr guided	Sim ✓	
& directed	TV ✓	
Envir: * classroom, lab, sch library,	A/V ✓	
community		

The Inquiry Role Approach was designed to meet the needs of educators who wanted students to participate more in their own learning in high school modern biology classes. More specifically, the IRA methodology was developed to operationalize a document entitled Inquiry Objectives in the Teaching of Biology that was written jointly by McREL and BSCS (Biological Sciences Curriculum Study) staff. This document was written to meet a need for more specific inquiry behaviors that were implicit in the BSCS and other biology textbook materials.

The fact that the Inquiry Role Approach was specifically designed to meet the needs of an ongoing curriculum development project in a subject matter field is only one of its unique features. As the title implies, there is an emphasis on enactment of roles and social skill development. Since education is fundamentally a social enterprise, effective communication is of vital importance to share information, divergent points of view and convert shared responsibilities into viable and effective action. The student, in learning to assume responsibility, develops tolerance for the viewpoints of others as he demonstrates a willingness to change his own point of view when objective evidence does not support it. Up to the present time, the evaluation results on the effects of the IRA program tend to show that its greatest strength probably lies in its change of inquiring attitudes of students. It is hypothesized by the developers that attitudes reflect a self-concept of the student and a change of self-concept, favorable to inquiry, is not likely to occur unless he can communicate effectively with others.

The IRA program was subjected to field test in 1972-73 school year. The results showed that the program could be successfully implemented and when implemented students showed significant gains in attitudes, inquiry skills, and biology content. Their gains were significantly higher than non-IRA students on attitudes and inquiry skills. The program was judged to accomplish the purpose for which it was designed.

Future plans include cooperating with the publisher (Silver Burdett) and National Institute of Education to develop demonstration and training centers during 1974-75 to effectively implement the program.

Reason: * update methods, change in philosophy, publication	Adopt: (partial) 40 tchrs, 4,000 students, 10 schools	Pers: FT PT NPT Adm 1 Wr 3 V Sch 3 Res 2 TEd 2 Trial 14	Publ: reproduced institutionally (\$3/10 students)
Initiator(s): R.M. Bingman	Tchr Ed: conducts work- shops; provides manuals, guides, films, consu- tants & evaluation		

#### Descriptive References::

- A Small Group Study Approach for Biology Based on Inquiry Objectives. Dec 1970. American Biology Teacher. 32.  
A Successful Inquiry Methodology. Sept 1974. American Biology Teacher. (to be published)  
LEIB - IRA: Preliminary Report. Sept 1972. American Biology Teacher. 34.  
Research: (The following three papers presented at NARST in Chicago, March 1974.)  
IRA Implementation: Its Documentation and Relationship to Student Inquiry Development.  
Measurement of Social Skills and Attitudinal Development of IRA Biology Students.  
Students Cognitive, Affective and Social Skills Performance.



**INTEGRATED SCIENCE APPROACH (ISA)**
**Gerald Merson, Director**
**See ICh Report(s): none**
**Mamaroneck High School  
Mamaroneck, New York 10543  
Tel: (914) 698-9000**
**1972-1974**
**Participating  
Schools**

<b>Ages:</b> 15-16	<b>Exper:</b> C1 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang:</b> Eng	<b>Lec</b> ✓	programmed units
<b>Subj:</b> biol, chem, phys	<b>Sem</b>	activity sheets
<b>Approach:</b> integrated	<b>Disc</b> ✓	tests
<b>Ability:</b> avg+	<b>Indep</b>	objectives
<b>Eval Meth:</b> * achievement, standardized &	<b>Lab</b> ✓	overview
lab tests, tchr jdgmt	<b>Fld</b> ✓	newsletters
<b>Testing:</b> unit	<b>Dem</b> ✓	
<b>Cont Resp:</b> tchr directed	<b>Sim</b>	
<b>Envir:</b> * classroom, sch library, lab	<b>TV</b> ✓	
	<b>A/V</b>	

**No narrative provided by project**

<b>Reason:</b> update method	<b>Adopt:</b> -	<b>Pers:</b> FT PT NRT	<b>Publ:</b> repro-
<b>Initiator(s):</b> G. Merson,	<b>Tchr Ed:</b> -	<b>Adm</b> 3	duced by
H.A. Simon		<b>Wr</b> 3	mimeograph
		<b>VSch</b>	
		<b>Res</b>	
		<b>TEd</b> 3	
		<b>Trial</b>	

**Descriptive References:**
**Showalter, V. FUSE Program. Ohio State University, Columbus, Ohio.**

AN INTEGRATED SCIENCE PROGRAM  
FOR PRE-SERVICE ELEMENTARY  
SCHOOL TEACHERS

Department of Education  
Purdue University  
Lafayette, Indiana 47907

1973-1975  
Gov: Fed(NSF,  
UPSTEP)

A. DeVito, F. Nordland,  
Directors

Tel: (317) 493-3621

See ICh Report(s): none

Ages: 18-20, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	programmed units
Subj: biol, chem, phys, earth-space, science methods	Sem ✓	activity sheets
Approach: integrated, inquiry	Disc	overview
Ability: all	Indep ✓	Non-Print Materials:
Eval Meth: achievement, lab, oral & standardized tests, tchr jdgmt, student questionnaire	Lab ✓	slides
Testing: term, unit	Fld ✓	
Cont Resp: administratively directed	Dem	
Envir: classroom, sch library, lab	Sim	
	TV ✓	
	A/V ✓	

The Purdue University PSTE project involves an integration of science content, elementary science methodology, and early school experiences. The science content is integrated about the theme "Man and His Environment" and is presented in five sequential courses. The content divides roughly into two semesters of life science, two semesters of physical science, and one semester of environmental science including sex and drug education. The science concepts are presented through inquiry utilizing a teaching model of exploration, invention, and discovery. Students actively engage in problem solving activities in which they are constantly challenged to explain why they believe and what is the evidence. Concurrent with this instruction are a series of structured school experiences.

The PSTs, as freshman, are first introduced to the teaching profession through a methods course. This serves a variety of purposes. It solidifies early the desire for PSTs to teach or not to teach. A continuum for progressive involvement with children from a 1-1 basis to large group instruction is developed over a three year interval. A constant tie to the relevance of on-going science content instruction, promoted through inquiry, to elementary classroom instruction is also provided during this interval. Materials from elementary science projects are utilized. They provide excellent examples of appropriate inquiry activities for the PSTs.

Participation by the PSTs in this project and its approach to science instruction has resulted in the students' awareness of the contribution of science to the enhancement of their ability to pursue an investigation, gather data, control variables, and develop confidence in their ability to formulate conclusions based on original observation. This confidence has been transmitted by the PSTs into viable science lessons with elementary school children where these same assets were promoted with the joy, the excitement, and the vigor associated with "good" science instruction.

Reason: update content & methods, change in philosophy	Adopt: - Tchr Ed: -	Pers: FT PT NRT Adm Wr VSch not Res answered TEd Trial	Publ: -
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Initiator(s): A. DeVito,  
F. Nordland

No references available

# INTERDISCIPLINARY APPROACHES TO CHEMISTRY (IAC)

Henry Heikkinen, Director

See ICh Report(s): 8

IAC Project Team  
P.O. Box 463  
College Park, Maryland 20742

1970-1973

Private,  
Publisher,  
Participating  
Schools

Ages: 16-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts - instructional
Subj: chem	Sem	modules with inte-
Approach: interdisciplinary	Disc ✓	grated lab activi-
Ability: all	Indep	ties
Eval Meth: achievement and lab tests,	Lab ✓	tchr manuals
tchr jdgmts, student q're	Fld	tests, objectives
Testing: unit	Dem ✓	overview, newsletters
Cont Resp: tchr guided	Sim	Non-Print Materials:
Envir: classroom, lab	TV	overhead transpar-
	A/V	encies

The IAC course in chemistry is composed of an introductory module which introduces the basic skills and concepts of chemistry, and six additional modules based on units of study in organic chemistry, physical chemistry, environmental chemistry, inorganic chemistry, biochemistry, and nuclear chemistry. The separate, paperbound IAC modules can be taught in any order desired by teachers or students, once the introductory module (or its equivalent) is completed.

The interchangeable modules can be used in conjunction with existing courses as enrichment units, or can be arranged into mini-courses, a one-semester, or a full year course in chemistry. Flexibility is programmed in so local decisions can be made about which modules are most appropriate, in what order they will be taught, and whether they will be taught by conventional group work or by self-pacing.

The laboratory-oriented IAC modules are designed to be investigative, interdisciplinary, relevant, and fun. In effect, IAC seeks to popularize chemistry and to extend chemical education to a much larger student audience by making it more interesting, more readily adaptable to local situations, and more in tune with the times. The IAC program intends to show the relationship of chemistry to other disciplines such as biology, physics, nuclear science, environmental science, and the earth sciences.

All IAC modules were pilot-tested and modified in light of extensive teacher and student feedback for three years prior to the release of revised modules and teachers guides for general use in 1973. A comprehensive test package has been developed for the IAC program involving a student attitude assessment form, both laboratory skills tests and knowledge tests for each module, as well as comprehensive (end-of-year) examinations in both the skills and knowledge areas.

Future plans include ongoing monitoring of classroom teaching experiences with IAC modules, the possible development of one or more new modules, continued communication with teachers through the IAC Newsletter and through orientation sessions for teachers and supervisors in local workshops and in-service implementation programs.

Reason: update methods, change in philosophy, develop new units	Adopt: 15,000 students	Pers: FT PT NRT	Publ: 60,000
	Tchr Ed: conducts work-	Adm 3	copies repro-
	shops; provides consul-	Wr 19	duced commer-
Initiator(s): M. Gardner,	tants	VSch 5	cially by off-
H. Heikkinen		Res 4	set
		TEd 13	
		Trial 120	

## Descriptive References:

Gardner, M. 1973. The Interdisciplinary Approaches to Chemistry (IAC) Program and Related Research. Science Education Research. Australian Science Education Research Association. pp 17-21.

Gardner, M. 1972. IAC Progress Report. REACTS. Proceedings of the Regional Educators Annual Chemistry Teaching Symposium. Department of Chemistry, University of Maryland, College Park, Maryland. pp 1-6.

## Research:

Heikkinen, H. 1973. Factors Influencing Student Attitudes Toward the Study of High School Chemistry. Unpublished Doctoral Dissertation, University of Maryland.

Hearle, R. 1973. The Identification and Measurement of High School Chemistry Laboratory Skills. Unpublished Doctoral Dissertation, University of Maryland.

**INTERMEDIATE SCIENCE CURRICULUM  
STUDY (ISCS)**

George Dawson, Director

See ICh Report(s): 8,7,6,5

415 North Monroe Street  
Room 705  
Florida State University  
Tallahassee, Florida 32301

Tel: (904) 644-4054

1966 -

Gov: Fed(USOE,  
NSF)

Ages: 12-15; tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr	Lec	lab books
Subj: biol, chem, phys, earth-space	Sem	supplementary books
Approach: integrated	Disc	tchr manuals
Ability: all	Indep	tests, objectives
Eval Meth: * lab, achievement & oral tests, tchr jdgmts	Lab	✓ overview
Testing: individual	Fld	newsletters
Cont Resp: student directed	Dem	Non-Print Materials:
Envir: lab	Sim	slide tape
	TV	audiotape
	A/V	lab equipment

The specific objectives of the project are: 1) to develop a comprehensive individualized science program for grades 7 to 9; 2) to provide student materials written in a self-pacing style; 3) to provide in addition to the basic package of materials used by all students certain supplementary materials known as "excursions" which alternate optional pathways to follow; 4) to develop a program, field test and revise the design using feedback from teachers, students, specialists, and special computer assisted instruction classes to perfect student-teacher and test materials; 5) to build a suitable sequence of science instruction emphasizing both content and process skills which will gradually move from a comparatively tight structure in grade 7 to open-ended activities in grade 9; 6) to develop an Individualized Testing System and a management system for administering these individualized tests, which are called Performance Checks; and 7) to produce Individualized Teacher Preparation Modules for use by science teachers of all three levels of the ISCS program.

The most unique feature of the ISCS materials is the fact that the students using them progress at different rates and through different instructional pathways depending upon their interest, abilities, and previous experience. The materials have been designed so that this can be accomplished in ordinary science classrooms by teachers with limited special training. The project utilizes a variety of instructional methods: independent study, laboratory investigations, discussion sessions and self-pacing materials.

Plans for the future involve special publication of materials of interest to teachers, such as working with students in the inner-school, how to increase the readability of the materials, the production of a module for use by the teacher-educator, and the establishment of a Visitor's Learning Center where interested people may visit to study the materials and confer with staff members.

Reason: * update method, change in philosophy	Adopt: 7,000 tchrs, 950,000 students, in all 50 states	Pers: FT PT NRT Adm Wr VSch not answered Res TEd Trial	Publ: reproduced commercially by Silver Burdett
Initiator(s): E. Burkman, D. Redfield, W.R. Snyder	Tchr Ed: conducts workshops; provides manuals, guides, films & consultants		

**Descriptive References:**

A Science Course Built for Junior High Students. May 1970. Research in Review. 1(3):1.  
Burkman, E. Dec 1970. ISCS: An Individualized Approach to Science Instruction. The Science Teacher. 37(9): 27.

Hathway, J.S., D.D. Redfield, and W.R. Snyder. May 1972. What Makes ISCS Tick? Science Activities. VII: 50-54.

**Research:**

Intermediate Science Curriculum Study. Final Report: ISCS 1971. ERIC ED 048 004, SE 010960 and ED 048 005, SE 010 961.

Redfield, D.D., B.A. Conlon, and T.G. Teates. 1970. Technical Report II, CAI Word Rate - Student Ability as Predictors of Achievement. Tallahassee: ISCS.

Snyder, W.R., and T. Kellogg. 1970. Technical Report IV: Preliminary Analysis of Teacher Factors with ISCS Student Achievement. Tallahassee: ISCS.

**INTERRELATED EXPLORATIONS IN  
SCIENCE (IES)**

Nancy C. Griffin, Director

See ICh Report(s): none

P.K. Yonge Laboratory School  
College of Education  
University of Florida  
Gainesville, Florida 32611  
Tel: (904) 392-1526

1972-1974

Univ. of Florida  
Fla Ed Res & Dev  
Council

Ages: 11-13	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: biol, chem, phys, earth-space	Sem	tests
Approach: integrated	Disc	behavior objectives
Ability: all	Indep	overview
Eval Meth:* lab, oral tests, tchr jdgmts	Lab	tchr guides
Testing:* unit, weekly, individual	Fld	
Cont Resp:* tchr guided, student & method directed	Dem	Non-Print Materials:
Envir:* classroom, sch grounds, sch library	Sim	games
	TV	models
	A/V	

**No narrative provided by project**

Reason: update methods	Adopt: 10 tchrs, 1,000 students, 4 sch	Pers: FT PT NRT	Publ: 2,000
Initiator(s): N.C. Griffin, V. Allen, T. Gadsden, P. Becht, S. Poor	Tchr Ed: conducts work- shop, no special prepar- ation required	Adm Wr 3 2 VSch 1 Res 1 TEd 4 Trial	copies repro- duced insti- tutionally by mimeograph (\$75/10 students)

**Descriptive References:**

Griffin, N.C. Jan 1974. Interrelating Science Through Body Involvement. Activites  
Recherches Pedagogiques. 3(13).

Middle School Unified Science. May 1973. Science for Society Education Review.  
Research:

A research monograph of field test results. To be published early in 1975. P.K.  
Yonge Laboratory School, Gainesville, Florida.

A resource monograph of program approach and design. To be published early in 1975.  
Florida Education Research and Development Council.

**JEFFERSON COUNTY CURRICULUM  
DEVELOPMENT**

Tom Gann, Director

See ICh Report(s): 8

Jefferson County Board of  
Education  
Curriculum Center  
1810 South 25 Court  
Birmingham, Alabama 35209

1968 -

Gov

Tel: (205) 879-0531

Ages: 6-20, Tch ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	programmed units,
Subj: biol, chem, phys, earth-space, math, social sciences	Sem	activity sheets,
Approach: interdisciplinary	Disc ✓	tchr manuals, tests,
Ability: avg, avg+, slow	Indep ✓	objectives
Eval Meth: achievement, lab & oral	Lab ✓	Non-Print Materials:
tests, tchr jdgmt	Fld	videotape, slide
Testing: unit, individual	Dem ✓	tape, audiotape
Cont Resp: tchr guided, material directed	Sim	
Envir: school grounds & library,	TV ✓	
classroom, lab	A/V	

Schools are for students. Each student has a set of needs which must be met for him to have a profitable school experience. This simple philosophy is the basis for the Jefferson County School System's instructional innovation program.

The first step toward meeting individual needs was to initiate a program of curriculum development to provide materials for individualized instruction in every area. Teacher committees established skill and knowledge sequences and learning objectives. Among the materials they produced were teacher guides which incorporated suggestions for adapting the curriculum to various modes of learning and individual student units on different ability levels. These materials are printed, packaged, and dispatched from the curriculum center to the schools. Teachers organize them and orient students in their use. The student units are structured to clarify for the student what he should learn and ways in which he can learn. He is given learning options and encouraged to evaluate his progress in relation to this goals.

Evaluation, whether it is student self-evaluation, a conventional written examination, teacher observation, or a performance demonstration, is aimed at providing a measure of success for the student very day. Use of curriculum materials enables students to work independently without limitation. This independent study does not preclude group interaction; the program provides ample opportunities for large and small group learning activities. The teacher serves as an instructional guide rather than as a dispenser of information. Working together, teachers and students establish a classroom climate conducive to learning; teachers help students, and students help each other.

Reason: update content & method, change in philosophy	Adopt: (partial), 80 schools	Pers: FT PT NRT	Publ: 5000 cop- ies/grade
Initiator(s): J.R. Hall, E.A. Hollis	Tchr Ed: conduct workshops; provide manuals, guides & consultants	Adm 3 Wr 12 200 200 VSch 12 Res 12 TEd 12 200 200 Trial	reproduced by offset

**Descriptive References:**

Flanagan, J. Sept 1976. Functional Education for the 70's. Phi Delta Kappan.  
Educational Reorganization and Reorientation Through the Personalization of Instruc-  
tion - Jefferson County Schools.

**Research:**

Gann, T.R. 1974. A Study of an Individualized Reading Program for Sixth-Grade Stu-  
dents in Jefferson County, Alabama. Unpublished Doctoral Dissertation, University  
of Alabama.



JOHN MUIR INSTITUTE (JMI) URBAN  
EXPERIENTIAL ENVIRONMENTAL STUDIES  
CURRICULUM PROJECT

2118-C Vine Street  
Berkeley, California 94709  
Tel: (415) 548-0525

1973 -  
Gov: Fed(OEE),  
Private,  
Foundation

David Sutton, Paul Hamon,  
Directors

See ICh Report(s): none

Ages: 12-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	programmed units
Subj: environmental ed	Sem	activity sheets
Approach: * interdisciplinary, inquiry	Disc	tchr manuals
Ability: * all, average	Indep ✓	tests
Eval Meth: tchr jdgmt	Lab ✓	objectives
Testing: individual	Fld ✓	overview
Cont Rel: * material & administratively directed	Dem ✓	charts
Envir: * community, classroom	Sim ✓	Non-Print Materials:
	TV	games
	A/V	models

The John Muir Institute for Environmental Studies (JMI) is a non-profit foundation that sponsors needed environmental research and development projects. In 1972 JMI determined that a comprehensive urban environmental education program was needed. Following a study of various instructional strategies, techniques, and media, JMI has elected to undertake the development of a kindergarten through high school curriculum with the following characteristics:

1) The curriculum is based on an integrated environmental studies approach. The materials stress not only the physical and biological sciences, but also social, economic, historical and philosophical aspects of environmental matters.

2) The curriculum is concerned with urban problems. The student is taught to view the city as an ecosystem and to apply general ecological concepts to specific urban problems.

3) The curriculum is concerned with generalizable concepts, skills and attitudes. The overall goal of the curriculum is not to teach the student facts -- it is to teach him to think about environmental problems.

4) The instructional technique is individualized, experiential, and project based. The student is briefly prepared and then taken on a visit to a specific site. After the site visit, the student is asked to select a specific aspect of the visit that excited him most and to undertake a project built around his interest. Because of the costs, time, and logistic considerations involved in field trips, the curriculum is being designed to supplement a regular school program.

5) The curriculum is based on a comprehensive kindergarten-high school design. Although the students may only do six projects a year, the net result, after working with the curriculum for several years, should be a student who has a very strong working knowledge of the general environmental studies concepts.

JMI hopes to make the high school level kits available by late 1975. The kits for the primary grades will come out later, probably at one year intervals.

Reason: change in philosophy, develop new course	Adopt: being tested	Pers: FT PT NRT	Publ: test
	Tchr Ed: conducts work-shops; provides manuals	Adm 2	copies repro-duced by tchr
		Wr 6	
Initiator(s): M. Linn, D. Sutton, P. Hamon		VSch	
		Res 1	
		Ted	
		Trial 5	

#### Descriptive References:

An Overview of the John Muir Institute's Urban Experiential Environmental Studies Curriculum Project. April 1974.



**K-12 ENVIRONMENTAL EDUCATION PROGRAM**

Marvin Meissen, Director

See ICh Report(s): none

Madison Public Schools  
545 W. Dayton Street  
Madison, Wisconsin 53703  
Tel: (608) 257-9561

1969-1974

Gov: Fed,  
Participating  
Schools

Ages: 5-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: environmental	Sem	field guides
Approach: interdisciplinary	Disc	Non-Print Materials:
Ability: all	Indep ✓ ✓	filmstrips
Eval Meth: tchr jdgmts, student	Lab	slide tape
questionnaire	Fld ✓ ✓	lab equipment
Testing: unit	Dem	
Cont Resp: * tchr & student directed	Sim ✓ ✓	
Envir: * classroom, school grounds,	TV	
outdoors, community	A/V	

The Madison Public Schools environmental education program was an attempt to coordinate the many fine local efforts and projects designed to improve environmental education, and to effectively organize these efforts for use of community resources. For years educators in the Madison schools have used school forest areas and outdoor sites with naturalists for instruction of the school population. In 1969, with increased responsibility in environmental education identified, many of the operating components were identified as part of an overall program.

The objectives of the project were to provide facilities, guidelines and resources for effective community programs and to assure participation of students at all levels in meaningful experiences. The systematic use of resources available for the project was guided by those members of the planning group. Federal funds were used to identify and develop local audio-visual materials. This project under the directorship of Mary Lou Peterson, won awards and resulted in an increased in-class backup component for use of outdoor facilities. The development and expansion of the Cherokee Outdoor Education Area with Richard Lee and the city park commissioner's office, resulted in an increased usage of this facility, and an increased effectiveness in the overall program. The school-community effort worked to refine already existing procedures to encourage student involvement, identifying effective teacher in-service methods, and developing a school-community approach to help student participants understand the nature of man-created and natural systems.

The project is effectively completed with termination of funding in 1974. Continuing work on refinement is necessary and continued maintenance imperative for continuation of well-planned and effective experiences for students at all levels.

Reason: * update content & methods	Adopt: 300 tchrs, 8,000 students, 8 schools	Pers: FT PT NRT	Publ: 2,000
Initiator(s): P. Olson, R. Lee, M.L. Peterson, D. Archbald	Tchr Ed: * provides manuals, guides, filmstrips	Adm 1 2 Wr 6 VSch 3 Res 2 TEd 2 Trial 50	copies repro- duced commer- cially by offset

No references given

**K-12 MULTIDISCIPLINARY PROCESS  
CURRICULUM IN ENVIRONMENTAL  
EDUCATION**

William J. Hamilton, Director

Environmental Education Office  
Edmonds School District #15  
3800 196th Street, S.W.  
Lynnwood, Washington 98036

1973-1974

Gov

Tel: (206) 778-8831

See ICh Report(s): none

	Exper:	Cl	12+	2-12	I	Printed Materials:
Ages: 5-18	Lec	✓				activity sheets
Lang: Eng	Sem	✓				tchr manuals
Subj: biol, chem, phys, earth-space, math, technology, social sciences	Disc	✓				objectives
Approach: interdisciplinary, process	Indep				✓	
Ability: all	Lab	✓				
Eval Meth: lab tests, tchr jdgmt	Fld	✓				
Testing: varies	Dem	✓				
Cont Resp:* tchr directed and guided	Sim	✓				
Envir:* community, school grounds	TV	✓				
	A/V	✓				

This project is a working model for the structure and implementation of a multi-disciplinary process curriculum in environmental education, K - 12. This model emphasizes the broadly based socio-ecological approach endorsed by the Edmonds School District Environmental Education Council. The design of the model presented here includes five phases which have been sequentially organized into the following plans:

1) To plan for the structure of appropriate training and student activities as designed by two writing teams to be selected on the basis of defined qualifications. The participating teams will represent each grade level, K - 6 and each relevant secondary discipline 7 - 12. The team will consult with community, local, state, and natural resource personnel and will incorporate and expand existing materials into a total program that reflects the objectives established.

2) A plan for implementing the materials written by means of training sessions at the elementary building level and for the specific secondary disciplines and secondary teachers involved. The writing team will form a nucleus for the training of teachers in use of materials and equipment.

3) A plan to evaluate the effectiveness of materials and methods used through formal and informal feedback from students and teachers involved. Students will be evaluated on the cognitive aspects of the curriculum materials written and both teachers and students on the attitudinal aspects.

4) A plan for revision and retraining as necessary.

5) A plan for dissemination of developed materials through the Office of The Washington State Superintendent of Public Instruction as required by the project description.

6) A plan to continue the program utilizing district and community funds under the guidance of the Edmonds District 15 Environmental Council in cooperation with the District Environmental Consultant.

Reason: update content	Adopt: -	Pers: FT PT NRT	Publ: 500 copies
Initiator(s):	Tchr Ed: conducts work-	Adm 1	reproduced in-
L. Squire, L. Sears,	shops, provides manuals	Wr 15	stitutionally
C. Nelson, L. Park,		VSch	by offset
J. Pennington		Res	
		TEd 15	
		Trial 130	

No references given

K-12 SCIENCE DESIGN -  
LAS CRUCES SCHOOLS (K-12 SD)

J. Paul Taylor, Director

See ICh Report(s): 7,6,5,4,3

Director of Instruction  
301 West Amador Street  
Las Cruces, New Mexico 88001  
Tel: (505) 524-2894

1961-1964

Gov:Local;  
Participating  
Schools

Ages: 5-18, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp	Lec ✓	activity sheets
Subj: biol, chem, phys, earth-space, career ed, environmental ed	Sem ✓	tchr manuals
Approach: discipline centered, interdisci- plinary, integrated, process, conceptual, inquiry, discovery	Disc ✓ ✓	objectives
Ability: all	Indep ✓ ✓ ✓	overview
Eval Meth: achievement & lab tests, tchr jdgmt, student questionnaire	Lab ✓ ✓ ✓	bibliography
Testing: term, unit	Fld ✓ ✓	
Cont Resp: tchr directed & guided, material directed	Dem ✓ ✓	
Envir: community, school grounds & library, classroom, lab	Sim	
	TV ✓ ✓ ✓	
	A/V	

In the early sixties, the teachers of Las Cruces District #2 voted for a multiple text/material adoption in science, provided that a teacher's guide was prepared to aid the teacher in carrying out an effective science program. It was this provision that led to the work of the K-12 Science Committee. Nearby New Mexico State University scheduled "a two-semester graduate course, Directed Study in Education: Science Curriculum Construction", geared entirely to Las Cruces School District #2's plan for curriculum study in science.

A conceptual framework for developing the curriculum was agreed on, accepting nine concepts considered appropriate. Grade-level committees developed a scope and sequence chart for each grade level with appropriate resource units compiled by teachers with consideration for the learner in "his major scientific interests in age-level progression and the possibility of integrating science with other subject areas". The format of the prepared guides covered philosophy, objectives, scope and sequence, appropriate resource units, suggested experiments, and bibliography.

In the fall of 1964, the K-12 Science Design was implemented in grades K-12. Teachers guides were completed for grades 1-9. Senior High adopted biology for the tenth, chemistry for the eleventh, and physics for the twelfth, making their text/material selections appropriate for the levels. As a result of the K-12 Science Design, the media centers of the Las Cruces Schools have become more curriculum oriented to meet the demands of classroom interests.

Reason: change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: repro- duced institu- tionally
Initiator(s): F.E. Atkinson, M. Stewart, C. Brown, W. Porter, W.A. Dick-Peddie	Tchr Ed: conducts work- shops; provides guides, films & consultants	Adm 2 1 Wr 26 VSch 10 Res 26 TEd Trial 9	

**Descriptive References:**

Taylor, J.P. March 1964. K-12 Science Design: Working Papers in a Science Curriculum. The Science Teacher. 31(2).

**Research:**

Elbers, D. Studies and Reports.

KNOWLEDGE FOR USE PROJECT  
Phillip R. Pennington, Director

3066 S.W. Flower Terrace  
Portland, Oregon 97201  
Tel: (503) 244-9122

1973-  
Not fully  
funded as yet

See ICh Report(s): none

Ages: adult	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: all	Sem ✓	tests
Approach: interdisciplinary	Disc ✓	behavioral objec-
Ability: all	Indep ✓	tives
Eval Meth: proctor or self-testing	Lab	indexes and bibli-
Testing: individual	Fld	ographies
Cont Resp: material directed	Dem ✓	Non-Print Materials:
Envir: sch library	Sim ✓	slides
	TV	games
	A/V ✓	

The ultimate goal of the Knowledge for Use Project is to integrate knowledge from various disciplines into a complex cross-referenced system so that a person pursuing a question or an interest can locate and learn things relevant to his needs. It organizes interrelations and implications. It also aims at providing supplementary materials for traditional college courses that show relationships between the disciplines and to show how specialized knowledge can relate to broader issues.

The project's approach is to design indexes and annotated bibliographies which include references to unitized learning materials as well as to more traditional literature. It designs learning units as needed to supplement available ones. The project attends to verbal/non-verbal associations, detailed feedback to the learner on results of learning efforts, Piagetian logic operations, values, and other factors which generally relate to use of knowledge. Workshops in which participants design their own reference aids and materials are included. These workshops may evaluate usefulness of materials previously made through interviews with former participants.

Knowledge for Use is in its beginning stages. A preliminary core organization has been developed following divisions of personal development (self), systems (world), and knowledge utilization (interaction of self and world). This organization is information science-based. Some materials have been developed, but the predominant operation will be, at first, organizing certain interdisciplinary projects. These will produce materials that relate specific disciplinary knowledge to the core organization. They will include study of personal epistemologies, Piagetian logic structures, and techniques for coping with complexity. These are fundamental questions essential to the project.

Reason: change in the philosophy	Adopt: -	Pers: FT PT NRT	Publ: repro-
Initiator(s): -	Tchr Ed: -	Adm	duced insti-
		Wr	tutionally by
		VSch not	offset
		Res answered	
		TEd	
		Trial	

No references given

LABORATORY PROGRAM FOR COMPUTER  
ASSISTED LEARNING (PROJECT LOCAL)

Robert N. Haven, Director

See ICh Report(s): 8,7

200 Nahatan Street  
Westwood, Massachusetts  
02090

Tel: (617) 326-3050

1967 -

Gov: Fed;  
Participating  
Schools

Ages: 8-18, tchr ed	Exper:* Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec 3 ✓	overview
Subj:* math, biol, chem, phys, earth- space, social sciences, business ed	Sem	newsletters
Approach:* inquiry, discovery	Disc	supplementary books
Ability: all	Indep ✓ 2	programmed units
Eval Meth: achievement & standardized tests, tchr jdgmts, student q're	Lab ✓ 1	tchr manuals
Testing: term	Fld	Non-Print Materials:
Cont Resp:* tchr & material directed, tchr guided	Dem	computer programs
Envir:* lab, classroom	Sim 4 ✓	overhead transpar- encies
	TV	
	A/V	

Project LOCAL, previously a very successful five-town endeavor, began offering its support services for computer-oriented education to a wider audience of school systems in January, 1973. Expanding the organization makes it possible to provide better services at much lower prices than are available from other sources. The services being offered include: in-service training, document and computer program library, AV materials library, contract consulting, and access to time-shared computers.

School systems can elect to receive services independently or as consortium members. Membership carries additional benefits such as: 1) access to all services listed above at lower costs than when obtained independently; 2) membership in a community of users sharing ideas and common interests/problems; 3) participation in project planning; and 4) consultative help with curricula and day-to-day problems.

Reason: update method	Adopt: unknown	Pers: FT PT NRT	Publ: reproduced
Initiator(s): Westwood	Tchr Ed:* conducts work-	Adm 2 8	institutionally
Public Schools,	shops, provides consul-	Wr 5	by mimeograph
E. Gallagher,	tants	VSch 2	
J. Pender		Res 2	
		TEd 2	
		Trial	

Research:

Computer-Oriented Instruction and Supporting Services in Project LOCAL Schools. 1970-71 School Year.

Project LOCAL Report - Laboratory Program for Computer-Assisted Learning Phase I.  
July 1967-Aug 1968.

LANDER CONSERVATION CENTER  
Robert J. Legoski, Director

863 Sweetwater Street  
Lander, Wyoming 82520

1968-1971  
Participating  
Schools

See ICh Report(s): none

Ages: 6-18, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	activity sheets
Subj: environmental ed	Sem ✓	tchr manuals
Approach: interdisciplinary	Disc ✓ ✓	overview
Ability: all	Indep ✓ ✓	newsletters
Eval Meth: student q're	Lab	Non-Print Materials:
Testing: -	Fld ✓ ✓	slides
Cont Resp: * tchr guided, administratively directed	Dem ✓	flims
Envir: * sch grounds, community	Sim	slide tape
	TV	
	A/V	

How does a child learn? By doing, by inquiring, by asking -- not by being told. That philosophy provides the base for an exciting new approach to teaching about "this spaceship Earth," the environment.

A curriculum committee of Wyoming teachers spent the summer of 1971 developing a unique packet of imaginative materials and activities for environmental education. The prime goal of this materials development effort was to help Wyoming students to become aware of themselves as individuals and to understand interrelationships within their environment.

Nearly 300 cards, each proposing a learning activity, were prepared in the initial writing effort. All are designed to allow for individual choice. Most can be worked alone, in small groups, or with an entire class. Some are structured; others are open-ended. They reflect a multi-disciplinary approach, expanding the classroom to include the learner's whole life, and fostering the transfer of learning among existing curricula. For this reason subject areas are not designated. Furthermore, precise objectives are not specified on the cards because each activity is designed to meet a wide variety of already established objectives. Nor are age or grade levels suggested, as the cards are designed for wide appeal from kindergarten through high school. The cards are classified in four areas designed for convenience -- earth, air, water, and life. Activities may overlap into any or all of the other categories, and apply to many curricular course offerings. The explanations are in lively language, to intrigue both the student and the teacher. The materials needed to carry out the activities are inexpensive and readily available locally. Flexibility is built in, to meet varying local situations and to encourage the use of local resources and resource people.

Primary to the development of the materials was placing the learner on his own as a decision maker, while the teacher becomes the arranger of the learning environment rather than a disseminator of knowledge.

Reason: update content	Adopt: -	Pers: FT PT NRT	Publ: (\$7.50/10 students)
Initiator(s): R.W. Skyles	Tchr Ed: conducts workshops; provides guides & consultants	Adm 1	
		Wr 14	
		VSch	
		Res	
		TEd	
		Trial	

No references given



LANDER CONSERVATION CENTER  
Robert J. Legoski, Director

863 Sweetwater Street  
Lander, Wyoming 82520

1968-1971  
Participating  
Schools

See ICh Report(s): none

Ages: 6-18, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	activity sheets
Subj: environmental ed	Sem ✓	tchr manuals
Approach: interdisciplinary	Disc ✓ ✓	overview
Ability: all	Indep ✓ ✓	newsletters
Eval Meth: student q're	Lab	Non-Print Materials:
Testing: -	Fld ✓ ✓	slides
Cont Resp:* tchr guided, administratively directed	Dem ✓	flims
Envir:* sch grounds, community	Sim	slide tape
	TV	
	A/V	

How does a child learn? By doing, by inquiring, by asking -- not by being told. That philosophy provides the base for an exciting new approach to teaching about "this spaceship Earth," the environment.

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Primary to the development of the materials was placing the learner on his own as a decision maker, while the teacher becomes the arranger of the learning environment rather than a disseminator of knowledge.

Reason: update content	Adopt: -	Pers: FT PT NRT	Publ: (\$7.50/10 students)
Initiator(s): R.W. Skyles	Tchr Ed: conducts workshops; provides guides & consultants	Adm 1	
		Wr 14	
		VSch	
		Res	
		TEd	
		Trial	

No references given



**LIFE SCIENCE INVESTIGATIONS -  
MAN AND THE ENVIRONMENT (MATE)**

Gary Day, Dennis L. Harvey,  
Directors

Houghton Mifflin Company  
110 Termont Street  
Boston, Massachusetts 02107  
Tel: (617) 423-5725

1966 -

Private,  
Foundation,  
Participating  
Schools

See ICh Report(s): 8,7,6

	Exper: C1	12+	2-12	I	Printed Materials:
Ages: 12-14	Lec				texts
Lang: Eng	Sem				tchr manuals
Subj:* biol, technology, social sciences, environmental ed	Disc	✓	✓	✓	tests
Approach:* process, interdisciplinary, inquiry	Indep			✓	objectives
Ability: all	Lab	✓	✓	✓	overview
Eval Meth:* criterion reference test, tchr jdgmt	Fld			✓	
Testing: unit	Dem			✓	
Cont Resp: teacher directed	Sim	✓	✓		
Envir:* lab, classroom, community, school grounds	TV				
	A/V				

The MATE project utilizes content and media that are relevant and appealing to young people. The primary goals of the course are to enable individuals to develop their own inquiry skills and to develop their own perspectives on the major environmental problems that mankind faces. Course materials have been developed and tested with the help of more than fifty teachers in schools affiliated with ERC. Commercial publication and distribution of all course materials is being conducted by the Houghton Mifflin Company.

The course has several unique features, among which is the use of games and simulations as instructional activities. A second is the use of performance objectives that are given to the students and keyed to specific self-evaluation items.

The program consists of twenty-four Investigations, grouped into four units: 1) Investigating Living Things; 2) The Environment Affects Living Things; 3) Living Things Affect Each Other; and 4) Man Affects the Environment. Five investigations involve games: The Redwood Controversy, The Mouse in the Maze, The Planet Management Game, The Pollution Game, and Thermal Pollution.

Reason: develop new course	Adopt: 3,000 tchrs, 100,000 students	Pers: FT PT NRT	Publ: repro-duced commercially (\$150/10 students)
Initiator(s): G.H. Baird, J. Dye A.H. Blankenship,	Tchr Ed: provides manuals	Adm 2 Wr 8 VSch 2 Res TEd Trial 33	

No references given

**LIGHTSHIP CHESAPEAKE, ELEMENTARY  
PROGRAM (Lightship)**

Thomas N. McFadden

National Capital Parks  
1200 Ohio Drive, S.W.  
Washington, D.C. 20242

Tel: (202) 426-6896

1971 -

Gov

See ICh Report(s): none

Ages: 12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	tchr manuals
Subj: * biol, chem, social sciences	Sem	Non-Print Materials:
Approach: integrated	Disc ✓	slides
Ability: all	Indep	videotape
Eval Meth: tchr jdgmt	Lab ✓	
Testing: under development	Fld ✓	
Cont Resp: tchr & lightship staff directed	Dem	
Envir: lightship & small craft	Sim	
	TV	
	A/V ✓	

Operating from a converted Coast Guard Lightship, the Chesapeake, the pilot program was begun in December 1971, whereby urban 5th and 6th grade students spend a day aboard ship learning about aquatic ecology, and particularly, how the health of the Potomac River directly affects the city. The approach is an interdisciplinary one and teachers receive a manual with program format and mini-lessons for preparing their students for the trip to the ship. Teacher workshops are conducted at the beginning of each semester. The manual also has post-site activities for follow up lessons. While the students are aboard (10:00 to 2:00) they receive an orientation to the ship as a navigation aid and historical vessel, plus a look at the lives of the men who manned her. They board one of the Lightship's small craft for a trip on the Potomac where they collect water samples, weather parameters, and examine man's effect on the historical development of the river. Back on board, the class is divided into "crews" that rotate through stations: a) hydrological cycle and sources of water, b) visit the ship's aquarium to study food chains and habitats of aquatic life, c) conduct water quality analyses on the sample they collected and also examine plankton.

The entire shipboard experience is unique to urban students. For many it is their first real personal experience with their source of water. The program is very popular in the D.C. school system and one additional day of classes has been added to accommodate suburban Maryland and Virginia schools. The program is evaluated annually by Park Service personnel, Lightship staff and D.C. school science coordinators. Future plans include the addition of a simulated submarine to be installed in the forward bilge section with portholes with rising and falling water levels, tapes of fish noises, and movies of aquatic life.

Reason: develop new course	Adopt: 50 tchrs	Pers: FT PT NRT	Publ: 1,000
Initiator(s): T.N. McFadden	Tchr Ed: conducts work- shops; provides manuals & consultants	Adm Wr VSch not Res answered TEd Trial	copies repro- duced institu- tionally

**Descriptive References:**

Children Today. Office of Child Development, Childrens' Bureau, HEW. P.O. Box 1182, Washington, D.C. 20013. DHEW Publication No. (OCD) 73-14.

LIGHTSHIP CHESAPEAKE HIGH SCHOOL- National Capital Parks  
STUDENTS TOWARD ENVIRONMENTAL 1200 Ohio Drive, S.W.  
PARTICIPATION PROGRAM (STEP) Washington, D.C. 20242  
(LIGHTSHIP) Tel: (202) 426-6896

1973 -  
Gov:Fed

Thomas N. McFadden, Director  
See ICh Report(s): none

Ages: 12-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj:* biol, chem, nautical science	Sem	field guides
Approach: interdisciplinary, integrated,	Disc	charts
discovery	Indep	
Ability: all	Lab	Non-Print Materials:
Eval Meth: tchr jdgmt	Fld	slides
Testing: -	Dem	videotape
Cont Resp: tchr & lightship staff directed	Sim	lab equipment
Envir: lab, lightship & tug	TV	
	A/V	

Students Toward Environmental Participation (STEP) is a program which gives metropolitan area high school students a unique opportunity to examine in depth a selected environmental study area (ESA). By systematically monitoring an area in the Potomac River Basin, these students gain an insight into the different factors that interact and are interdependent in their ESA.

Environmental studies currently include marine biology, marshland community relationships and water quality analysis. Students have access to the ship's laboratory and all other equipment necessary for the project.

Reason: develop new	Adopt: 100 tchrs,	Pers: FT PT NRT	Publ: -
course	2,000 students,	Adm	
	30 schools	Wr	not
Initiator(s):	Tchr Ed: provides manuals,	VSch	answered
T.N. Mc Fadden	& consultants	Res	
		TEd	
		Trial	

**Research:**

Results of both fall and spring semester sampling efforts, 6 parameters, available upon request from the Lightship.

LINCOLN AREA ENVIRONMENTAL  
EDUCATION PROJECT (LAEEP)

Donald W. McCurdy, Director

See ICh Report(s): none

211 Henzlik Hall  
University of Nebraska at  
Lincoln  
Lincoln, Nebraska 68508  
Tel: (402) 472-3151

- 1974  
Gov

Ages: tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	resource units
Subj:* science, social sciences	Sem	curriculum guide
Approach: interdisciplinary	Disc	
Ability: all	Indep varies	
Eval Meth: -	Lab	
Testing: -	Fld	
Cont Resp: tchr directed	Dem	
Envir:* classroom, community	Sim	
	TV	
	A/V	

This project involves a summer institute-workshop to be followed by an academic year in-service program, for 25 in-service and 5 pre-service science and social studies teachers in the Lincoln, Nebraska area. The purpose of this two phase program shall be to provide these teachers with the cognitive knowledge and understanding of the concepts, principles, and issues relevant to environmental problems facing this region, our nation, and the world as a whole. It will also provide for training in the use of nationally recognized curriculum development projects that have produced materials in the area of environmental education. These materials will be incorporated into a series of resource units that will be printed and distributed to the participants.

Characteristics of this proposed project include: 1) an interdisciplinary approach--focusing on the needs of teachers in the natural and social sciences; 2) utilization of University personnel from a wide variety of disciplines including zoology, botany, engineering, agriculture, geography, political science and economics; 3) a cooperative-University-public school project; 4) a blending of expertise in content and pedagogy; 5) a combination summer and academic year program to help insure implementation and evaluation; 6) the development of strategies for utilizing materials from several nationally recognized curriculum developed projects (i.e. B.S.C.S., E.S.C.P., I.S.C.S., E.S., H.S.G.P.); and 7) focus on the needs of pre-service as well as in-service teachers.

It is anticipated that there will be a series of workshops conducted in future summers and that materials will be constantly updated and revised.

Reason: develop new course	Adopt:(partial) 25 tchrs	Pers: FT PT NRT Adm 1 Wr 25 VSch Res TEd Trial 25	Publ: 150 copies reproduced by mimeograph
Initiator(s): R. Reeder, R. Van Horn, R. Macklem, D. Rathe, D. McCurdy	Tchr Ed: conducts work-shops		

No references given

LOS ANGELES UNIFIED SCHOOL  
DISTRICT OUTDOOR EDUCATION  
Durrell A. Maughan, Director

Bellevue Youth Services Center  
3317 Bellevue Avenue  
Los Angeles, California 90026  
Tel: '213) 665-4626

1967-1969  
Gov

See ICh Report(s): none

Ages: 10-12	Exper: C1 12+ 2-21 I	Printed Materials:
Lang: Eng	Lec	programmed units
Subj: biol, earth-space, social sciences	Sem	activity sheets
Approach: interdisciplinary, inquiry, discovery	Disc / /	tchr manuals
Ability: all	Indep	field guides
Eval Meth: achievement tests, tchr jdgmts, student questionnaire	Lab	objectives
Testing: individual	Fld	overview
Cont Resp: administratively directed	Dem / /	Non-Print Materials:
Envir: outdoors	Sim	slides
	TV	
	A/V	

The Outdoor Education Program is a practical approach to making many aspects of the curriculum more meaningful. Activities are correlated with the approved courses of study in such areas as arithmetic, reading, composition, astronomy, geography, geology, history, natural science, meteorology, conservation, physical science, music, arts and crafts. Other activities include manual work, health, citizenship, physical education, and moral and spiritual values. Camp experience includes the study of erosion control (80,000 evergreen trees have been planted thus far), fire prevention, tree culture, archery, hiking, crafts, swimming, nature lore, cookery, dramatics, and campfire programs.

From September to June, selected 6th grade classroom groups and their teachers attend the outdoor classroom. During the school year, junior and senior high school students go on weekends. Capacity during the school year and summer is 40 boys and 40 girls; weekend groups consist of 40-50 campers. Day trips have been added successfully. Since the center's inception in 1925, more than 200,000 campers have attended. In 1969-1970, 9,733 students attended. On the basis of present limited accommodations, a school attends only once and then cannot be rescheduled for approximately seven years.

Reason: update method, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced by mimeograph
Initiator(s): D.A. Maughan	Tchr Ed: conducts workshops; provides manuals, guides & consultants	Adm	
		Wr	not
		VSch	answered
		Res	
		TEd	
		Trial	

No references given

**THE MADISON PROJECT**

Robert B. Davis, Director

See ICh Report(s): 8,7,6,5,4,3,2,1

 1210 West Springfield Avenue  
 Urbana, Illinois 61801

 1957 -  
 Gov: (NSF, USOE);  
 Syracuse Univ,  
 Webster College,  
 Participating  
 Schools

Ages: 7-16	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng, Japanese	Lec 5	supplementary books
Subj: math	Sem 1	reports
Approach: * discovery, conceptual, process, discipline-centered, inquiry	Disc 3	newsletters
Ability: * average +, all	Indep 2	Non-Print Materials:
Eval Meth: * tchr jdgmts, videotape of student performance; lab, oral & achievement tests	Lab	films
Testing: frequent	Fld	
Cont Resp: administratively & student directed, tchr guided	Dem 4	
Envir: classroom	Sim	
	TV	
	A/V	

The Madison Project was one of probably only three projects that sought to combine clear notations, careful sequencing of mathematical topics, learning by generalizing from instances, and learning new concepts in a context where they were appropriate tools for achieving a reasonable result. The goal was to create a school mathematics curriculum that children would enjoy, that yielded students and teachers a sense of gratification, that produced clearer conceptual understanding in students, and that served better than the traditional curriculum in preparing students for further study in later grades and in college.

Project activity has developed smoothly since 1957, as follows: 1) 1957-8 - feasibility trials with culturally deprived 7th graders (at Madison School in Syracuse, whence the Project name); 2) 1958-9 - feasibility trials with average 7th graders and gifted 3rd graders; 3) 1959-64 - developmental work with children in grades 2 through 9; 4) 1962-65 - documentation by videotaping and filming typical classroom lessons. These films are our major product. They are intended for study by teachers, to show what we did and how we did it; 5) 1964-72 - large scale teacher education programs in Chicago, San Diego, Los Angeles, New York City, Philadelphia, Berkeley, and Washington, D.C.; 6) 1972 - present teacher education programs at the University of Kentucky and elsewhere; preparation of a computer-assisted version on the PLATO computer system.

The Project assumes that schools cannot make major changes suddenly; Project materials are supplementary, and are intended to help schools move toward the curriculum the Project designed. These materials are not that new curriculum itself, and in that sense the materials can be used (as a doctor can use a stethoscope) but cannot be adopted. Local curriculum design work is required in building the local program.

Reason: * update method, change in philosophy, develop new course, update content	Adopt: unknown	Pers: FT PT NRT	Publ: * reproduced
	Tchr Ed: * conducts work-shops; provides films, guides & consultants	Adm 3 4	commercially &
		Wr 7	institutionally
		VSch 7	by offset
		Res 3	
Initiator(s): R.B. Davis, D.E. Kibbey, M.F. Barberis, J.G. Wexler		TEd 100	
		Trial 1000's	

**Descriptive References:**

Davis, R.B. Winter 1971-72. Observing Children's Mathematical Behavior as a Foundation for Curriculum Planning. Journal of Children's Mathematical Behavior. 1(1): 7-59.  
 Davis, R.B. What Classroom Role Should the PLATO Computer System Play? AFIPS Conference Proceedings, Volume 43. (Proceedings of the 1974 National Computer Conference). pp 169-173.

**Research:**

A Modern Mathematics Program as it Pertains to the Interrelationship of Mathematical Content, Teaching Methods, and Classroom Atmosphere. 1965. Report submitted to the Commissioner of Education, U.S. Office of Education. (Coop. Res. Project No. D-093).

**MAINE ENVIRONMENTAL EDUCATION  
PROJECT**

Dean B. Bennett, Director

See ICh Report(s): none

Intermediate School  
Yarmouth, Maine 04096

Tel: (207) 846-3392

1970 -

Gov: Fed (ESEA  
Title III),  
Participating  
Schools

Ages: 5-20, tchr ed, adults	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	texts, supplementary
Subj: environmental ed	Sem ✓	books, programmed
Approach: interdisciplinary, process,	Disc ✓	units, activity
conceptual, inquiry, discovery	Indep ✓	sheets, tchr manuals,
Ability: all	Lab ✓	field guides, tests,
Eval Meth: tchr jdgmts	Fid ✓	objectives, overview,
Testing: objectives-based pre & post-	Dem ✓	newsletters, charts
tests for activities	Sim	Non-Print Materials:
Cont Resp: administratively, tchr, student	TV	slides, overhead
& material directed	A/V ✓	transparencies,
Envir: community, school grounds, class-		stereoscopic prints
room & lab		

The Maine Environmental Education Project views environmental education as a process aimed at producing a citizenry that possesses a knowledge, motivation, and ability to maintain and improve the quality of the total environment for all life, and a process for improving the quality and effectiveness of educational practices at all levels in all disciplines. The project's activities and accomplishments toward achieving these two goals include the following:

1) A first step was the development of a wide geographic network of K-12 locally funded programs with trained coordinators located in the Yarmouth area, Bangor, Kennebunk-Kennebunkport, Oxford Hills and Cape Elizabeth. A year training program was established with the University of Michigan and the University of Maine at Orono.

2) An innovative teaching-learning process and related activities for classroom and firsthand community total environment studies was designed. This process stresses the skills of investigation, evaluation-interpretation and problem-solving as well as ecosystem concepts and feelings and values.

3) A practical evaluation model for assessing student outcomes has been developed and tested.

4) The project has been involved with model organizational methods and implementation strategies for total community and site studies, the identification of community resources, and environmental planning involving both the school and community people.

5) Graduate, undergraduate, and inservice education programs and courses have been established within the State University system and approved by the State Department of Educational and Cultural Services.

Reason: establish state-	Adopt: 200 tchrs,	Pers: FT PT NRT	Publ: 3,000
wide program	5,000 students,	Adm 1	copies repro-
	25 schools	Wr 2 5	duced institu-
Initiator(s):		VSch 2	tionally &
F.H. Harrison,	Tchr Ed: conduct work-	Res 1	commercially by
D.B. Bennett	shops; provides manuals	TEd 2 5	mimeograph &
	guides & consultants	Trial	offset (\$55/10
			students)

**Descriptive References:**

National Advisory Council on Supplementary Centers and Services. March 1974. Sharing Educational Success - Sixth Annual Report of the National Advisory Council on Supplementary Centers & Services. Washington, D.C.: U.S. Office of Education.

Bennett, D.B. Spring 1972. A Statewide Strategy for Environmental Education. The Title III Quarterly.

Keller, M.A. Outdoor Education Comes of Age: Learning About Life from Life. Parents' and Better Family Living.

**Research:**

Bennett, D.B. 1972. The Development of a Model to Evaluate the Attitudinal and Behavioral Goals of K-12 Environmental Education. Ph.D. dissertation, The University of Michigan.



MAN: A COURSE OF STUDY  
(MACOS)

Peter B. Dow, Director

See ICh Report(s): none

Social Studies Program  
Education Development Center  
15 Mifflin Place  
Cambridge, Massachusetts 22138

Tel: (617) 868-5800

1963-1970

Gov: Fed;  
Foundation

Ages: 10-12

Lang: Eng

Subj: biol, technology, social sciences

Approach: interdisciplinary, process,  
conceptual, inquiry, discovery

Ability: all

Eval Meth: achievement tests, tchr  
jdgmts, student questionnaire &  
interviews

Testing: individual

Cont Resp: tchr guided

Envir: community, classroom,  
school library

Exper: C1 12+ 2-12 I

Lec

Sem

Disc ✓

Indep ✓

Lab

Fld ✓

Dem

Sim ✓

TV

A/V ✓

Printed Materials:

supplementary books  
activity sheets  
tchr manuals, tests  
overview, charts  
newsletters

Non-Print Materials:

slides, filmstrips  
films  
records  
games

Man: A Course of Study is an interdisciplinary social studies program for upper elementary and middle school students and is based on three questions framed by Jerome S. Bruner, its principal developer: "What is human about human beings" How did they get that way" How can they be made more so?" Course materials rely heavily on research sources and present subject matter through a variety of media, including films, filmstrips, records, posters, and booklets.

The first half of the course examines the similarities and differences between human beings and other animals, particularly salmon, herring gulls, and baboons. These studies explore concepts such as life cycle, innate and learned behavior, parental care, aggression, territoriality, group structure, and communication. The second half of the course is an intensive study of man in society. The Netsilik Eskimos of the Canadian arctic are studied in depth as an example of the small-scale, simple society that reflects universal human characteristics and problems. The materials emphasize the inter-relatedness of technology, social organization, belief systems, and child rearing practices as central elements of a cultural system, and they illustrate how the specific cultural traditions of the Netsilik have enabled them to survive in one of the most hostile environments on earth. The course closes with a brief examination of how the Eskimo lives today.

Learning strategies have been devised in such a way as to insure maximum flexibility in the use of the materials, but they also stress cooperation and exchange of information among students. Special emphasis is placed on using a variety of media to accommodate a diversity (enactive, iconic, symbolic) of student learning styles. A summary of evaluation findings based on nation-wide testing during the development period accompanies the materials for teachers. Schools electing to adapt the program must provide inservice training. Lesson plans and background readings for twenty teacher education seminars are provided as part of the course materials. Approximately 250,000 students are using the program at the present time and expansion is taking place at the rate of approximately one thousand classrooms per year.

Reason: change in philosophy, develop new course	Adopt: 8,000 teachers, 250,000 students 1,500 schools	Pers: FT PT NRT Adm 5 Wr 10 VSch 5 Res 5 TEd 5 Trial 250	Publ: 30,000 copies reproduced commercially by off-set (\$150/10 students)
Initiator(s): P.B. Dow	Tchr Ed: conducts workshops; provides manuals, guides, films & consultants		

#### Descriptive References:

Bruner, J.S. 1969. Man: A Course of Study in Toward A Theory of Instruction. Massachusetts: Belknap Press of Harvard University Press.

Dow, P.B. Man: A Course of Study in Retrospect: A Primer for Curriculum in the '70's in Theory Into Practice.

Dow, P.B. April 1972. If You Were a Baboon, How Would You Tell Your Mother You Were Hungry? in Natural History:

#### Research:

Hanley, J. and D. Whitla. 1970. Curiosity, Competence, Community. Education Development Center.

MAN'S CULTURAL RELATIONSHIP TO  
THE ENVIRONMENT - PAST, PRESENT,  
& FUTURE

L.L. Livingston, Director

Rt. 1, Box 127  
Delta, Colorado 81416  
Tel.(303) 874-4438

1971-1974

Gov: Fed  
(ESEA, Title III)  
& local (Joint  
Sch District 50)

See ICh Report(s): none

Ages: 8-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp	Lec ✓	activity sheets
Subj: biol, earth-space, social sciences	Sem ✓	tchr manuals
Approach: interdisciplinary	Disc ✓	field guides
Ability: all	Indep ✓	newsletters
Eval Meth:*student q're, tchr jdgmts	Lab ✓	Non-Print Materials:
Testing: unit	Fld ✓	slides
Cont Resp.* student directed, tchr	Dem ✓	slide tape
guided, administratively directed	Sim	models
Envir.* classroom, sch grounds, community	TV	lab equipment
	A/V ✓	

The overall project purpose was to show in perspective continuity the effect of man's culture on his environment and how man has adjusted to and utilized his environment to achieve his present day sophistication to the exclusion of proper environmental planning and control; and, how man might best make use of his environment in the future.

The materials produced by the project are as follows: eight media and instructional units developed around basic major stages of the cultural relationship between man and his environment (Grades 3-6); 18 problem solving instructional units simulating environmental situations which require an ethical decision as part of the solution (Grades 1-6); and a nine week study (45 hours) in Colorado History designed to analyze the physical and cultural environment of Delta County, and to demonstrate the interdependency of rural and urban citizenry upon one another as related to their respective environment (Grades 7-12). In addition, the project has undertaken the following activities: organization of a community advisory council made up of individual citizens, students, Forest Service, Soil Conservation, County Planning Commission and municipal representatives; organization of a core of twelve project teachers and two principals representing eight different schools, eighth grade levels, actively involved in instructional development and school and community activities; the construction of instructional media and activities for all grade levels; the development of four outdoor areas to be used for instructional activities; the development of an environmental simulating chamber; and the building of a portable (D.C.) weather station capable of monitoring and recording wind speed and direction, air temperatures, ground temperature, humidity, rainfall and water pH on a clock timed schedule.

Reason: develop new course	Adopt: 10 tchrs, 430 students, 2 sch	Pers: FT PT NRT	Publ: repro-duced insti-tutionally by mimeograph
Initiator(s): M.C.		Adm 1	
Kreutz, H. Anderson	Tchr Ed: conducts work-shops; provides guides and consultants	Wr 5	
		VSch 1	
		Res	
		TEd 4	
		Trial 38	

No references given

**MARINE ECOLOGY RESEARCH  
PROJECT (MER)**

75 Santa Barbara Road  
Pleasant Hill, California 94523

1970-1975

George J. Castellani, Director

Tel: (415) 937-4100, ext 368

Gov, Foundation,  
Participating  
Schools

See ICh Report(s): none

Ages: 12-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: biol, chem	Sem	activity sheets
Approach: interdisciplinary, integrated, inquiry, discovery	Disc ✓ ✓	tchr manuals
Ability: all	Indep	field guides
Eval Meth: achievement & atandardized tests, student questionnaire	Lab ✓ ✓	tests
Testing: pre-post criterion referenced test	Fld ✓ ✓	overview
Cont Resp: tchr & student guided	Dem	newsletters, charts
Envir: classroom, lab	Sim	Non-Print Materials:
	TV	slides, audiotape
	A/V ✓	overhead transpar- encies
		lab equipment

Project MER, operated by the Contra Costa County Superintendent of Schools jointly with the Alameda County Superintendent of Schools and the Diocese of Oakland, provides Bay Area students with an opportunity to study marine ecology as part of their school curriculum and to participate in a series of on-going scientific research studies of the San Francisco Bay-Delta-Estuary complex.

Students involved are senior high students, mostly enrolled in biology classes. They spend 6-8 weeks utilizing the MER curriculum materials. The Guide to Marine Ecology Research, a comprehensive unit including selected readings on estuarine ecology with emphasis on the local region and integrated laboratory investigations was written by local teachers for this unit. The students spend two 4 hour sessions at the Pt. Molate Marine Laboratory, located in Richmond. Following training, students establish Field Stations around the Bay where they monitor the waters for the dominant physico-chemical and biological parameters. Data collected is reviewed by the MER staff for validity and entered in the county computer for analysis.

A special program is offered for intermediate students at the P.M.M.L. The materials developed by local teachers is especially designed for this age group. A resource guide for intermediate teachers is under development and is planned for release in September, 1974.

Reason: update content & methods, develop new course	Adopt:(partial) 800 students	Pers: FT PT NRT	Publ: 4,000 cop- ies reproduced
	Tchr Ed: conducts work- shops	Adm 1/3	institutionally
Initiator(s): W. Landis, G.J. Castellani		Wr 1/3 13	by mimeograph & offset
		VSch 1/3	
		Res 1	
		TEd 1	
		Trial 0	

**References:**

Detail report to be available July 1, 1974.

**MARINE ENVIRONMENTAL STUDIES  
PROGRAM**

David Whitaker, Director

See ICh Report(s): none

Toll Gate High School  
575 Centerville Road  
Warwick, Rhode Island 02886  
Tel: (401) 738-9770

1973-1974

Gov: Fed (ESEA  
Title III)

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	lab books
Subj: marine science	Sem ✓	tests
Approach: interdisciplinary	Disc ✓	overview
Ability: average, average +	Indep ✓	Non-Print Materials:
Eval Meth: achievement tests, tchr	Lab ✓	slide tape
jdgmts, student questionnaire	Fld ✓	
Testing: weekly pre-test, unit	Dem ✓	
Cont Resp: tchr directed & guided	Sim	
Envir: community	TV	
	A/V	

A principal objective of this project was to capitalize on the significant natural resource Narragansett Bay provides the two cities (Cranston and Warwick) by promoting in students both scientific and sociological understanding of their marine environment.

In Warwick, approximately seventy five students from each of the school department's three high schools and Bishop Hendricken High School participate in the program. Toll Gate High School serves as the on-shore laboratory site for the Warwick component of the program. The Cranston School Department also involves seventy five students with Cranston High School East serving as the project's on-shore laboratory.

The course of study, which is heavily laboratory oriented, was written during the summer of 1973 by eight marine experts from Rhode Island and Massachusetts. The two cities each have use of a 19-foot Boston Whaler Boat, trailer, and 12-passenger bus specifically for use in the program. Thus, no marine area is inaccessible, and comparative studies of various areas can be readily achieved. Students who cannot swim take a water safety course. The instructor and all students are required to wear life jackets while on the water.

During the winter months, use of the boat will be restricted, but shore activities are still feasible and field trips to organizations which are economically, educationally, and politically involved in marine science will be conducted. For example, students will attend sessions of the legislative assembly during discussion on environmental legislation.

Students have use of a library with over fifty reference books which were ordered specifically for the course as well as a wide variety of oceanographic equipment. As the project evolves, new avenues of educational inquiry will emerge. Students will explore areas of interest with much independent research into both the natural and social sciences.

Reason: develop new course	Adopt: 2 tchrs, 150 students, 2 schools	Pers: FT PT NRT	Publ: 250 copies reproduced by offset (\$2500/10 students)
Initiator(s): J. Breit, M. Blais, E. Slocum, C. Gamba, R. Casey	Tchr Ed: conducts workshops, provides manuals	Adm 1 Wr 8 VSch 12 Res TEd 30 Trial	

No references given

MARINE SCIENCE EDUCATION  
CENTER (MSEC)

George E. Mann, Director

1347 Palmer Street  
Mayport, Florida 32233

Tel: (904) 246-2733 or 246-1521

1968-1971

Gov: Fed. County

See ICh Report(s): none

Ages: 4-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	lab & supplementary
Subj: biol, chem, phys, earth-space	Sem	books, activity
Approach: process, inquiry	Disc ✓	sheets, tchr manuals,
Ability: all	Indep ✓	field guides, tests,
Eval Meth: achievement & lab tests, tchr	Lab ✓	objectives,
jdgmts, student questionnaire	Fld ✓	overview, charts
Testing: individual	Dem ✓	Non-Print Materials:
Cont Resp: administratively & tchr	Sim	slides, flimstrips,
directed	TV	filmloops, films,
Envir: community, sch grounds, classroom,	A/V ✓	overhead transpar-
lab, ocean marsh		encies, videotape,
		audiotape, models

No narrative provided by project

Reason: develop new course	Adopt: 200 tchrs, 30,000 students, 125 schools	Pers: FT PT NRT	Publ: repro- duced by offset
Initiator(s): J. Barile, J. Beakley	Tchr Ed: conducts work- shops; provides manuals, guides, films, consul- tants	Adm 2 Wr 12 VSch 12 Res 12 TEd 12 Trial	350

No references given

MATH IDEA KIT SERIES I (K-3);  
II (3-6)

830 South Lincoln Street  
Longmont, Colorado 80501

1972-1973

Terry Shoemaker, Director

Tel: -

Participating  
Schools

See ICh Report(s): none

Ages: 6-11

Lang: Eng

Subj: math

Approach: conceptual, discovery

Ability: all

Eval Meth: tchr jdgmt

Testing: -

Cont Resp: tchr directed

Envir: classroom, lab

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab     ✓   ✓   ✓   ✓

Fld

Dem

Sim

TV

A/V

Printed Materials:

activity sheets

objectives

The Math Ideas Kit is a collection of teacher idea cards and supportive supplies for use by elementary school teachers in developing concepts in elementary school mathematics. It should be stressed that the cards were originally written to develop concepts, however, this does not preclude their being used for skill development. The packet consists of 150 idea cards for each of two levels K-3 and 3-6 written by teachers. Each of the activities presented on the cards has been tested in actual elementary school classrooms. Each card refers to an activity that requires manipulative materials for use by the student. In most cases the materials referred to are items which the teacher and/or student can collect for a very minimal cost. Some of the activities refer to activities that require some preparation of materials by the teacher, but again the amount of preparation required is minimal. There are several cases where the materials referred to are items which are commercially prepared; however, these materials would ordinarily be found in the typical elementary school classroom, such as geoboards. The cards present ideas for activities and are not prescriptive in any way. They are simply to serve as seed ideas for the teachers who use the cards. This does not, however, rule out the possibility that they may be used just as written.

The cards are categorized under seven major headings corresponding to the seven major strands in the elementary school mathematics program. (Set Recognition and Operations, Number-Numeral, Geometry, Measurement, Probability, Number Theory, and Functions.) Within each strand no attempt is made to sequence the activities for use in the classroom. This was purposely done so that the teacher using the packet could choose the activities that best fit her teaching style, and not ones chosen by an "outsider" unfamiliar with that specific classroom.

The "Ideas" packet may be ordered through the Northern Colorado Educational Board of Cooperative Services, 830 S. Lincoln, Longmont, Colorado, 80501.

Reason: develop new  
course

Adopt: -

Tchr Ed: conducts work-  
shops; provides con-  
sultants

Initiator(s):  
M. Swadner

Pers: FT PT NRT

Adm     2

Wr     200

VSch

Res

TEd     50

Trial

Publ: 200 copies  
reproduced by  
offset (\$30/10  
students)

No references given



**MATHEMATICS FOR CAREERS**

Ruth Hoffman, Director

See ICh Report(s): none

University of Denver Math Lab

University Station

Denver, Colorado 80210

1972 -

 Participating  
Schools

Ages: 14-20	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: math	Sem	activity sheets
Approach: conceptual, inquiry, discovery	Disc	
Ability: all	Indep	Non-Print Materials:
Eval Meth: achievement tests	Lab	slide tape
Testing: individual	Fld	
Cont Resp: tchr guided or student directed	Dem	
Envir: community, school grounds & library, classroom, lab	Sim	
	TV	
	A/V	

Upon the request of representatives of ten Eastern Colorado school districts, a career oriented mathematics project commenced in December, 1971. The project was started with the following concerns and desires:

- There is little or no material available for student use to communicate the opportunities, necessary training and job related obligations.
- There is a void in teacher information and training for the non-vocational trained teacher related to career opportunities, necessary training and job obligations, thus making the job of relating subject matter to student interest nearly impossible.
- There is a need for information and instructional materials that will provide the desired flexibility of communicating electrical industry opportunities, necessary entry level qualifications and training, and job related obligations. Such desired flexibility in communicating with the student would require a program that could be integrated into any existing program or class.
- The instructional materials produced and program design could be expanded from mathematical emphasis to include all subject areas.

The preliminary packets produced by a group of teachers in June, 1972, include three career areas: Electrical Industry, Banking, and Auto Mechanics. Several additional packets, including the following, have also been produced: Interior Design, Drafting, Carpentry, Health, Plumbing, Cosmetology, etc. Each package of materials in Mathematics for Careers contains several components. Among these components are: introductory material concerning the specific vocation, a list of mathematical skills and concepts that are needed in the career, diagnostic and mastery tests on the subject matter, problem situations using the mathematical skills, enrichment material and other resources.

The introduction to some of the packets consists of audio tapes/slide components made locally by members of the writing team under the direction of the University of Denver Mathematics Laboratory. The tapes address aspects of the career such as salaries, working conditions, union involvement and fringe benefits. In those cases where such information is not included, the teacher may wish to investigate these aspects on his own - or, better, yet, he may encourage students to do further research.

Reason: change in philosophy	Adopt: -	Pers: FT PT NRT	Publ: repro-
		Adm 3	duced by off-
Initiator(s):	Tchr Ed: conducts work-	Wr 20	set (\$10/10
R. Hoffman,	shops; provides manuals	VSch	students)
T. Shoemaker	& consultants	Res	
		TEd 4	
		Trial	

No references given



**MATHEMATICS INQUIRY IN THE  
CONRAD AREA (MICA)**

Contact: Richard R. Koch

Conrad Area School District  
99 Middleboro Road  
Wilmington, Delaware 19804

1970-1973

Gov: Fed

See ICh report(s): 8

Ages: 5-13, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	supplementary books,
Subj: Math	Sem	tests, objectives,
Approach: discipline-centered,	Disc ✓ ✓	overview
conceptual, inquiry	Indep ✓	
Ability: all	Lab ✓	
Eval Meth: achievement & standardized	Fld ✓	
tests, tchr jdgmt, student questionnaire	Dem ✓ ✓	
Testing: term	Sim	
Cont Resp: tchr directed	TV	
Envir: classroom	A/V	

Project MICA is aimed at strengthening mathematics instruction through use of a variety of materials that are used or manipulated by students. Objectives are to improve student attitudes, creativity, achievement, understandings and skills, including perception of patterns. Teachers are encouraged to use a variety of concrete materials and instructional techniques, including the inquiry approach. Students of all ability levels were involved. Success with special education classes was most notable.

Use of concrete materials was built on the stages of educational development outlined by Piaget. Measurement activities are built on Dewey's "learn by doing" philosophy.

For each workshop, participants' attitudes, familiarity with materials and techniques, and ability to write measurable objectives were measured. Workshops of four to six weeks yielded significant growth on many of these measures. Student growth in perception of patterns and cognitive abilities (using some of ETS measures of Guilford's model of the intellect) was measured. Control classes were used two years. Criterion referenced measures of achievement were used the last year. Measures showing significant growth varied from year to year.

The workshops do have an effect. Teaching approaches to mathematics are noticeably different: more subgrouping within the classroom for mathematics instruction; more varied activities in the classroom, more use of concrete materials, more use of diagnostic measures; more measuring and graphing activities. Reactions indicate improved student interest and attitudes. Positive influences of teachers in the project on other teachers are evident.

Workshops of a more condensed nature will continue to be conducted. Concrete materials for mathematics instruction will continue to be purchased. Methods encouraged by the project will continue to be encouraged.

Reason: update method	Adopt: 32 tchrs,	Pers: FT PT NRT	Publ: 70 copies
Initiator(s): R.R. Koch	1500 students, 2 schools	Adm 2	reproduced
		Wr 1	institutionally
		VSch	by mimeograph
		Res 1	& offset
		TEd 2	(\$15-75/10 stu-
		Trial	dents)

**Research:**

Koch, R. July 1973. MICA 1972-73 Outcome Evaluation Report. Wilmington, Delaware: Conrad Area School District, 88 pages.

Koch, R. Dec 1972 Summer Workshop Report. Wilmington, Delaware: Conrad Area School District, 60 pages.

**MATHEMATICS-METHODS PROGRAM (MMP)**      Mathematics Education Development      1971-1975  
**John F. LeBlanc, Director**      Center  
**See ICh Report(s): none**      Indiana University      Gov: Fed (NSF)  
    329 South Highland Ave.  
    Bloomington, Indiana 47401  
    Tel: (812) 337-1163

Ages: 19-20, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	lab books
Subj: math	Sem ✓      ✓	tchr manuals
Approach: interdisciplinary, process, discovery	Disc      ✓	field guides
Ability: all	Indep	tests
Eval Meth: achievement & lab tests, tchr jdgmts	Lab      ✓	Non-Print Materials:
Testing: unit	Fld ✓	videotape
Eval Meth: administratively directed	Dem	slide tape
Envir: lab	Sim	
	TV	
	A/V      ✓      ✓	

The Mathematics-Methods Program, developed at Indiana University under a National Science Foundation grant, is a laboratory approach to training prospective teachers to teach elementary school mathematics. The Program has two components: a university classroom component and an elementary school field experience component. Thirty colleges and universities across the nation will be implementing the Program in 1974-1975, using the classroom component alone or in conjunction with elementary school field experiences.

In the university classroom, the students work in small groups doing activities in the twelve written units which comprise the Program's instructional materials. Each unit integrates the content and the methods of teaching that content for a particular topic in the school mathematics curriculum. The prospective teachers are able to see the relevance of the mathematics they learn to their professional goals. The mathematical concepts are learned by doing; the related elementary school concepts are identified; the materials and methods appropriate for teaching the contents are used. The prospective teachers are taught as they themselves should teach.

An elementary school field experience model is also being developed, in which regularly scheduled and carefully sequenced experiences with small groups of children provide insights into children's mathematical thinking and learning patterns. Over the course of these visits prospective teachers progress from doing follow-up work with children after observing an experienced teacher, to teaching a prepared lesson, and, finally, to developing and teaching their own lesson. To support this model videotaped lessons with accompanying lesson plans have been prepared.

Informal investigation carried on during the first two years of the Program's implementation has shown that, in addition to mastering the required content, the prospective teachers found the Program a valuable means of assessing their commitment to teaching and of gaining a measure of confidence and flexibility--as well as a repertoire of activities--to call upon in their future teaching careers. Various informal measures have been employed in formative evaluation, and a summative evaluation has been funded by the National Science Foundation.

Reason: update methods	Adopt:(partial) 50 tchrs,	Pers: FT PT NRT	Publ: 2,500
Initiator(s):	1,800 students, 30 sch	Adm      2      1	copies repro-
J.F. LeBlanc, D.R. Kerr	Tchr Ed: conducts college	Wr      10	duced insti-
	workshops; provides	VSch      1      1	tutionally by
	manuals & consultants	Res      2	offset
		TEd	
		Trial      25	

No references given

**MCHS FORESTRY AND ENVIRONMENTAL  
EDUCATION PROJECT**

Contact: Harold Knapp

See ICh Report(s): none

Sentinel High School  
915 South Avenue West  
Missoula, Montana 59801  
Tel: (406) 728-2400, ext 296

1963 -

Gov, Sportman's  
Club, Partici-  
pating Schools

Ages: 15-19	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	lab books,
Subj: forestry, environmental ed	Sem ✓ ✓	programmed units,
Approach: skill development	Disc ✓ ✓	activity sheets,
Ability: all	Indep ✓ ✓	tchr manuals, field
Eval Meth: tchr jdgmts	Lab ✓ ✓	guides, tests, over-
Testing: -	Fld ✓ ✓	view, charts
Cont Resp: tchr guided	Dem ✓ ✓	Non-Print Materials:
Envir: lab, outdoors	Sim ✓ ✓	slides, filmstrips,
	TV	filmloops, films,
	A/V	overhead transpar-
		encies, slide tapes,
		lab equipment

The project is planned to develop skills and/or understandings in the following areas: 1) work attitude, 2) responsibility, 3) leadership development, 4) ecological concepts, 5) environmental improvement, 6) resource management.

The students become aware of the problems faced by personnel in the Environmental field. We cooperate very closely with representatives of the Resource Management Agencies, often we are working side by side, designing and constructing recreation areas, picnic grounds, trails, city and county parks, wildlife habitat design and development, etc.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced by mimeograph
	Tchr Ed: no special preparation required	Adm 1	
Initiator(s): H. Knapp		Wr 1	
		VSch 1	
		Res 1	
		TEd 1	
		Trial 1	

No references given

**METRICS - THE HAWAII METRIC PROGRAM**

Irv King, Director

See ICh Report(s): none

University of Hawaii  
1776 University Avenue  
Honolulu, Hawaii 96822

Tel: (808) 948-7158

1972-1976

Gov:State

Ages: 5-12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	texts
Subj: Math	Sem	tchr manuals
Approach: discipline centered	Disc ✓ ✓ ✓	objectives
Ability: all	Indcp	
Eval Meth: achievement tests, tchr jdgmt, student questionnaire	Lab ✓ ✓	
Testing: unit	Fld	
Cont Resp: tchr directed	Dem	
Envir: school grounds, classroom	Sim	
	TV	
	A/V	

The Hawaii Metric Project is developing a K-6 metric measurement program which can be used as a supplement to existing math programs. The project was mandated by the State Legislature in 1972, and beginning in September 1975 the materials will be used to help convert the elementary schools of Hawaii to the metric system.

The program is an active one in which students learn measurement by measuring. Decimal fractions are introduced as a natural part of measurement beginning at the third grade level.

The materials will be evaluated by an independent evaluator.

Reason: update method, develop new source, legislative mandate	Adopt: being field tested	Pers: FT PT NRT	Publ: 1400
Initiator(s): I. King	Tchr Ed: conducts workshops; provides consultants	Adm 1	copies reproduced by State Dept. of Ed.
		Wr 2	by offset
		VSch 3	(\$42/10 students)
		Res 1	
		TEd ✓	
		Trial 70	

**Descriptive References:**

King, I., and N. Whitman. April 1973. Going Metric in Hawaii. The Arithmetic Teacher.  
Research:  
King, I., and G. Bodley. Conservation of Number and Liquid. Nanaikapono Model Schools Report No. 1.

MINNESOTA ENVIRONMENTAL SCIENCE FOUNDATION, INC. (MESFI)  
 5400 Glenwood Avenue  
 Golden Valley, Minnesota  
 55422  
 Richard Myshak, Director  
 See ICh Report(s): 8,7

1967 -  
 Gov: Fed, State,  
 Local; Private,  
 Foundations &  
 Participating  
 Schools

Ages: all	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: * ecology, social sciences, biol, communications	Sem	programmed units
Approach: * interdisciplinary, process, inquiry, discovery	Disc	activity sheets
Ability: all	Indep all	tchr manuals
Eval Meth: -	Lab	field guides
Testing: -	Fld	newsletters
Cont Resp: staff	Dem	Non-Print Materials:
Envir: * classroom, school grounds, community	Sim	slides
	TV	slide tape
	A/V	games

We are a multi-educational resource organization providing products and services to other educational groups, to governmental agencies, citizens' organizations and to the community-at-large.

Our working environment isn't the exciting classroom or the intriguing nature trail, nor is it the corridor of the legislature or the intense atmosphere of the citizens meeting. Rather, it is in the dispassionate and cool milieu of creativity, of production and of service that we develop those products which help others engage in the more intense process of environmental decision-making.

Our expertise is in ecology, education, resource management and social sciences programming. By mixing these areas of expertise we are able to provide you with: Services (assistance in programming and conducting programs in the proper use of environmental materials and sites.)

Materials (products of research designed to promote environmental learning especially for, but not limited to, the schools.)

Site Planning (helping others plan, develop and use their lands for environmental education and recreation purposes.)

Reason: update methods, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: conducts work- shops; provides manuals & consultants	Adm 1 3	institutionally
Initiator(s):		Wr 1 6	& commercially
H. Casmey		VSch 1	(\$2/10 students)
		Res 2 4	
		TEd 4	
		Trial	

No references given

MINNESOTA SCHOOL MATHEMATICS  
AND SCIENCE TEACHING PROJECT  
(MINNEMAST)

James H. Werntz, Jr., Director  
Contact: Jean Dailey  
See ICh Report(s): 8,7,6,5,4,3,2,1

University of Minnesota  
Minnesota School Mathematics  
and Science Center  
720 Washington Avenue, S.E.  
Minneapolis, Minnesota 55455

1961-1970  
Gov: NSF; University of Minnesota

Ages: 5-9, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: coordinated math & science	Sem ✓	overview
Approach: -	Disc ✓	units
Ability: all	Indep ✓	
Eval Meth:	Lab ✓	
Testing: -	Fld	
Cont Resp: -	Dem	
Envir: -	Sim	
	TV	
	A/V	

The MINNEMAST Project developed a coordinated curriculum in mathematics and science for grades K-3, as well as teacher preparation materials and teaching aids. Based on the premise that the elementary school curriculum should emphasize the interrelationship between science and mathematics, the project produced 29 sequential units that coordinate the teaching of mathematics with the teaching of science in kindergarten and the primary grades. The materials are aimed not only at preparing children in concepts, skills, and attitudes, but also at developing within children the ability to organize content and skills acquired from any of a variety of sources. Teacher manuals, student manuals, printed aids for students, and kits of materials are available for each of the units. In order to facilitate the transition to upper-elementary materials, the project prepared the publication, MINNEMAST Recommendations for Science and Math in the Intermediate Grades.

In conjunction with the project's concern and efforts to improve the preparation of prospective elementary teachers, Professor Avron Douglass wrote the text, Ideas in Mathematics, which provides a new approach to undergraduate mathematics instruction. Since several MINNEMAST Units involve living things, the project produced a teacher resource handbook, Living Things in Field and Classroom. In addition, a resource book of enrichment materials in science mathematics history, Adventures in Science and Mathematics is available.

Reason: -	Adopt: 6,000 students, 125 schools	Pers: FT PT NRT	Publ: -
Initiator(s):		Adm	
P.C. Rosenbloom	Tchr Ed: conducted workshops	Wr	not
		VSch	answered
		Res	
		TEd	
		Trial	

Descriptive References:

- Bray, E.C. June 1969. MINNEMAST, An Elementary Math-Science Program. School Science and Mathematics.
- Rising, G.R. Dec 1965. Research and Development in Mathematics and Science Education at the Minnesota School Mathematics and Science Center and the Minnesota National Laboratory. School Science and Mathematics. 65: 811-814.
- Werntz, J.H. March 13, 1967. A Style of Understanding. Nature and Science. 4(12). Research:
- Hively, W., H. Patterson, and S.H. Page. Winter 1968. A Universe-Defined System of Arithmetic Achievement Tests. Journal of Educational Measurement. 5(4): 275.
- Johnson, P.E. 1969. On the Communication of Concepts in Science. Journal of Educational Psychology. 60: 32-40.
- Murray, F. 1968. Reversibility Training in the Acquisition of Length Conservation. Journal of Educational Psychology. 59(2): 82-87.
- Murray, F. June 1968. Operational Conservation of Illusion-Distorted Length. British Journal of Educational Psychology. 38, Part Two: 189-193.

**MOBILE ENVIRONMENTAL EDUCATION  
LABORATORY (MEEL)**

Jack Rhoton, Director

See ICh Report(s): none

Kingsport City Schools  
1701 Center Street  
Kingsport, Tennessee 37664  
Tel: (615) 245-3155

1972  
Tennessee  
Valley  
Authority

Ages: 5-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	student activity
Subj:* biol, chem, social sciences, math	Sem	guide
Approach: interdisciplinary	Disc	
Ability: all	Indep 3	Non-Print Materials:
Eval Meth:* oral tests, tchr jugmts,	Lab 2	lab equipment
student questionnaire	Fld 1	
Testing: individual	Dem	
Cont Resp:* tchr guided & directed	Sim	
Envir:* school grounds, community,	TV	
classroom	A/V	

The primary objective of this project is to demonstrate and verify a new concept in environmental education by: a) providing in-service training to elementary, secondary, and postsecondary personnel; b) developing materials designed to assist the introduction of environmental studies in existing programs; and c) developing curricula which provide useful learning experiences leading to an understanding of environmental principles, problems and their causes, and possible solutions to those problems.

The mobility and flexibility of the mobile laboratory is what makes this project unique. The mobile unit and included equipment serve as a basic resource for conducting environmental studies on-site at each school campus and at selected community resources.

The project is founded on the realization that there is a definite need for learning experiences which help students become: a) aware of the natural and man-made environment and the related problems; b) knowledgeable and accurately informed about the total environment; c) motivated to find alternatives or solutions to these problems; and d) committed to and involved in some type of constructive action to remedy these problems.

Educators from thirty states have indicated an interest in this project. The mobile laboratory has been demonstrated as part of in-service programs and workshops in several upper East Tennessee School Systems. We work with other school systems insofar as practical and we are interested in sharing our experience with others.

Plans for future use of the mobile laboratory include its expanded utilization in community resource studies, in residence programs, and in environmental study areas as well as greater use of curriculum materials that were developed for the mobile laboratory.

Reason:* update content	Adopt: -	Pers: FT PT NRT	Publ: 600 copies
change in philosophy,		Adm 1	reproduced by
update methods	Tchr Ed: conducts work-	Wr 5	linotype
	shops	VSch	(\$46/10 stu-
Initiator(s): R.E. Evans,		Res	dents)
J. Wert, R. Childress		TEd	
		Trial 5	

**Descriptive References:**

The Tennessee Teacher. April 1973.

Tennessee Conservationist. Aug 1972.

Newsletter of the Southeast Region. Nov 1972.



**A MODEL COMPREHENSIVE PROGRAM  
IN URBAN ENVIRONMENTAL EDUCATION  
(UEEP)**

Watkins School  
12th & E Streets, S.E.  
Washington, D.C. 20003

1972-1975  
Gov:(ESEA  
Title III)

Ethel J. Hackney, Director

See ICh Report(s): none

Ages: 4-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets
Subj: environmental ed	Sem	tchr manuals
Approach:* interdisciplinary, conceptual	Disc ✓ ✓ ✓	tests, objectives
Ability: all	Indep ✓	overview
Eval Meth:* tchr jdgmts, student q're;	Lab ✓	newsletters
achievement, oral & lab tests	Fld ✓	
Testing: varies	Dem ✓	Non-Print Materials:
Cont Resp:* tchr guided, student &	Sim ✓	slides, filmstrips
material directed	TV	filmloops, overhead
Envir:* classroom, sch grounds, community	A/V ✓	transparencies,
		slide tape, games

The overall goal of the UEEP is to design and implement a comprehensive program which will produce an environmentally literate citizenry through: 1) developing instructional materials, in various subject areas, which infuse environmental education into existing curriculum; 2) providing in-service teacher training; 3) developing an Environmental Resource Center which locates resources, both human and physical, and provides mechanism for channeling them to users; 4) providing technical assistance for environmental education activities; 5) providing out-of-classroom experiences for approximately 40,000 students per year; 6) serving as an information clearinghouse; 7) funding a Mini-Grant Program which enables teachers and students to execute projects of their own choosing; and 8) organizing environmentally concerned students into the Senior High School Environmental Education Alliance.

The most unique characteristic of this program is the way in which it enables the schools to make maximum use of the multiple environmental resources of the Washington area. Federal and local governmental agencies, community groups, professional and trade organizations, individuals, companies and volunteer organizations all contribute generously to this program. Contributions are in the form of technical assistance, films, speakers, printed materials, plants, kits of teaching materials, workshop leadership, and special programs for students. These special programs provide out-of-classroom experiences which enable students to develop certain skills and allow them first hand experience with the various aspects of the Washington environment.

The project operates on the following principles: Interdisciplinary environmental education concepts should be incorporated into every subject; Students should have environmental education experiences at every grade level to effect a cumulative build-up; Environmental education should be the vehicle for basic educational skills; and Students should become personally involved in environmental problem solving situations.

In addition to the outside evaluation, self evaluation is on going. Staff-designed instruments measure effectiveness of project materials and activities.

As a result of the project a large percentage of teachers are teaching Environmental Education; special projects are in progress in numerous schools; materials and assistance are readily available and thousands of students partake of out-of-classroom experiences.

The project will continue all present activities but will place increased emphasis on teacher training in the future.

Reason: Develop new course	Adopt: -	Pers: Fl PT NRT	Publ reproduced
		Adm 1 2 30	institutionally
		Wr 5 30	commercially
Initiator(s):	Tchr Ed: conducts work-	VSch 30	by mimeograph
E.J. Hackney,	shops; provides consul-	Res 30	& offset
R.G. Pierce	tants, no special prep-	TEd (\$10/10 stu-	dents)
	aration required	Trial	

No references given

**A MODEL EDUCATIONAL PROGRAM  
IN ECOLOGY, KINDERGARTEN  
THROUGH ADULT EDUCATION**

Laurel Ecology Center  
1044 North Hayworth Avenue  
Los Angeles, California 90046

1971-1975

Gov

Grant R. Cary, Director

Tel: (213) 656-7457

See ICh Report(s): 8

Ages: 6-18, tchr ed, adult	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp	Lec ✓	supplementary books,
Subj: biol, social sciences, environ- mental sciences	Sem ✓	activity sheets
Approach: interdisciplinary, conceptual, inquiry	Disc ✓	tchr manuals
Ability: all	Indcp ✓	tests
Eval Meth: achievement, oral & standard- ized tests, student questionnaire	Lab ✓ ✓	Non-Print Materials:
Testing: term, weekly, unit, individual	Fld ✓	filmstrips
Cont Resp: administratively & tchr directed	Dem ✓ ✓	audiotape
	Sim ✓	models
	TV	lab equipment
	A/V ✓ ✓	study prints
Envir: classroom		

The Model Educational Program in Ecology is designed to develop, implement and monitor a comprehensive and sequential ecology program from kindergarten through adult education. The objective is to considerably increase a student's knowledge of ecological facts and concepts as well as encourage positive attitudes toward environmental stewardship.

One program component is the development of a model interdisciplinary curriculum planned to follow a sequential program of environmental education. The suggested learning strategies provide for a variety of individualized experiences for pupils. They are keyed to each ecology concept. Another component is the development and organization of "Learning Activity Modules" (LAMs). A LAM is a package of instructional support materials developed in relationship to a specific conceptual framework in ecology which has objectives, lesson plans and teaching strategies, informational background material, and laboratory and manipulative material. In addition, LAMs may have such multi-media items as film strips, audio tapes, picture sets, slides, simple models, and specimen displays. Schedules may be included for ordering auxiliary materials and service such as 16mm films, field trips, live animals, and reference books and pamphlets.

During the planned in-service sessions, teachers are able to participate in pre-teaching discussions and handle the LAM materials, giving them the opportunity to plan strategies unique to their individual teaching situations. Individual teachers and teacher-teams, both elementary and secondary, have contracted to write LAMs, produce illustrations and photographic units, and test and revise pilot modules.

The program is scheduled to operate over a four-year period in four phases. At the end of that time, program objectives will become operational throughout all grade levels, thus affecting over 700,000 students.

Reason: update content, develop new course	Adopt: -	Pers: FT PT NRT	Publ: 2,000
	Tchr Ed: conducts work- shops; provides guides, films & consultants	Adm 1	copies repro- duced institu- tionally by
Initiator(s): S. Sitkoff		Wr 35	mimeograph &
		VSch 2	offset (\$55/10
		Res 2	students)
		TEd 4	
		Trial 170	

No references available

MODERN COORDINATE GEOMETRY  
A WESLEYAN EXPERIMENTAL  
CURRICULAR STUDY

Wesleyan University  
Middletown, Connecticut 06457

1964-1965  
Gov: Fed

R.A. Rosenbaum, Director

See ICh Report(s): 4

Ages: 15	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	texts
Subj: math	Sem	tchr manuals
Approach: * conceptual, integrated	Disc ✓ ✓	tests
Ability: average +	Indep ✓	newsletters
Eval Meth: * achievement tests, student questionnaire, tchr jdgmts	Lab	
Testing: term, unit	Fld	
Cont Resp: administratively directed	Dem	
Envir: classroom	Sim	
	TV	
	A/V	

During the summer of 1964, at Wesleyan University, Middletown, Conn., under a National Science Foundation grant, a team directed by Prof. R.A. Rosenbaum, wrote a modern coordinate geometry text for high school students and a teachers' commentary. The writing project developed directly out of a pilot experiment sponsored by the School Mathematics Study Group in 1961-62. In the experiment, teachers worked from a text based on Howard Levi's "Foundations of Geometry and Trigonometry" (Prentice Hall 1956). All six teachers were unanimous in stating that the results were sufficiently encouraging to warrant the writing of a suitable text for this course.

The text written at Wesleyan University is now the course of study in five experimental centers throughout the country. Each center has a mathematics consultant and six teachers, one of whom acts as group chairman. Written reports are submitted regularly for each chapter, and comments are encouraged on text difficulty, suitability, etc. This information is being collated, and will guide a rewrite committee during the summer of 1965.

"Modern Coordinate Geometry" uses only five axioms pertaining to geometric entities, and since it is an analytic course, it assumes the properties of real numbers.

An early study of triangles and parallelograms in an affine plane, restricted to division points and parallelism, makes possible a simplified approach via equations which can be handled by tenth year students. The techniques of algebra are in use through the year, thus avoiding the discontinuity in the development of mathematics that usually occurs in the tenth year.

Reason: * update methods, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially by offset (\$16/10 & students)
	Tchr Ed: provides manuals	Adm 2	
Initiator(s):		Wr 12	
R.A. Rosenbaum,		VSch 5	
H. Sitomer		Res	
		TEd	
		Trial 43	

Descriptive References:

Sitomer, Harry. April 1965. Modern Coordinate Geometry: A Wesleyan Experimental Curricular Study. American Mathematical Monthly. 72(4): 416-417.

MONONA GROVE, K-12, UNIFIED,  
CONCEPT CENTERED SCIENCE PROGRAM

Carl H. Pfeiffer, Director

Science Department  
4400 Monona Drive  
Monona, Wisconsin 53716

1964 -

Gov: Fed(OE),  
Participating  
Schools

See ICh Report(s): none

<p>Ages: 5-18 Lang: Eng Subj: biol, chem, phys, earth-space, math, social sciences Approach: integrated Ability: all Eval Meth: achievement, lab, oral &amp; standardized tests, tchr jdgmt, student questionnaire Testing: term, unit, individual Cont Resp: curriculum committee Envir: community, school grounds &amp; library, classroom, lab</p>	<p>Exper: C1 12+ 2-12 I Lec ✓ Sem ✓ Disc ✓ Indep ✓ Lab ✓ Fld ✓ Dem Sim TV A/V</p>	<p>Printed Materials: texts, lab books, supplementary books, programmed units, activity sheets, tchr manuals, tests, objectives, overview Non-Print Materials: slides, filmstrips, overhead transpar- encies, videotape, slide tape, audio- tape, models, lab equipment</p>
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The unified science program being implemented at Monona Grove, Monona, Wisconsin, is a structured, K-12 concept-centered program. The Monona Grove school district established in 1961 now includes four elementary schools, K-5, one middle school, 6-8 and one 4 year high school. The district serves approximately 2400 students K-8, and 1100 in grades 9-12.

The program is based on the premise that all science is concerned with the nature of Matter and Energy and with interactions between matter and energy which, as a function of Time, result in Change. The central theme of the program is the "process of change" and its implications for the individual, society, and the environment. The extent to which an individual is able to conceptualize broad generalizations which characterize the nature of matter and energy and interactions which lead to change has a direct bearing on the extent to which understanding of "self", one's relationship to others, and to the physical environment is attained.

The unified science program is in its 10th year since its introduction at the freshman level in 1964 and the 7th year in which all science taught at the high school has been part of the program. During the past five years the program has been expanded to include elementary grades K-6. A totally unified K-12 science curriculum is anticipated by 1975.

Evidence available at this time indicated that this unified approach has greater potential for the realization of the educational goals established for science education in this school district than the subject-oriented programs which it replaced.

Reason: change in philosophy	Adopt: 32 tchrs, 3100 students, 5 schools	Pers: FT PT NRT Adm Wr VSch not Res answered TEd Trial	Publ: reproduced by offset
Initiator(s): C.H. Pfeiffer	Tchr Ed: provides man- uals, guides & consul- tants		

No references given

## NATURE OF EVIDENCE

Gene D'Amour, Director

See ICh Report(s): none

Philosophy Department

West Virginia University

Morgantown, West Virginia 26506

Tel: (304) 293-3641

1972-1974

University

Ages: 18-20	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: biol, chem, phys, social sciences, geology, philosophy	Sem	objectives
Approach: interdisciplinary, guided design & decision-making	Disc ✓	
Ability: average	Indep	
Eval Meth: achievement tests, reports	Lab	
Testing: unit	Fld	
Cont Resp: tchr guided, material directed	Dem	
Envir: classroom, school library, lab	Sim	
	TV	
	A/V	

This is a multidisciplinary course designed to compare and contrast the way in which different professionals in science, social science and the humanities gather evidence and make decisions. Through the Guided Design approach, each professional is able to model the way in which he would approach the solution of a problem, but the students do the thinking for each step before they find out what the professional decided to do. The students participate in six projects, two from each area. All the problems are set in Kwankoma, an experimental settlement in Tanzania.

Reason: change in philosophy	Adopt: 10 tchrs, 60 students, 1 school	Pers: FT PT NRT	Publ: reproduced institutionally
Initiator(s): G. D'Amour	Tchr Ed: conducts work-shops, provides manuals & consultants	Adm	
		Wr 10	by mimeograph & offset (\$80/10 students)
		VSch	
		Res	
		TEd 1	
		Trial	

## Descriptive References:

Wales, C.E. and R.A. Stager. Feb 1972. Guided Design: The Design of an Educational System. Engineering Education. 62(5).

Stager, R.A. and C.E. Wales. March 1972. Guided Design: A New Concept in Course Design and Operation. Engineering Education. 62(6).

## Research:

Feldhusen, J.F. March 1972. Guided Design: An Evaluation of the Course and Course Pattern. Engineering Education. 62(6).

Tseng, M.A. and C.E. Wales. April 1972. Effect of a Guided Design Course Pattern on Student Personality Variables. Engineering Education. 62(7).

NEBRASKA PHYSICAL SCIENCE  
PROJECT (NPSP)

Donald W. McCurdy, Director

See ICh Report(s): 8,7

211 Henzlik Hall  
University of Nebraska - Lincoln  
Lincoln, Nebraska 68508

Tel: (402) 472-3151

1969-1972  
Government

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	programmed units
Subj: chem, phys	Dem	tchr manuals
Approach: integrated	Disc	tests
Ability: average, average +	Indep	objectives
Eval Meth: achievement tests	Lab	overview
Testing: individual	Fld	
Cont Resp: material directed	Dem	
Envir: classroom, lab	Sim	
	TV	
	A/V	

The Nebraska Physical Science Project is a cooperative enterprise of the University of Nebraska and the Nebraska State Department of Education. It grew out of the felt need for a course that would treat the basic concepts of chemistry and physics in an integrated fashion and at the same time provide for an individualized approach to instruction based on relatively specific behavioral outcomes.

The NPSP program can be described as having the following basic characteristics: 1) the integration of physics and chemistry content; 2) the development of self-directed learners; 3) a continuous progress curriculum; 4) the utilization of multiple resources; 5) an emphasis on behavioral objectives; and 6) a modification in the traditional role of the teacher.

Reason: update method	Adopt: 30 tchrs, 450 students, 25 schools	Pers: FT PT NRT	Publ: 2,000
Initiator(s): D. Rathe, R. Fisher, D. Wilson, D. McCurdy, E. Zimmerman	Tchr Ed: provides manuals & consultants	Adm 1 Wr 30 VSch Res 1 TEd Trial 30	copies repro- duced commer- cially by off- set (\$62/10 students)

**Descriptive References:**

McCurdy, D.W., and R.L. Fisher. Dec 1969. Physical Science Project--An Individualized Two-Year Chemistry-Physics Course. The Science Teacher.  
McCurdy, D.W., and R.L. Fisher. June 1971. A Program to Individualize Instruction. School Science and Mathematics.

**Research:**

McCurdy, D.W., and F.H. Wood. May-June 1974. An Analysis of Characteristics of Self-Direction as Related To Success in an Individualized Continuous Progress Course in Chemistry and Physics. School Science and Mathematics.



**OUTDOOR BIOLOGY INSTRUCTIONAL STRATEGIES (OBIS)**

W.M. Laetsch

Lawrence Hall of Science  
University of California  
Berkeley, California 94720

Tel: (415) 642-3679

1973 -

Gov

See ICh Report(s): none

Ages: 10-15, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	field guides
Subj: biol, environmental ed	Sem	overview
Approach: discipline centered, conceptual, discovery	Disc ✓ ✓	newsletters
Ability: all	Indep	activity sheets
Eval Meth: tchr jdgm, student question-naire	Lab	Non-Print Materials:
Testing: -	Fld ✓ ✓	field equipment
Cont Resp: tchr guided	Dem	
Envir: community, sch grounds	Sim ✓ ✓	
	TV	
	A/V	

Learning activities developed for OBIS are intended to present an intellectually honest introduction to basic concepts of ecology, presented in ways that are palatable and exciting for youngsters. Underlying all OBIS materials is the assumption that a basic understanding of eco-systems, populations, communities, food chains, and interactions of organisms with the environment is essential to the ability to make intelligent decisions concerning the environment. Strategies useful for the study of eco-systems are believed universally applicable wherever there is life, and are not limited to any specific environment of localized environmental problems. Thus, OBIS is based on a broader viewpoint of environmental education than many environmental groups which focus on specific instances of pollution control or recycling.

Unlike many other biology projects, OBIS is not designed primarily as a school science curriculum, although many of the materials may be suited for use by school groups. OBIS activities are oriented toward community-sponsored youth organizations such as Scouts, 4-H Clubs, recreation center clubs, summer camps, and nature center groups. School ecology clubs, "Saturday science" groups, school camps and other extracurricular school groups are also prime targets.

OBIS departs from the common curriculum-development procedure of determining a single sequence of learning activities leading to specific concepts. Instead, the OBIS staff intends to identify or invent a variety of alternative strategies and techniques for environmental study. Physical sciences, social sciences, art, recreation, and psychology are being tapped as potential sources for interest-seducing "entrance activities" leading to understanding of ecological problems.

A number of OBIS activities are suitable for both large and small groups of young people, and many projects are adaptable to completely individualized use. Printed materials being developed for the leader are suitable for community-group leaders who may have little or no training in biology.

Reason: develop materials for community youth groups	Adopt: -	Pers: FT PT NRT	Publ: 2000
Initiator(s): A.J. McCormack, T. Thier	Tchr Ed: conducts workshops; provides consultants	Adm 3 Wr 2 5 VSch 2 Res 1 TEd 1 Trial	copies reproduced institutionally by linotype (\$100/10 students)

**Descriptive References:**

- McCormack, A.J. Oct 1974. Outdoor Biology Instructional Strategies. Science and Children. 12(2).  
McCormack, A.J. Oct 1974. OBIS - The Uncurriculum. Learning. 3(2).



**PENNSYLVANIA NUCLEAR SCIENCE  
PROJECT (PNS)**

John J. McDermott, Director

See ICh Report(s): 8,7

Pennsylvania Department of Education 1969-1974  
P.O. Box 911  
Harrisburg, Pennsylvania 17126 Gov: State  
Tel: (717) 787-7320

Ages: 15-19	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	texts, lab books,
Subj: nuclear science	Sem ✓ ✓	supplementary books,
Approach: interdisciplinary, integrated,	Disc ✓ ✓ ✓	tchr manuals, tests,
process, conceptual, inquiry	Indep ✓	objectives, news-
Ability: avg, avg+	Lab ✓	letters, charts
Eval Meth: achievement, lab & standard-	Fld ✓	Non-Print Materials:
ized tests, tchr jdgmts, student q're,	Dem ✓	slides
interest inventories	Sim	filmstrips
Testing: term or half year, weekly,	TV ✓	videotape
unit, individual, achievement	A/V	audiotape
Cont Resp: admin & tchr directed, tchr &		lab equipment
student guided		
Envir: community, classroom, sch library		
or resource center, lab, nuclear reactor		
facility		

The overall project purpose is to provide an enrichment program for science-oriented students of high academic ability by presenting a cross-disciplinary course, freely including areas of nuclear physics, nuclear and radio-chemistry, radiation biology, and radioisotope applications. Radiation characteristics and radioisotope methodology make up the bulk of the laboratories.

The course utilizes a systems approach and is written in behavioral terms. Achievement tests are specifically designed to measure the behavioral objectives. Methodological innovations by pilot program teachers are encouraged.

Independent study, programmed instruction, laboratory investigations, lectures, seminars, discussion sessions, computer assisted instruction (some cases), field experiences, audio-tutorial, and innovations by pilot program teachers are encouraged.

Reason: update content and	Adopt: 175 tchrs,	Pers: FT PT NRT	Publ: 4,000
methods, develop new	4,000 students,	Adm	copies repro-
course	169 schools	Wr 1 150	duced by state
Initiator(s):	Tchr Ed: conducts work-	VSch 1	publication
J.J. McDermott	shops; provides manuals,	Res	(\$2,500/10
	films, guides, consul-	TEd 10 10	students)
	tants	Trial 169	

For references see 8th Report of the International Clearinghouse on Science & Mathematics Curricular Developments.

**PENNSYLVANIA NUCLEAR SCIENCE  
PROJECT (PNS)**

John J. McDermott, Director

See ICh Report(s): 8,7

Pennsylvania Department of Education 1969-1974  
P.O. Box 911  
Harrisburg, Pennsylvania 17126 Gov: State  
Tel: (717) 787-7320

Ages: 15-19	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	texts, lab books,
Subj: nuclear science	Sem ✓ ✓	supplementary books,
Approach: interdisciplinary, integrated,	Disc ✓ ✓ ✓	tchr manuals, tests,
process, conceptual, inquiry	Indep ✓	objectives, news-
Ability: avg, avg+	Lab ✓	letters, charts
Eval Meth: achievement, lab & standard-	Fld ✓	Non-Print Materials:
ized tests, tchr jdgmts, student q're,	Dem ✓	slides
interest inventories	Sim	filmstrips
Testing: term or half year, weekly,	TV ✓	videotape
unit, individual, achievement	A/V	audiotape
Cont Resp: admin & tchr directed, tchr &		lab equipment
student guided		
Envir: community, classroom, sch library		
or resource center, lab, nuclear reactor		
facility		

The overall project purpose is to provide an enrichment program for science-oriented students of high academic ability by presenting a cross-disciplinary course, freely including areas of nuclear physics, nuclear and radio-chemistry, radiation biology, and radioisotope applications. Radiation characteristics and radioisotope methodology make up the bulk of the laboratories.

The course utilizes a systems approach and is written in behavioral terms. Achievement tests are specifically designed to measure the behavioral objectives. Methodological innovations by pilot program teachers are encouraged.

Independent study, programmed instruction, laboratory investigations, lectures, seminars, discussion sessions, computer assisted instruction (some cases), field experiences, audio-tutorial, and innovations by pilot program teachers are encouraged.

Reason: update content and	Adopt: 175 tchrs,	Pers: FT PT NRT	Publ: 4,000
methods, develop new	4,000 students,	Adm	copies repro-
course	169 schools	Wr 1 150	duced by state
		VSch 1	publication
Initiator(s):	Tchr Ed: conducts work-	Res	(\$2,500/10
J.J. McDermott	shops; provides manuals,	TEd 10 10	students)
	films, guides, consul-	Trial 169	
	tants		

For references see 8th Report of the International Clearinghouse on Science & Mathematics Curricular Developments.

PEOPLE AND TECHNOLOGY (P&T)

Ruth MacDonald, Director

See ICh Report(s): none

Education Development Center  
15 Mifflin Place  
Cambridge, Massachusetts 02138

Tel: (617) 868-5800

1969-1975

Gov

Ages: 12-14	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: biol, phys, math, technology, social sciences	Sem	tchr manuals
Approach: interdisciplinary, conceptual, inquiry	Disc ✓ ✓	field guides
Ability: all	Indep ✓ ✓	tests, overview
Eval Meth: oral interviews, tchr jdgmts, student questionnaire	Lab ✓	newsletters
Testing: teacher selected	Fld ✓	charts
Cont Resp: material directed	Dem ✓ ✓	Non-Print Materials:
Envir: community, school grounds & library, classroom & lab	Sim ✓ ✓	filmstrips, films
	TV	audiotape
	A/V ✓ ✓	games, models
		lab equipment

People and Technology is a program for students in the middle grades that explores the relationship between technology and society. The goal of the course is to empower students in their relationship to contemporary technology: in their competence to use it, their ability to analyze its social and environmental costs and benefits, and in their recommendations for its more humane use and change. The experimental version now in use in 750 classrooms is the product of research, scholarly consultation, and development that began in 1969. P&T provides a unique opportunity for younger students to analyze this significant contemporary question within the school curriculum.

P&T is unique also in the teaching and learning strategies that it employs. The interdisciplinary approach draws on the natural and social sciences to explore different aspects of the technology/society relationship. Unit I, People and Tools, introduces basic concepts of tool making and use; Unit II, Acquiring Energy, introduces the concept of inputs and outputs of a technological system to analyze the impact of large-scale technological interventions in the environment; Unit IV, Communicating, is concerned with expansion of the human capacity for communicating through the technologies of photography and film making.

Each unit includes manipulative activities where students acquire a hands-on familiarity with tools and techniques; an in-depth case study where abstract concepts are derived from a concrete, historical situation; and a community study where the conceptual framework is used as a tool of social analysis. Multi-media students materials, an inquiry approach to learning, and a variety of learning modes involve students of varying ability background. Resources for teachers include Teacher's Guides, workshops and seminar readings for in-service training, and opportunities to communicate with each other and with the developers through a telephone hot-line and a newsletter.

Our formative evaluation, based on a nation-wide questionnaire survey and on interviews and observations in the Boston metropolitan area, indicates that P&T is perceived by both students and teachers as an exciting and valuable learning experience. We plan to develop additional units focusing on the impact of the automobile and on strip mining in Appalachia, and to publish the curriculum in 1975.

Reason: develop new course	Adopt: (partial) 750 schools	Pers: FT PT NRT	Publ: reproduced commercially
Initiator(s): P. Daw, R. MacDonald	Tchr Ed: conducts work- shops; provides manuals, guides, films & consul- tants	Adm 2 Wr 2 VSch 2 Res 2 TEd 2 3 Trial	

Research References:

Harvard University Program on Technology & Society, Research Reviews 1-8. 1964-1971.  
Cambridge, Massachusetts, Harvard University Press.  
Harvard University Program on Technology & Society, A Final Review. 1964-1972.  
Cambridge, Massachusetts, Harvard University Press.

PERSONALIZED ADVENTURES IN  
CHEMICAL EDUCATION (PACE)

Harold Wengert, Director

Malcom Price Laboratory School  
University of Northern Iowa  
Cedar Falls, Iowa 50613

1967-1973

Univ

See ICh Report(s): 8

Ages: 15-20	Exper: Ci 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	tchr manuals, tests,
Subj: chem	Sem ✓	objectives, overview,
Approach: process, inquiry, discipline-	Disc ✓	sequential packets
centered, conceptual, discovery	Indep ✓ ✓	
Ability: all	Lab ✓ ✓	Non-Print Materials:
Eval Meth:* achievement lab, oral &	Fld	slides, filmloops,
standardized tests, student q're,	Dem ✓ ✓	models
tchr jdgmts	Sim	
Testing: individual	TV	
Cont Resp:* material & student directed,	A/V ✓ ✓	
tchr guided		
Envir:* lab, classroom, sch library,		
community		

The goals of the PACE curriculum are: 1) To provide a self-paced chemistry curriculum written specifically for General Education, 2) To allow flexibility for student individualization of pace and content as determined by the student's goals, 3) To provide a high student success program which could accommodate students of widely varying backgrounds.

Some of the general characteristics of PACE include that it: 1) Is a multi-reference approach, 2) Incorporates group dynamics through team learning, 3) Can be adopted into a school system with little or no change in the existing facilities, 4) Uses multi-media as an integral part of learning, 5) Allows teachers and students flexibility to incorporate other learning strategies as well as other learning materials, 6) Uses expendable packets (20 packets, 436 pages) for the software materials, allowing for modification, updating, and revision.

The underlying learning principle is learning for mastery through the strategies of inquiry, guided discovery, and experimentation. The first few packets are structured, with a progressive decrease in structure until Packet 20 which is totally open inquiry. The evaluation of the materials came through the pilot and field tests. Both the cognitive and affective domains were evaluated over a four year period with about 4,000 students participating. A longitudinal study is presently underway with the PACE students to determine the feelings and success rate in subsequent science courses.

The project has grown from 24 students in 1967-68 to about 7,000 students in 100 schools in 15 states in 1973-74. In almost all of these schools there has been a significant increase in enrollment in chemistry, as much as 200% in some.

A continual updating and rewriting is anticipated based on feedback and on-going research. Also, PACE II modules are being developed on topics in organic chemistry, qualitative analysis, consumer chemistry and biochemistry.

Reason:* change in philosophy, update methods & content, develop new course	Adopt: 100 tchrs, 7,500 students, 90 schools	Pers: FT PT NRT	Publ: 20,000
	Tchr Ed: provides manuals, guides & consultants	Adm 1	copies repro-
Initiator(s): H. Wengert		Wr 1	duced commer-
		VSch 1	cially by
		Res 1	offset
		TEd 1	(\$30/10 stu-
		Trial 25	dents)

Descriptive References:

- Wengert, H. 1972. PACE, Individualized Science: like it is. National Science Teachers Association. Washington, D.C. Chapter 5.
- PACE - How Well is It Doing? Unpublished paper given to the Iowa Science Teachers Section, Iowa Academy of Science. Available from director of project.
- Wengert, H. 1974. A Study of Predictors of Self-Pacing for PACE Chemistry Students. Unpublished Doctoral Dissertation, University of Northern Colorado.

PHYSICAL SCIENCE FOR NON-SCIENCE

MAJORS (PSNS)

Lewis Bassett, Director

Contact: Henry B. Hollinger

See ICh Report(s): 7,6,5

Department of Chemistry

Rensselaer Polytechnic Institute

Troy, New York 12181

Tel: (518) 270-6341

1965-1970

Gov: NSF

Ages: 19-20

Lang: Eng, Sp, Japanese

Subj: chem, phys

Approach: \* inquiry, integrated

Ability: average

Eval Meth: varies

Testing: varies

Cont Resp: tchr directed

Envir: classroom, lab

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

texts

lab books

supplementary books

tchr manuals

tests

newsletters

Non-Print Materials:

lab equipment

The purpose of the project was to develop a new type of course in physical science to be given in liberal-arts colleges and teacher training institutions to non-science majors. The primary target was prospective elementary teachers, but it was assumed that the course would be appropriate for various other categories of students.

One objective was to change the negative attitudes of many students toward science. This was to be accomplished by allowing the student to make his own discoveries and to learn how to put these together with the discoveries of others. The second objective was to bring the student to an understanding of what science is and what scientists do, both experimentally and theoretically. This was to be accomplished by narrowing the scope of the subject matter to allow greater depth. The subject chosen was solid matter with excursions into the investigation of liquids and gases whenever such investigations could shed light on the nature of solids. This subject was chosen because the material is inextricably involved with both chemistry and physics and because there are many simple experiments that could be performed by the students.

A formal evaluation was conducted by Wayne W. Welch, University of Minnesota. He found that the first objective, changing attitudes of students toward science, was met with significant success. Success in the second area, understanding of science, was not significantly greater than the success of traditional approaches to physical science.

Reason: change in philosophy, develop new course	Adopt: unknown	Pers: FT PT NRT	Publ: 40,000
	Tchr Ed: conducts work-shops; provides manuals	Adm 4	copies repro-
		Wr 20	duced commer-
		VSch 6	cially (\$120/10
Initiator(s): L.G. Bassett, W.E. Eppenstein, E.A. Wood		Res	students)
A.A. Strassenburg,		TEd	
		Trial	

Descriptive References:

Wood, E.A. Feb 1969. The PSNS Project. Journal of Chemical Education. 46: 69.

AIP Educational Newsletter. Nov 1969. Vol XII(8).

Strassenburg, A.A. 1970. Seventh Report of the ICSMCD. pp 486-488.

PHYSICAL SCIENCE FOR NON-SCIENCE

MAJORS (PSNS)

Lewis Bassett, Director

Contact: Henry B. Hollinger

See ICh Report(s): 7,6,5

Department of Chemistry

Rensselaer Polytechnic Institute

Troy, New York 12181

Tel: (518) 270-6341

1965-1970

Gov: NSF

Ages: 19-20

Lang: Eng, Sp, Japanese

Subj: chem, phys

Approach: \* inquiry, integrated

Ability: average

Eval Meth: varies

Testing: varies

Cont Resp: tchr directed

Envir: classroom, lab

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

texts

lab books

supplementary books

tchr manuals

tests

newsletters

Non-Print Materials:

lab equipment

The purpose of the project was to develop a new type of course in physical science to be given in liberal-arts colleges and teacher training institutions to non-science majors. The primary target was prospective elementary teachers, but it was assumed that the course would be appropriate for various other categories of students.

One objective was to change the negative attitudes of many students toward science. This was to be accomplished by allowing the student to make his own discoveries and to learn how to put these together with the discoveries of others. The second objective was to bring the student to an understanding of what science is and what scientists do, both experimentally and theoretically. This was to be accomplished by narrowing the scope of the subject matter to allow greater depth. The subject chosen was solid matter with excursions into the investigation of liquids and gases whenever such investigations could shed light on the nature of solids. This subject was chosen because the material is inextricably involved with both chemistry and physics and because there are many simple experiments that could be performed by the students.

A formal evaluation was conducted by Wayne W. Welch, University of Minnesota. He found that the first objective, changing attitudes of students toward science, was met with significant success. Success in the second area, understanding of science, was not significantly greater than the success of traditional approaches to physical science.

Reason: change in philosophy, develop new course

Adopt: unknown

Tchr Ed: conducts workshops; provides manuals

Pers: FT PT NRT

Adm 4

Wr 20

VSch 6

Res

TEd

Trial

Publ: 40,000

copies reproduced commercially (\$120/10 students)

Initiator(s): L.G. Bassett, W.E. Eppenstein, E.A. Wood A.A. Strassenburg,

Descriptive References:

Wood, E.A. Feb 1969. The PSNS Project. Journal of Chemical Education. 46: 69.

AIP Educational Newsletter. Nov 1969. Vol XII(8).

Strassenburg, A.A. 1970. Seventh Report of the ICSMCD. pp 486-488.



PHYSICAL SCIENCE STUDY  
COMMITTEE ADVANCED TOPICS  
(PSSC ADVANCED TOPICS)

Uri Haber-Schaim, Director

See ICh Report(s): 7,6,5,4,3,2

Physical Science Group  
Boston University  
38 Cummington Street  
Boston, Massachusetts 02115

Tel: (617) 353-4244

1963-1966

Gov:Fed

Ages: 17-18	Exper: CI 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: phys	Sem	lab books
Approach: discipline-centered, process,	Disc ✓	tchr manuals
conceptual, inquiry	Indep ✓	tests
Ability: average +	Lab ✓	
Eval Meth: achievement & standardized	Fld	Non-Print Materials:
tests, tchr jdgmts	Dem ✓	films
Testing: unit	Sim	lab equipment
Cont Resp: administratively directed	TV	
Envir: classroom, school library, lab	A/V	

This short course is intended to follow the PSSC and be used in advanced high school physics courses. The topics covered are irreversible processes, entropy, relativity, and some atomic and nuclear physics.

Reason: update content	Adopt: unknown	Pers: FT PT NRT	Publ: 21,250
& method, change in		Adm	texts reproduced
philosophy, develop	Tchr Ed: conducts work-	Wr	commercially
new course	shops	VSch not	
		Res answered	
Initiator(s):		TEd	
U. Haber-Schaim,		Trial	
F. Friedman			

No references given



**PHYSICAL SCIENCE STUDY COMMIT-  
TEE COLLEGE INTRODUCTORY PHYSI-  
CAL SCIENCE (CIPS)**

Uri Haber-Schaim, Director  
See ICh Report(s): 7

Physical Science Group  
Boston University  
38 Cummington Street  
Boston, Massachusetts 02115

Tel: (617) 353-4244

1968-1969

Gov:Fed

Ages: 17-18, tchr ed	Exper: CI 12+ 2-12 I	Printed Materials:
Lang: Eng, Sp, Port	Lec	text
Subj: chem, phys	Sem	lab books
Approach: discipline centered, integrated, process, conceptual, inquiry	Disc ✓	Non-Print Materials:
Ability: average	Indep ✓	filmloops
Eval Meth: achievement & standardized tests, tchr jdgmts	Lab ✓	films
Testing: unit	Fld	lab equipment
Cont Resp: administratively directed	Dem ✓	
Envir: classroom, school library, lab	Sim	
	TV	
	A/V ✓	

Based on the belief that an understanding of scientific principles is better gained from observation and analysis than from memorization, College Introductory Physical Science provides a departure in the teaching of science. The text provides the students with guidelines for an active study of some of the fundamental facts and ideas of physics and chemistry. To understand the orderliness in nature, the student carries on an active dialogue with it.

The program is set up around student participation in the investigative process. The format consists of a pre-lab session conducted by the teacher, a student laboratory session, and then a post-lab session in which interpretations and analysis can be made. Experiments are organized so that the work load is shared by the entire class and conclusions can be drawn by pooling all data in a general discussion.

In the two years of pilot testing in seven colleges it was used successfully in one- and two-semester courses. Used alone it is ideal for a one-semester course; used with other reading material it can be utilized in a two-semester course. The laboratory experiments, dealing with the properties of matter, build in logical progression to an atomic model of matter. The program is designed for non-science majors. It is particularly good for prospective elementary school teachers who can use the inquiry approach when teaching science to children.

Reason: update	Adopt:(partial) 75	Pers: FT PT NRT	Publ: 22,500
develop new course,	schools	Adm	copies (Eng)re-
change in philosophy,	Tchr Ed: provides guide-	Wr	produced commer-
publication	books	VSch not	cially by offset
Initiator(s):		Res answered	(\$350/10 stu-
U. Haber-Shaim		TEd	dents)
		Trial	

No references given

PHYSICAL SCIENCE STUDY COMMITTEE  
(PSSC) COLLEGE PHYSICAL SCIENCE II  
(CPSII)

Uri Haber-Schaim, Director

See ICH Report(s): none

Physical Science Group  
Boston University  
38 Cummington Street  
Boston, Massachusetts 02115

Tel: (617) 353-4244

1968 -

Gov: Fed

Ages: 17-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts & lab books
Subj: chem, phys	Sem	tchr manuals
Approach: discipline-centered, integrated, process, conceptual, inquiry	Disc ✓	tests
Avility: average	Indep ✓	Non-Print Materials:
Eval Meth: achievement & standardized tests, tchr jdgmts	Lab ✓	filmloops
Testing: unit	Fld	films
Cont Resp: administratively directed	Dem ✓	lab equipment
Envir: classroom, school library, lab	Sim	
	TV	
	A/V ✓	

College Physical Science II provides a departure in the teaching of science. The text provides the students with guidelines for an active study of some of the fundamental ideas leading to the law of conservation of energy.

It is a laboratory-oriented course, but extensive laboratory facilities are not required. All the equipment necessary can be set up on a table top. The student learns about energy by participating in experiments involving its transfer to different forms. College Physical Science II does not use Newton's law to get to the conservation of energy. It rather follows roughly the path of Joule.

The program is set up around student participation in the investigative process. The format consists of a pre-lab session conducted by the teacher, a laboratory session in which the students perform their experimental work, and a post-lab session in which interpretations and analysis can be made. Experiments are organized in such a way that the work load is shared by the entire class and conclusions can be drawn by pooling all data in a general discussion. The course requires no more than a knowledge of very simple algebra. The laboratory experiments, dealing with energy changes, build in logical progression, leading to the conservation of energy.

The program is designed for non-science majors. It is particularly useful for prospective elementary school teachers.

Reason: update methods, change in philosophy, develop dew course	Adopt: unknown	Pers: FT PT NRT	Publ: 2,000
	Tchr Ed: provides guidebooks	Adm	copies repr-
		Wr	duced institu-
		VSch not	tionally by
Initiator(s):		Res answered	offset (\$550/10
U. Haber-Schaim		TEd	students)
		Trial	

No references given

PHYSICAL SCIENCE STUDY COMMIT-  
TEE COLLEGE PHYSICS (CPSSC)

Uri Haber-Schaim, Director

See ICh Report(s): 6

Physical Science Group  
Boston University  
38 Cummington Street  
Boston, Massachusetts 02115

Tel: (617) 353-4244

1966-1967

Gov:Fed

Ages: 17-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Ger, Swed, Sp	Lec	texts, lab books,
Subj: phys	Sem	supplementary books,
Approach: discipline centered	Disc ✓	tchr manuals, tests
Ability: average, average +	Indep ✓	
Eval Meth: achievement & standardized	Lab ✓	Non-Print Materials:
tests, tchr jdgmts	Fld	films
Testing: term, unit	Dem ✓	lab equipment
Cont Resp: administratively directed	Sim	
Envir: classroom, school library, lab	TV	
	A/V ✓	

This physics course corresponds to the high school PSSC Physics, except that its content is extended. It goes deeper into a number of topics and is written at a higher level. It includes material from the Advanced Topics course.

Reason: update content	Adopt: -	Pers: FT PT NRT	Publ: 32,000
& method, develop new	Tchr Ed: -	Adm	copies (Eng)
course, change in		Tr	reproduced com-
philosophy		VSch not	mercially by
		Res answered	offset
Initiator(s):		TEd	(\$900/10 stu-
U. Haber-Schaim		Trial	dents)

No references given

PHYSICAL SCIENCE STUDY COMMIT-  
TEE INTRODUCTORY PHYSICAL  
SCIENCE (IPS)

Uri Haber-Schaim, Director

Physical Science Group  
Boston University  
38 Cummington Street  
Boston, Massachusetts 02215

1963-1972

Gov

Tel: (617) 353-4244

See ICH Report(s): 8,7,6,5,4,3

Ages: 12-14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr, Sp. Portuguese, Turkish, Korean, Japanese, Phillipino	Lec	texts, lab books
Subj: chem, phys	Sem	tchr manuals
Approach: integrated, process, conceptual, inquiry	Disc ✓	tests, overviews
Ability: all	Indep	newsletters
Eval Meth: achievement, lab, oral & standardized tests, tchr jdgmts	Lab ✓	Non-Print Materials:
Testing: term, weekly, unit	Fld ✓	filmloops
Cont Resp: admin & tchr directed	Dem ✓	films
Envir: classroom, lab	Sim ✓	lab equipment
	TV	
	A/V ✓	

IPS is a year-long course in introductory physical science. Its purpose is to give all students a beginning knowledge of physical science and to offer some insight into the means by which scientific knowledge is acquired. The course is designed to serve as a solid foundation both for those students taking later courses in physics, chemistry and biology and for those taking no further natural science in high school.

The theme of the course is the development of evidence for an atomic model of matter. The method employed is one of student experimentation and guided reasoning on the results of such experimentation. The laboratory experiments are contained in the body of the text and must be carried out by the students for the proper understanding of the course. Many of the conclusions and generalizations arrived at as a result of doing the experiments become essential parts of the complete text. Although laboratory space is always an asset, the experiments in this course have been successfully performed in classrooms containing individual flat desk tops and only one sink.

The course had its genesis in the Physical Science Study Committee physics program. Reports from PSSC, CBA, and CHEM Study teachers over the years had clearly indicated that an understanding of the nature of experimental physical science and some of the basic scientific skills could and should be acquired by the students before they take these courses in the senior high school. This indication served as the starting point to evolve a laboratory-oriented introductory physical science course that would properly equip students to meet the challenge of modern senior high-school courses in science. Interaction with others in working through investigations, discussing data, and suggestive further work, is the key to the philosophy underlying the program.

Reason: update methods, change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: 1.5 mil-
Initiator(s): -	Tchr Ed: conducts work- shops; provides manuals, films, consultants	Adm 2 1	lion copies
		Wr 8 20 5	reproduced
		VSch 2 5	commercially
		Res	by offset
		TEd 1 4	(\$300/10
		Trial 60	students)

Descriptive References:

Abegg, G. April 1970. Interaction: Key to IPS Philosophy. The Science Teacher. 37(4).

PHYSICAL SCIENCE STUDY COMMITTEE  
(PSSC) PHYSICAL SCIENCE II (PS II)

Uri Haber-Schaim, Director

See ICh Report(s): 8,7

Physical Science Group  
Boston University  
38 Cummington Street  
Boston, Massachusetts 02215  
Tel: (617) 353-4244

1967-1972

Gov (NSF)

Ages: 12-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr. Sp, Portuguese, Turkish, Italian	Lec	texts, lab books
Subj: chem, phys	Sem	tchr manuals
Approach: integrated, process, conceptual, inquiry	Disc ✓ ✓	tests, overview
Ability: avg, avg+	Indep ✓ ✓ ✓	newsletters
Eval Meth: achievement, lab, oral & standardized tests, tchr jdgmts	Lab ✓ ✓ ✓	Non-Print Materials:
Testing: term, weekly, unit	Fld	filmloops
Cont Resp: admin & tchr directed	Dem ✓ ✓ ✓	lab equipment
Envir: classroom, lab	Sim	
	TV	
	A/V ✓ ✓	

The program objectives and instructional details are described in the preface of the text, teacher's guide and newsletter. Effective with the beginning of 1974, the Physical Science Group became affiliated with Boston University. The teacher training, school services, and material development activities will be continued at the new facilities on the Boston University campus.

The PS II course was developed as a follow up course for Introductory Physical Science (IPS) which would appeal to a broad spectrum of students. The PS II course, therefore, continues the study of physical science begun in IPS with the same spirit and philosophy of laboratory experimentation and observation. Two major topics were chosen for the course, 1) some of the fundamentals of chemistry and physics of electric charge, and 2) forms of energy and the conservation of energy.

The authors see the IPS-PS II combination as a possible foundation for several sequences, ranging from the minimum IPS, PS II, biology to a program for science-oriented students consisting of IPS, PS II, physics and/or chemistry, biology and another year of biology or earth science.

Reason: update methods, change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced
Initiator(s): Uri Haber-Schaim, et al.	Tchr Ed: conducts workshops; provides manuals, guides & films	Adm 2	commercially by
		Wr 9 11	offset (\$500/10
		VSch 5	students)
		Res	
		TEd 3	
		Trial 52	

Descriptive References:

Haber-Schaim, U. May 1971. The Teaching of Energy in the Junior High School. The Physics Teacher. 9\*5): 238-243.

PHYSICAL SCIENCE STUDY  
COMMITTEE PHYSICS (PSSC)  
Jerrold R. Zacharias, Director  
Uri Haber-Schaim, Present Dir.

Physical Science Group  
Boston University  
38 Cummington Street  
Boston, Massachusetts 02115

1956-1960  
Gov: Fed,  
Foundation

See ICh Report(s): 6,5,4,3,2

Tel: (617) 353-4244

Ages: 16-17	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr, Sp, Russ & 14 other lang.	Lec	texts, lab books,
Subj: phys	Sem	supplementary books,
Approach: discipline-centered	Disc ✓	tchr manuals, tests
Ability: avg, avg+	Indep ✓	Non-Print Materials:
Eval Meth: achievement & standardized	Lab ✓	films, lab equipment
tests, tchr jdgmts	Fid	
Testing: term, unit	Dem ✓	
Cont Resp: administratively directed	Sim	
Envir: classroom, sch library, lab	TV	
	A/V ✓	

The Physical Science Study Committee was a group of university and secondary school physics teachers working to develop an improved beginning physics course.

The textbook is the heart of the PSSC course, in which physics is presented not as a mere body of facts but basically as a continuing process by which men seek to understand the nature of the physical world. Besides the textbook there are the following closely correlated parts: a laboratory guide and a set of new and inexpensive apparatus; a large number of films; standardized tests; a series of paperback books by leaders in related fields; and a comprehensive teacher's resource book directly related to the course.

The PSSC physics course originally was the work of a large number of people, mainly school and college physics teachers, over a period of four years. A brief account of this collaboration is given at the end of the book. Here it is appropriate, however, to recognize two of these collaborators. Professor Jerrold R. Zacharias, of the Department of Physics of the Massachusetts Institute of Technology, called together a committee of leaders in physics and in education from which this project sprang. He has been active in all phases of the project. Professor Francis L. Friedman, also of the Department of Physics at M.I.T. and a member of the Committee from the beginning, played the major role in developing the textbook and has contributed significantly to all parts of the program.

Reason: update content & methods, change in philosophy, develop new course	Adopt: unknown  Tchr Ed: conducts insti- tute, provides guidebooks	Pers: FT PT NRT Adm W: VSch not Res answered TEd Trial	Publ: 1 million copies (Eng) reproduced commercially by offset (\$860 + texts/ 10 students)
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**Initiator(s):**

J.R. Zacharias,  
F.L. Friedman

**Descriptive References:**

The Use of PSSC Physics Course in the U.S. Feb 1968. The Physics Teacher.  
The PSSC Course. March 1967. Physics Today.

**PHYSICAL SCIENCE STUDY  
COMMITTEE (PSSC) UNDERGRADUATE  
PROGRAM FOR PHYSICS-CHEMISTRY  
TEACHERS**

Physical Science Group  
Boston University  
38 Cummington Street  
Boston, Massachusetts 02115

969 -  
Gov: Fed

Uri Haber-Schaim, Director  
See ICh Report(s): none

Tel: (617) 353-4244

<b>Ages:</b> 17-20, Tchr ed	<b>Exper:</b> C1 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang:</b> Eng	<b>Lec</b>	texts, lab books,
<b>Subj:</b> chem, phys, math, education	<b>Sem</b> ✓	supplementary books,
<b>Approach:</b> interdisciplinary,	<b>Disc</b> ✓	tchr manuals, tests
integrated, inquiry	<b>Indep</b> ✓	
<b>Ability:</b> avg	<b>Lab</b> ✓	<b>Non-Print Materials</b>
<b>Eval Meth:</b> achievement, lab, oral &	<b>Fld</b> ✓	filmloops, films,
standardized tests, tchr jdgmts	<b>Dem</b> ✓	videotape, models,
<b>Testing:</b> term, weekly, unit	<b>Sim</b>	lab equipment
<b>Cont Resp:</b> administratively & tchr	<b>TV</b>	
directed, tchr guided	<b>A/V</b> ✓	
<b>Envir:</b> classroom, school library, lab		

In 1969 the Physical Science Group received a grant from the National Science Foundation to develop a four-year program to prepare high school teachers of physics and chemistry. This new program has several characteristic features. First, the traditional separation of content and methodology has been eliminated. Beginning in the freshman year, the students are involved in a wide variety of instructional settings. The amount of lecture time is drastically reduced in favor of laboratory and discussion work. Second, the students have an early and continued involvement in public school science classrooms. The work includes observation trips to a variety of schools (junior and senior high) in the first year and some extended visitations in the sophomore and junior years. This culminates with the student teaching experience in the last year.

Third, the students become actively involved in developing the competencies required of a good science teacher through activities introduced in the science classes. Working in small groups the students develop test questions on the material they are studying. They become involved in teaching by conducting problem sessions and post-lab discussions in the science and math classes. In the second and third year, each student spends about two weeks as a teaching assistant in the freshman science courses.

Fourth, much of the physics and chemistry is treated in an integrated fashion to achieve economy of time and a unity of approach. The two and one-half years of mathematics developed for the program focus on the math skills needed for science teaching and correlate closely with the science topics. A special shop course has been developed. Fifth, the science, math, and shop courses are designed to be utilized by students not enrolled in the program but in need of specific work in these areas.

<b>Reason:</b> update methods,	<b>Adopt:</b> -	<b>Pers:</b> FT PT NRT	<b>Publ:</b> repro-
change in philosophy,		<b>Adm</b>	duced institu-
develop new course	<b>Tchr Ed:</b> conducts work-	<b>Wr</b>	tionally &
	shops, provides guides,	<b>VSch</b> not	commercially
<b>Initiator(s):</b>	<b>films &amp; consultants</b>	<b>Res</b> answered	by offset
U. Haber-Schaim		<b>TEd</b>	
		<b>Trial</b>	

**Descriptive References:**

- Haber-Schaim, U. Sept 1974. A Four-Year College Program for Future Physics-Chemistry Teachers. Science Education.
- Bowman, L. Oct 1971. A New Undergraduate Program for Future Physics-Chemistry Teachers. Journal of College Science Teaching. 1(1).
- Haber-Schaim, U. July 1971 Preservice Education of Physics-Chemistry Teachers. American Journal of Physics. 39(7): 721-24.



P.K. YONGE LABORATORY SCHOOL  
CORRELATED SCIENCE PROGRAM (CSP)  
Thomas Gadsden, Jr., Director  
See ICh Report(s): none

P.K. Yonge Laboratory School  
University of Florida  
Gainesville, Florida 32611  
Tel: (904) 392-1526

1968-1975  
University of  
Florida, Flor-  
ida R & D  
Council

Ages: 15-17	Exper: C1 12+ 2-12 1	Printed Materials:
Lang: Eng	Lec ✓	lab books, supple-
Subj: biol, chem, phys, earth-space	Sem ✓	mentary readings,
Approach: * integrated, conceptual	Disc ✓	activity sheets,
Ability: all	Indep ✓	tchr manuals, field
Eval Meth: achievement tests	Lab 1 2	guides, tests,
Testing: * unit, individual	Fld ✓	objectives, overview,
Cont Resp: tchr guided	Dem	programmed materials
Envir: community, sch grounds & library, classroom, lab	Sim	Non-Print Materials:
	TV	overhead transpar-
	A/V	encies

The P.K. Yonge Correlated Science Program is a three-year (grades 10, 11, 12) unified science sequence. The subject matter of the program centers on six major interdisciplinary concepts -- pervasive ideas with lasting value and meaning for students. The six concepts are Change, Equilibrium, Orderliness, Models, Quantification, and Technology. The program involves students in the processes of science so that they might gain the desire and ability to continue questioning and learning in a scientific manner, even in considering their social environments. There are many opportunities to explore the interface between science and society, through investigating current issues, persistent philosophical questions, and a study of decision making. The approach and techniques are success oriented to help students perceive themselves as valuable, able to cope with a dynamic science and technology, and perceive science as a positive potential rather than a frustrating adversary. The techniques also aim toward students becoming increasingly responsible for their own learning as they progress through the program. Since students, teachers, and situations vary from year to year and from one location to another, the Correlated Science Program is intended to be highly flexible in structure, while maintaining a continuous and spiraling flow throughout. This is accomplished through a unit approach in which entire units, sub-units, or individual learning activities can be rearranged, removed, or inserted without damaging the total program. In practice this is accomplished with a rapid access filing system and by using flow charting techniques that permit easy visualization of both the whole and the parts. Alternative learning paths, enrichment alternatives, and decision points (self tests with accompanying skill activities) used to help students obtain prerequisite skills are used to permit flexibility within the program for individual students.

The program is presently undergoing field-test evaluation and revision in Florida schools. Availability on a wider basis should be possible in mid-1975.

Reason: change in philosophy, develop new course	Adopt: 3 tchrs, 80 students, 1 school	Pers: FT PT NRT	Publ: reproduced institutionally
Initiator(s): D. Altieri, T. Gadsden, J..	Tchr Ed: conducts work-shops, provides guides & consultants	Adm 1 Wr 1 2 VSch 1 Res 1 TEd Trial 3	

#### Descriptive References:

- Altieri, D.P., T. Gadsden Jr., and V. Allen. 1971. An Operational Model for Individualizing Instruction. Science Education. 55(3): 269-273.  
Gadsden, T., Jr., V.F. Allen, and W.L. Dixon. Sept 1974. Cutting Boundaries with Correlated Science. School Science and Mathematics.

**PREPROFESSIONAL INDIVIDUALLY  
PACED INSTRUCTION (PIPI)**

K.A. McCollom, Director

College of Engineering  
Oklahoma State University  
Stillwater, Oklahoma 74074  
Tel: (405) 372-6211, Ext 6233

1970-1973

Gov: Fed (NSF),  
Private, Univ

See ICH Report(s): 8

Ages: 19-20	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec	objectives, activ'ty
Subj: chem, phys, math, communications	Sem	sheets, tests,
Approach:* integrated, process, inter-	Disc 3	supplementary books,
disciplinary, discipline-centered	Indep 1	overview
Ability: all	Lab 2	Non-Print Materials:
Eval Meth:* achievement tests,	Fld	audiotape
student questionnaire	Dem 4	
Testing: individual	Sim	
Cont Resp: tchr directed	TV	
Envir: school library	A/V 5	

Designed specifically to help pre-engineering students successfully bridge their first two years of required course work, the PIPI program -- Pre-professional Individually Paced Instruction -- combines three educational concepts, integrated curricula, individually paced instruction and mastery learning. This model ties together pre-professional courses across eight disciplines, two colleges and the freshman and sophomore levels.

One of the greatest benefits of the PIPI project was the creation of the integrated sets of objectives in behavioral terms and the creation of criteria to achieve these objectives. These quantitative materials are gradually being adopted by teachers teaching in the conventional courses as well as in the self-paced PIPI courses. As far as is known, there are no other sets of objectives for this combination of subject areas that are tied together in such an integrated form.

Perhaps the most important conclusion about the program must come from the evaluation of the effectiveness with which students learn with the PIPI materials and learning model. Initial measurements are quite favorable, although the numbers of students in the pilot group participating in the complete curricula are few. Those measurements that have been made indicate that students succeed better both in the PIPI pre-professional course and in a follow-up engineering course than do the students in conventional courses of the same type. Students also persist in engineering more readily given the PIPI experience. A large majority of students who take the PIPI courses like this method of instruction and would take other courses as well as recommend them to their friends. More refined evaluation must await a larger sample of students completing both the PIPI pre-professional curricula and an engineering education.

Reason: update methods, change in philosophy	Adopt: -	Perz: FT PT NRT	Publ: 55,000
Initiator(s):	Tchr Ed: conducts work- shops, provides guides & consultants	Adm 1 1	reproduced
K.A. McCollom,		Wr 17 10	institutionally
L. Harrisberger		VSch 12	by offset
		Res 3	(\$500/10 stu-
		TEd 12	dents)
		Trial 32	

**Descriptive References:**

McCollom, K.A. Oct 1973. Pre-Professional Instruction in Engineering. Engineering Education. 64(1): 28-31.

McCollom, K.A. March 1974. Self-Paced Learning and Student Motivation. Engineering Education. 64(6): 427-479.

**Research:**

PIPI Program Preprofessional Individually Paced Instruction. July 2, 1973. Final Report to the National Science Foundation, Oklahoma State University. Engineering Research Report ER73-EL-24.

**PREPROFESSIONAL INDIVIDUALLY  
PACED INSTRUCTION (PIPI)**

K.A. McCollom, Director

College of Engineering  
Oklahoma State University  
Stillwater, Oklahoma 74074  
Tel: (405) 372-6211, Ext 6233

1970-1973

Gov: Fed (NSF),  
Private, Univ

See ICh Report(s): 8

Ages: 19-20	Exper: Cl 12+ 2-12 I	Printed Materials:*
Lang: Eng	Lec	objectives, activ'ty
Subj: chem, phys, math, communications	Sem	sheets, tests,
Approach:* integrated, process, inter-	Disc 3	supplementary books,
disciplinary, discipline-centered	Indep 1	overview
Ability: all	Lab 2	Non-Print Materials:
Eval Meth:* achievement tests,	Fld	audiotape
student questionnaire	Dem 4	
Testing: individual	Sim	
Cont Resp: tchr directed	TV	
Envir: school library	A/V 5	

Designed specifically to help pre-engineering students successfully bridge their first two years of required course work, the PIPI program -- Pre-professional Individually Paced Instruction -- combines three educational concepts, integrated curricula, individually paced instruction and mastery learning. This model ties together pre-professional courses across eight disciplines, two colleges and the freshman and sophomore levels.

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Reason: update methods, change in philosophy	Adopt: -	Perz: FT PT NRT	Publ: 55,000
Initiator(s):	Tchr Ed: conducts work- shops, provides guides & consultants	Adm 1 1	reproduced
K.A. McCollom,		Wr 17 10	institutionally
L. Harrisberger		VSch 12	by offset
		Res 3	(\$500/10 stu-
		TEd 12	dents)
		Trial 32	

**Descriptive References:**

McCollom, K.A. Oct 1973. Pre-Professional Instruction in Engineering. Engineering Education. 64(1): 28-31.

McCollom, K.A. March 1974. Self-Paced Learning and Student Motivation. Engineering Education. 64(6): 427-479.

**Research:**

PIPI Program Preprofessional Individually Paced Instruction. July 2, 1973. Final Report to the National Science Foundation, Oklahoma State University. Engineering Research Report ER73-EL-24.

PROGRAM FOR LOW ACHIEVERS IN  
MATHEMATICS (PLAM)

Dale Frederick, Director

Lafayette Parish School Board  
P.O. Drawer 2158  
Lafayette, Louisiana 70501

1971-1974

Gov

See ICh Report(s): 8

Ages: 13-15	Exper: Cl 12+ 2-12	Printed Materials:
Lang: Eng	Lec ✓	texts
Subj: math	Sem	supplementary books
Approach: process, conceptual, inquiry	Disc ✓	activity sheets
Ability: slow	Indep ✓	tchr manuals
Eval Meth: achievement & standardized	Lab ✓	Non-Print Materials:
tests, student questionnaire	Fld ✓	overhead transpar-
Testing: term, unit	Dem	encies
Cont Resp: administratively, tchr &	Sim	games
student directed	TV	
Envir: classroom	A/V	

This project was designed to conduct an exemplary program for low achievers in mathematics in grades 7-9 in four parishes in Louisiana (Iberia, Lafayette, St. Martin, and Vermilion) by providing trained personnel for the purpose of stimulating the adoption of an improved educational program in mathematics for low achievers.

Some of the major objectives of the project are: 1) to develop a positive attitude among low achievers toward mathematics and toward school; 2) to develop a positive attitude among teachers of low achievers in mathematics by developing an understanding of the characteristics of low achievers and of techniques and methodology for successfully teaching low achievers; and 3) to significantly improve achievement in mathematics among low achievers.

Participating teachers receive intensive in-service training in the use of a variety of methods for teaching low achievers. Students are provided with self-contained instructional materials designed especially to meet their needs. Emphasis is placed on student involvement. Teachers are encouraged to use small group activities and to individualize their instruction.

In addition to the director of the project, a mathematics specialist is available in each parish to provide assistance to participating teachers.

Reason: update content	Adopt: 40 tchrs,	Pers: FT PT NRT	Publ: 3,000
& methods, develop	3,000 students,	Adm 1	copies repro-
new course	30 schools	Wt 2	duced institu-
Initiator(s):	Tchr Ed: conducts work-	VSch 5	tionally by
J. Gloriso,	shops; provides manuals,	Res	offset (\$50/10
L. Begnaud	guides, films & consul-	TEd 2	students)
	tants	Trial 40	

No references given

PROGRAMMED MATH TUTORIAL  
PROJECT (PMT)  
Nina L. Ronshausen and  
D.G. Ellison, Directors  
See ICH Report(s): 8

206 North Cottage Grove  
Indiana University  
Bloomington, Indiana 47401  
Tel: (812) 337 1257

1970-1974  
Gov: Fed, NSF,  
Participating  
Schools

Ages: 5-7	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books,
Subj: math	Sem	programmed units,
Approach: -	Disc	tests, tutor
Ability: under-achievers	Indep	manuals, field
Eval Meth: criteria-referenced tests	Lab	guides, objectives,
Testing: continual, pre & post testing	Fld	overview, tutoring
Cont Resp: material directed	Dem	work-books, progress
Envir: * classroom, sch library & halls	Sim	record sheets,
	TV	training manual
	A/V	Non-Print Materials:
	Tutoring	games, models,
		lab equipment

The aim of the project is to provide a means for effective supplementary tutoring of potential under-achievers in beginning mathematics. Detailed operational and content programs are designed to be administered on a 1-to-1 basis by carefully trained and closely supervised paraprofessionals.

Development of the programs has followed the principles of instructional design, with materials and tutoring procedures selected and repeatedly evaluated and revised to satisfy clear and comprehensive instructional objectives. Content programs for Grade I included 11 topics: sets and subsets, union and intersection of sets, one-to-one matching and set relations, cardinal numbers, addition of cardinal numbers, subtraction of cardinal numbers, numeration and place value, equality and number sentences, basic principles of addition, time-telling and values of sets of coins. The programs were simplified and adapted for kindergarten and extended in content for the second grade. The approach to teaching reflected in the operational programs is eclectic but with a behavioral orientation, including careful content planning and sequencing, individualization based on continual intrinsic testing, teaching of needed skills only (diagnostic teaching), self-paced mastery-based progress, "brightening", (a basic form of the discovery method) designed-in frequency of success consistently reinforced, and de-emphasis of failure.

In four years, approximately 1500 children have been tutored in tryouts in 14 school systems. Formal evaluations comparing achievement of tutees and controls have been carried out in 6 school systems. Evaluations of currently final versions of the programs have shown that one year of tutoring 15 minutes daily (a total of approximately 30 hours) has consistently produced statistically significant improvement in standardized achievement test score. In one study the terminal performance of a tutored kindergarten group was equal to the terminal performance of an untutored first grade group, although pre-test scores were markedly higher for the first graders.

Unless funds to continue development become available, plans are to discontinue the project.

Reason: update method, change in philosophy	Adopt: (partial) 100 tutors, 1540 students, 6 sch systems	Pers: FT PT NRT	Publ: 1,000
Initiator(s): D.G. Ellison, N.L. Ronshausen	Tchr Ed: conducts work- shops; provides manuals, guides & consultants; no special preparation required	Adm 1 Wr 1 VSch Res TEd Trial Tutors 100	copies repro- duced insti- tutionally by offset (\$1500/ 10 students)

#### Descriptive References:

- Ellison, Barber, Engle and Kampwerth. 1965. Programmed Tutoring: A Teaching Aid and a Research Tool. Reading Research Quarterly. 1(1).
- Ronshausen, N.L. 1974. The Effect on Mathematics Achievement of Programmed Tutoring As A Method of Individualized, One-To-One, Instruction. A Paper presented to the 1974 Annual Meeting of the AERA, Chicago: April 15-20.
- Ronshausen, N.L. 1974. The Effect of Programmed Tutoring on Mathematics Achievement: A Report on Two Years' Field Studies. A Paper presented to the 1974 Annual Meeting of the NCTM, Atlantic City: April 17-20.

PROJECT FOR THE MATHEMATICAL  
DEVELOPMENT OF CHILDREN (PMDC)

Eugene D. Nichols, Director

Florida State University  
Johnston Building  
Tallahassee, Florida 32306

1973 -

NSF

See ICh Report(s): none

Ages: 5-8

Lang: Eng

Subj: math

Approach: -

Ability: all

Eval Meth: -

Testing: -

Cont Resp: -

Envir: -

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:  
newsletter

not  
answered

The National Science Foundation provided financial support for the first phase of PMDC covering the period of June 1974 through September 1975. Its focus is on the learning and teaching of mathematics to children of ages 5-8 (grades 1 and 2). The main emphasis of the Project is on the investigation of the ways in which children succeed or fail to learn mathematical concepts and skills. More specifically, the Project has the following nine objectives: (1) To develop interview techniques with individual children, which will result in insights into children's modes and patterns of thinking; (2) To work with teachers to develop techniques for evaluating individual children's understandings in mathematics, mainly through observations and interviews; (3) To develop and test techniques for reliably assessing the understandings and skills children have when entering the first and second grades; (4) To study the feasibility of teaching children some selected concepts and skills which are not ordinarily taught in standard curricula at this age level; (5) To study the feasibility of teaching the usual first and second grade level concepts and skills, but employing different approaches with the aim of achieving greater success; (6) To develop modules, including various aids, in pursuit of the above five objectives; (7) To identify those practices which teachers succeed with; to capture, refine and extend these practices to other teachers; (8) To explore ways in which teachers can successfully learn to incorporate into their daily practice the materials produced and findings obtained in meeting objectives one through seven; and (9) To develop techniques and procedures for evaluating all activities pursued in meeting objectives one through eight.

Reason: update approach, Adopt: -

develop means of assess-  
ing skills & understand-  
ing of concepts

Tchr Ed: -

Pers: FT PT NRT Publ: -

Adm

Wr

VSch

Res

TEd

Trial

not  
answered

Initiator(s): -

No references given



PROJECT I-C-E (INSTRUCTION-  
CURRICULUM-ENVIRONMENT) (I-C-E)

1927 Main Street  
Green Bay, Wisconsin 54301

1970-;975

Gov

Robert J. Warpinski, Director

Tel: (414) 468-7464

See ICh Report(s): 8

Ages: 5-17, tchr ed, adult	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books
Subj: environmental ed	Sem	activity sheets
Approach: interdisciplinary, integrated, conceptual, inquiry, discovery	Disc ✓	field guides
Ability: all	Indep ✓	tests
Eval Meth: achievement test, student questionnaire	Lab	newsletters
Testing: yearly, pre-post testing	Fld ✓	Non-Print Materials:
Cont Resp: tchr directed	Dem	slides
Envir: community, school grounds & library, classroom, lab	Sim ✓	slide tape
	TV	
	A/V	

During the last three years, 215 teachers from Cooperative Educational Service Agencies 3, 8, and 9 have written integrated environmental lessons or guides for all grades and subjects. Over 35,000 guides have been sent to area public and non-public schools. To help teachers implement these guides, our Project staff offers inservice programs, outdoor or urban workshops, and daily services for many requests for ideas, materials, and audio-visual aids. We serve all public and non-public schools in North-eastern Wisconsin and their 165,000 students at a project cost of \$.50 per student, per year.

Further we communicate and cooperate with our region's colleges and universities-- St. Norbert's College, University of Wisconsin-Green Bay, University of Wisconsin-Oshkosh, and Lawrence University--with pre-service teacher training, new approaches, and programs. Another supportive element of our total community effort has been business, industry, civic, and social groups which have given moral support as well as donations of audio-visual resources.

Last year, the President's National Advisory Council awarded the Project an "Educational Pacesetter Award". This year, the Project is one of two in Wisconsin nominated for national validation as a step to national and/or statewide dissemination of project programs and materials. Our major task is the final edition and publication of the environmental guides for all grades and subjects. Also, we work personally with area teachers to implement ideas from the "ICE" guides.

Reason: update methods	Adopt: 3,000 tchrs, 65,000 students	Pers: FT PT NRT	Publ: 40,000
Initiator(s): Wis. Dept. of Pub. Instruction, R.S. Way, W. Bowman, R. Warpinski, K. Rawson M. Schommer, T. Rhodes	Tchr Ed: conducts work- shops; provides guides & consultants	Adm 1 Wr 1 215 VSch 1 Res 1 TEd 2 Trial	copies repro- duced institu- tionally by mimeograph (\$10/10 stu- dents)

Descriptive References:

- Kellner, R.W., and R.J. Warpinski. Spring 1974. All About Project I-C-E. The Journal of Environmental Education. Madison, Wisconsin. 5(3): 27-28.
- Kellner, R.W. Spring 1972. A Regional Approach to Environmental Education Project I-C-E, Green Bay, Wisconsin. In Title III in Environmental Education, a Title III Quarterly. National Advisory Council, Washington, D.C. pp. 9-11.



PROJECT PART-TIME PUPILS AS  
RESPONSIBLE TEACHERS TO  
INCREASE MUTUAL ESTEEM

Union Street School  
South Weymouth, Massachusetts  
02190

1970-1971  
Gov

Mary F. Toomey, Director

Tel: (617) 335-5322

See ICh Report(s): none

Ages: 4-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	activity sheets
Subj: biol, chem, phys, earth-space, math, tech, humanities, industrial arts	Sem	Field guides
Approach: interdisciplinary	Disc ✓	overview
Ability: all	Indep	Non-Print Materials:
Eval Meth: achievement, lab & oral tests, student questionnaire	Lab ✓	slides
Testing: unit	Fld ✓	films
Cont Resp: tchr guided, student directed	Dem ✓	slide tape
Envir: school grounds, classroom	Sim	audiotape
	TV	
	A/V	

Project PART-TIME utilizes the talents of qualified high school students to enrich the curriculum of elementary school children and provide other special services to them.

In the enrichment aspect of the program, high school students with special knowledge of particular subject areas are encouraged to share their subjects with elementary children. Subjects may be of a wide range and include any of the sciences, foreign languages, dancing, music, art, sports, handwork, vocational skills, or other hobbies.

In additional special services, Project PART-TIME supplies tutors, big brothers and sisters, and aides to speech therapists or motor coordination specialists. This extension of the services of professionals enables needy children to receive more of the individual attention they require.

Project PART-TIME could easily expand its services to include other areas such as clerical assistants and library aides.

Reason: change in philosophy	Adopt: 6 schools	Pers: FT PT NRT	Publ: 2,000
	Tchr Ed: provides manuals & guides	Adm 1	copies repro- duced by offset
Initiator(s): M.F. Toomey		Wr 1 1	
		VSch 2	
		Res	
		TEd	
		Trial	

Descriptive References:

Massachusetts Teacher. Nov 1973.  
Teacher. March 1974.

Research:

Project Part-Time Evaluation by Psychometrics Inc., 34 Hudson Street, Falmouth, Massachusetts.

PROJECT PHYSICS (formerly  
Harvard Project Physics)  
F. James Rutherford, Director

Longfellow Hall  
Harvard University  
Cambridge, Massachusetts 02138

1964-1970  
Gov: Fed(USOE, NSF);  
Harvard Univ;  
Ford, Carnegie &  
Sloan Foundations

See ICh Report(s): 8,7,6,5,4,3

		Exper: Cl	12+	2-12	I	Printed Materials:
Ages: 16-20, tchr ed		Lec	✓	✓		texts, lab books,
Lang: Eng, Fr, Portugese, Italian		Sem	✓		✓	supplementary books,
Subj: phys, astronomy, humanities		Disc	✓	✓	✓	programmed units,
Approach: * discipline centered, integrated,		Indep		✓	✓	tchr manuals, tests,
interdisciplinary, conceptual		Lab	✓	✓	✓	objectives, over-
Ability: average, average +		Fld		✓	✓	view, newsletters,
Eval Meth: achievement tests, tchr jdgmts		Dem	✓	✓		charts
Testing: unit		Sim				Non-Print Materials:
Cont Resp: tchr guided; tchr, student &		TV				filmstrips, filmloops,
material directed		A/V	✓	✓	✓	films, overhead
Enir: classroom, sch library, lab						transparencies, lab
						equipment

Project Physics began in 1964 to create a modern course in physics with a humanistic bias. The intended population was the two million high school students who each year did not elect to study physics:

Historical contexts, personalities of scientists, time-charts, diverse significant artwork, marginal notes, qualitative as well as quantitative problems, and a relaxed writing style appeal to students. The mathematical skills required are minimal. Diversity and individual choice are sought to provoke student interest and personal involvement.

The multi-media course requires choices by teachers and students among emphases and experiences. A wide variety of teaching styles can be used. These range from lecture-demonstration-laboratory to contract teaching and individual study.

Evaluation through school trials was continuous during four complete re-writings before publication. The reading level has been lowered for the 1975 edition to an average of Grade 9-10. Summary evaluation and subsequent researches show that most objectives have been approximated.

Enrollments have expanded dramatically in many schools using the course materials. Adaptations and usage in Canada, Australia, Portugal, and Italy show acceptance of this approach.

Extension of the course materials, especially additional supplemental units and film loops, are anticipated.

		Pers:	FT	PT	NRT	Publ: 250,000
Reason: update methods,	Adopt: -	Adm	1		2	copies (USA &
change in philosophy,		Wr	20			Canada) repro-
develop new course	Tchr Ed: conducts work-	VSch				duced commer-
	shops, provides manuals,	Res	5			cially by lino-
Initiator(s): G. Holton,	guides, films & consul-	TEd	1		1	type
F.J. Rutherford,	tants	Trial			100	
F. Watson						

#### Descriptive References:

The Physics Teacher. May 1967.

Introducing the Project Physics Course. Holt, Rinehart, and Winston: New York City. Free.

#### Research:

Welch, W. 1973. Review of the Research and Evaluation Program of Harvard Project Physics. Journal of Research in Science Teaching. 10(4): 365-378.

QUANTITATIVE PHYSICAL SCIENCE  
(QPS)  
Sherwood Githens, Jr., Director  
See ICh Report(s): 8,7

Science Education Department  
Duke University  
Durham, North Carolina 27708  
Tel: (919) 684-3924

1963-  
Duke University,  
Mary Duke Biddle  
Foundation &  
Charles F.  
Kettering  
Foundation

Ages: 14-18, adults  
Lang: Eng  
Subj: physical science  
Approach: -  
Ability: all  
Eval Meth: -  
Testing: -  
Cont Resp: -  
Envir: -

Exper: Cl 12+ 2-12 I  
Lec  
Sem  
Disc ✓  
Indep  
Lab ✓  
Fld  
Dem  
Sim  
TV  
A/V

Printed Materials:  
student manuals

The overall project purpose is: to promote operation-oriented equipment-based teaching and learning of basic physical science, based primarily upon student usage of equipment and elementary mathematics; to create and supply guidance materials for the teacher and for the school administrators who decide to install this type of instruction; to devise special equipment items when necessary for economy or to fill a total lack or to result in better pedagogy - and to promote small scale production for use in the experimental schools. Specific objectives are: primarily, to prepare junior-high students to enjoy and extract more benefit from senior-high courses in science and mathematics; to serve as a terminal or general-education course for those students who do not elect chemistry or physics; to serve as a part of programs in vocational education.

The project provides a mechanism to attain a number of behavioral objectives in the fields of basic science, mathematics, and basic engineering. Learning starts with specifics and progresses to generalities and conclusions; processes and content are intermingled. Students learn by using devices - which helps motivate them. Demonstrations when made by the teacher usually are in connection with the same devices manipulated by the students. Textbook supplies connecting link, organizes, and serves as a basis for study and review after the student has performed the manipulative learning operations (MLOs). The work is sequenced so that the activities preceding any unit constitute preparation for that unit.

A perfectly good QPS course can be offered by a skillful teacher to students whose reading ability is poor, with little or no use of the textbook. But if the students can and will read the textbook and student's manual, a quite high-level course can be offered. Thus, there is considerable difference in the levels at which the course is being offered. Although QPS was originally intended for age-14 junior-high school students, experience has shown that its content and method are suitable for a much wider range of ages, including adults. The program can be adjusted to the learning rates and degrees of preparation of slow, average, or talented students.

Reason: develop new course	Adopt: 100 tchrs	Pers: FT PT NRT	Publ: -
Initiator(s): S. Githens	Tchr Ed: conducts workshops, provides manuals	Adm	
		Wr	
		VSch	not
		Res	answered
		TEd	
		Trial	

**Descriptive References:**

Journal of Research in Science Teaching. 1964. 2: 345-348.  
The Physics Teacher. Oct 1970. 8(7): 366-373.

SCHOOL MATHEMATICS STUDY GROUP  
(SMSG)

Edward G. Begle, Director

See ICh Report(s): 8,7,6,5,4,3,2,1

School of Education  
Cedar Hall  
Stanford University  
Stanford, California 94305  
Tel: (415) 321-2300, ext 2681

1958-1972

Gov: NSF

Ages: 5-18, tchr ed	Exper: Cl 12 2-12 I	Printed Materials:
Lang: Eng, Arabic, Bengali, Chinese,	Lec	newsletter
Cypriot, Dutch, Fr, Greek, Indonesian,	Sem	
Italian, Japanese, Korean, Portuguese,	Disc	
Swedish, Turkish, Vietnamese	Indep	not
Subj: math	Lab	answered
Approach: -	Fld	
Ability: -	Dem	
Eval Meth: -	Sim	
Testing: -	TV	
Cont Resp: -	A/V	
Envir: classroom		

The primary purpose of the SMSG was to foster research and development in the teaching of school mathematics. The project produced materials in mathematics for students and teachers in the elementary and secondary schools. Major objectives of the study group were preparation of sample text materials designed to illustrate the kind of curriculum that the members of the group felt was demanded by the increased use of science, technology, and mathematics in our society, and the preparation of materials designed to help teachers prepare themselves to teach such a curriculum.

A second major activity was the contribution of the National Longitudinal Study of Mathematical Abilities in which students originally in grades 4, 7, and 10 were followed for five years to determine the effects of conventional, SMSG, and other new course sequences on performance in mathematics and science. This activity was extended to grades K-3, for which special tests measuring mathematics achievement were developed to evaluate higher cognitive skills usually ignored by standard tests. SMSG also carried out some experimentation with specialized materials designed to fulfill specific needs in mathematics education.

Among the numerous materials produced by SMSG are: elementary school texts Grades 1 through 6; junior high school texts; texts for slower students; senior high school texts for average and above average students in a college preparatory program; supplementary and enrichment materials; the New Mathematics Library which consists of short expository monographs on various mathematical subjects; Studies in Mathematics which is a series of background books for teachers; filmed courses for elementary school teachers; and, ELMA Technical Reports which contain tests and other measuring instruments used in the National Longitudinal Study of Mathematical Abilities. Over 275 different items have been produced with many of them translated into various languages.

Reason: develop new	Adopt: -	Pers: FT PT NRT	Publ: -
course		Adm	
	Tchr Ed: -	Wr	
Initiator(s): -		VSch	not
		Res	answered
		TEd	
		Trial	

Descriptive References:

Begle, E.G. March 1968. "SMSG: The First Decade." The Mathematics Teacher.  
56(3): 239-245.

SCIENCE COURSES FOR  
BACCALAUREATE EDUCATION

V.L. Parsegian, Director

Rensselaer Polytechnic Institute  
Troy, New York 12181

Tel: (518) 270-6439

1967-1972

Kettering  
Foundation

See ICh Report(s): 8,7,6,5,4

Ages: college	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	texts
Subj: biol, chem, phys, earth-space	Sem	lab books
Approach: interdisciplinary, integrated, conceptual	Disc ✓ ✓	tchr manuals
Ability: all	Indep ✓ ✓	
Eval Meth: achievement & oral tests	Lab	
Testing: optional	Fld	
Cont Resp: tchr & material directed	Dem	
Envir: classroom, lab	Sim	
	TV	
	A/V	

The project objectives were to integrate the physical and life sciences as much as possible, and to present these with a historical, philosophical approach and within the context of social interests. The project is suitable for the potential attorney, economist, businessman, psychologist, anthropologist, teachers in elementary schools, theologians, as well as majors in the physical sciences.

Plans are underway for a follow-up project to develop courses of study (and tests) that can continue to serve as bridges between the sciences and the humanities and the fine arts. If successful this would continue to be centered at Rensselaer Polytechnic Institute under the direction of V.L. Parsegian

Reason: change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially
	Tchr Ed: provides guide-books	Adm 1	
		Wr 1 22	
Initiator(s): V.L. Parsegian		VSch	
		Ros	
		TEd	
		Trial 5	

Descriptive References:

Parsegian, V.L. Oct 1969. Giving Relevance To Science. The Physics Teacher. pp 379-384.

Parsegian, V.L. Feb 1972. What Makes Studies Interdisciplinary? Journal of College Science Teaching.

SCIENCE COURSES FOR  
BACCALAUREATE EDUCATION

V.L. Parsegian, Director

Rensselaer Polytechnic Institute  
Troy, New York 12181

Tel: (518) 270-6439

1967-1972

Kettering  
Foundation

See ICh Report(s): 8,7,6,5,4

Ages: college	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	texts
Subj: biol, chem, phys, earth-space	Sem	lab books
Approach: interdisciplinary, integrated, conceptual	Disc ✓ ✓	tchr manuals
Ability: all	Indep ✓ ✓	
Eval Meth: achievement & oral tests	Lab	
Testing: optional	Fld	
Cont Resp: tchr & material directed	Dem	
Envir: classroom, lab	Sim	
	TV	
	A/V	

The project objectives were to integrate the physical and life sciences as much as possible, and to present these with a historical, philosophical approach and within the context of social interests. The project is suitable for the potential attorney, economist, businessman, psychologist, anthropologist, teachers in elementary schools, theologians, as well as majors in the physical sciences.

Plans are underway for a follow-up project to develop courses of study (and tests) that can continue to serve as bridges between the sciences and the humanities and the fine arts. If successful this would continue to be centered at Rensselaer Polytechnic Institute under the direction of V.L. Parsegian

Reason: change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced commercially
	Tchr Ed: provides guide-books	Adm 1	
		Wr 1 22	
Initiator(s): V.L. Parsegian		VSch	
		Ros	
		TEd	
		Trial 5	

Descriptive References:

Parsegian, V.L. Oct 1969. Giving Relevance To Science. The Physics Teacher. pp 379-384.

Parsegian, V.L. Feb 1972. What Makes Studies Interdisciplinary? Journal of College Science Teaching.

**SCIENCE CURRICULUM IMPROVEMENT  
STUDY (SCIS)**

Robert Karplus, Director

See ICh Report(s): 8,7,6,5,4,  
3,2,1

Lawrence Hall of Science  
University of California  
Berkeley, California 94720

Tel: (415) 642-4541

1962-1974

Gov: Fed(NSF)

Ages: 5-12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng, Fr, Sp, Ger, Swedish, Danish, Japanese	Lec	tchr manuals
Subj: biol, chem, phys, earth-space	Sem	tests
Approach: process, conceptual, inquiry, discovery	Disc ✓	newsletters
Ability: all, special: blind & deaf	Indep ✓	charts
Eval Meth: achievement & oral tests, tchr jdgmts, student questionnaire	Lab ✓	student manuals
Testing: each concept, individual	Fld ✓	Non-Print Materials:
Cont Resp: tchr guided	Dem	filmstrips
Envir: classroom	Sim	filmloops
	TV	films
	A/V	lab equipment

SCIS usually capsulizes its purposes as the development of scientific literacy. But it is important to delineate exactly what is meant by that term and how the staff hopes to achieve this goal. An important meaning of scientific literacy is sufficient knowledge and understanding of the fundamental concepts of both the biological and physical sciences for effective participation in twentieth century life. A second implication of scientific literacy is the development of a free and inquisitive attitude and the use of rational procedures for decision-making. In the SCIS program, children learn science in an atmosphere of intellectual freedom, where their own ideas are respected, where they learn to test their ideas by experiment, and where they learn to accept or reject ideas, not on the basis of some authority, but on the basis of their own observations. Each unit of the SCIS program presents activities which lead to the understanding of important scientific and process-oriented concepts.

The SCIS program is designed for elementary school children in grades K through 6. The program has been successful with disadvantaged inner-city children in many of the country's urban centers, as well as with disadvantaged rural children in a compensatory education, language development project. In addition, Adapting Science Materials for the Blind is adapting SCIS materials for use with visually impaired children.

Since the last Clearinghouse Report we have developed evaluation supplements for each of the 12 units. The instruments are designed so that school districts can adapt them to their local needs.

The plan for the future is to utilize continuing resources on administration and implementation of the program on a national and international level.

Reason: change in philosophy, develop new course	Adopt: 60,000 tchrs, 2,000,000 students, 2,000 schools	Pers: FT PT NRT	Publ: repro- duced commer- cially by offset & linotype
Initiator(s): R. Karplus, H.D. Thier, C. Lawson	Tchr Ed: conducts work- shops; provides Handbook, guides, films & consultants	Adm 4 2 Wr 10 1 VSch 10 Res 1 TEd 1 8 Trial 550	

**Descriptive References:**

SCIS Omnibus. May 1973. Science Curriculum Improvement Study.

SCIS Teacher's Handbook. Jan 1974. Science Curriculum Improvement Study.

**Research:**

Renner, J.W., and D.G. Stafford. Research Studies of SCIS Success in the Classroom.  
Rand McNally & Company, Chicago, Illinois.



**SCIENCE FOR THE SEVENTIES  
(SFTS)**

Irvin T. Edgar, Director  
See ICH Report(s): 8,7

Division of Science & Technology  
Bureau of Curriculum Services  
Department of Education  
Commonwealth of Pennsylvania  
Box 911  
Harrisburg, Pennsylvania 17126  
Tel: (717) 783-1822

1968-1979  
Gov:State

Ages: 4-12	Exper: CI 12+ 2-12 I	Printed Mtterials:
Lang:* Eng, Korean	Lec	tchr manuals
Subj: elementary science	Sem	objectives
Approach: process, conceptual, inquiry, discovery	Disc ✓ ✓ ✓	overview
Ability: all	Indep	
Eval Meth: lab tests, tchr jdgmts	Lab ✓ ✓ ✓ ✓	Non-Print Materials:
Testing: unit	Fld	videotape
Cont Resp: SFTS committee	Dem	
Envir:* classroom, school grounds, community	Sim	
	TV ✓	
	A/V	

Elementary teachers report that SFTS lessons have been used successfully in support of text-centered programs, incidental science programs, as well as "modern" elementary science programs. Two pilot programs were conducted during the final months of the 1973-1974 school year. First, the ITV broadcast of the videotaped programs for direct classroom use provided the opportunity to field test this approach prior to the state-side ITV network broadcast during the 1974-75 school year. Secondly, the cable television broadcast of SFTS videotapes is an integral part of the in-service course described above. Both approaches hold promise for future use. Videotape introductions to SFTS science lessons at the intermediate level are now in production.

Reason: update content & method, change in philosophy	Adopt:(partial)	Pers: FT PT NRT	Publ: reproduced
	Tchr Ed: conducts work-shops; provides manuals, guides, consultants, TV	Adm 2	institutionally
Initiator(s): F. Alder, D. Alfke, R.W. Allison, J. Currie, W.H. Bolles, W. Chamberlain, T.V. Come, C.E. Heilman, J.J. McDermott, D. Smith, P.W. Welliver		Wr 6	& commercially
		VSch 10	by offset (\$20/
		Res 4	10 students)
		TEd 2	
		Trial 65	

**Descriptive References:**

Science For The Seventies. 1968. Pennsylvania Clearinghouse on Methodology in Elementary Sciences.  
Science For The Seventies. 1969. Pennsylvania Clearinghouse on Methodology in Elementary Sciences.  
Edgar, I. T. Nov 1973. Science and the Primary School Teacher. Science and Children. 11(3): 22-24.  
Research:  
In progress.

SCIENCE FOR THE SEVENTIES  
AND INSTRUCTIONAL TELEVISION  
(SFTS-ITV)

Paul W. Welliver, Director

320 Rackley Building  
The Pennsylvania State University  
University Park, Pennsylvania 16802

Tel: (814) 865-1500

1972-1975

Gov: Pennsylvania  
Dept of Education

See ICh Report(s): none

Ages: 5-12, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tchr manuals
Subj: elementary science	Sem	
Approach: * inquiry, discovery, process	Disc ✓	Non-Print Materials:
Ability: all	Indep ✓	videotape
Eval Meth: lab tests	Lab ✓	
Testing: unit	Fld ✓	
Cont Resp: material directed	Dem	
Envir: * classroom, school grounds	Sim	
	TV ✓	
	A/V	

In 1968, the Pennsylvania Department of Education initiated production of a guide to the teaching of elementary school science which contained sample lessons designed to assist teachers in the transition to modern approaches to the teaching of science. These materials were being developed under a statewide thrust for the improvement of elementary school science instruction entitled "Science for the Seventies" (SFTS).

Wishing to speed the dissemination and implementation of SFTS, in 1972 the Pennsylvania Department of Education funded the SFTS-ITV Project. Under this project, SFTS lessons were tried in elementary school classrooms and areas within the lessons were identified with which teachers and students required assistance. Furthermore, six teaching strategies were identified which were considered to be important to valid science instruction.

Instructional television programs were then designed for use by teachers in their classrooms which would provide both teachers and students with assistance in undertaking the SFTS lessons. These television programs were structured to introduce concepts and techniques useful to the investigation and inquiry activities that followed. The television programs are unique in that they include discussion periods which allow for active interaction between teachers and students during the televised productions with opportunities for teachers to deliberately practice the six instructional strategies. Additional television tapes and printed guide materials have been prepared for teacher orientation and utilization.

Evaluation is being conducted to determine effectiveness. Pilot studies indicate that teachers and students are receptive to this approach and adapt to this unique technique of television utilization. In the fall of 1974, the project will be implemented in primary grade classrooms throughout Pennsylvania expanding to intermediate grades in the fall of 1975. Support is incorporated in the project for evaluation relative to effectiveness in dissemination and implementation of SFTS and orientation of teachers to effective instructional strategies and methods.

Reason: update method	Adopt: (partial)	Pers: FT PT NRT	Publ: 1,000
Initiator(s):	500 tchrs, 10,000	Adm 1	copies repro-
P.W. Welliver, I. Edgar,	students, 90 schools	Wr 3	duced institu-
N. Alfke, R. Shrigley,		VSch 3 2	tionally by
M. Szabo	Tchr Ed: conducts work-	Res 1 1	offset (\$20/10
	shops; provides manuals,	TEd 2 2	students)
	guides & videotapes	Trial 80	

No references available

SCIENCE, NATURE, & THE  
SURVIVAL OF MAN (SNSM)

William H. Bolles, Director

See ICh Report(s): 8

Pennsylvania Department of  
Education

Box 411, Room 566

Harrisburg, Pennsylvania 17126

Tel: (717) 787-7320

1971-1976

Gov

Ages: 16-19

Lang: Eng

Subj: environ

Approach: interdisciplinary

Ability: slow

Eval Meth: tchr jdgmt

Testing: individual

Cont Resp: tchr guided

Envir: community, school grounds &  
library, classroom, lab

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tchr manual

Based primarily upon social issues that are under the direct influence of science, SNSM has become a program of environmental education and centers about two major topics: pollution and population. The basic intent of SNSM is to involve the majority of prospective citizens, which the non-science major students represent, in intelligent consideration and examination of major issues. This is accomplished through active participation in science experiences and investigation of phenomena present in the student's own community.

Student acceptance and enjoyment of science is frequently squelched by strict emphasis on academic requirements and specialized subject matter. Non-science major students are particularly damaged by this procedure and usually develop an unfavorable attitude toward science. SNSM removes the emphasis placed on academic growth and substitutes student participation in identifying and studying of problems uncovered in the local environment. The SNSM experience has as a major goal the development of a desirable attitude toward science. Accordingly, an SNSM Scale is used to investigate the effects of the total program and is administered at the beginning and end of the school year. This Scale investigates student attitudes, not subject matter growth.

The developers of SNSM (which was formerly called "Science for Nonscience Major Students") recognized the necessity of creating a profitable interaction between non-science major students and an informed adult - the teacher. The flexibility in the SNSM approach allows teachers and students to interact in a way that results in changed behavior for both groups according to the SNSM Scale results.

Reason: develop

materials for slow  
learners

Adopt: 25 tchrs,

500 students,  
20 schools

Pers: FT PT NRT

Adm

Wr

VSch

Res

TEd

Trial 20 10

Publ: 500 copies

reproduced in-

stitutionally

by offset

Initiator(s): -

Tchr Ed: provides manuals  
& consultants

Descriptive References:

Science, Nature and the Survival of Man. April 1971. The Science Teacher. 38(3).

**SECONDARY SCHOOL ENVIRONMENTAL  
EDUCATION PROJECT (SSEEP)**

James L. Aldrich, Director

See ICh Report(s): none

The Conservation Foundation  
1717 Massachusetts Avenue, N.W.  
Washington, D.C. 20036

Tel: (202) 265-8882

1973-1974

Gov:Fed

Age: 12+	Exper: C1 12 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓ ✓ ✓	supplementary books
Subj: water resource management	Sem ✓ ✓ ✓ ✓	Non-Print Materials:
Approach: interdisciplinary	Disc ✓ ✓ ✓ ✓	slides
Ability: all	Indep ✓ ✓ ✓ ✓	games
Eval Meth: tchr jdgmts	Lab ✓ ✓ ✓ ✓	
Testing: -	Fld ✓ ✓ ✓ ✓	
Cont Resp: -	Dem	
Envir:* classroom, community	Sim ✓ ✓ ✓ ✓	
	TV	
	A/V ✓ ✓ ✓ ✓	

Each unit focuses on a particular aspect of water resource problems and how that problem interfaces with other environmental concerns - land use, growth, economic development, individual freedoms and life style, etc. The units approach the topic through the eyes of people who are involved in and affected by the problem and must face its alternative solutions.

The units include: "Water, Water, Everywhere..." which targets growth, water supply and water quality in the Central Florida areas as viewed by a group of high school students who become involved in a local referendum; "Willingboro, A Town With Wet Feet" which addresses regional planning of water resources on a watershed basis, discussing water supply, water quality, storm water and flood control, and local decision-making. The problem is seen through the eyes of a small New England town; "Good News" which moves into science fiction evaluating extensive interbasin water transfer from the technologic, sociologic, ethical, economic and health risk perspectives; "D'Lema" which is a role-playing game dealing with the location of a new industry in a small town and the myriad questions that the citizens must confront in seeking a balance between environment and development issues; and, "You Me and Water," a background paper for all the units, which is presented in conversational format.

Both science and social studies teachers have used the materials in a great variety of their courses in every grade from 7th through 12th. The units were used in team teaching, coordinated social studies/science programs, as individual study projects, in coordination with field studies and in an alternative education program.

Each of the teachers involved in the project kept a journal that provided feedback on just what happened in the use of the materials and thus a strong input for revising the materials for final publication.

Reason: develop new course	Adopt: trial	Pers: FT PT NRT	Publ: repro-
	Tchr Ed: no special preparation required	Adm 2	duced commer-
Initiator(s): J.L. Aldrich		Wr 3	cially by
		VSch 3	offset
		Res 2	
		TEd	
		Trial 22	

No references given

**SECONDARY SCHOOL MATHEMATICS  
CURRICULUM IMPROVEMENT  
STUDY (SSMCIS)**

Howard F. Fehr, Director

Box 120  
Teachers College  
Columbia University  
New York, New York 10023

1965-1972

Gov: Fed

Tel: (212) 678-3439

See ICh Report(s): 8,7,6,5,4

Ages: 11-18	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓ ✓	texts, supplementary
Subj: math	Sem	books, tchr manuals,
Approach: discipline-centered	Disc ✓ ✓	tests, objectives,
Ability: avg+	Indep ✓ ✓	newsletters
Eval Meth: achievement & standardized	Lab	
tests, tchr jdgt, student q're	Fld	
Testing: unit, N.Y. State Regents tests	Dem	
Cont Resp: administratively directed	Sim	
Envir: classroom, sch library, lab	TV	
	A/V	

This project had as its goal the construction of a six-year program of mathematical instruction of a contemporary nature for grades seven through twelve, for able students -- those in the upper 15% of cognitive ability. The curriculum eliminates the traditional separation of the several branches -- arithmetic, algebra, geometry, analysis -- and unifies the instruction through its fundamental concepts (set, relation, mapping, operation) and structures (group, ring, field, vector space). Efficiency gained by this construction permits the introduction into high school of much mathematics presently taught to collegiate undergraduates.

That mathematics can be organized in terms of fundamental concepts and structures became well known through the work in foundations at the turn of this century and the Bourbaki analysis begun in the late 1930's. What was not known as late as 1965 was how this organization could be presented in teachable form to able secondary school students. Tentative guidelines became available through national and international seminars held during 1959-1965.

The unified organization, as well as the elimination of certain traditional topics no longer deemed useful, permits the teaching of the calculus in the fifth and sixth years. It also permits the introduction into the study of genuine modern applications of probability, statistics, computer oriented problems, linear programming, numerical analysis and the usual application of differential and integral calculus. It is not the rigorous formality of the structures that is stressed, but their properties that mold the mathematics study of all branches into a unified whole.

The content and pedagogical features are determined by an eminent group of American and European mathematicians and mathematics educators. The experimental materials are taught in schools with specially trained teachers in each class. Each course underwent three revisions before release for public use.

Reason: change in philosophy, develop new course, publication	Adopt: 200+ tchrs, 35,000 students throughout U.S., S.A., Israel, Arab nations & Japan	Pers: FT PT NRT	Publ: 50,000 reproduced institutionally
Initiator(s): H.F. Fehr	Tchr Ed: conducts N.S.F. Institutes, provides guides & consultants	Adm 4 1 Wr 20 VSch 3 2 Res 5 TEd 3 Trial 20	

**Descriptive References:**

The Secondary School Mathematics Curriculum Improvement Study: A Unified Mathematics Program. Jan 1974. The Mathematics Teacher.

SSMCIS Bulletin No. 7. Spring 1973. Teachers College, Columbia University.

**Research:**

Williams, S.I., and C.O. Jones. July 1973. Performance of SSMCIS trained students on College Board Mathematics Examinations. Educational Testing Service, 1 TDQ 73-4.  
Clark, W., and Fey, J. Arithmetic Achievement in Seventh and Eight Grade SSMCIS Classes of Montgomery County, Maryland. Technical Report No. II - Supplement.

**SOCIAL SCIENCE EDUCATION  
CONSORTIUM (SSEC)**

Irving Morrissett, Director

855 Broadway  
Boulder, Colorado 80302

Tel: (303) 492-8155

1963 -

\*Foundation,  
Gov: NSF, Office  
of Education

See ICh Report(s) : none

Ages: tchr ed  
Lang: Eng  
Subj: social sciences  
Approach: interdisciplinary  
Ability: all  
Eval Meth: -  
Testing: -  
Cont Resp: -  
Envir: school library, Resource  
& Demonstration Center (RDC)

Exper: Cl 12+ 2-12 I

Lec  
Sem  
Disc  
Indep  
Lab  
Fld  
Dem       ✓   ✓   ✓  
Sim  
TV  
A/V  
Work-       ✓   ✓   ✓  
shops

The Social Science Education Consortium (SSEC) is a not-for-profit organization funded by the National Science Foundation to improve the quality of social science education at all grade levels. To help meet this goal the SSEC maintains a Resource and Demonstration Center---a "hands on" center with new social science project materials, innovative textbooks, multimedia kits, games and simulations, ERIC microfiche collection, professional library and reference materials. The Consortium offers a unique visitor workshop program in which individuals and groups are trained in the analysis and use of innovative social science curriculum materials and methods. For those who wish to keep abreast of changes, but are unable to visit the Resource Center, an Information Request Service is available as well as a Consultation Program whereby SSEC staff, for a fee, will travel to school districts to train educators. The Consortium also publishes a variety of items related to social science education, including analyses of curriculum materials, newsletters, books, and occasional papers.

The SSEC serves as the contracting agent for the ERIC Clearinghouse for Social Studies/Social Science Education, ERIC/ChESS, the Office of Education supported center that puts social studies material into the ERIC system and publishes reviews and analytical papers based on that material. Manual and computer services for social science related topics are available from ERIC/ChESS, which is housed in the same building as SSEC. A cost schedule for computer searches should be available in October, 1974.

Reason: update method,  
change in philosophy,  
improve curricula

Adopt: -

Tchr Ed: conducts work-  
shops, provides  
consultants

Pers: FT PT NRT   Publ: -

Adm   10   3

Wr

VSch

Res

TEd

Trial

Initiator(s):

I. Morrissett,  
J. David, F. Haley

No references given



**SOCIOLOGICAL RESOURCES FOR THE  
SOCIAL STUDIES (SRSS)**

Robert C. Angell, Director

See ICh Report(s): 7,6,5,4

American Sociological Association  
1722 N Street, N.W.  
Washington, D.C. 20036

Tel: (202) 833-3410

1964-1971

Gov: Fed(NSF)

Ages: 16-19	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: social sciences	Sem	supplementary books
Approach: * discipline centered, inquiry	Disc 1	tchr manuals
Ability: all	Indep	newsletters
Eval Meth: achievement tests	Lab	
Testing: unit	Fld 2	
Cont Resp: administratively directed	Dem	
Envir: classroom	Sim 3	
	TV	
	A/V 4	

Sociological Resources for the Social Studies was a project of the American Sociological Association, supported by the National Science Foundation. Its headquarters was open for seven years, 1964-71. It produced a one-semester high school course consisting of 21 short units called episodes (both the course and the episodes have published teacher's manuals), seven paperback readings books, and a teacher training book (developed jointly with the High School Geography Project) entitled HSGP and SRSS: Experiences in Inquiry. Allyn and Bacon, Inc. have published all our materials.

The goal of the project was to up-grade the curricular materials in sociology available for high schools. The project emphasized inquiry teaching and learning. The student manuals for the course and the episodes cannot be used independently because so much of the knowledge that is to be imparted derives from class activities and projects discussed in the teacher's manuals. The evaluation conducted was formative. There has been, unfortunately, no summative evaluation. There is no continuing organization that might do it. There are black-line masters for transparencies in the course teacher's manual. Finished transparencies are optionally available for many of the episodes. We also produced a teacher training film, "Sociological Inquiry in the Social Studies Classroom."

Reason: develop new course, publication	Adopt: in use throughout U.S. and Canada	Pers: FT PT NRT	Publ: 200,000
		Adm 1	copies repro-
Initiator(s): N. Gross, P. Lazarsfeld	Tchr Ed: conducted workshops, provided manuals, film, consultants	Wr 4 150	duced commer-
		VSch 1	cially by lino-
		Res 1	type
		TEd	
		Trial	

No references given



**SOUTH CENTRAL KANSAS ELEMENTARY  
MATH-SCIENCE PROJECT (SOCKEMS)**

John M. Nickel, Director

See ICh Report(s): none

161 Corbin Center  
Wichita State University  
Wichita, Kansas 67208

Tel: (316) 689-3681

1969-1972

Gov: Fed(ESEA  
Title III),  
Participating  
School

Ages: 5-12	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	tests
Subj: biol, chem, phys, earth-space, math	Sem	objectives
Approach: integrated, conceptual, discovery	Disc	newsletters
Ability: all	Indep	Non-Print Materials:
Eval Meth: achievement tests, student questionnaire	Lab ✓	games
Testing: individual	Fld ✓	lab equipment
Cont Resp: tchr guided, student directed	Dem	
Envir: school grounds & library, classroom	Sim	
	TV	
	A/V	

This project, which combines math and science under one umbrella, is dedicated to erasing emphasis on fact and substituting emphasis on the learning process. Using inexpensive materials the teachers are putting "do" things into the hands of kids.

The project is also a teacher-training approach designed to help innovative people help children learn. In five-week summer workshops, teacher participants are given substantive background in both math and science. They are also given, through participation in the activities they ask students to do later, understanding of the pragmatic philosophy essential to successful teaching of modern math and science through a discovery approach.

SOCKEMS has proven that teachers willing to accept innovation can make meaningful changes in the learning habits of kids, as well as in the teaching habits of instructors themselves.

Some 80% of the teachers selected by superintendents for the original cross-training in the innovative approach succeeded in making the change. And those teachers have become valuable "change agents" in the school districts they represent and in other schools which have expressed an interest in the new concept.

Reason: update content & methods	Adopt:(partial) 100 tchrs, 280 students	Pers: FT PT NRT Adm 3 Wr 1 VSch 3 Res 1 TEd 3 Trial 30	Publ: reproduced institutionally by mimeograph (\$20/10 students)
Initiator(s): G. Crumb J.M. Nickel, D. Knorr	Tchr Ed: conducts work- shops; provides manuals, guides, consultants & materials		

**Descriptive References:**

SOCKEMS Socks it to 'em in Math-Science. Dec 1971. Science and Children.

**Research:**

Project Evaluation Reports I & II. 1971, 1972. Selection Research, Inc. Lincoln, Nebraska.

SPECIAL ISSUE ON PLANT  
PATHOLOGY FOR AMERICAN  
BIOLOGY TEACHER (PIPathABT)

Carl W. Boothroyd, Director

308 The Parkway  
Ithica, New York 14850

Tel: (607) 272-8718

1965-1966

American Phyto-  
pathological  
Society

See ICH Report(s): none

Ages: \* 20,19,18

Lang: Eng

Subj: biol

Approach: discipline-centered

Ability: all

Eval Meth: none

Testing: none

Cont Resp: none

Envir: varies

Exper: C1 12+ 2-12 I

Lec.

Sem

Disc

Indep ✓

Lab

Fld

Dem

Sim

TV

A/V

The objective of this project was to take advantage of an offer by the editorial board of the National Association of Biology Teachers to devote a complete issue of their periodical, The American Biology Teacher, to the subject of Plant Pathology. A committee was appointed by the Teaching Committee of the American Phytopathological Society to prepare such an issue for publication. Much of the ground work was done by G.L. McNew of the Boyce Thompson Institute.

Financial support by the National Science Foundation supplemented that of the American Phytopathological Society and made possible a very readable, professional treatment of Plant Pathology to the many subscribers to The American Biology Teacher. Additional copies were supplied free of charge to anyone interested. The issue was completely distributed as of 1973 and there are no plans for reprinting.

It is believed that this special issue served its purpose and was well received. It introduced to new members of the Biology profession and re-emphasized for regular subscribers the importance of Plant Pathology as a Biological Science and the increasing need for a strong biological science orientation for work in Plant Pathology. It was used by teachers in the profession to acquaint their students with the general scope and potential in the science and by counselors to introduce their students to the subject.

The National Association of Biology Teachers is to be congratulated for making their periodical available to scientific disciplines, and therefore contributing to the improvement of undergraduate education.

Reason: publication

Adopt: -

Pers: FT PT NRT

Publ: 2,000

Initiator(s):

Tchr Ed: -

Adm 6

copies repro-

C.W. Boothroyd,

Wr 6

duced commer-

G.L. McNew, A. Kelman

VSch

cially by lino-

Res

type

TEd

Trial

No references given

STUDENT ASSISTED DEVELOPMENT  
OF MATERIALS FOR ENVIRONMENTAL  
& SOCIAL STUDIES (SADMESS)  
Irving Morrissett &  
Suzanne Wiggins Helburn, Dirs.  
See ICh Report(s): none

Social Studies Education  
Consortium, Inc.  
855 Broadway  
Boulder, Colorado 80302  
Tel: (303) 443-1370

1971-1972  
Gov: Fed (USOE)

Ages: 16-18	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	supplementary books,
Subj:* social sciences, environmental ed	Sem	field guides, tests,
Approach:* process, discovery	Disc ✓	overview, charts
Ability: all	Indep ✓	Non-Print Materials:
Eval Meth: student self-evaluation	Lab	slides
Testing: none	Fld ✓	
Cont Resp: student directed	Dem	
Envir: community	Sim	
	TV	
	A/V	

The SADMESS project was a one-year effort, funded by the U.S. Office of Education under the Environmental Education Act of 1970, to involve high school students in the development of curriculum materials focusing on the social aspects of environmental problems. Eight students from two high schools in the Boulder Valley (Colorado) Public Schools participated as full-fledged staff members, working afternoons at the Social Science Education Consortium, a non-profit educational corporation headquartered in Boulder. The students received social studies course credit and were also paid a salary. Four staff members of the Consortium worked with them, each devoting 20% to 50% time to the project during the year.

The students and staff worked together to develop overall objectives and concrete plans for the activities they undertook during the year. Half of the group focused on developing a book about religious and philosophical views toward man's relationship with the earth. The students involved in this project conceived, researched, wrote, edited, designed, and pasted-up a beautifully illustrated book entitled Sunshine Unfolding, which is available through the SSEC (Publication #151, \$4.95). The other half of the group decided to conduct a community-wide environmental fair. The core group of SADMESS students ultimately managed to involve over 100 community helpers as active participants in putting on the fair.

The SADMESS Final Report, which was submitted to the U.S. Office of Education and is also available through the SSEC, incorporates many useful guidelines on conducting student-generated projects.

Reason: develop new course	Adopt: -	Pers: FT PT NRT	Publ: 200-600
	Tchr Ed: no special preparation required	Adm 1	copies repro-
Initiator(s): I. Morrissett, S.W. Helburn		Wr 12	duced institu-
		VSch 8	tionally by
		Res	offset &
		TEd	linotype
		Trial 6	(\$50-80/10 stu-
			dents)

**Descriptive References:**

Sunshine Unfolding. SSEC Pub #151.

**Research:**

SADMESS Final Report. SSEC Pub. #153.

Boulder Experiments Scrapbook. SSEC Pub #152.

**STUDENT CENTERED SCIENCE PROGRAM (SCSP)**

Herb Strongin, Director  
See ICh Report(s): none

San Francisco Unified School District  
Student Centered Science Program  
350 Amber Drive, Room 2  
San Francisco, California 94131  
Tel: (415) 826-8715

1969 -  
Gov:Local,  
Participating  
Schools

Ages: 5-13, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang:* Eng, Sp	Lec ✓	activity sheets
Subj: biol, chem, phys, earth-space, math, social sciences	Sem	tchr manuals
Approach: integrated, conceptual, inquiry, discovery,	Disc ✓ 2 3	tests
Ability: average	Indep ✓	objectives
Eval Meth:* tchr jdgmts, lab & achievement tests	Lab ✓	overview
Testing: none	Fld ✓	newsletters
Cont Resp:* tchr directed & guided, material directed	Dem ✓	Non-Print Materials:
Envir:* classroom, community	Sim	lab equipment
	TV	
	A/V	

The Student Centered Science Program (SCSP) was developed in San Francisco for use by children in grades K - 6. Over 700 teachers and 17,500 youngsters are participating in the program.

SCSP consists of two components: a) the teachers' Guides - K, Primary, and Intermediate, and b) the student Kits - K, Primary, 4, 5, and 6.

The Guides provide the teacher with the directions for initiating each student investigation, and include related background information, evaluation techniques (for both student and teacher) and suggested concomitant learning.

The student investigations are grouped under four fundamental conceptual themes: 1) the Scientific Method; 2) The Molecular Nature of Matter, 3) Energy Conversion - Energy Flow, and 4) Change - Physical and Biological.

The kits contain all the material necessary for a class of 30 to carry out all investigations for one school year.

The use of low cost materials does not diminish the program's educational value. On the contrary, one reason the SCSP has been so successful is its use of low cost everyday materials; for, by providing youngsters with materials found in his environment, he is more apt to be comfortable with them, and freer to investigate outside of the classroom. The teacher too feels more comfortable about permitting the youngsters to carry on independent investigations, when the tools of investigation are familiar, inexpensive and easily replaceable.

Revised Teacher Guides, will be available soon from Addison Wesley Publishing Company under the title Teaching Science on a Shoestring.

Reason: develop new course	Adopt: 500 tchrs, 12,500 students, 600 schools	Pers: FT PT NRT	Publ:* 2,000
Initiator(s): B. Burnham, J. Coenen, D. Dietz, L. Lee (Pumpelly), H. Strongin	Tchr Ed: conducts workshops; provides manuals, guides & consultants	Adm 1 Wr 10 VSch 1 Res 2 TEd 12 Trial 30	copies reproduced institutionally & commercially by offset (\$10/10 students)

**Descriptive References:**

Teacher Magazine. Oct 1973. Cover Story.

**Research:**

Student Centered Science Program Evaluation by the Research Division S.F.U.S.D.

STUDENTS' INSTRUCTIONAL  
GAMING NETWORK (SIGN)  
Layman E. Allen, Director  
See ICh Report(s): 1

2040 Mental Health Research  
Institute  
University of Michigan  
Ann Arbor, Michigan 48104

1960 -  
Gov, Univ,  
Foundation,  
Publisher,  
Participating  
Sch

Ages: 10-17	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	programmed units,
Subj: math, social sciences, Eng	Sem	activity sheets,
Approach: discipline-centered, process,	Disc	tchr manuals, tests,
conceptual, discovery	Indep	newsletters
Ability: all	Lab	Non-Print Materials:
Eval Meth: achievement & standardized	Fld	games
tests, tchr jdgmts, student q're	Dem	
Testing: term, unit	Sim	
Cont Res: tchr guided, student &	TV	
material directed	A/V	
Envir: classroom, sch library	Games	

The Students' Instructional Gaming Network (SIGN) seeks to develop more positive attitudes among students toward, and to enhance their learning of, mathematics, set theory, mathematical logic, the strong inference approach to scientific method, rigorous inductive and deductive reasoning, and English spelling and grammar. To these ends, the instructional games EQUATIONS, ON-SETS, WFF 'N PROOF, QUERIES 'N THEORIES, and ON-WORDS have been developed (beginning at Yale University in 1960 and continuing at Mental Health Research Institute of The University of Michigan since 1966) and are being used to varying degrees in in-curriculum and extracurricular programs throughout the United States and abroad. All of the games except QUERIES 'N THEORIES are non-simulation, resource allocation games in which the resources to be allocated are the symbols which are ordinarily used in the subject matter of the game: thus, a student playing EQUATIONS is actually doing mathematics; a person playing WFF 'N PROOF is actually doing mathematical logic. All of the games are open-ended in the level of difficulty at which players may play: the players set the problems to be solved.

Ancillary materials have been developed to connect EQUATIONS more closely with some ideas in the curriculum (e.g., ratio and proportion, percentage), and pamphlet-form facsimiles of computer-assisted instruction which use EQUATIONS are now available for classroom use. The 105-pamphlet series, called Instructional Math Play (IMP) Kits, teaches 21 mathematical ideas -- 5 versions of each idea -- in the format of a solitaire game which the student may play against the computer program whose moves in response to any move the student chooses to make are found in tables in the pamphlet. The IMP Kits have been successfully piloted with a group of ten junior high school mathematics teachers and with a high-ability eighth-grade mathematics class.

Reason: change in philosophy, develop new source, publications	Adopt: extensive	Pers: FT PT NRT	Publ: repro-
	Tchr Ed: conducts workshops, provides manuals & consultants	Adm 2	duced institutionally & commercially
Initiator(s): L.E. Allen		Wr 4	by mimeograph
		VSch 3	(\$65/10 students)
		Res 3	
		TEd 2	
		Trial 10	

#### Descriptive References:

Allen, L.E. Dec 1972. RAG-PELT: Resource Allocation Games--Planned Environments for Learning and Thinking. Simulation & Games. 3(4): 407-438.  
Allen, L.E., R.W. Allen, and J. Ross. Sept 1970. The Virtues of Non-simulation Games. Simulation & Games. 1(3): 319-326.  
Allen, L.E. 1971. Some Examples of Programmed Non-Simulation Games: WFF'N PROOF, ON-SETS, and EQUATIONS. Educational Aspects of Simulations. Ed. P.J. Tansey, Chapter 4. London: McGraw-Hill. pp 63-90.

#### Research:

Edwards, K.J., D.L. Devries, and J.P. Snyder. May 1973. Learning Games and Student Teams: Four Research Reports on Effects in the Classroom. The Johns Hopkins University Center for Social Organization of Schools.  
Allen, L. and D. Main. 1973. The Effect of Instructional Gaming upon Absenteeism: The First Step. Communication #301, Mental Health Research Institute, The University of Michigan.

Frank Sganga, Director

See ICh Report(s): none

Ages: 10-13	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	lab books,
Subj: math	Sem	activity sheets,
Approach: process	Disc	tchr manuals, tests,
Ability: all	Indep	overview, charts,
Eval Meth: achievement, oral and	Lab	study sheets
standardized tests	Fld	Non-Print Materials:
Testing: unit and individual	Dem	audiotape
Cont Resp: tchr directed	Sim	
Envir: classroom	TV	
	A/V	

Each classroom is equipped with a tape player and a headset for each student. Prepared tapes are available for each student's use. The tapes guide the student through mathematical concepts and processes in small steps. As he listens to the tapes, he will be responding on specially-prepared worksheets.

At the start of the year, the level of each student's ability in math is determined, and he begins work in the appropriate booklet. Each booklet contains detailed explanations, practice exercises, review exercises, and self tests. Successful completion of a self test allows a student to take an achievement test which is administered by the teacher. Three achievement tests (A, B, and C) are available for each unit of work.

After completing the practice exercises in his booklet, the student can compare his results with answer sheets readily available to him. Incorrect responses will be checked and corrected. If the student has difficulty in locating his errors, he may replay the tape or consult the instructor. The importance of these two features cannot be overemphasized. The tireless tape can be immediately rewound and replayed as often as necessary.

What is even more important, however, is the fact that the student may go to the teacher's desk to get his questions answered WITHOUT FEAR OF EMBARRASSMENT. This personal aspect of the program is of prime importance in mathematics where to fall behind is tantamount to failure due to the highly-structured nature of the subject. With this approach, the teacher will also be free to circulate among students to help them as needed.

Care will be taken to ensure that activities are varied and reasonably short. While the primary emphasis will be on the individualization of instruction, there will also be regularly scheduled "WHOLE CLASS ACTIVITIES" to foster the interchange of ideas through group discussions. Such activities will involve areas of mathematics related to but not dependent upon what has already been learned.

Reason: update method	Adopt: 50 tchrs, 3,000	Pers: FT PT NRT	Publ: 20,000
	students, 25 schools	Adm 1	copies repro-
Initiator(s);		Wr 1	duced commer-
F. Sganga	Tchr Ed: conducts work-	VSch 1	cially by off-
	shops; provides manuals	Res	set (\$17/10
	& consultants	TEd	students)
		Trial	

No references given



**SURVEY OF RECENT EAST  
EUROPEAN LITERATURE IN SCHOOL  
& COLLEGE MATHEMATICS**

Izaak Wirszup, Director

Department of Mathematics  
The University of Chicago  
Chicago, Illinois 60637

Tel: (312) 753-2753, 753-2741

1956 -

Gov: (NSF)

See ICh Report(s): 7,5

Ages: all, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang:* Rus, East European languages, Eng, Fr	Lec	supplementary books
Subj:* math, phys, technology, psychology, education	Sem	tchr manuals
Approach: varies	Disc	
Ability: all	Indep	not answered
Eval Meth: -	Lab	
Testing: -	Fld	
Cont Resp: -	Dem	
Envir: -	Sim	
	TV	
	A/V	

The Survey was established to answer an urgent need for information in mathematics and mathematics education from East European sources. Its main objectives have been: 1) to study current developments in teaching mathematics and related subjects at all levels in the Soviet Union and other Communist countries, 2) to make accessible these studies and other relevant information to projects for improving mathematics education in the United States and to the mathematical community, and 3) to publish for U.S. teachers and students some of the best materials from these sources. The Survey has concentrated on (a) Soviet programs in extracurricular mathematical activities, (b) the literature prepared by outstanding mathematicians for mathematically talented students, (c) the training and improvement programs for mathematics teachers, and (d) the research conducted over the past 30 years by Soviet psychologists and mathematicians in the psychology and methods of learning and teaching mathematics. The first three Survey programs resulted in 33 books translated and adapted for American high school and college students and their teachers. These books have been widely incorporated in high school and college libraries throughout the country. Ten additional survey books are currently being prepared for publication by the University of Chicago Press, to appear in 1974-1975. Program (d) was conducted as a joint effort by the Survey and the School Mathematics Study Group (SMSG) of Stanford University and resulted in the preparation of a 15-volume series of Survey translations and adaptations entitled Soviet Studies in the Psychology of Learning and Teaching Mathematics. The six volumes already available in this series are being studied in seminars and courses at many colleges and universities across the United States. The Survey has been concerned for some time with the teaching of mathematics to mentally retarded and other handicapped children.

Reason: update content & method, develop new course, publication	Adopt:(partial)  Tchr Ed: provides manuals, guides & consultants	Pers: FT PT NRT Adm 1 2 Wr 3 VSch 7 Res TEd Trial	Publ: 15,000 copies/volume reproduced in- stitutionally- & commercially by mimeograph & offset
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**Research:**

Soviet Studies in the Psychology of Learning and Teaching Mathematics. (published jointly by the School Mathematics Study Group at Stanford University and the Survey), 15 volumes.



**SURVIVAL: AN EXPERIENCE WITH THE  
NEW HUMANITIES**

Richard Todd, Director

Locke Middle School  
Billerica, Massachusetts 01821

Tel: (617) 664-3366

1971-1975

Gov; Partici-  
pating Schools

See ICh Report(s): none

Ages: 12-13

Lang: Eng

Subj: social sciences, performing arts

Approach: discovery

Ability: all

Eval Meth: achievement & lab tests,  
student questionnaire

Testing: weekly, individual

Cont Resp: tchr guided, student directed

Envir: sch grounds & library, classroom

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Indep ✓

Lab ✓ ✓

Fld

Dem ✓

Sim

TV ✓

A/V ✓ ✓

Printed Materials:

activity sheets

tchr manuals

tests, objectives

overview

Non-Print Materials:

slides, films

overhead

transparencies

videotape

slide tape

audiotape

games, models

The overall aim is to engage the project as a necessary component with other departments in the Billerica School System by developing a course determined by expressed student interests concerning world conditions. Independent study and small work group options allow students to learn at maximum individual capacity. The course utilizes the basic skills of artistic expression (including music, art, literature, and multi-media forms) in a classroom situation with variable teacher-student ratios.

Reason: update content &  
methods, develop new  
course, change "geography"  
to environmental educa-  
tion program

Adopt: 14 tchr, 600  
students, 2 schools

Tchr Ed: conducts work-  
shops; provides  
manuals, films &  
consultants

Pers: FT PT NRT

Adm 1

Wr 1 2

VSch 5

Res 4

TEd 8

Trial 14

Publ: 100 copies

reproduced

institutionally

(\$2500/10

students)

Initiator(s): R. Todd,  
T. DiMare, L. Vania,  
D. Hovasse

No references given

TEACHERS' CENTER PROJECT  
Thomas C. O'Brien, Director

Southern Illinois University  
Edwardsville, Illinois 62025  
Tel: (618) 692-3082

1972 -  
NSF and  
Louis B. Beaumont

See ICh Report(s): none

Ages: adult, tchr ed  
Lang: Eng  
Subj: math  
Approach: -  
Ability: all  
Eval Meth: student writing  
Testing: -  
Cont Resp: tchr guided  
Envir: school library

Exper: Cl 12+ 2-12 I  
Lec ✓  
Sem ✓  
Disc ✓  
Indep ✓  
Lab ✓  
Fld  
Dem  
Sim  
TV  
A/V

Printed Materials:  
newsletters  
position papers  
articles  
informal researches  
transcripts of  
interviews

Mathematics education as it is widely practiced in elementary schools consists of the transmission by teachers to students of the facts, rules, procedures, nomenclature and notation of elementary school arithmetic with an almost exclusive attention to accuracy and speed in arithmetic computation. This, we think, is an inappropriate preparation for children who will be adults in the Twenty-first Century. Certainly computational proficiency is important to an educated citizen, but by no means should computational issues be exhaustive of the mathematical preparation of students when even now hand calculators can be had for as little as \$19.95. Rather, we have suggested that the mathematics education of a young child should be concerned with thinking (with computation as an aspect of this more important issue).

In addressing these questions, we very strongly believe, teachers should be agents rather than patients. That is, it has too often been the case in American education that teachers have to settle for pre-pre-packaged, instant-success, "teacher proof" programs, programs parachuted from on high by curriculum reform groups, universities, school administrators and publishers, and far too often mathematics education for them consists of isolated and disarticulated activities, games and gimmicks in mathematics education without any consideration of the purpose those activities purport to serve.

We think that the professional obligation of teachers is to develop their own point of view with respect to education, not to allow others to foist disarticulated tricks upon her. The Teachers' Center Project, then, consists of the Belleville (Illinois) Area Teachers' Center and the St. Louis Area Teachers' Center. Both Centers are grassroots operations which encourage continuing collaboration by teachers, largely under the "umbrella" of Piagetian research, through which teachers construct a point of view, construct and cull activities to encourage children's cognitive growth, and conduct informal research on children's cognitive and mathematical status and growth.

Reason: teachers' request	Adopt: -	Pers: FT PT NRT	Publ: 500 copies
	Tchr Ed: continuing	Adm 1	reproduced
Initiator(s): T.C. O'Brien	collaboration	Wr	institutionally
		VSch	by offset
		Res	
		TEd	
		Trial	

**Descriptive References:**

- O'Brien, T.C. Feb 1973. Why Teach Mathematics? Elementary School Journal.  
O'Brien, T.C. 1974. New Goals for Mathematics Education. Childhood Education.  
O'Brien, T.C. Oct 1974. Some Comments On British Education. Elementary School Journal.  
O'Brien, T.C. and P. Budde. (in press) Hypothesis Testing. Mathematics Teaching. (Great Britain)

## TEACHING ENVIRONMENTAL ISSUES

Calla Smorodin, Director

See ICh Report(s): none

Committee for Environmental

Information

438 N. Skinker Blvd.

St. Louis, Missouri 63130

Tel: (314) 863-6560

1972-1974

Gov:Fed

Ages: 15-17

Lang: Eng

Subj:\* social sciences, earth-space

Approach: interdisciplinary

Ability: average

Eval Meth: -

Testing: -

Cont Resp: -

Envir: classroom

Exper: Cl 12+ 2-12 I

Lec

Sem

Disc

Index

Lab

Fld

Dem

Sim

TV

A/V

not  
answered

Printed Materials:

texts

activity sheets

tchr manuals

The Committee for Environmental Information (CEI) believes that the resolution of today's environmental crises requires the informed political and social participation of all Americans. To better prepare students for this responsibility, CEI is developing a series of supplemental curriculum packages for use in the secondary social studies classroom. Each package deals with a specific crisis area and presents pertinent data that will enable students to compare and weigh economic and social benefits and costs inherent in resolving the crisis. Though each package deals with a different content area, the skill objectives are similar throughout. After presenting relevant background information, each package provides a forum in which students can identify and clarify their own personal values regarding societal goals.

Specifically, the overall purposes of these materials are: 1) to increase the students' awareness of the complicated nature of today's environmental problems; 2) to increase the students' understanding of the social, economic, and political factors that have contributed to the present environmental crisis; and 3) to introduce students to the public issues which must be debated and decided in order to work toward the resolution of the environmental crisis.

Students will learn to view technological developments within a cost/benefit framework in order to weigh the social and economic benefits of progress against possible deleterious effects on the individual and his total environment. Students will study the public issues to be resolved, take a position based on their analyses of cost/benefit factors, and support that view. In so doing, students will identify and clarify their own personal values as they relate to resolving environmental problems.

Reason: develop new  
course

Adopt: -

Pers: FT PT NRT

Publ: 200 copies

Adm 1

reproduced by

Initiator(s): P.H. Royse

Tchr Ed: no special  
preparation required

Wr 1 1

mimeograph

VSch

Res

1

TEd

Trial

Descriptive References:

Education - For External Use Only. April 1973. Environment. p. 5.

TECH PHYSICS PROJECT (PRODUCT:  
PHYSICS OF TECHNOLOGY MODULES)  
(Formerly National Tech Physics  
Project)

Indiana State University  
Terre Haute, Indiana 47809  
Tel: (812) 232-6311, ext 5355

-1974  
Gov: (NSF);  
McGraw-Hill

Philip DiLavore, Director

See ICh Report(s): 8

		Exper: C1	12+	2-12	I	Printed Materials:
Ages: 18-20		Lec	✓			tchr manuals
Lang: Eng		Sem				newsletters
Subj: phys		Disc	✓	✓	✓	lab modules
Approach: process		Indep	✓	✓	✓	
Ability: all		Lab	✓	✓	✓	
Eval Meth: achievement & lab tests,		Fld				
tchr jdgmts		Dcm	✓	✓	✓	
Testing: unit, individual		Sim				
Cont Resp: tchr & student directed		TV				
Envir: * lab, classroom		A/"				

The aim of the Tech Physics Project is to produce instructional materials for the teaching of introductory college physics in a "modular" form, and with a laboratory-oriented approach. Each module comprises a relatively independent unit of instruction, and each is based upon a technological device or system. (Thus they are called the "Physics of Technology" modules.) In each module, only those physics topics which flow naturally from the study of the device are discussed. Approximately ten to twelve modules will form a one-year course, but about thirty of them are being produced, so that the individual teachers will be able to assemble sets of modules which are most appropriate for their students. The Project encourages individualized study of modules.

The group of students at which the Physics of Technology modules are aimed comprises those students who are in technician training or technology programs and who are taking a "technical physics" course. The modules have had considerable use in other kinds of courses as well. Even though the modules are based on technological devices, the aim is to teach basic physics concepts; the technology involved is used only as a motivating device. Unusual aspects of the modules are that: (1) physics is taught by means of "real-world" devices. Generalizations into broad, physical principals follow from observations by the student of the principle in action in the device being studied; (2) the instructional units are three-week modules, which may be assembled as the instructor chooses; and (3) "coverage" of topics in a traditional sense is not aimed for. Rather, it is intended that the students should get into the topics in more depth and that this treatment shall give them a feel for the methods and topics of physics. However, most of the traditional topics are covered in various modules.

Reason: -	Adopt: 18 tchrs, 400 students, 14 schools	Pers: FT	PT	NRT	Publ: reproduced
Initiator(s): National Tech Physics Steering Committee	Tchr Ed: conducts workshops; provides manuals and consultants, little special preparation required	Adm	5		commercially by offset (\$2,500/10 students)
		Wr	35		
		VSch	10		
		Res			
		TEd	2		
		Trial	60		

#### Descriptive References:

DiLavore, P. 1973. Physics of Technology - A Report of the Tech Physics Project. The Physics Teacher. 11: 473.

**TECHNOLOGY FOR CHILDREN (T4C)**

Fred Dreves, Director

See ICh Report(s): 8,7

New Jersey State Dept of Education 1968 -

Vocational Division

225 West State Street

Trenton, New Jersey 08625

Gov

Tel: (609) 292-5653

Ages: 4-11	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	lab books, supplementary books,
Subj: earth-space, math, tech, social sciences, language arts	Sem	programmed units,
Approach: interdisciplinary, conceptual, inquiry, discovery	Disc ✓ ✓ ✓ ✓	activity sheets &
Ability: all	Indep ✓ ✓ ✓ ✓	cards, tchr manuals,
Eval Meth: achievement, lab, oral & standardized tests, tchr jdgmt, student questionnaire	Lab / ✓ ✓ ✓	tests, newsletters, charts
Testing: -	Fld ✓ ✓ ✓ ✓	
Cont Resp: tchr, student & material directed, tchr guided	Dem ✓ ✓ ✓ ✓	Non-Print Materials:
Envir: community, sch grounds & library, classroom, lab	Sim ✓ ✓ ✓ ✓	slides, filmstrips,
	TV	films, overhead transparencies,
	A/V	videotape, audiotape, games, models, lab equipment

Technology for Children (T4C) helps elementary school personnel develop an organized, cooperative approach to provide children with individualized and experiential or hands-on learning.

Individual local school groups are assisted to become self-sufficient implementers of T4C in order that individual children may: 1) achieve a better self-awareness and thereby become more responsible for their own learning; 2) develop a better understanding of technology and the world of work; 3) achieve a more meaningful level in the traditional basic educational skills.

The program is unique in at least these four ways: 1) The child, the whole child -- not the curriculum -- is T4C's focus. It is not enough to introduce interesting activities or to add technology-related units of learning for all students. Children must be encouraged to interact with the world-of-work environment in a self-directing manner; 2) The world -- outside the classroom as well as inside -- is the reality with which the children will react. This T4C process of interaction highly values the child learning how to learn and not just little bits of information; 3) The world of technology is opened to the children, not to provide them with job skills, but that they may see how people relate to people via technology in everyday living and how they personally relate to this social scene. They come to understand that they are free to accept, reject and/or modify their surroundings; 4) Teachers, who themselves might not have had a first-hand chance to understand the world of work, actually start to discover, to experiment, and to manipulate current technology with their pupils. These new experiences of the teacher result in renewed enthusiasm for learning for teachers as well as for the children.

Reason: up-to-date content & methods, change in philosophy, develop new course	Adopt: several thousand	Pers: FT PT NRT	Publ: 40,000
	Tchr Ed: conducts workshops, provides manuals, guides, films & consultants	Adm 3	copies reproduced institutionally & commercially by mimeograph, offset & linotype (\$200/10 students)
Initiator(s): F. Dreves, K. Charlesworth, R. Harnack, L. Griblick, M. Jantos		Wr 2	
		VSch 5	
		Res 2	
		TEd 1	
		Trial	

No references given

TIME, SPACE, AND MATTER:  
INVESTIGATING THE PHYSICAL  
WORLD (TSM) (Formerly Secondary  
School Science Project)

10 Seminary Place  
Rutgers University  
New Brunswick, New Jersey 08903  
Tel: (201) 932-7614

1963-1968

Gov

George J. Pallrand, Director  
See ICh Report(s): 8,7,6,5,4,3

Ages: 12-15	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: earth-space	Sem	lab books
Approach: interdisciplinary, integrated,	Disc ✓ ✓ ✓	supplementary books
conceptual, inquiry, discovery	Indep ✓ ✓ ✓ ✓	tchr manuals
Ability: all	Lab ✓ ✓ ✓ ✓	overview
Eval Meth: lab tests, tchr jdgmts	Fld ✓ ✓ ✓ ✓	newsletters
Testing: individual	Dem	charts
Cont Resp: tchr directed & guided	Sim ✓ ✓ ✓	
Envir: community, school grounds,	TV	
classroom	A/V	

This project is a science course which emphasizes doing science rather than recounting its achievements. The course consists of nine interrelated Investigations which enable the student to learn something about the nature and history of the physical world through direct observation and inference. In the course several themes are integrated into a sequential format, providing continuity from one investigation to the next. The student plays an active role in Time, Space, and Matter: He is engaged in doing—in manipulating materials, in making observations, in carrying out investigations, and in interpreting the results. He then extends these findings to the world at large. Everything he does in the laboratory, at home, or in the field leads to new investigations and interpretations.

From the beginning the project was directed at the large bulk of general students in the major urban centers who have not been strongly attracted to the sciences. The flexibility of the materials make the program suitable for use for a wide variety of students who are below grade level in both reading and math ability. These skills are developed in the program but do not limit what the student is able to accomplish.

Reason: update methods, change in philosophy, develop new course	Adopt: unknown	Pers: FT PT NRT	Publ: -
	Tchr Ed: conducts work- shops, provides manuals	Adm 1	
		Wr 5	
		VSch 2	
		Res 2	
		TEd	
		Trial 50	

Descriptive References:

- Ferris, F.L. 1963. The Princeton Junior High School Science Project. Journal of Research in Science Teaching. 1: 281-284.
- Pallrand, G.J. March 1970. Time, Space and Matter. The Physics Teacher. pp 124-129.
- Piburn, M.D. Jan 1974. The Content and Structure of Time, Space and Matter. School Science and Mathematics. pp 69-74.
- Research:
- MacMahan, H., Jr. Jan 1966. Princeton Project or ESCP: A Difficult Choice. School Science and Mathematics. pp 86-91.
- Piburn, M.D. April-June 1972. Teacher Training and the Implementation of Time, Space and Matter. Science Education. pp 197-205.
- Roth, R.A. Jan 1971. Princeton Project and the Process Approach: A Critique. School Science and Mathematics. pp 44-48.



TOTAL EDUCATION IN THE  
TOTAL ENVIRONMENT (T.E.T.E.)

William R. Eblen, Director

See ICh Report(s): 8,7

P.O. Box 242  
Dobbs Ferry, New York 10522

Tel: (914) 693-3350

1964 -  
Gov:Fed(USOEE),  
State; Exxon  
Corp, Kazanjian  
Economics & Gen-  
eral Service  
Foundations,  
UNEP

Ages: 3-20, adult, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	supplementary books
Subj: human ecology	Sem ✓	activity sheets
Approach:* interdisciplinary, process, conceptual	Disc ✓	tchr manuals, tests
Ability: all	Indep ✓	overview, news-letters
Eval Meth:* oral, achievement & standardized tests, student q're, tchr jdgmts	Lab ✓	Non-Print Materials:
Testing: tchr determined	Fld ✓	slides, filmstrips
Cont Resp:* tchr & material directed	Dem ✓	overhead transpar- encies, videotape
Envir:* community, sch grounds, classroom, sch library	Sim ✓	slide tape, games
	TV ✓	audiotape
	A/V	

T.E.T.E. has one basic goal: to simplify and synthesize the complex, basic inter- actions that must be understood by all individuals so that, in keeping with their own culture and values, they will be able to appreciate the relationship between the envi- ronmental impact of their individual actions and their future well-being.

T.E.T.E. is not crisis-oriented because learners become sensitized to the under- lying causes and fundamental issues - past, present and future - based on cultural values. Established at the grass-roots level in 1964, T.E.T.E. does not attempt to replace or pre-empt existing curricula or methodology but to add a new dimension based on common goals and common values. In order to do this, T.E.T.E. begins with individ- ual teachers and reflects the cultural differences and pace of local adaptation. By adapting to local, personal environments, the Total Environment Approach becomes appli- cable in any country and culture.

Education has been defined as "a long-enduring process of cultural self-evolution" which means "learning is living". Unless teaching strategies set the stage for making enlightened choices in response to basic problems, there is teaching 'irrelevance.' The 'learner' will be schooled but not educated. The Total Environment Approach assumes that if certain basic ideas are understood, both 'environment' and 'ecology' will be defined in the broadest sense as an integral part of all of education.

A wide variety of evaluation techniques, including the types of instruments availa- ble, baseline data employed, and ways of improving their usefulness, are available up- on request.

The U.S. Office of Environmental Education provided funds for T.E.T.E. to conduct national regional workshops for all fifty states in 1972-73.

The first of a planned series of international meetings will be a Pilot Seminar financed by UNEP on Environmental Education Methodology in East Africa in 1974 co- sponsored by IUCN and WCOTP.

Reason:* update method & content, change in philosophy	Adopt:(partial) 4,500 tchrs, 450,000 students, 300 schools	Pers: FT PT NRT	Publ: reproduced
Initiator(s): W.R. Eblen, R.A. Casey	Tchr Ed: conducts work- shops; provides manuals & consultants	Adm 2 1 Wr 2 3 VSch 2 Res 2 TEd 2 5 Trial 155	institutionally & commercially by offset & linotype

#### Descriptive References:

Total Education in the Total Environment. Nov 1971. Official Library Case Study  
United Nations Conference on the Human Environment. Ref. No.: GI 42/9/1.  
T.E.T.E.: Total Education in the Total Environment. 1971. Focus on Environmental  
Education in New England, NESDEC, Newton, Massachusetts.  
Using the Total Urban Environment. Dec 1969. The Science Teacher. 36(9).

#### Research:

Summated Rating Scale Results Indicating Attitudinal Changes in Teachers Exposed to the  
Total Environment Approach During an In-Service Workshop (August 1969) in New Hamp-  
shire. 1971. Total Education in the Total Environment. Norwalk, Connecticut:SPRED.



UNDER ROOF, DOME AND SKY  
John Richardson, Director  
See ICh Report(s): none

Middle Atlantic Planetarium Society 1970-1973  
c/o Lower Moreland School District  
555 Red Lion Road  
Huntingdon Valley, Pennsylvania 19006  
Gov: Fed (NSF), participating sch  
Tel: (215) 947-2200, Ext 36

Ages: 6-17, tchr ed	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	activity sheets,
Subj: astronomy	Sem	tchr manuals, tests,
Approach: discipline-centered, inquiry, discovery	Disc ✓	objectives, overview, charts
Ability: all	Indep	
Eval Meth: achievement & lab tests	Lab ✓	
Testing: unit	Fld	
Cont Resp: tchr guided	Dem ✓	
Envir: classroom, planetarium	Sim	
	TV	
	A/V	

This program was designed by the Middle Atlantic Planetarium Society to improve the quality of planetarium education. Recognizing the lack of trained personnel and the dearth of established lesson plans, the society wrote and tested forty-five (45) student-centered activities for the planetarium. These learning activities have been designed to help planetarium directors and classroom teachers work together in integrating classroom and planetarium experiences, and to involve students in active inquiry in the planetarium.

Each lesson includes: 1. an Introduction; 2. Student Preparation (including suggested grade level and science knowledge needed by the student prior to planetarium experience); 3. Facts and Concepts (statement of the major ideas that are developed); 4. Objectives (terminal behavioral-change the student should be able to demonstrate as a result of the activity and supportive objectives); 5. Materials; 6. Procedure (a. in the classroom, b. in the planetarium and c. follow-up activities); 7. Evaluation Suggestions; 8. Vocabulary; 9. Suggested Resources; 10. Data Sheets (designed for student use) and 11. Appendices.

The activities offered are divided by content into seven categories: Stars and Constellations, Changing Time and Seasons, Earth and Its Motions, Celestial Coordinate Systems, The Moon, Mathematics and Measurements and Motions of the Planets.

The project was funded by the National Science Foundation's Cooperative College-School Science Program with the University of Maryland. The project involves input from classroom teachers and planetarium directors from some twenty-three school districts as well as the staff at the University of Maryland.

Reason: update methods, change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: 1,000
	Tchr Ed: provides manuals & guides	Adm 2	copies reproduced commercially by
		Wr 50	offset
Initiator(s): R. Blake, B. Chronister, J. Richardson		VSch	(\$50/10 students)
		Res 50	
		TEd	
		Trial 50	

**Descriptive References:**

Under Roof, Dome and Sky, The Planetarium. June 1973. 2(2).

**UNIFIED SCIENCE & MATHEMATICS  
FOR ELEMENTARY SCHOOLS (USMES)**

Earle L. Lomon, Director

Education Development Center  
55 Chapel Street  
Newton, Massachusetts 02160  
Tel: (617) 969-7100

1970-1978  
Gov: Fed(NSF)

See ICh Report(s): 8

Ages: 6-14, tchr ed

Lang: Eng

Subj: biol, chem, phys, math, tech,  
social sciences, language arts

Approach: interdisciplinary, integrated,  
process, inquiry, discovery

Ability: all, special

Eval Meth: tchr jdgmts, student reports

Testing: -

Cont Resp: tchr guided, student directed

Envir: community, sch grounds & library,  
classroom, lab

Exper: C1 12+ 2-12 I

Lec

Sem

Disc

Indep

Lab

Fld

Dem

Sim

TV

A/V

Printed Materials:

tchr manuals

overview

newsletters

charts

lab books

supplementary books

activity cards

Since its inception in 1970, USMES has been developing and carrying out trial implementations of interdisciplinary units which are based on long-range investigations of real and practical problems taken from the local school/community environment. The development work is carried on primarily by classroom teachers, assisted by university specialists at workshops and occasionally during the year. In responding to these real problems, called challenges, students themselves decide on the course of action and are involved in all aspects of problem solving: observation, collection of data, representation and analysis of data, formulation and trial of successive hypotheses, and decision on a final action to be taken.

One unique aspect of USMES is the degree to which it provides experience in the real problem-solving process. Evidence to date indicates that substantial time can be spent on USMES with no loss in the rate of learning the standard school subjects. Another unique aspect of the USMES program is that from the beginning, units are developed by teachers and students. By the time USMES units are ready for implementation, documentation has shown that the challenges motivate students and elicit good learning experiences.

By 1978, 32 units will have been developed and trial implemented as examples of the real problem-solving style of learning. In addition, models of district-wide implementation will have been developed and a support mechanism organized to ensure future wide-spread implementation.

Reason:	* change in philosophy, develop new course	Adopt:(partial)	400 tchrs, 12,000 students, 100 schools	Pers: FT PT NRT	Adm 7 2	Wr 9	VSch 25	Res 2	TEd 2	Trial 150	Consultants 20	Publ: 50-2,500 copies reproduced
Initiator(s):	E.R. Lomon	Tchr Ed: conducts workshops; provides manuals, guides, films & consultants										

**Descriptive References:**

How do you move a lunch line faster? Winter 1974. Mosaic. 15(1). National Science Foundation, Washington, D.C.

Real Problem-Solving. Spring 1974. EDC News, No. 4. Educational Development Center, Newton, Massachusetts.

Real Problem Solving in USMES: Interdisciplinary Education and Much More. Oct 1974. School Science and Mathematics.

**Research:**

Shapiro, B. May 1973. The Notebook Problem. Education Development Center, Newton, Massachusetts.

Krairojananan, S. 1973. The Mathematical Behaviors Derivable From the Program of Unified Science and Mathematics for Elementary Schools. Doctoral Dissertation, Michigan State University.

UNIVERSITY OF ILLINOIS ASTRONOMY  
PROGRAM (UIAP) (Formerly  
Elementary School Science Project -  
ESSP)

Department of Astronomy  
University of Illinois at  
Urbana - Champaign  
Urbana, Illinois 61801

1961-1966

Gov: NSF

Stanley P. Wyatt &  
J. Myron Atkin, Directors

Tel: (217) 333-3090

See ICh Report(s): 8,4,3,2,1

Ages: 11-14	Exper: Cl 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec	texts
Subj: phys, earth-space, math, astronomy	Sem	activity sheets
Approach: discipline-centered, interdisci-	Disc	tchr manuals
plinary, integrated, conceptual, inquiry,	Indep	tests
discovery	Lab	
Ability: avg, avg+	Fld	
Eval Meth: achievement & standardized tests,	Dem	
tchr jdgmts, student q're	Sim	
Testing: unit	TV	
Cont Resp: administratively & tchr directed	A/V	
Envir: classroom		

The Elementary-School Science Project of the University of Illinois was supported by the National Science Foundation beginning in 1961 and terminating in 1966 when the Project goals were completed. During that interval a small group of astronomers, other physical scientists, and public school teachers specializing in science education convened during the summers to write and rewrite experimental materials on astronomy for children. The resultant books were tried out in a good sample of classrooms across the United States.

The spirit of the Project derived in part from the finding that many of the already-existing school materials on planets, stars, and galaxies addressed largely trivial topics, abounded with conceptual and factual errors, and failed to stress how the astronomer goes about learning what he thinks he knows. ESSP attempted to identify the fundamental concepts of the subject and composed a series of books based on those findings. The materials are an interdisciplinary blend of basic applied mathematics; rudimentary physical ideas such as gravitation, atomic structure, and the quantum picture; along with an astronomical story-line from earth to galaxies. Interspersed with the expository material are a large variety of activities for the classroom, corridor, and schoolyard.

The final series consists of six books, each one with its own Teacher's Guide. They are to some extent sequential, although a proper understanding of any one book does not require exposure to all previous books. Book 1 seems to be most suitable at about grade 6 and Book 6 perhaps at grade 9. The titles are: 1, Charting the Universe; 2, The Universe in Motion; 3, Gravitation; 4, The Message of Starlight; 5, The Life Story of a Star; 6, Galaxies and the Universe.

After several years of trial it became apparent that the level of at least the later books is somewhat higher than ought to be characterized by the word "elementary."

Therefore the project name was changed to the University of Illinois Astronomy Program.

Reason: change in philosophy, develop new course	Adopt: -	Pers: FT PT NRT	Publ: reproduced institutionally
	Tchr Ed: provides manuals & guides	Adm 2	
		Wr 10	
		VSch 3	
		Res 2	
		TEd	
		Trial 50	

**Descriptive References:**

- Atkin, J.M. 1961 "Teaching Concepts of Modern Astronomy to Elementary-School Children," Science Education 45:54.
- Wyatt, S.P. 1962. "University of Illinois Elementary Science Project," Science Education News. AAAS Misc. Pub. 62-14:9.
- Wyatt, S.P. 1972. "Astronomy at the Lower School Levels, International Conference on Education in and History of Modern Astronomy, Annals N.Y. Acad. Science. 198: 158.

UNIVERSITY OF MARYLAND MATHEMATICS  
PROJECT (UMMaP)  
John Mayor, Henry Walbesser, Directors  
James Henkelman, Present Director

College of Education  
University of Maryland  
College Park, Maryland 20742  
Tel: (301) 454-2031

1957-Present  
Gov: Fed(NSF,USOE)  
Carnegie Founda-  
tion

See ICh Report(s): 8,7,6,5,4,3,2,1

Ages: 12-15, tchr ed	Exper: C1 12+ 2-12 I	Printed Materials:
Lang: Eng	Lec ✓	texts
Subj: math	Sem	supplementary books
Approach: conceptual, discipline-centered,	Disc ✓ ✓	activity sheets
inquiry, process	Indep ✓ ✓ ✓ ✓	tchr manuals
Ability: all	Lab ✓ ✓ ✓ ✓	tests
Eval Meth: achievement & standardized tests,	Fld	objectives
tchr jdgmts, student questionnaire	Dem	overview
Testing: individual	Sim	Non-Print Materials:
Cont Resp: tchr guided, student directed	TV	games
Envir: classroom, lab	A/V	manipulative materials

The University of Maryland Mathematics Project (UMMaP) was started in 1957 with the support of the Carnegie Corporation of New York.

In the three year period 1957-60 the staff of UMMaP prepared experimental courses in mathematics for grades seven and eight, with assistance of teachers in the public schools of Montgomery County, Maryland and Arlington County, Virginia. The courses were taught in experimental form in these counties and in quite a number of other public and private school systems. NSF Summer Institutes and inservice courses provided teacher education. The UMMaP experimental seventh and eighth grade courses have been influential in the development of junior high mathematics in this country.

In February of 1962, the National Science Foundation made a grant to the University of Maryland for the preparation of experimental courses in mathematics for elementary teachers. A procedure similar to that used in preparation of the junior high school course was followed. Members of the staff with the assistance of graduate students teaching these courses at the University of Maryland prepared early drafts and revisions after the teaching experience. Copies of the experimental textbooks are still available. The experimental texts were used in the courses in mathematics for elementary school teachers offered at the University of Maryland in the period 1962-67 and in a number of other colleges and universities.

U.S. Office of Education grants in 1966 and 1968 funded the preparation of an inservice course for elementary school teachers in mathematics. Games and Algorithms and its accompanying manipulative materials were the basis for NSF sponsored Summer Institutes at the University of Maryland in 1968 and 1969 and are currently being used in inservice programs in Maryland and other states.

At the present time UMMaP is preparing a new course, for preservice elementary school teachers. This course involves new content topics built around unifying concepts. The emphasis is on mathematical processes and small group discovery learning.

Reason: update content & method, publication	Adopt: unknown	Pers: FT PT NRT	Publ: repro-
	Tchr Ed: conducts work-	Adm 2	duced institu-
Initiator(s): J. Mayor	shops, provides manuals	Wr 6	tionally &
		Vsch 2	commercially
		Res 2	by mimeograph,
		TEd 4	offset and
		Trial 20	linotype

#### Descriptive References:

Garstens, H.L. 1964. Mathematics for the Elementary Education Major at the University of Maryland. American Mathematical Monthly. 71(547-550).  
University of Maryland Mathematics Project, Games and Algorithms - A New View in Elementary School Mathematics for Teachers. April 1970. The Arithmetic Teacher. (342-346).

## UPPER MISSISSIPPI RIVER ECO-CENTER R.R.

Dennis Etnyre, Director

Thomson, Illinois 61285

1972-1975

Gov: (Title III  
ESEA)

See ICh Report(s): none

<b>Ages:</b> 10-12, tchr ed	<b>Exper:</b> Cl 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang:</b> Eng	Lec	activity sheets
<b>Subj:</b> biol, earth-space, math, social sciences, environmental ed	Sem	tchr manuals
<b>Approach:</b> interdisciplinary, discovery	Disc	field guides
<b>Ability:</b> -	Indep	tests, objectives
<b>Eval Meth:</b> pre & post-achievement tests, student questionnaire	Lab	overview
<b>Testing:</b> bi-yearly pre & post test	Fld ✓	newsletters
<b>Cont Resp:</b> tchr, administratively & student directed	Dem	<b>Non-Print Materials:</b>
<b>Envir:</b> * outdoors, school grounds & library, classroom, community	Sim	slides
	TV	slide tape
	A/V	

The Upper Mississippi River ECO-Center project funded in the Thomson Unit District #301 under Title III, ESEA is an exemplary environmental education project serving the seven school districts in Carroll County, Illinois. The major objective is the development of a comprehensive environmental education program for students and citizens of Carroll County.

The Center's staff of three is involved in the following curriculum reform activities:

**Field Experiences** - Day field programs are provided for 5th and 6th grades during the school year. The staff also leads experiences for other grades, and conducts overnight camping sessions. In two years there have been over 5000 student field exposures.

**In-Service Training** - Sessions have been provided for all 4th, 5th, and 6th grade teachers and from districts K-12. Over 330 teachers have received training.

**Resource Development** - Several outdoor areas in the county have been utilized for field trips including the 80-acre Bluffville Outdoor Education Site owned by the Thomson District.

**Reference Center** - For teacher and student use has been developed including books, pamphlets, and A-V and field equipment. **Curriculum materials produced** - include Bibliography and Environmental Educational Materials, Curriculum Guide K-8, Teachers Guide to Fifth Grade Environmental Education, and Educational Resource Directory.

**Dissemination** - newsletters are sent to area teachers. Other efforts include speaking engagements, educational conferences, news articles, and radio programs.

**High School Operation Awareness Course** - Academic credit canoe-camping, backpacking courses are held locally.

**Objectives include:** recreation skills, biological studies, environmental impact studies, decision making, safety and first aid, and a conservation work project.

**Evaluation** - Objectives are continuously evaluated. Knowledge and attitude tests have been developed with evaluation showing statistically significant gains. The project has received the National Pacesetter Award for being nationally validated as an outstanding innovative project worthy of adoption/adaption.

<b>Reason:</b> develop environmental education project	<b>Adopt:</b> 30 tchrs, 750 students, 7 schools	<b>Pers:</b> FT PT NRT	<b>Publ:</b> -
<b>Initiator(s):</b> H. Kennedy, D. Etnyre	<b>Tchr Ed:</b> conducts workshops; provides guides, consultants & reference material	Adm 1	
		Wr 1	
		VSch 1	
		Res 2	
		TEd 15	
		Trial	

**Descriptive References:**

Teacher Outdoors - UMECO Arrives. Spring 1973.

**VALUING THE ENVIRONMENT**  
**Charles T. Vizzini, Director**  
 See ICh Report(s): none

**Environmental Education Center**  
 1658 Sterling Road  
 Charlotte, North Carolina 28209  
 Tel: (704) 333-0506

**1973-1975**  
 Gov: State (Dept  
 of Development  
 Project SEED)

<b>Ages:</b> 6-11	<b>Exper:</b> Cl 12+ 2-12 I	<b>Printed Materials:</b>
<b>Lang:</b> Eng	Lec	tests, objectives,
<b>Subj:</b> environmental ed	Sem	lists of resources,
<b>Approach:</b> interdisciplinary	Disc ✓	values strategies
<b>Ability:</b> all	Indep ✓ ✓ ✓	<b>Non-Print Materials:</b>
<b>Eval Meth:</b> pre-post tests	Lab	slide tape,
<b>Testing:</b> beginning & end of year	Fld ✓ ✓	planetarium program
<b>Cont Resp:</b> tchr directed	Dem ✓	
<b>Envir:</b> * classroom, sch grounds	Sim ✓ ✓	
community	TV ✓	
	A/V ✓	

Valuing the Environment is an elementary program for grades one to six utilizing the interdisciplinary environmental packets that are based on clarifying values. The program strives to develop an awareness and a better understanding of the community and of this "space-ship" earth.

The objectives of the project have been: 1. To promote in children those sensitivities, concepts, and attitudes which will help them become better aware of environmental problems and to encourage development of the competencies necessary to seek adequate solutions, 2. To establish the valuing process as the means to accomplish these sensitivities, concepts, attitudes and skills, 3. To encourage an increased awareness by the community of environmental needs.

Teachers use encounters (field and hands-on experiences) from a number of themes (plants and animals, air, land use, etc.) to complement the existing material being taught at their grade level. Each encounter includes: a basic introduction as background for the teacher; behavioral objectives that are to be met by the students; a field type activity on the school grounds or in the community; several values clarification strategies that can be interwoven into the discussion and/or activity. Some encounters may have more than one activity with hand-on experiences. Pre and post testing are accomplished by teacher developed tests.

Valuing the environment is a pilot study at Cotswold Elementary School, but will be available to other elementary teachers in the East Mecklenburg feeder area during 1974-75, and other feeder areas, 1975-76.

<b>Reason:</b> * change in philosophy, develop new unit	<b>Adopt:</b> (partial) 12 tchrs, 360 students, 1 school	<b>Pers:</b> FT PT NRT Adm 2 Wr 12 VSch Res 12 TEd 12 Trial Consult. 1	<b>Publ:</b> 500 copies reproduced institutionally by offset (\$120/10 students)
<b>Initiator(s):</b> C.T. Vizzini	<b>Tchr Ed:</b> conducts workshops, provides guides & consultants		

No references given



**WHAT PEOPLE EAT**

Isaias Raw, Director

See ICh Report(s): none

Harvard School of Public Health

Dept. of Nutrition

665 Huntington Avenue

Boston, Massachusetts 02115

Tel: (617) 734-3300, Ext 558

1971 -

Howard Univ,  
Carnegie Corp

Ages: 17-19

Lang:\* Eng, Sp, Portuguese

Subj:\* nutrition, chem, biol

Approach:\* discovery, integrated

Ability: all

Eval Meth: tchr jdgmt, Student q're

Testing: unit

Cont Resp:\* material directed, tchr  
guided

Envir:\* lab, classroom, community

Exper: Cl 12+ 2-12 I

Lec

Sem 3

Disc

Indep

Lab

Fld

Dem 5

Sim

TV

A/V

Printed Materials:\*

texts, lab books,

tchr manuals

What People Eat is a one-year program designed for students who have had no previous interest or background in the sciences or mathematics, but who have potential for work in the area of the health sciences. The motivational focus, learning about one's own food, has been shown in trials to be an inducement for students to study sectors of science that previously represented impossibilities to them.

The curriculum is designed to be supervised self-instructional, requiring a minimum of faculty time. It includes many classroom experiments. Approximately twenty questions per chapter are incorporated into the main flow of textual material. They are designed to help the student learn principles from the experiments he performs or to impress fundamental theory. These questions require short answers in a separate notebook. This provides the instructor with a quick evaluation of the student's reasoning and progress; it also provides a way of choosing topics for clarification in lecture or seminar.

The first half of the text covers all basic topics presented in elementary chemistry texts, but employs nutritional and biological motivation. The second half of the text explores nutrition as it relates to the individual, his food, and the world. The first half of the laboratory portion of the course requires each student to analyze a one-day duplicate sample of his food for ash, protein, nitrogen, carbohydrates, lipids, unsaturated fatty acids, cholesterol, carbon, hydrogen, and calories. In the process he learns chemical technique and explores nutritional requirements and the nutritional value of his food. The second half of the laboratory will include laboratory and field projects dealing with nutritional problems and their scientific and social implications.

Blood and Microbes will constitute another one-year course, designed to develop medical technician skills. Together with What People Eat it will complete preparation for health careers.

Reason: change in philosophy, develop new course

Adopt: 6 tchrs,  
250 students,  
5 schools

Pers: FT PT NRT

Adm 3

Wr 1 4

VSch 3

Res 3

TEd

Trial 7

Publ: 600 copies reproduced commercially by offset (\$200/10 students)

Initiator(s): E.R. Pariser, I. Raw, A. Bromley

Tchr Ed:\* conducts workshops, provides consultants &amp; guides

**Descriptive References:**

Barron, Bromley, Pariser, Raw, and Vournakis. A New Integrated Science Program Based on Nutrition. AIBS Education Review.

Raw, Bromley, Pariser, Vournakis. What People Eat--a Chemistry Program Based on Nutrition. Journal of College Science Teaching (submitted).

**Research:**

Raw, and Holleman. Water--Energy for Life. Chemistry. 46: 6-11.

Raw, Bromley, Holleman, Pariser, and Vournakis. A Simple, Low Cost Calorimeter for Measuring Heat of Combustion and Carbon and Hydrogen. Journal of Chemical Education. (submitted)



**VII. UNESCO SCIENCE AND MATHEMATICS EDUCATIONAL ACTIVITIES**

## VII. UNESCO SCIENCE AND MATHEMATICS EDUCATIONAL ACTIVITIES

An international organization that has brought leadership to science and mathematics curriculum development work to various parts of the world is UNESCO, with its headquarters in Paris. It has a specific charge to aid developing countries and establishes valuable links with all countries to help in this endeavor. Under a recent reorganizational plan the former Division of Science Teaching is now known as the Division of Pre-University Science and Technology Education. During the past few years they have undertaken major science and mathematics curriculum improvement projects including the following: Teaching of Physics in Latin America; New Approaches and Techniques of Biology Teaching in Africa; Mathematics Project for the Arab States, the Pilot Project for Chemistry Teaching in Asia and the UNESCO Program in Integrated Science Teaching. Each of these projects has been detailed in previous editions of The International Clearinghouse Report and readers are referred to the Seventh and Eighth Reports, particularly other of their present projects are detailed elsewhere in this volume.

Besides their curriculum work the Division staff maintains a briefing room at UNESCO House in Paris on science and mathematics educational developments. They have a strong interest in establishing and cooperating with regional Science Teaching Centers and were instrumental in helping the American Association for the Advancement of Science's Information Clearinghouse at the University of Maryland's Science Teaching Center become the International Clearinghouse on Science and Mathematics Curricular Development in 1965. During the Fall of 1973 the Division sponsored a conference on ways to establish and strengthen additional Science Teaching Centers around the world.

A major function of this UNESCO Division has been to provide interaction between science educators in all parts of the globe. This is carried out through major conferences and numerous publications. One of the most successful undertakings was the UNESCO Sourcebook on Science Teaching. It has been translated into some 25 languages and almost a million copies have been printed. A major revision of this important book has been released as the New UNESCO Sourcebook on Science Teaching and is available from any UNESCO publications center. Presently the International Council of Associations for Science Education (ICASE) that UNESCO helped establish, is under contract to produce a companion volume to the Sourcebook which will be titled the UNESCO Science Teachers Handbook. ICASE has just released an International Directory of National Science Teaching Associations and may later develop a guidebook on how groups may establish such associations.

Other of their publications of special interest to science and mathematics curriculum workers are the New Trends volumes which have been produced for the areas of Biology, Chemistry, Physics, Mathematics and Integrated Science Teaching. Some of these are into their second volume and third ones are being developed presently.

More information on these and numerous other programs of the UNESCO Division of Pre-University Science and Technology Education is available from the Director, Dr. Harold A. Foecke at UNESCO, Place deFontenoy, Paris 75700, Paris, France.

# I. KEY TO THE INFORMATION ON THE PROJECT DESCRIPTIONS

official project title as furnished by the director	address to use when writing for additional project information	year project began and year it ended
director's name (past or present) and co-directors' or contact's names	telephone number for contacting project for more information	source of funding

which earlier international clearinghouse  
reports to see more about project details

AGES: of students involved	types of learning experi- ences and number in group <u>EXPER: C1 12+ 2-12 I</u>	PRINTED MATERIALS: types of printed material the pro- ject developed. See earlier I.C. reports for title/details
LANG: languages available	LEC lectures	NON-PRINT MATERIALS: types of non-print materials such as audio-visual aids/ lab equipment the project developed
SUBJ: subject areas covered	SEM seminars	
APPROACH: of presentation	DISC discussions	
ABILITY: ability level	INDEP independent study	
EVAL METH: evaluation methods of student accomplishments	LAB laboratory activities	
TESTING: frequency of testing	FLD field experiences	
CONT RESP: who has the content responsibility	DEM demonstrations	
ENVIR: the learning environments	SIM simulations	
*means that answers have been rated from most to least descriptive	TV televised lessons	
	A/V audio-visual presentations	

NARRATIVE: a narrative with a maximum of 300 words usually written by the project director summarizing the goals or objectives of the project, its unique characteristics, the major underlying principles of learning involved, the kinds of project evaluations being employed, the estimated impact of the project and any projected plans for the future.

REASON: reasons for the project's origi- nal initiation	ADOPT: known adoption and present use of the project's materials	number of project personnel involved <u>PERS: ft pt nrt</u> (numbers under ft - full time, pt - part time, nrt - non-released time ADM administrator WR writer VSCH school visitor RES researcher TED in-service TRIAL teachers	PUBL: publication details inclu- ding format and implementation costs per 10 students in U.S. dollars
INITIATOR(S): names of project initiators			

REFERENCES: bibliographic references to the project divided into articles of a descriptive nature and those pertaining more to related research studies

## II. KEY FOR THE INDEX ABBREVIATIONS

### SUBJECT:

agr-e	agricultural education
an	anthropology
art	art
astr	astronomy
b	biology
b-e	business education
b-s	behavioral sciences
c	chemistry
c-e	career education
c-s	computer science
com	communications
comp	computing
cyb	cybernetics
e-e	environmental education
e-p	environmental planning
e-s	earth-space
ec	economics
ecol	ecology
ed	education
el-s	elementary science
er-s	engineering science
eng	english
f	forestry
g	geography
g-s	general science
geol	geology
h	health
h-e	home economics
hist	history
hu	humanities
i-a	industrial arts
i-a	language arts
m	mathematics
m-s	marine science
mat	materials
med	medicine
meth	methods
mus	music
n-s	natural science
naut-s	nautical science
nuc-s	nuclear science
nutr	nutrition
p	physics
p-a	performing arts
p-e	physical education
p-s	physical science
phys	physiology
phil	philosophy
pr-s	primary science
psych	psychology
psych-ed	psychology education
r	religion
s	science
s-o	subject-oriented
s-s	social sciences
sur	survival
"	technology
u-s	urban studies
w-r-m	water resources management

### AGES:

TEd	teacher education
coll	college level
resch	researchers

### ABILITY:

avg	average
avg+	above average
all	all levels
EMR	educationally mentally retarded
EMH	educationally mentally handicapped
slow	slow learner
spec	special education
u-a	underachievers

### APPROACH:

c	conceptual
d-c	discipline-centered
dis	discovery
g-d-m	guided decision-making
hist	historical
inq	inquiry
integ	integrated
interdis	interdisciplinary
p	process
s-d	skill development
s-o	subject oriented
p-s	problem-solving
pol	political skills
psych	psychological
u	unified