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SCIENCE EDUCATION RESEARCH STUDIES -- 1950.

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SUMMARIES OF 54 STUDIES IN SCIENCE EDUCATION COMPLETED DURING 1950 ARE TREATED IN THIS LISTING. THE STUDIES LISTED REPRESENT THE RESPONSE TO A NATIONWIDE QUESTIONNAIRE REQUESTING COPIES OF RESEARCH REPORTS. FOR EACH ENTRY IN THE LISTING THERE ARE INCLUDED--(1) THE AUTHOR'S NAME, (2) THE TITLE OF THE STUDY, (3) WHETHER OR NOT IT IS A THESIS OR DEGREE ITEM, (4) THE YEAR THE STUDY WAS COMPLETED, (5) THE INSTITUTION WHERE THE STUDY WAS CONDUCTED, (6) THE NUMBER OF PAGES IN THE COMPLETE REPORT, (7) THE SOURCE FROM WHICH THE COMPLETE STUDY MAY BE OBTAINED, (8) A STATEMENT OF THE PROBLEM, (9) THE SOURCES OF DATA, (10) THE KIND OF STATISTICAL TREATMENT USED, AND (11) THE MAJOR FINDINGS. ENTRIES ARE LISTED ALPHABETICALLY BY THE AUTHOR'S LAST NAME. (RS)

Selected Science Service

Division of Elementary and Secondary Scho

Circular No. 334-II

SCIENCE EDUCATION RESEARCH STUDIES — 1950

Prepared by
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This summary of research studies in science education is the first annual listing which has grown out of a cooperative project involving the National Association for Research in Science Teaching and the Office of Education. Fifty-four studies are reported in this summary.

Report forms for pertinent research studies were mailed to research leaders throughout the Nation. As reports were received the summaries were prepared from the data given. No attempts were made to evaluate the quality of the research studies. The statements as reported in the summaries are, except in a few instances, as reported by the authors.

Persons who know of related or similar studies which were completed during 1951 but which are not included in this listing are urged to bring them to the attention of the Office of Education. These studies will then be included when this listing is revised.

The information given concerning each study includes, wherever possible, the following items in the order given: author (surname first), title of study, "non-thesis" or degree if a thesis, year study was completed, institution where study was carried out, pages in the complete report, and source from which copy of the complete study may be obtained. This is followed by a statement of the problem or problems, sources of data, statistical treatment used, and major findings. Certain additional information is available from the Office of Education but full information can be obtained best from the source given in the summary.

Since this cooperative project is in its developmental stages, suggestions concerning ways to make the summaries of increased help will be appreciated.

The members of the Research Committee of the National Association for Research in Science Teaching who assisted in the development of this project are: Mr. A. O. Baker, Cleveland Public Schools; Dr. Guybert P. Cahoon, Ohio State University; and Dr. Francis D. Curtis (Chairman), University of Michigan.

ABRAHAMS, ALLAN. Classification of Recent Scientific Developments According to the Principles of Physical Science to Which They Apply. M. Ed., 1950, Boston University. 112 p.

Problem or Problems.--The purpose of this study is to abstract and list the developments of physical science from 1940 to 1950; and to classify those developments according to the principles of physical science to which they apply, or by which they are governed.

Sources of Data.--Reference books, periodicals.

Statistical Treatment.--Standard deviation, coefficient of correlation.

Major Findings.--It does not indicate that we may expect facts to be discovered which will alter the number of principles or "basic truths" but it should prepare us to accept such new evidence if and when it is discovered.

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ABRAMSON, BERNARD. A Comparison of Two Methods of Teaching Elementary Mechanics in High School. Ph.D., 1950, New York University. 204 p. New York University Library, New York City.

Problem or Problems.--(1) Are there differences in gain in knowledge of mechanics resulting from the differences in the methods of instruction? (2) Are the differences significant or reliable? Is one method of instruction superior to the other? (3) Which type of student, bright or dull, good reader or poor reader, benefited more from each method of instruction?

Sources of Data.--Experimental groups, control groups, courses of study, questionnaires, expert judgments and interviews.

Statistical Treatment.--Mean, standard deviation, critical ratio.

Major Findings.--(1) The discussion of pictorial ideographs as a method of teaching science is at least as effective as the generally accepted laboratory exercise and demonstration, etc., for teaching mechanics; (2) reliable immediate gains in information of as much as 24.7% by those discussing pictorial ideographs were obtained in some units of work. Recall gains of as much as 37% were obtained by the same method; (3) at no time and in no unit of work was the combination method of teaching found superior; (4) the biggest and most consistent gains were made by the poor students (low IQ and poor readers); and (5) for all students forgetting was appreciable after three months but not after two months.

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ADAMS, SAM. A Study of Various Factors Related to Success in College Physics. Ph.D., 1950, Louisiana State University. Graduate School, Louisiana State University, Baton Rouge.

Problem or Problems.--(1) What relationships exist between various types of high school achievement and success in college physics? (2) What relationships exist

between various types of college-level achievement and success in college physics? (3) Is achievement in college physics affected by student age or veteran status?

Sources of Data.--Official records.

Statistical Treatment.--Mean, standard deviation, and coefficient of correlation.

Major Findings.--(1) Articulation between high school and college physics was low ($r = .32$); (2) For other types of high school achievement with respect to success in college physics, r was below .32; (3) College entrance tests told very little to probable success in college physics; (4) A coefficient of correlation of .43 was found between achievement in freshman college mathematics and achievement in college of physics; (5) Physics achievement was found to be independent of veteran status; and (6) The only age group which did notably superior work in college physics was about 25 years of age.

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BAILEY, DOYLE E. The Use of Community Resources by High School Science Teachers. Ed. D., 1950, Colorado State College of Education. 88 p. Author, Beaumont High School.

Problem or Problems.--The purpose of this study is to determine what community resources are being used by high school science teachers, what methods are employed in using these resources, and how often they are used.

Sources of Data.--Questionnaires.

Statistical Treatment.--Comparison of frequencies.

Major Findings.--(1) Documentary materials, audio-visual materials, and field trips are the most commonly used methods of using community resources by the teachers of science in Texas. (2) Science teachers seldom use resource visitors, interviews, and surveys as methods of using community resources. (3) Teachers of general science and biology use community resources in their teaching more than teachers of chemistry and physics. (4) Industrial plants, public utilities, water departments, public health services, and natural resource agencies are the community resources most frequently used by Texas science teachers. (5) The size of the community had little effect on what community resources were used most frequently. (6) The three conditions existing in the schools which teachers felt prevented wider use of community resources were: rigid class schedules, transportation difficulties and expenses, and lack of available resources. (7) The disfavor and objection among other faculty members has an effect on the extent of use of community resources. (8) School administration disfavor and community disfavor are not hindrances to wider community use. (9) Local personnel is very cooperative in the use of community resources by the schools.

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BLANCHET, WALDO WILLIE EMERSON. Prevalence of Belief in Science Misconceptions Among a Group of In-Service Teachers in Georgia. Non-degree, 1950, The Fort Valley State College. The Author. Fort Valley State College, Fort Valley, Georgia.

Problem or Problems.--The purpose of this investigation was to find out the prevalence of belief in certain popular science misconceptions among a group of in-service teachers in the common schools for Negroes in Georgia.

Sources of Data.--Questionnaires or tests administered to 318 in-service teachers.

Statistical Treatment.--Comparison of frequencies.

Major Findings.--(1) The large number of misconceptions that were indicated as being true by a relatively high percentage of the in-service teachers is evidence that belief in the 100 popular science misconceptions compiled by Hancock is widespread among the in-service teachers in the common schools for Negroes in Georgia who were included in this study; (2) if Hancock's conclusion be valid that the 100 misconceptions that were used in this study are the most important ones, of a list of 292 misconceptions in terms of their potentialities for affecting the behavior of persons subservient to them, then the high percentage of in-service teachers who indicate that the misconceptions are true is evidence that the behavior of these teachers may be influenced by these misconceptions. However, if it is assumed that the effect of a misconception of relatively high rank (1-49 in Hancock's study) on the behavior of one who is subservient to it is more marked than of one of relatively low rank (50-100 in Hancock's study), then the effect on the behavior of these teachers may be somewhat lessened by the slight indication that the misconceptions of relatively low rank are believed to be true by a larger percentage of the group than are those of relatively high rank; and (3) a total of 111 in-service teachers who did not respond to some of the statements because they did not understand words or expressions in them is a lack of understanding of some of the words that occur in everyday experience. Moreover, some of the teachers who did not respond to all of the statements, although they gave no indication of the reasons for their not doing so, may not have responded because they, too, did not understand some of the words or expressions in them.

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BRANDWEIN, PAUL FRANZ. Selection and Training of Future Scientists II. Origin of Science Interests. Non-degree, 1950. 7 p. Author, Forest Hills High School, Forest Hills, New York.

Problem or Problems.--Since 1945 careful observations have been made by the writer of the behavior of certain students who can be said to have shown a "science potential." The writer's hypothesis is that there is no such quantity as "science talent." Preliminary work on the origin of the science interests of these youngsters tends to support this hypothesis.

Sources of Data.--Experimental groups, control groups, interviews, judgments and questionnaires.

Statistical Treatment.--None.

Major Findings.--Preliminary work on the origin of the science interests of students with "science potential" does not support the hypothesis that there is such a quantity as "science talent." It indicates that very high intelligence (as

measured by high IQ, high mathematical ability, high verbal ability, coupled with an environment favorable to interesting work in science, may produce the individual who is successful in scientific research. In any event, there doesn't appear to be any evidence at hand to deny the validity of this hypothesis.

There is every indication that young people with "science potential" can be recognized early in their high school careers.

Four patent factors seem to affect the origin of an interest in science in students with "science potential," --(1) high intelligence of the type which results in high success on tests of intelligence and of mathematical and verbal skills, (2) well-trained teachers, (3) the opportunities for work in science, (4) success in science, over and above success in other intellectual or artistic endeavors. A latent factor which seems to be present is a science interest early in youth. But this latent factor may not be indicative per se of "science potential," since it is not sustained in a good number of students. Whether there is another latent factor to be called "science talent" remains to be determined and defined by continued investigation as do, indeed, the preliminary and tentative summarizations made here.

However, there is no doubt that future scientists are influenced or can be influenced by the opportunities made available to them in their early pre-college education. This has significance for those national programs which recognize our continued need for scientists.

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BOECK, CLARENCE H. The Inductive Compared to the Deductive Approach to Teaching Secondary School Chemistry. Ph.D., 1950, University of Minnesota. 254 p. Library, University of Minnesota, Minneapolis.

Problem or Problems.--The purpose of this study was to compare through controlled experimental evaluation the learning of students instructed in such a manner as to stress the use of the inductive approach in high school chemistry laboratory exercises and correlated discussions with the learning of students who were instructed by the use of the more commonly found deductive--descriptive exercises. Comparisons were made in four areas or on four objectives and a combination of all of them. (1) Knowledge of the basic facts and principles of chemistry; (2) ability to apply these principles in new situations, (3) knowledge of and ability to use the scientific method and possession of a scientific attitude; and (4) development of some basic laboratory skills and resourcefulness.

Sources of Data.--Experimental groups and control groups.

Statistical Treatment.--Analysis of Variance and Covariance.

Major Findings.--Differences not large enough to be significant were found in favor of the inductive method for knowledge of facts and principles, application of principles, performance of laboratory techniques, and laboratory resourcefulness. The inductive method proved to be (statistically significant) superior to the deductive method in (1) knowledge of and ability to use the scientific method with an accompanying scientific attitude; and (2) identification of proper laboratory techniques.

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BUTTERFIELD, HARRY ROBERT. A Physical Science Survey of the High Schools of the Nine Bay-Counties. M. A., 1950, San Francisco State College. 87 p. Library, San Francisco State College, San Francisco, California.

Problem or Problems.--The aim of the text is to reveal factual evidence of what is currently being done in the curriculum of physical science in the nine bay-counties. The study is not intended to prophesy outcomes or changes in the physical science curriculum. It is primarily intended to build a foundation on which other research studies can be made.

Sources of Data.--Questionnaires.

Statistical Treatment.--Mean, median and comparison of frequencies.

Major Findings.--A typical course in chemistry, physics, and advanced science (physical) is listed. The typical course gives the most likely used text and workbook, length of class period, time devoted to lecture and laboratory, size of class, fraction of girls in class, content of course by topics covered and length of time devoted to each.

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CARRIER, ELBA ONESYME. Supplementary Reading for High School Science. M. A., 1950, Boston University. 153 p. School of Education Library, Boston University, Boston, Massachusetts.

Problem or Problems.--In the modern secondary school where programs are being altered to fit the needs of the students, the science courses still provide little at the secondary level for supplementary reading. This study seeks to find and justify supplementary, up-to-date science articles in the popular periodicals which will fill this need. It further seeks to make a useful catalogue of these articles with brief annotations of each for the convenience of the reader.

Sources of Data.--Reference books, periodicals, etc.

Statistical Treatment.--None.

Major Findings.--(1) In a two-year period 775 articles of possible use in high school science are found; (2) these articles, complete with details of author, periodical name, date and volume and descriptive annotation are catalogued in the work; and (3) a convenient list of topic headings is arranged.

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COADY, MARTHA. A Survey of Trailside Museums and Nature Trails. M. S., 1950, University of Massachusetts. 87 p. Goodell Library, University of Massachusetts, Amherst.

Problem or Problems.--To what extent are they now being used as a medium of public education and their probable future part as a medium of education.

Sources of Data.--Reference books, periodicals, experimental groups, interviews,

questionnaires.

Statistical Treatment.--None.

Major Findings.--A trailside museum is a simple, informal building with exhibits to explain natural phenomena of local area. Exhibits should create enough interest to stimulate the visitor to go afield. Concepts should be gained in brief periods. Should offer protection to natural and historical objects. Provide facilities for advanced study groups. Should serve as a center of natural education. Will play important role in future interpretive programs of National and municipal parks. Trailside museums are not a fad. (1) Sixty per cent of National Parks have nature trails; (2) eighty-seven per cent of municipal, State and county have nature trails. Group A has live exhibits. Group B does not have caged animals. No one person can be credited as the founder of either the trailside museum or natural trail. Trailside museums differ according to persons in charge, area in, group serving, and funds available. National Park museums have excellent dioramas due to larger, more diversified staff. Nature trails are on the decline due to vandalism and the fact that most people prefer to be led. They can continue as a valuable technique in camps.

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CRALL, HOWARD WILLIAM. Teaching and Evaluation of Achievement in Applying Principles in High School Biology. Ph.D., 1950, Ohio State University. 475 p. University Library, Ohio State University, Columbus.

Problem or Problems.--(1) To demonstrate the practicability of teaching high school biology by basing class experiences on the applications of biological principles; (2) to evaluate the achievement of pupils engaging in such experiences by certain unique techniques, designed to measure growth toward certain objectives; and (3) to compare the progress of the class whose experiences were application-based with the progress of another class whose experiences were not purposely application-based.

Sources of Data.--Experimental groups, control groups, interviews, expert judgments, questionnaires, behavior checks, anecdotal records, parents and other teachers.

Statistical Treatment.--Mean, median, standard deviation, critical ratio and "T" test.

Major Findings.--(1) Teaching high school biology by basing class experiences on applications of biology principles was demonstrated to be practicable; (2) students engaging in such experiences made significant growth toward certain educational objectives as measured by certain evaluation techniques; and (3) students engaging in experiences which were application-based made more growth than students engaging in experiences which were not purposely application-based.

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DAVIS, GEORGE THEODORE. On Teaching Natural Resource Conservation Through Biology in Massachusetts High Schools. Ed. D., 1950, Harvard University. 276 p.

Graduate School of Education Library, Harvard University, Cambridge, Massachusetts.

Problem or Problems.--(1) To determine the status of conservation instruction in public high school biology courses in Massachusetts; (2) to evaluate this instruction with respect to certain criteria; and (3) to organize a set of instructional materials in conservation, based on current needs for use in biology courses.

Sources of Data.--Reference books, periodicals, textbooks, courses of study, and expert judgments.

Statistical Treatment.--Mean, median, comparison of frequencies and quartiles.

Major Findings.--(1) The majority of students are gaining little or no understanding of the biological foundations of conservation education. Even when they take a course in elementary biology, most students do not thereby gain opportunities to develop sound conservation understandings and attitudes derived from experiences with local resource problems and remedial practices; (2) because of the great confusion which exists in the curriculum status and educational purposes of elementary biology, the biological aspects of conservation instruction do not have a secure place in programs designed to serve the general education needs of students; (3) most of the biology I teachers lack an understanding of (a) the modern concepts of natural resource conservation, (b) the current significance of this subject in secondary science, and (c) the modern purposes and practices of teaching conservation in biology; (4) even where sincere attempts are being made to teach natural resource conservation in elementary biology, the instruction often violates widely accepted principles of teaching; (5) most elementary biology teachers do not take advantage of existing opportunities for making conservation a significant and challenging part of biological study; and (6) unless a number of new departures (for Massachusetts, at least) in teacher education are attempted, the existing opportunities for sound conservation instruction in biology will remain largely unexplored.

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DELOACH, WILL SCOTT. The Undergraduate Preparation of High School Chemistry Teachers, Alabama, 1948-1949. Nonthesis, 1950, Huntingdon College. 6 p. Author, Mississippi State College for Women, Columbus, Mississippi.

Problem or Problems.--A study of the undergraduate preparation (semester hours credit) in the fields of chemistry, physics and mathematics of the chemistry teachers in the white high schools of Alabama for the year 1948-1949.

Sources of Data.--State Department of Education records.

Statistical Treatment.--None.

Major Findings.--Not given.

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DELOACH, WILL SCOTT. Subjects Taught by High School Chemistry Teachers, Alabama, 1948-1949. Non-degree, 1950, Huntingdon College, Author, Mississippi State

College for Women, Columbus, Mississippi.

Problem or Problems.--The purpose of the study was to determine what subjects in addition to chemistry were taught by the white high school chemistry teachers of Alabama.

Sources of Data.--State Department of Education records.

Statistical Treatment.--None.

Major Findings.--Of the total of 195 white high school chemistry teachers in Alabama in 1948-1949, 7.2% taught only chemistry, 18.5% one other subject, 42.6% two other subjects, 24.1% three others. In the Southern Association high schools, 8.7% taught only chemistry, 31.9% one other subject, 49.3% two others, and 8.7% three others. Of the total, 46.7% taught only science, in the Southern Association schools, 73.9% taught only science.

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DELOACH, WILL SCOTT and HALL, AUBORN RUSS. Time and Place of Undergraduate Training of a Group of High School Chemistry Teachers. Nonthesis, 1950, Huntingdon College. Authors, Mississippi State College for Women, Columbus.

Problem or Problems.--A study of the chemistry teachers in the white high schools of Alabama, public and private, for the year 1948-1949 to determine when and where they had their undergraduate training. The "when" was determined by date of graduation and the "where" dealt both with geographical location and with type of school - university, liberal arts college, teachers college, technical and agricultural school.

Sources of Data.--State Department of Education records.

Statistical Treatment.--None.

Major Findings.--Of 195 teachers, 78% attended college in Alabama and 70% graduated from Alabama schools, 13% of the 195 graduated from the University of Alabama, 16% from Alabama Polytech, 18.5% from Alabama State Teachers College, 22% from liberal arts colleges in Alabama. One-fourth of the 195 were less than 5 years out of college and 58% were less than 15 years out. Twice as many women as men were liberal arts college graduates.

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DOHRMAN, VIOLA M. The Development of a Science Program for School #52 (Grades I-VI) With Suggested Units for Grade Six. M. Ed., 1950, New York State College for Teachers. 190 p. Graduate Division, New York State College for Teachers, Buffalo.

Problem or Problems.--This study concerns itself with the construction of a suitable science program for a typical Buffalo public elementary school, Grades I through VI. One portion concerns itself with an investigation to determine a satisfactory basis for such a program. Questions and comments were obtained to

find out exactly where the interests of the children lay. This thesis is entirely a curricular study.

Sources of Data.--Reference books, periodicals, expert judgments, and records of children's questions.

Statistical Treatment.--Tables of frequency.

Major Findings.--Curricular materials suitable for use in Grades I-VI in a typical Buffalo school were developed.

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EBMEIER, RAYMOND GERALD. A Determination of the Contribution of Selected Supplementary Teaching Materials in High School Chemistry. M. A., 1950, University of Nebraska. Library, University of Nebraska, Lincoln.

Problem or Problems.--The problem of this study is to determine on an objective basis the actual contribution of certain selected and evaluated business - sponsored teaching materials in high school chemistry.

Sources of Data.--Experimental groups.

Statistical Treatment.--Critical ratio and Fisher's "t."

Major Findings.--(1) On the basis of tests employed in this study, teacher-directed discussion of supplementary reading materials was found to contribute materially to the enrichment of a high school chemistry class. (2) The use of supplementary reading materials do not contribute materially to general achievement in chemistry classes, when this achievement is measured by standardized achievement tests.

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ENGEL, MARION EMIL. A Study of the Preparation, Assignment, and Experience of Science Teachers in the State of Nebraska. M. A., 1950, University of Nebraska. Library, University of Nebraska, Lincoln.

Problem or Problems.--The primary problem is an investigation of the preparation of science teachers in the State of Nebraska and an examination of the adequacy of this preparation in terms of the recommendations of various authoritative bodies. Related, but secondary problems, are those involving the experience and assignment of the science teachers in Nebraska schools.

Sources of Data.--State Department records.

Statistical Treatment.--Mean and median.

Major Findings.--(1) The average science teacher in the State of Nebraska is not adequately prepared to teach science when judged by recommended programs proposed by the authorities in the field. These same authorities recommend, in general, a minimum of 60 hours of preparation in the science field. The pattern of courses

recommended by various authoritative committees usually includes at least three years work in a special field, two years work in an additional science, and one year in a third science, with additional science electives. It has been found in this study that the average teacher in Nebraska has 38.71 hours in science, which is less than two-thirds of the work recommended. (2) In the field of education it is proposed by the authorities that the science teacher should have approximately 24 hours earned in professional education courses with at least six of these hours devoted to science teaching methods. There were very few science teachers in Nebraska reporting any hours earned in science teaching methods. This may be due to the fact that these hours were listed with the hours in education. The Nebraska science teachers earned an average of 30.39 hours in professional education courses, which is substantially above that recommended. (3) The biological and physical science survey courses recommended by the authorities in the field, have not been included as a part of the preparation of the science teachers in Nebraska except in a few isolated instances. (4) Most science teachers who are new to the profession start in the small schools. (5) The new teacher in the small school has the heaviest teaching load and the least preparation and is usually engaged in teaching in diversified fields. (6) The science teacher in the larger school was not always the best prepared teacher so far as hours of preparation are concerned.

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FLATHER, DONALD McINTOSH. An Evaluation of the Science Program in the High Schools of British Columbia. Ph.D., 1950, University of Washington. 420 p. Education Library, University of Washington, Seattle.

Problem or Problems.--In this thesis the main problem will be restricted to an evaluation of the present courses in sciences offered in the high schools of British Columbia between the years of 1937 and 1949. These sciences include General Science III, offered normally in Grade IX and prerequisite to the elective General Science IV or Grade X which in turn has been prerequisite to General Science V taken most frequently in Grade XI, but elective also in Grade XII. This survey has covered also the courses for Grade XII or Grade XIII in the special sciences of Agriculture, Biology, Chemistry, and Physics. Three aspects of the problem have been observed. (1) From what antecedents have the present courses in science been derived? (2) How adequate are the present sources in the sciences in fulfilling the needs of the students? (3) What recommendations can be made to increase the effectiveness of the present science? It was the purpose of this research: (1) To examine the present program as to its operation; (2) to aid in providing high school students of British Columbia the best possible training in science, concomitant with their other training and in accordance with expenditures appropriate to present society; (3) to draw to the attention of the teachers and public the status and functions of science teaching in British Columbia at the present time; (4) to suggest improvements, if these appear from the research; (5) to study the relationship of teachers' courses, texts, and testing programs to the science program; (6) to ascertain the need for highly qualified teachers of science in British Columbia; (7) to indicate some procedures which may improve the status and training of science teachers; and (8) to discuss whatever additional aspects that the study may disclose.

Sources of Data.--Reference books, periodicals, textbooks, courses of study,

experimental groups, control groups, interviews, expert judgments, and questionnaires.

Statistical Treatment.--None.

Major Findings.--The major conclusion was that the science curriculum was in need of much overhauling and changing if it was to meet the needs of youth leaving the schools today. In each area of science, recommendations were made for changes, supplements, and general improvements in the curriculum. It is evident that the need for improvement and of bringing up to date the curriculum is the most important factor in the general curriculum improvement program in the schools of British Columbia today.

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FRIEDENBERG, EDGAR ZODIAG. A Manual of Suggestions for Graduate Students Teaching Chemistry. Nonthesis, 1950, University of Chicago and Antioch College. 93 p. Author, 5801 Ellis, Chicago 37, Illinois.

Problem or Problems.--To develop a manual of suggestions dealing with problems of instruction and evaluation which graduate students engaged in teaching elementary chemistry need deal with, with special attention to emotional problems of students, and ontological bases of scientific knowledge.

Sources of Data.--Courses of study and expert judgments.

Statistical Treatment.--None.

Major Findings.--A manual with ninety-three pages of suggestions was prepared.

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GINSBERG, RITA H. A Review of the Available Objective-Type Tests Used in College Science Courses Since 1938. M. Ed., 1950, Boston University. 89 p. School of Education Library, Boston University, Boston, Massachusetts.

Problem or Problems.--The purpose of this study is threefold; namely, to review the research in testing which has been done since 1938 in the fields of chemistry, physics, botany, and zoology as taught in the colleges; to review and evaluate the standardized tests which have been published in these fields since 1938; and to indicate the college trend in regard to the use of objective-type tests in chemistry, physics, botany, and zoology courses.

Sources of Data.--Reference books, periodicals and questionnaires.

Statistical Treatment.--None.

Major Findings.--More research has been done on chemistry testing than biology or physics testing. No laboratory tests have been discovered in the field of biology. No tests which measure attitudes have been found in the chemistry or physics fields. There is a need for the development of tests in biology and physics, for the development of a scientific attitudes test in chemistry and

physics, and for the development of a laboratory test in biology.

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GOINS, WILLIAM FAUNTLEROY, JR. An Evaluation of Science Courses Offered for General Education in Selected Negro Colleges. Ph.D., 1950. The Ohio State University. 306 p. Main Library, Ohio State University, Columbus.

Problem or Problems.--To evaluate, in the light of certain criteria, the science courses offered for general education in a selected group of Negro colleges.

Sources of Data.--Reference books, periodicals, courses of study, and interviews.

Statistical Treatment.--None.

Major Findings.--(1) The general education programs of the several colleges suffer from the lack of a well-formulated, clearly-understood philosophy of general education in the colleges. (2) The quality of the general education science courses in the colleges suffers because of inadequacies in equipment and supplies. (3) The general low level of the colleges with respect to adequately meeting students' needs in general education is partially caused by factors that are found in the academic environment and in the quality of instruction. Some of these factors are: overcrowded classes, overburdened teachers, inadequate facilities, lack of qualified teachers, attitude of some teachers that the general courses are inferior to standard courses, inadequate evaluation procedures, dearth of attention given to social values. (4) Too little time is allocated in most of the colleges to the general education science courses. (5) Negro colleges are becoming increasingly aware of the shortcomings of their present general education courses and more sensitive to the requirements of an adequate general education program.

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GONDER, FRANK CULLEN. A Survey of General Science in the Nine Bay Area Counties. M. A., 1950, San Francisco State College. 53 p. San Francisco State College, San Francisco, California.

Problem or Problems.--The purpose of this thesis is to examine the conditions under which general science is being taught in the nine Bay Area Counties. The general conditions under examination come under two headings: (1) Concerning the class with respect to grade placement, requirement, percent of the students of the school affected, class size, laboratory experiences, physical science balance, and trends such as advanced general science for juniors and seniors, and general science in the core curriculum; and (2) preparation of the teacher and the science class load of the general science teacher.

Sources of Data.--Reference books, periodicals, textbooks, and questionnaires.

Statistical Treatment.--Mean and comparison of frequencies.

Major Findings.--(1) General science required in 85% of the junior high schools but only 21% of the high schools; (2) two most popular grade placements are the

eighth and ninth. Some general science placements run from seventh through twelfth (not in any one school, however); (3) fifty-five percent of the students of the Bay Area counties were in a course of general science at some grade level; (4) average class size is 33 with extremes of 16 and 42; (5) average amount of time devoted to the laboratory was 11.75%. Seventy-two percent of the students have less than 10% laboratory experience and 15,813 students who receive no laboratory experiences; and (6) a trend is indicated in a course of advanced general science.

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GRANT, CHARLOTTE L. Health Education in the Biological Sciences. Nonthesis, 1950, Oak Park and River Forest High School, Oak Park, Illinois. 20 p. Author, Oak Park High School, Oak Park, Illinois.

Problem or Problems.--Health Instruction in biology department. Integration with other departments. Functions and personnel of School Health Council. School health services and school environment. Follow-up studies to indicate student needs and meeting those needs by changes in curriculum and cooperation of school services and the community.

Sources of Data.--Courses of study, experimental groups, interviews, and questionnaires.

Statistical Treatment.--None.

Major Findings.--More student evaluation, more cooperation among departments and more cooperation with the community.

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GUBA, EGON G. A Statistical Analysis of Some Factors Involved in the Preparation of High School General Science Teachers. M. A., 1950, Kansas University. 85 p. Library, University of Kansas, Lawrence.

Problem or Problems.--(1) Description of typical graduating senior with a teaching major in science; and (2) analysis of teacher at grade point average, age, sex, type of school, units of high school science, semester hours of college science, science area of major, and broadness of training on students ability in science as measured by Cooperative Test of Proficiency in Natural Science, Form S.

Sources of Data.--Questionnaires and cooperative tests.

Statistical Treatment.--Mean, median, standard deviation, Fisher's "t," Chi square, analysis of variance and covariance, and Behrens-Fisher "d" test.

Major Findings.--The test as a whole proved to be rather easy for the majority of cases, and this fact places some doubt upon the value of the results of the analysis. The validity of the test used with the particular population of this study is rather questionable, and the fact that so few of the factors tested were found to have any relation to the test scores may well have its basis here. If the test had been more highly discriminating, more of the factors might have

been found to have a bearing.

However, one can conclude that on the average and within the limitations imposed on the findings:

I. Students were more successful in generalizing their knowledge of scientific terms and concepts as measured by Part I of the test when they were: (1) males, (2) in the upper one-fourth of the distribution in terms of total number of semester hours of college science earned, and (3) better than average students as evidenced by grade point averages.

II. Students were no more successful in generalizing their knowledge of scientific terms and concepts as measured by Part I of the test when they were: (1) older rather than younger in age, (2) credited with several units of high school science rather than few, (3) students at different types of institutions: university, private college, or teachers college, (4) classified as a specific science major, chemistry, physics, or biology, and (5) broadly rather than narrowly trained in the sciences.

III. Students were more successful in interpreting and comprehending scientific material as measured by Part II of the test when they were: (1) males, (2) younger rather than older in age, and (3) better than average students as evidenced by grade point averages.

IV. Students were no more successful in interpreting and comprehending scientific material as measured by Part II of the test when they were: (1) credited with several units of high school science rather than few, (2) students at different types of institutions: university, private college, or teachers college, (3) classified as a specific science major: chemistry, physics, or biology, (4) broadly rather than narrowly trained in the sciences, and (5) in the upper one-fourth of the distribution in total number of semester hours of college science earned rather than in the lower one-fourth.

We may say that the typical science student in this study was (1) a male with a median age of about 24 years and without teaching experience, (2) a student with a C+ or B- average in science courses taken, (3) a student possessing almost 4 years of high school science credit, and (4) a student possessing a median number of hours of 51 in all science, 20 in biology, 15 in chemistry, 8 in physics, and zero in earth science.

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HAUSDOERFFER, WILLIAM HERMAN. The Mathematical Content of Two General College Physics Texts. Ed. D., 1950, Rutgers University. 242 p. Library, Rutgers University, New Brunswick, New Jersey.

Problem or Problems.--(1) What mathematics is essential for solving the problems contained in the general college physics texts examined? (2) What mathematics is essential for a comprehension of the body of each general college physics text examined?

Sources of Data.--Textbooks.

Statistical Treatment.--Comparison of frequencies.

Major Findings.—(1) The mathematical calculations that must be performed by the general college student using the texts examined involve skills, facts, and concepts usually associated with junior-high school or high-school mathematics; and

(2) many of the topics usually stressed in high-school mathematics are not used at all in the texts examined. Examples: Advanced factoring, division by polynomials, addition formulas from trigonometry, special products, equations above second degree.

The findings of this study provide some justification for reconsidering the content of the high-school and early college mathematics programs. As suggested in this chapter, certain topics needed for college physics should be considered for inclusion in the mathematics program. It is also recommended that a number of topics already in the mathematics program be stressed. In order to accommodate these suggestions, it is recommended that relatively useless material be weeded out of mathematics courses. These changes probably would reduce the mathematical difficulties confronting many students of college physics.

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HOWARD, ALEXANDER H. JR. The Effect on Film-Learning of Narrations Restructured Toward Specific Behavioral Objectives. Ph.D., 1950, University of Chicago. Department of Education, University of Chicago, Chicago, Illinois.

Problem or Problems.--(1) An examination of the effect of narration or verbal commentary in films upon the achievement of specific learning objectives; and (2) an exploration of the possibility that known principles of instruction can be applied to revise film narrations per se so as to increase defined learning in film experiences.

Sources of Data.--Experimental groups and control groups.

Statistical Treatment.--Mean, and standard deviation.

Major Findings.--(1) The narration structured toward recall of information and the narration structured toward activity choice evoked significant change in behavior of the specified kind, but the understanding narration did not always do so; (2) it was inconclusive as to whether a narration primarily structured for a given objective evoked more gain toward that objective than narrations not primarily structured for that objective; (3) no one narration type was consistently better than another in developing a pattern of objectives, although the activity choice narration had a slight edge; and (4) words and phrases in a narration apparently operated as "cues" for students in answering questions on recall of information tests.

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HUNTLEY, VELMA FLORA. Helping College Freshmen with Their Developmental Tasks: A Report of Work Done with Girls Enrolled in a Course in Anatomy and Physiology. Ed. D., 1950, Teachers College, Columbia University. Library, Teachers College, Columbia University, New York City.

Problem or Problems.--This investigation is concerned with identifying and describing behavior changes as brought about by the study of human relationships within the scope of a course in anatomy and physiology for college girls. This is a teaching project in which consideration is given to the developmental tasks concerned with adequate understanding of human relationships of a sexually

functional nature. The behavior changes may be expected to be the result of educative experiences in the form of class discussions, lectures, readings, demonstrations, illustrative materials, a trip to the American Museum of Natural History to study the exhibits in the room called "Biology of Man," the dealing with questions raised by members of the class, observations concerning the moves in our society, scientific subject matter content concerning the structure and function of the reproductive system of man and woman, and limited films.

Sources of Data.--Student responses, problems, opinions in field of adjustment or developmental tasks of this age level.

Statistical Treatment.--None.

Major Findings.--The evidence is the presentation of subjective data, rather than that to be found in objective tests of facts. It seems as if the actual chronicles of students' questions or responses, or self-directed action, satisfaction, frustration, allows for a greater quality of expression, than would an attempt to evaluate the project by statistical computations. The analysis is qualitative and is made along with the account of the work itself because there is the assumption that behavior changes, or changes in patterns of thinking, occur during the accomplishment of the educative experience. These changes are chronicled in detail.

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HUNTER, W. ALEXANDER. A Handbook for Student Teachers of Science with Special Implications for the Teacher Education Program at Long Island University. Ed.D., 1950, Teachers College, Columbia University. 141 p. Library, Teachers College, Columbia University, New York City.

Problem or Problems.--The purpose of this study is to bring together in a handbook certain pertinent materials, suggestions, illustrations, general information, and guiding principles which the student teachers of science at Long Island University should find helpful during that period of uncertainty so common to the novice as he undertakes the student-teaching part of his professional education. It is intended that the handbook be made available to the interested student as soon as he indicates his desire to prepare for the teaching profession, so that he may familiarize himself with pertinent items as the need for information arises.

Sources of Data.--Reference books, periodicals, textbooks, experimental groups, and expert judgments.

Statistical Treatment.--None.

Major Findings.--Studies show that many student teachers are presently undertaking their student teaching without proper orientation in the problems and duties which beginning teachers are certain to encounter. The study herein referred to sets forth certain guiding principles and concepts which should prove helpful to departments of education in their efforts to provide experiences which will best prepare aspiring teachers to successfully carry out their responsibilities as student teachers. While the study is written with special emphasis on conditions in New York City schools, it has wide applicability wherever students are being

prepared to enter the teaching profession.

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HURD, ARCHER W. Factors Influencing Student Success in Medical Education. Nonthesis, 1950, Medical College of Virginia. 64 p. Bureau of Educational Research and Service, Medical College of Virginia, Richmond 19, Virginia.

Problem or Problems.--(1) Student-faculty ratios in schools of medicine; (2) case studies of freshmen medical students; (3) geographical distributions of medical students in M. C. V.; (4) a survey of student reasons for choosing medicine as a career; (5) types of instruction disliked by students; (6) student opinions on present-day social problems; (7) personal problems worrying students; (8) types of instruction favored by students; (9) phases of medical practice especially interesting students; (10) language ability of students; (11) differentiation in achievements--pre and final--Test AF; (12) a study of entrance criteria; (13) intelligence (IQ) and achievement; (14) distribution on Test AS; (15) item analysis Test AS; (16) aptitude and achievement of sophomores; and (17) some conclusions.

Sources of Data.--Questionnaires, aptitude and achievement tests and grades given.

Statistical Treatment.--Mean, median, standard deviation, coefficient of correlation, critical ratio, and comparison of frequencies.

Major Findings.--Needed further studies: integration of curriculum; clearer aims and objectives; student motivations; unit-problem project plan; psychosomatic and psychosocial medicine; financing medical education; practical work and personalized instruction; better evaluation-aptitude and achievement; selection of students; emphasis upon principles and generalizations; need of student opinion in planning; complexity of human abilities; more study of human personality and social health.

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JOHNSON, PHILIP G. The Teaching of Science in Public High Schools. Nonthesis, 1950, U. S. Office of Education, Washington 25, D. C. 48 p. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. (20¢).

Problem or Problems.--This study reports enrollments in general science, biology, chemistry, and physics in public high schools, the additional science offerings, the number of teachers serving these pupils, class size, grade placement of science subjects, time allotments for recitation and laboratory and troublesome problems related to the teaching of science. The findings are based on data collected for the school year 1947-48. These data were provided by teachers or administrators in a sampling of the Nation's public high schools.

Sources of Data.--Questionnaires.

Statistical Treatment.--Median and comparison of frequencies.

Major Findings.--The findings in this study are based on returns from 715 public high schools and are for the school year 1947-48. The schools supplying the information constituted 94.7 percent of the 755 schools in the sample. The sample was randomly selected from 23,947 public high schools, and it was proportionate to the types and sizes of these high schools.

Somewhat more than 60 percent of the pupils in the seventh and ninth grades were enrolled in general science during the first term of 1947-48. Enrollment in the eighth-grade general science and in biology was equivalent to 75 percent or more of the pupils in the eighth and tenth grades, respectively. Less than half of the senior high schools offered chemistry, and less than half offered physics. However, the combined enrollment in chemistry and physics was equivalent to about one-third of the pupils in the eleventh and twelfth grades. This study indicates that more than 50 percent of the high-school pupils were enrolled in the four commonly offered high-school science courses during the first term of 1947-48.

Some schools make a practice of alternating science courses between terms and between years, while a number of schools offer science courses other than general science, biology, chemistry, and physics. Therefore, a percent larger than that indicated above represents the total number of pupils enrolled in science during the school year 1947-48.

Boys and girls were about equally distributed in the science courses except in chemistry, where there was a small majority of boys, and in physics, where there were more than three times as many boys as girls.

Part-time science teachers outnumbered the full-time science teacher, and men constituted more than 59 percent of all the science teachers. The number of sections of science offered was such that about two-thirds the number of teachers working full time in science could have taught all the regular science sections that were offered. The average class size was smallest for physics, where it was 19 pupils, and largest for seventh-grade general science, where it was 30 pupils.

The seventh-, eighth-, and ninth-grade general science courses were rather definitely arranged for the corresponding grade levels. Biology, chemistry, and physics were being studied by pupils from the ninth grade to the post-graduate levels. Biology was arranged for tenth-grade pupils in most of the schools, although in some schools it was arranged for the ninth grade and in other schools for the eleventh and twelfth grades. More schools enrolled pupils in chemistry at the eleventh grade than at any other grade level. In a majority of the schools that offered it, physics was a twelfth-grade course. Physics and chemistry were offered in alternate years in some schools, and in these and other schools both eleventh- and twelfth-grade pupils were enrolled in the course.

The study shows that for the school year 1947-48, the most common practice was to allot five periods per week to each of the science courses. Less than five periods per week was relatively uncommon, even for the general science courses. Time equivalent to more than five periods per week was the practice in about half of the schools that offered chemistry and physics. The science pupils in some schools had twice as much time for a science course as did pupils in some other schools. About three-fourths of the schools that reported an offering in chemistry and physics also reported time for laboratory work; however, about half of these schools included the laboratory time within the five periods per week devoted to the subject.

The troublesome problems reported in this study were most commonly related to physical facilities such as equipment, supplies, rooms, and school. Science

teachers, programs and schedules, finances, pupils, and books were also mentioned. These problems appeared to be common to all types and sizes of high schools.

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KARRAS, NITA. A Study to Determine Fourth Grade Children's Concepts of the Natural World As They Relate to Conservation. Nonthesis, 1950, The City College. 43 p. Seminar in Educational Research, The City College, New York City.

Problem or Problems.--The purpose of this study was to determine seventy fourth-grade children's concepts of the natural environment as they relate to conservation. The concern here has been -- do children possess concepts involved in conservation? To what extent? What are their misconceptions? Their limited understandings? The method used was the individual interview derived from Piaget's clinical investigation.

Sources of Data.--Reference books, periodicals, textbooks, and questionnaires.

Statistical Treatment.--Comparison of frequencies.

Major Findings.--(1) Children do not recognize man's great dependence upon plants and animals, and in many cases have no awareness at all by "I don't know" answers; (2) children are not aware of the interrelationships that exist in nature. This was fairly well confirmed by the study; (3) brighter children have more accurate and complete concepts involved in conservation than the average and slow children. The bright children were not always free of misconceptions; and (4) the hypothesis that children tend to know more about plant life than any other factor in their natural environment was not borne out by the findings except where the bright group is concerned.

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LANGDON, LYMON ALBERT. Handbook for the Teaching of Nature Study as a Motivating Activity for Elementary Teachers in Nassau County. Ed. D., 1950, New York University. 215 p. School of Education, New York University, New York City.

Problem or Problems.--The major problem was to collect and validate information on the natural phenomena of Nassau County. The following areas were covered: bird life, plants, mammals, reptiles, marine life, insects, geology, astronomy, meteorology, and conservation.

Sources of Data.--Reference books, periodicals, courses of study, interviews, questionnaires, and field work.

Statistical Treatment.--None.

Major Findings.--This study was in the creative field and involved writing a handbook.

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LANSA, ARVO A. The Construction and Evaluation of a General Science Inventory Test for Grade Six. M. Ed., 1950, Boston University. 48 p. School of Education Library, Boston University, Boston, Massachusetts.

Problem or Problems.--This study is directed towards the construction and evaluation of an inventory, paper and pencil, test in elementary science based on the science terms found in some current sixth grade science books. It is intended as a measure of the pupil's background in sixth grade science prior to instruction in it. As such, it may prove useful as a quick measure of interest in science on the theory that children on their own volition will learn more about what they are interested in and that this will be reflected in an area in which there has been little previous formal study. On the same basis, an acquaintance with the specialized vocabulary of science is probably indicative of an interest in science.

Sources of Data.--Reference books, periodicals, textbooks, and courses of study.

Statistical Treatment.--Mean, median, standard deviation, coefficient of correlation, and comparison of frequencies.

Major Findings.--(1) A reliability coefficient of .94 indicates that a test of this type appears to have sufficient reliability to justify an estimate of its validity; and (2) item-analysis data revealed that there are one hundred and forty-nine items with satisfactory discrimination indices.

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LENNON, ALICE M. Teaching Occupational Information Through Related Science. M. Ed., 1950, Boston University. 73 p. School of Education, Boston University, Boston, Massachusetts.

Problem or Problems.--The purpose of this study is to reveal the occupational information that is contained in related science textbooks and to indicate how this information can be imparted in conjunction with science instruction. This study is limited to the occupational information found in five textbooks published by five different companies.

Sources of Data.--Textbooks.

Statistical Treatment.--Comparison of frequencies.

Major Findings.--Not reported.

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LINDER, PHYLLIS. The Teaching of Human Anatomy and Physiology. Nonthesis, 1950, Pennsylvania College for Women. Author, Pennsylvania College for Women, Pittsburgh.

Problem or Problems.--This paper undertakes to determine the extent and nature of the teaching of human anatomy and physiology in the high school curricula in the United States with reference to other educational programs.

Sources of Data.--Reference books, periodicals, interviews, expert judgments, and questionnaires.

Statistical Treatment.--None.

Major Findings.--Marked increase in the number of printed articles between 1943 and 1950 seems to be indicative of the awareness of the public to the need of a more complete program in the teaching of human anatomy and physiology. On the whole, my data show that the teaching of human anatomy and physiology, whether treated as a separate course or in the inclusion of another, ranges from being well taught to not being taught at all. Certain school systems are becoming aware of the need of a more extended and inclusive program and there are certain individuals in the teaching profession that have instigated a program of their own as a result of an awareness to that need. All these conclusions are found to be similarly true of the public, private and parochial schools.

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LITTRELL, MERITT MARSHALL. A Study of Laboratory Practices and Objectives in High School Biology. M. A., 1950, University of Nebraska. Library, University of Nebraska, Lincoln.

Problem or Problems.--What are the present practices in high school biology laboratory, and to what extent are these practices conforming with present statements of objectives to be attained through science instruction?

Sources of Data.--Questionnaires.

Statistical Treatment.--Mean.

Major Findings.--(1) It is evident that, in the opinions of teachers, laboratory work is considered to be essential part of biology instruction. (2) The factors apparent in this investigation seem to indicate that there is an inability among a high percentage of biology teachers to discriminate effectively between objectives which are appropriate and those which are not appropriate to high school biology laboratory. (3) In the opinions of the responding teachers the eight objectives of the Forty-Sixth Yearbook may be, in part, achieved in biology laboratory instruction. (4) The opinions expressed by the teachers belonging to the National Science Teachers Association reflect a better understanding of the objectives of biology laboratory instruction than the Nebraska teachers cooperating in the study. (5) The information available would indicate that the practices of high school biology teachers are not conforming with present statements of objectives to the extent believed to be desirable and practicable. They are instead adhering to traditional procedures of doubtful merit in many instances. (6) The purposes as expressed by the teachers reveals an inconsistency by a substantial number in checking the objectives and activities listed in the study. There appears to be a fundamental discrepancy between objectives checked and the activities selected for laboratory in some instances.

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MAYS, JAMES ERNEST. The Properties of Nylon Suitable for Classroom Demonstration. M. A., 1950, George Peabody College for Teachers. 63 p. Library, George Peabody College for Teachers, Nashville, Tennessee.

Problem or Problems.--A laboratory study of the new fabric, nylon, to develop demonstrations of its properties suitable for classroom and laboratory instruction. Particular attention was given to the application of household dyes to nylon. Numerous samples are mounted in the thesis.

Sources of Data.--Laboratory testing, reference books, and periodicals.

Statistical Treatment.--None.

Major Findings.--A number of practical demonstrations of the properties of nylon, especially with home dyes, was worked out.

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MICHALS, BERNARD EARL. A Comparison of Two Series of Elementary Science Books. M. A., 1950, Colorado State College of Education. 4 p., 68 p. Author, 2530 W. Princeton, Stockton, California.

Problem or Problems.--The problem was (1) to determine and classify according to science content areas the number of concepts and facts in one series of elementary science books for grades one through eight; (2) to compare the results of the first six grades with a portion of two previous studies which included a previous elementary series by the same author; and (3) to further compare the relative number and kinds of science facts found in the seventh and eighth grades with the first six grades.

Sources of Data.--Textbooks and previous similar investigations.

Statistical Treatment.--Comparison of frequencies.

Major Findings.--A total of 12,826 facts were recorded and the total results tabulated in percent to correspond with the previous study in order to give a more accurate comparison. The major findings are in table form. Table I - The comparative percent of scientific facts in biology, physics, geology, astronomy, and chemistry in Series II(a) and Series IV. Tables I, II, III, IV, V, VI, and VII are similar to Table I except the two series are compared in specific areas under each science field.

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MITCHELL, JOHN PAUL. A Comparative Study of Some Household Detergents. M. A., 1950, George Peabody College for Teachers. 82 p. Library, George Peabody College for Teachers, Nashville, Tennessee.

Problem or Problems.--A laboratory study of fifteen household detergents (powders, grains and flakes) to develop demonstrations of their properties suitable for laboratory and classroom instruction. Comparisons of the soap-based and the synthetic-based detergents were of special interest. The products were ranked

in respect to the quantitative measurement of fifteen separate characteristics of economic significance, and a summarized ranking was prepared on the basis of quality under conditions of actual use in a home.

Sources of Data.--Reference books, periodicals, and laboratory testing.

Statistical Treatment.--Median.

Major Findings.--A comprehensive set of practical demonstrations were prepared of interest to students in science classes. The information gained has economic significance as to "money's worth" in purchasing household detergents. The most highly advertised were not necessarily of the greatest value.

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MURRAY, CHALMERS (Editor) and others. New and Improved Demonstrations, Each Illustrating a Single Scientific Principle. M. Ed., 1950. Boston University. 14 p. School of Education Library, Boston University, Boston, Massachusetts.

Problem or Problems.--The purpose of this study is to design new and improved demonstrations, each illustrating a scientific principle as presented in the research of Edgar W. Martin and Harold E. Wise.

Sources of Data.--Reference books, periodicals, and textbooks.

Statistical Treatment.--None.

Major Findings.--To the most complete list of scientific principles, biological and physical, demonstrations can be developed and used to illustrate these principles in a functional manner.

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MOUSER, GILBERT WARREN. A Study of Opportunities for Leadership Training in Outdoor Education. Ph. D., 1950, Cornell University. Author, 2314 Walnut, Cedar Falls, Iowa.

Problem or Problems.--(1) Conduct a survey of training centers and programs engaged in leadership training for outdoor educating; (2) to discover reactions and practical outcomes of the training based on student appraisals; (3) to identify factors which would contribute to an effective leadership training for outdoor educating; and (4) to prepare accommodations.

Sources of Data.--Questionnaires, experimental groups, and visitation.

Statistical Treatment.--None.

Major Findings.--(1) Week-end conservation education camps might be established to create interest in the establishment of long term conservation camps. School administrators, county superintendents, college staff members, service club members, and progressive farmers might be invited at different times to attend such a week-end camp in groups. (2) State Colleges could lend valuable assistance to

a program in teacher education for conservation education. (a) College staff members might contribute instruction to the week-end program. (b) Conservation kits could be assembled for purpose of lending them for use in county or extension programs. (c) Speakers might prepare for programs. (d) Slides might be prepared. (e) More extension type programs might be offered. (f) Simplified field keys might be made to be used on field trips in conservation courses. (g) Television programs might be promoted to stimulate interest. (h) A co-ordinator might be appointed to plan the activities and to coordinate the conservation theme as it is taught in various college courses. (3) Workshop directors might make their programs more effective. (a) Workshop director conferences might be held. (b) There might be a system whereby there could be an exchange of experiments and new developments. (c) There might well be a sharing of talent, teaching units, and materials. (d) Outlines of workshop courses should be prepared. (e) Slides of educational activity at the training centers might be prepared. (f) A field activity manual should be prepared. (4) State departments of conservation and public instruction might work with colleges and school administrators that a greater interest in conservation might be aroused among teachers. (5) Conservation workshops might be more effective if: (a) Courses were of at least six weeks duration. (b) Specific plant and animal relationships were taught rather than vague generalities. (c) The program were administered in a camp situation. (d) Capable field naturalists were a part of the camping group and available at all times. (e) Field study was made a larger part of the instructional programs.

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MYERS, DeWITT EARL. The Problem Involving Correlation of Science with Vocational Curricula. M. A., 1950, State College of Washington. 91 p. Library, Washington State College, Pullman.

Problem or Problems.--Two occupational high schools were recently inaugurated in the Panama Canal Zone -- therefore: (1) How could we set up a physical science course that would be a departure from the ordinary physics, chemistry, etc., courses in that it would be tied directly to the science elements touched upon in the students' trade classes? (2) What is being done in the vocational, trade, technical, etc. high schools in the United States relative to their "related science"? (3) What elements of science would be necessary in such a "related science" course? (4) Is there any documentation to prove whether this type of course is more beneficial? (5) Course outline?

Sources of Data.--Reference books, periodicals, courses of study, experimental groups, interviews, expert judgments, and questionnaires.

Statistical Treatment.--None.

Major Findings.--A study of the available information on this type of science integration showed many suggestions on its development, stressed the need for "related science," but gave no specific outlines, courses of study developed, or specific cases where it was being carried on. A course outline of units of work to be covered was finally recommended. This was based on research data, questionnaire data returned, and data from experimentation carried on by the writer in a vocational high school situation.

NICHOLS, WILLIAM N. New and Improved Demonstrations for Use in Teaching Scientific Principles in Chemistry. M. Ed., 1950, Boston University. 100 p. School of Education Library, Boston University, Boston, Massachusetts.

Problem or Problems.—This study has been undertaken to develop "new" or improved demonstrations which have simplicity of design, forceful presentation of the principle involved, and "purity of concept," and which are catalogued according to the principles which they illustrate.

Sources of Data.—Reference books, periodicals, textbooks, and control groups.

Statistical Treatment.—None.

Major Findings.—A number of demonstrations was developed.

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OBOURN, ELLSWORTH SCOTT. Assumptions in Ninth Grade General Science. Ph.D., 1950, New York University. 358 p. Washington Square Library, New York University, Washington Square, New York City.

Problem or Problems.—(1) To determine the assumptions essential to the conclusions to be reached in a selected group of experimental exercises in ninth-grade general science and (2) to study how teachers make provision for the assumptions in their teaching procedures.

Sources of Data.—Textbooks, expert judgments, and questionnaires.

Statistical Treatment.—Comparison of Frequencies.

Major Findings.—(1) Experimental exercises in ninth-grade general science as now constituted do not seem to provide adequately for assumptions. (2) Factors inherent in the logical pattern of experimental exercises appear to influence jurors in judging assumptions as essential or unessential. (3) There is a group of assumptions associated with the 45 experimental exercises used in this investigation, which may be regarded as essential to the acceptance of the conclusions. (4) There seems to be no pattern of relationship between the types of experimental exercises and the categories of assumptions in this investigation. (5) Physical factors in the school environment do not seem to operate to select teachers who are more likely to provide for assumptions. (6) Greater provision for assumptions appears to be made in situations where provision has also been made for certain other elements of problem solving. (7) Experimental exercises observed in this study were presented exclusively by the teacher demonstration method. (8) Teachers of ninth grade general science observed in this study do not appear generally to be sensitive to the role of assumptions in the acceptance of conclusions.

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O'CONNOR, EDWARD R. Principles of Physical and Biological Science Found in Seven Textbooks of General Science for Grade Seven. M. Ed., 1950, Boston University. 104 p. Library, School of Education, Boston University, Boston, Massachusetts.

Problem or Problems.--To determine the principles of biological and physical science found in seven textbooks of general science for grade seven.

Sources of Data.--Textbooks and expert judgments.

Statistical Treatment.--None.

Major Findings.--(1) The authors of seventh grade science textbooks are aware of the need of presenting "principles" which are not too conceptually complex; (2) textbooks and courses of study should be built around a framework of appropriate generalizations; and (3) the determinations of which principles should be taught at a particular grade level should be investigated on the basis of pupil readiness.

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PETERSON, SHAILER. A Study of the Relation Between the Length of Dental School Courses and Admission Requirements. Nonthesis, 1950, American Dental Association, Chicago, Illinois. 5 p. Author, 222 E. Superior Street, Chicago 11, Illinois.

Problem or Problems.--Relation between the length of dental school courses and admission requirements.

Sources of Data.--Reference books, periodicals, and textbooks.

Statistical Treatment.--None.

Major Findings.--Great changes have taken place in the last 50 years in admissions requirements to dental schools. These changes have kept pace with the length of the dental school course which began as a one-year course about 110 years ago.

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PETERSON, SHAILER, A Comparison of the Dental Students in 1946, 1947, and 1949. Nonthesis, 1950, American Dental Association, Chicago, Illinois. 2 p. Author, 222 E. Superior Street, Chicago 11, Illinois.

Problem or Problems.--What types of persons select dentistry as a career?

Sources of Data.--Statistical data.

Statistical Treatment.--Not specified.

Major Findings.--Preprofessional honor-point ratio has increased steadily during the last four years and the average age of freshman students now is falling back toward prewar levels. Number of G.I.'s enrolled now on the decrease. Many of the factors about the entering classes are not returning to prewar levels. Dentistry students come largely from non professional fathers and they make their decision about dentistry when they were in high school or in college.

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PETERSON, SHAILER, A Study of the Relation Between the Number of Dental Student Applicants for 1950 and 1947. Nonthesis, 1950, American Dental Association, Chicago, Illinois. 3 p. Author, 222 E. Superior Street, Chicago 11, Illinois.

Problem or Problems.—Relation between the number of dental student applicants for 1950 and 1947.

Sources of Data.—Reference books, periodicals, and questionnaires.

Statistical Treatment.—Mean and standard deviation.

Major Findings.—Apparently the reservoir of students interested in studying dentistry remains as great for the 1950 class as it was in 1947. About 10,000 applicants filed about 18,000 applications for approximately 3,200 positions in freshman dental classes.

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POPE, TYE. A Technique for Evaluating Second Grade Children's Understanding of Science Terms and Principles. M. Ed., 1950, University of Texas. Library, University of Texas, Austin.

Problem or Problems.—To measure the levels of understanding of selected terms and principles in science by second grade pupils.

Sources of Data.—Experimental groups and interviews.

Statistical Treatment.—Comparison of frequencies.

Major Findings.—Not reported.

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RECTOR, MARION AGNES. A Systematic Study of the Herbaceous Plants and Shrubs in Christy Woods. M. Ed., 1950, Ball State Teachers College. Ball State Teachers College, Muncie, Indiana.

Problem or Problems.—This study was made to show how a wooded area, as Christy Woods, which is owned by a state teachers college might be used by a graduate student for original research work to produce information useful in botany, general biology, taxonomy, forestry, and ecology. Two problems were studied. The first was a taxonomic survey of the herbaceous plants (excluding grasses and sedges) and shrubs growing in Christy Woods. This study extended over a period of three years. It included the time of the first blooming of the various species. The second problem was an ecological study to determine the type, extent, and effects or damage done by a fire which occurred in a portion of the woods.

Sources of Data.—Field study.

Statistical Treatment.—None.

Major Findings.—It was found that there were two hundred and twenty-six species

of herbaceous plants and shrubs in the area studied. The fire was a surface type and burned approximately one and one-sixth acres. It was found that the herbaceous plants were temporarily retarded, but approximately eighty-nine percent of the small trees and shrubs were destroyed.

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SHERMAN, ROBERT C. The Conservation Attitudes and Information Possessed by Elementary School Teachers in Training. Ph.D., 1950, University of Missouri. Library, University of Missouri, Columbia.

Problem or Problems.--To determine the conservation attitudes of elementary school teachers and the factors related to the formation of these attitudes.

Sources of Data.--Interviews, expert judgments, tests of conservation education, and unique tests of conservation attitudes.

Statistical Treatment.--Mean, median, standard deviation, coefficient of correlation, critical ratio, and comparison of frequencies.

Major Findings.--(1) The Attitudes Inventory used in this investigation is a feasible device for deriving a picture of the conservation attitudes possessed by groups of elementary school teachers in training by inferring attitude patterns from responses to specific behavior situations related to conservation problems; (2) the data indicate common factors operating to produce in these respondents more conservation information and higher attitude agreement with conservation specialists; (3) more experience in teaching, up to about fifteen years; more college semester hours, up to the graduate level; or more semester hours of any kind of science, up to about twenty hours are factors which tend to increase conservation information and attitude agreement with conservation specialists; (4) neither the sex of an individual, his childhood home, nor the location of his teaching experience seems to have any important relationship to his conservation information or attitudes; (5) after consideration of college courses in conservation, botany, zoology, geology, and geography, as they are now organized and taught in the selected colleges, only conservation appears to be signally effective in producing more conservation information or higher attitude agreement with conservation specialists; (6) only those group organizations set up specifically for the purpose of giving information and influencing attitudes in conservation appear to affect significantly the conservation information and attitudes of the respondents; (7) individuals seem inclined toward higher agreement with conservation specialists on general principles of conservation than on applications of the principles to specific resources; (8) situations which involve self-interest or emotional and superstitious elements tend to cause a lowering of agreement with conservation specialists; and (9) the inability to make clear-cut decisions on conservation situations appears to be highly related to the lack of information of and/or insufficient experience in the situations.

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WANAMAKER, JOHN FREDERICK. A Survey of the Natural History of a College Campus as a Possible Means of Suggesting its More Effective Educational Significance. Ph.D., 1950, Cornell University. 414 p. Library, Cornell University, Ithaca,

New York.

Problem or Problems.--A survey of the natural history, both flora and fauna, was made over a three year period, on a 2300 acre campus at Elsah, Illinois. Teaching techniques and research problems which could be further carried out by students in the college biology department were instigated. A land utilization project was presented to the college authorities and a teaching program for the courses offered in field biology was developed for use in the biology department.

Sources of Data.--Reference books, periodicals, interviews, and field data.

Statistical Treatment.--None.

Major Findings.--Studies carried out by graduate students at Cornell University in the field of nature education shows that too few teachers recognize the value in or put any emphasis upon field work in their presentation of biological subjects. It has been also found that too few colleges or even teacher training institutions emphasize or even demonstrate the living aspect of the material presented in their biological courses. This study is an attempt to demonstrate the most effective possible use of the school campuses as a means of introducing the students to the living aspects of biology. Programs have been developed for use of the teachers in the biological sciences where courses adapted to field work can be carried out. While the presentation is at college level the high school teacher can make use of many of the suggestions.

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WRIGHT, WILLIAM H. A Directory of Science Education Organizations in the United States. M. Ed., 1950, Boston University. 89 p. School of Education, Boston University, Boston, Massachusetts.

Problem or Problems.--It was the purpose of this study to secure information on the extent and nature of science organizations in the United States. The investigation sought to gather information necessary to prepare, in the form of a directory, as complete a listing as possible of these organizations. Every listing will present as much valuable information as could be compiled for each organization individually.

Sources of Data.--Questionnaires.

Statistical Treatment.--None.

Major Findings.--The major finding was a listing of 110 science education organizations, including the following information for each: (1) Name and address of organization; (2) name and address of president; (3) name and address of secretary; (4) number of active members; (5) eligibility for membership; (6) scheduled meetings; (7) amount of annual dues; (8) local or national organization; (9) affiliations, if any; and (10) publications.

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