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ABSTRACT

This portfolio presents papers that were engendered by a conference held in 1978 at Udorn Thani, Thailand. The meeting was organized by the Asian Centre of Educational Innovation for Development and dealt with developing instructional materials and educational aids, particularly those which are produced from local and community resources, by educators in Asia and Oceania. The papers deal with: (1) methods to identify the common and special elements in core curricula for integrated rural development; (2) strategies, methodologies, and institutional arrangements used in the development of instructional materials for translating the core elements into teaching-learning materials and accompanying aids; (3) training teachers and other personnel in the design, use, and improvement of the materials developed; (4) problems and issues encountered in the development and use of materials and the strategies used to solve problems; and (5) mechanisms and procedures for continuous evaluation. Included are papers from: Indonesia, Korea, Pakistan, Thailand, India, Malaysia, Philippines, Nepal, and Sri Lanka. (JD)

ASIAN PROGRAMME OF EDUCATIONAL INNOVATION FOR DEVELOPMENT APEID

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A portfolio of experiences in Asia and Oceania

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PREFACE

The Asian Centre of Educational Innovation for Development (ACEID), jointly with the National Development Group for Educational Innovation in Thailand, organized a (Regional) Study Group Meeting from 4 to 19 December 1978 at Udorn Thani, Thailand, on developing instructional materials and educational aids, particularly those which are produced from local and community resources, both human and physical, in several areas of innovation including: i) curriculum development; ii) education of teachers, teacher educators and other educational personnel; and iii) science and technology education.

The participants prepared two separate volumes of report: a) a report on the activities of the meeting; and b) a portfolio of experiences of the participants in developing instructional materials.

The final report of the Study Group Meeting has been published separately under the title Universalizing education: Strategies for the development and use of instructional materials.

This portfolio was developed in the light of discussions during the Meeting. Basic drafts of the papers had been brought by the authors. These were presented at the Meeting and examined in depth by all the participants. In the light of this review, the authors rewrote the papers. They made substantial changes - clarifying points by rewriting some portions or providing additional material, giving evidence in support of certain claims as required by the Meeting and even supplying information on related aspects of their programmes (which the authors had not originally included in their papers) in view of the points made in other papers or questions asked in the course of discussions.

The papers deal with the following aspects:

1) Methods to identify the common and special elements for core curricula for integrated rural development;

2) Strategies, methodologies and institutional arrangements used in the development of instructional materials for translating the core elements into teaching-learning materials and accompanying aids;

3) Training of teachers and other personnel in designing, use and improvement of the materials developed;

4) Problems and issues encountered in the development and use of materials and the strategies used to solve problems;

5) Mechanism and procedure for continuous evaluation.

The papers are divided into three sections; namely, curriculum development, science and mathematics including technology, and teacher education.

SECTION 1

CURRICULUM FOR DEVELOPMENT

INDONESIA: INDONESIAN STRATEGY IN DEVELOPING INSTRUCTIONAL MATERIALS FOR PRIMARY AND SECONDARY SCHOOLS

by

Soedijarto

Introduction

The instructional material development activity, in this paper, is conceptualized as the last stage of a series of curriculum development activities that include: (i) the formation of institutional objectives; (ii) the planning of the structure of school learning programmes; (iii)the formulation of curricular objectives of each subject area offered in the school programmes; (iv) the selection and organization of the content of each subject area; (v) the selection and determination of the teaching-learning strategy; and (vi) the development of instructional materials and media. This sequence of activities has been adopted as a model for planning and developing school curriculum in Indonesia since 1973 when for the first time the Office of Educational and Cultural Research and Development (BP3K) was given the responsibility to direct and co-ordinate all activities related to curriculum standardization, curriculum development and curriculum reform. Before 1973, the development of school curriculum was the responsibility of the individual directorate directly concerned with administration of a certain level of school system.

This paper is especially intended to clarify how this model has been used to develop primary and secondary school curricula (including teacher education for primary school teachers) and to develop instructional materials and media.

Processes and strategies used in developing pre-university school curricula

It is not the intention of this section to discuss the complete steps for developing a school curriculum but rather to concentrate on the processes of (i) formulating institutional objectives; (ii) planning the structure of school learning programmes; (iii)formulating curricular objectives; and (iv) selecting and organizing the content of each subject area.

1. Formulation of institutional objectives

As stated above, the first step of curriculum planning and development is to formulate institutional objectives. These are objectives that clarify the competencies, knowledge and attitudes to be mastered by graduates of a particular school level. For this reason there are institutional objectives of the elementary school, institutional objectives of the senior general high school, and other institutional objectives related to each type and level of school.

Without a clear understanding of these objectives it is impossible for the curriculum planner to effectively and efficiently programme the number and types of subject areas.

To formulate the institutional objectives of each school, a team consisting of officials in the Ministry, experienced school principals, school supervisors, experienced teachers and curriculum planners studied the following documents:

a) national educational objectives stated in the Basic State Policy;

b) identified educational objectives derived from an assessment of national needs and problems; and

c) other relevant documents indicating the expectation of the society at large regarding the quality of people graduating from a certain school level.

Based on the results of the study mentioned above the team then tried to identify educational objectives which are suitable to the age level of graduates and may be achieved within a certain level of schooling.

After the team finished formulating the first draft of institutional objectives of a certain school, a national workshop, involving all official leaders of the Ministry of Education and Culture, all Heads of the provincial offices of education, selected teachers, Rectors of the University professors, was held to review and to give sanction to the first draft of the institutional objectives formulated by the team.

Following the above activity, the draft objectives was then reformulated and used as the basis for developing the curriculum of the school.

The general criteria used in formulating objectives of this level were that the objectives should:

a) be consistent with the spirit of the state philosophy stated in the Constitution;

b) serve as the translation of national educational objectives stated in the Basic State Policy;

c) be relevant to the social and national needs;

d) be relevant to the age level of the children; and

e) be realistically achievable within the time allocated.

At this level of curriculum work there is no question about rural versus urban type of school, for at this level the basic problem is to develop a curriculum which will promote national development and national philosophy.

2. Planning the structure of the school learning programmes

With a clear understanding of the nature and scope of the objectives of a certain school it is easier for the curriculum planne to generate school learning programme to facilitate the achievement o the institutional objectives.

In principle, in the Indonesian school curriculum there are three major clusters of objectives as follows:

a) objectives characterizing a moral man and, a good and healthy citizen;

b) objectives characterizing an intelligent and creative man with knowledge; and

c) objectives characterizing a skillful citizen mastering certain pre-vocational skills.

A team consisting of experienced headmasters, experienced sch supervisors, curriculum specialists, officials in the Ministry and curriculum planners conducted the following activities:

a) identify subject areas as the learning objects to achieve the objectives;

b) classify the subject areas into categories of programmes relevant to the clusters of objectives;

c) compare the value contribution of each category of subject areas with the objectives to be achieved; and

d) based on the result of the above activity, allocate the time for each category of subject areas.

After finishing the above four activities the team came up with a list of categories of school programmes, subject areas of each category and the time allocated for each category of the school programmes.

Based on the time allocated for each category of the school programmes, the time for each subject area was allocated using the following criteria:

a) the value contribution of each subject area in attaining the cluster of objectives to be achieved by a category of school programmes; and

b) the role of school learning in providing learning experiences to students in order to achieve certain objectives.

The following table shows the result of applying the above criteria.

Table 1: Structure of the curriculum programmes of SMP (Junior High School)

Educational Programmes	No.	Subject Area	GRADE					
			I		II		III	
		Semester	1	2	3	4	5	6
General Education Programme	1.	Religion	2	2	2	2	2	2
	2.	Pancasila Moral Education	2	2	2	2	2	2
	3.	Sports and Health	3	3	3	3	3	3
	4.	Arts	2	2	2	2	2	2
Academic Education Programme	5.	Indonesian	5	5	5	5	5	5
	6.	Local language	(2)	(2)	(2)	(2)	(2)	(2)
	7.	English	4	4	4	4	4	4
	8.	Social Studies	4	4	4	4	4	4
	9.	Mathematics	5	5	5	5	5	5
	10.	Science	4	4	4	4	4	4
Skill Education Programme	11.	Required	6	-	6	-	6	-
	12.	Elective	-	6	-	6	-	6
		Number of learning periods per week	37 (39)	37 (39)	37 (39)	37 (39)	37 (39)	37 (39)

To finalize the structure of the school learning programmes the team presented the output of their work to a national workshop, involving all people concerned with the sanctioning of the institutional objectives, to get their criticism, review, and suggestions.

3. Formulation of curricular objectives of each subject area

Nine curriculum development committee were appointed according to the nine subject areas in the curriculum: (i) religious education; (ii) Pancasila Moral Education; (iii) Arts Education; (iv) Sport and Health Education; (v) Languages (National and Foreign); (vi) Mathematics; (vii) Science; (viii) Social Studies; and (ix) Skill Education.

The first assignment for each committee was to formulate the curricular objectives, that is, the objectives to be achieved by the student in each subject area offered in the school learning programmes.

In formulating the curricular objectives the following factors would be considered:

a) the role and function of each subject area in achieving the total objectives of the school;

b) the time allocated for each subject; and
c) the age level of the student who will learn the subject.

In order that each curriculum committee could effectively accomplish the assignment, the membership of each committee usually consisted of: (i) selected experienced teachers; (ii) subject matter specialists teaching at teachers' colleges; (iii) professors of subject matters; and (iv) experts in curriculum design. For the Committee on Religious Education, the membership specially consisted of experts in relevant religions from the Ministry of Religious Affairs, while the Committees on Arts, Sports, and Health consisted of people from arts, sports, and health institutions.

With regards to the development of the Curriculum for Teacher Education, the formulation of the curricular objectives of each subject area was based on the competencies needed to perform new teaching roles in implementing the new curriculum of 1975 as well as the curriculum of the Development School system. For this reason, the development of the curriculum for Teacher Education has been carried out since the implementation of the curricula of the primary and secondary schools was started. Up to the present, the process of reforming the curriculum of Teacher Education is still underway.

After identifying teacher competencies needed to support the development and implementation of the 1975 school curriculum, a team of 70 teacher educators led by a committee on Curriculum of Teacher Education embarked on the total reform of the pre-service and in-service teachers education programmes. It is expected that at the end of 1978-1979 academic year, the curriculum for the first year of teachers' college programme will be put into trial.

4. The selection and organization of the content of the curriculum

The selection of the content of Curriculum

The first step in selecting the content of the curriculum was to translate the curricular objective into instructional objectives. This was based on the following considerations:

a) the instructional objectives should serve as sub-curricular objectives and intermed ate objectives for the achievement of the curricular objectives;
b) the formulation of instructional objectives should indicate the type of object as the substance of the objective; and
c) the instructional objectives should be measurable.

To ensure that the previous considerations are really taken into account in translating curricular objectives into instructional objectives the following steps were undertaken:

a) analyse the nature and scope of the curricular objectives;
b) identify alternative intermediate objectives that contribute to the achievement of the curricular objectives;
c) select from the alternatives those that are most relevant to: (a) function of the subject area in the total school programme; (b) level of student maturity; (c) socio-technological environment of the school; and (d) time allocated to achieve the objectives.

After the formulation of instructional objectives, the curriculum committee identified and selected the relevant topics and contents. Table 2 illustrates an example derived from the aforesaid activities.

After developing the course contents or outlines, a national workshop involving more selected subject matter teachers, subject matter specialist, professors of subject-matters, experts in curriculum design, and official leaders of the Ministry of Education and Culture would be held to review and give approval for use in the school.

Table 2: A quotation from the basic course outline of primary school curriculum

Curricular Objectives	Instructional Objectives	Topics
2. To know, to understand the interrelationship among living things and non-living things in connection with human life.	2.1. To know the relationship between a living thing and its environment.	2.1.1. Water animals and their specific characteristics
		2.1.2. Land animals and their specific characteristics
		2.1.3. Birds and their specific characteristics.
		2.1.4. Air and wind.
	2.2. To understand the basic concepts of the relationship between a certain living thing and another.	2.2.1 Food cycle and life cycle.
	2.3. To know the importance of fresh air and vitamins in connection with our health.	2.3.1. Fresh air
		2.3.2. Vitamins and their functions
		2.3.3. Food and hygiene
	2.4. To understand the change of the earth surface	2.4.1. Soil and rocks
		2.4.2. Soil fertilizing
		2.4.3. Rocks and minerals
		2.4.4. Soil and living things
		2.4.5. Natural resources.

The organization of the content of education

Since the importance of organizing the content is to develop a series of learning experiences which will have commulative effects on the behaviour of the learner, the question of vertical relationship in sequencing the topics so that they may reinforce each other in the process of learning the topics as well as the question of horizontal relationship are the basic issues to be considered.

In organizing the content that can guarantee the effective accumulation of learning experiences toward the achievement of the total objectives of the school learning programmes, the following criteria were suggested: i) continuity related to vertical relationship; ii) progressive logical sequencing and iii) integration related to horizontal relationship involving the functional relationship among subjects and areas in each period of learning programmes.

The most difficult problem in this process is the application of the principle of integration and horizontal relationship among the subject areas.

Table 3 illustrates the result of the above activity.

Process and strategy for developing instructional materials and accompanying aids

Before 1969 the development of instructional materials and accompanying aids in Indonesia was mostly dependent upon the initiative and creativity of individual writers and publishers. This state of affairs had resulted in a situation where almost in two decades of independence there were no innovations in the teaching methods as well as educational contents. For this reason, the Ministry of Education and Culture in 1969 as a part of its Five Year Development Plan, started a programme to develop instructional materials through writing textbooks with innovative ideas both in content and in the way of presentation.

A large portion of this section will be devoted to discuss the process and strategy of developing modular instructional materials in the Development School Project.

The programme of writing text materials has dual purposes; i.e., to provide enough textbooks for students and teachers and to introduce new ideas in the content of the subject areas that have never been changed since 1950. The composition of the team who wrote the textbooks consisted of university professors, selected lecturers of teachers' colleges, and selected well-educated and experienced high school teachers. This team was responsible in planning the course outline of the subjects for the new curriculum.

The team consisted of two groups: the writers and the evaluators. They work hand in hand continuously. The process of work is as follows: The writers and evaluators work together in a workshop to plan and prepare the outline of the textbook. Based on the results of the workshop, each writer prepares the draft manuscript, which is later reviewed by the evaluators and other writers. After the manuscript is accepted by the team, it is put into trial. Based on this trial, the text is revised for publication. The output of the team are teachers guide and student textbooks. Since the contents of the textbooks are new, all teachers are retrained to master the content and to be able to teach. The output of this mechanism has been used for the last five years. All textbooks now under reviewed based on the feedback and the requirement of the new curriculum of 1975.

Table 3: A part of the basic course outline of primary school science

Curricular Objectives	Instructional Objectives	Topic	Sub-topic	Grade I	II	III	IV	V	VI	
2.	2.1.	2.1.1.Water animals and their specific characteristics	2.1.1.1.The form of water animals	x						Will be developed
			2.1.1.2.The movement of water animals	x						
		2.1.2.Land animals and their specific characteristics	2.1.2.1.The form of land animals	x						
			2.1.2.2.The movement of land animals	x						
		2.1.3.Birds and their specific characteristics	2.1.3.1.The form and size of birds	x						
			2.1.3.2.The birds' way of life	x						
		2.1.4.Air and wind	2.1.4.1.The characteristics of air	x						
			2.1.4.2.The importance of air to living things	x						
			2.1.4.3.The influence of wind to life	x						
		2.1.5.Water	2.1.5.1.Introduction to water characteristics	x						
			2.1.5.2.The importance of water to living things	x						
			2.1.5.3.Hygiene Importance of water to health	x						
			2.1.5.4.Water as vapour and ice	x						

Development of modular instructional materials

The rationale of adopting the modular instructional system as the teaching-learning strategy in the Development School Project will not be discussed in detail but will be described briefly as the background information.

One of the basic assumptions underlying the adoption of modular instructional system is that the quality of education in terms of knowledge, attitudes, and skills mastered by the students will depend on the quality of the learning process. Traditionally, selection of the capability of the teacher. In the traditional way, the teacher is responsible for translating the basic course outline, written in the school curriculum, into the learning process. In many cases, based on the writer's own observations, the learning process adopted in the classroom is no more than listening to the lectures given by the teacher or copying lessons from the blackboard or listening to the teacher explaining the textbook that the children have. In the Indonesian context, the rate of increase of the student body cannot be matched adequately with the increase of qualified teaching staff. As an example, in 1972 when the decision on adopting the modular instructional system was in the process, only 21 per cent of the teachers who were teaching mathematics at the junior high schools were trained as mathematics teachers.

Since the modular system is an innovative teaching-learning strategy for Indonesia, there were only few people who knew the nature and characteristics of a modular programme. For this reason, before the team was established, a series of workshops and seminars were conducted involving experienced text writers, experienced teachers, experienced subject-matter specialists, experts in curriculum design, experts in instructional design, and professors of education as well as professors of particular subject-matters. After exploring all types of models of teaching-learning devices that will improve the teaching-learning processes without too much dependence upon the quality of the teachers, the modular system is decided as the teaching-learning device. Exemplar modules were written and tried out before being adopted by the workshop. The follow up of this activity was done by sending ten core members consisting of science educators, mathematics educators, social studies educators, language educators, and curriculum developers to attend an intensive training workshop abroad. This ten people plus twelve more were the group who trained new members on how to write a modular programme. Steps undertaken to develop a modular programme are as follows:

a) Analyze the nature and scope of the basic course outline of a certain semester. This is based on the assumption that the content of each semester or quarter had been organized properly. If it is found out that the horizontal as well as vertical relationship among semesters are not well organized, then the team can propose modification of the basic course outline.

b) Group instructional objectives and its topics into a logical sequence.

c) Divide the well-sequenced topics into units, each of which may be considered as the smallest unit of the learning programme.

d) Compare the vslue contributions among the various units in order to allocate the estimated time for learning each unit.

e) Specify instructional objectives of each unit based on instructional objectives stated in the curriculum.

f) Develop test instruments to measure the achievement of the objectives.

g) Based on the specific instructional objectives, translate the identified unit into detailed descriptions of the lesson to be learned.

h) Identify types of learning processes that will efficiently and effectively facilitate the achievement of the objectives.

i) Identify instructional aids needed to be provided or developed, to support the learning processed identified above.

After these activities have been accomplished, then a series of the blue-prints of the module is developed. Each approved blue-print is used by the members of the group as well as selected writers, mostly experienced teachers and lecturers, for writing the module.

Each writer, in writing the module is free to modify the blue-print so that the module will be developed in accordance with the level of maturity of students. Each writer will usually conduct a small scale try-out with teachers and students who will use the module.

The first manuscript of the module is then presented to the review meeting participated by all members of the curriculum development group and a member of the evaluation team for finalization. Some of the modules will be rewritten and revised before final editing and printing.

The module that has been written through this process is then put into trial. In preparing for the trial, the national evaluation team prepare instruments to get feedback from the teachers, students, as well as special observers.

In conducting the trial in each development school, the data collected are sent to the Curriculum Development Centre for manual and computerized analysis.

The result of this analysis is then submitted to the writers as the basis for revising the module. Besides getting feedback through this mechanism, each writer, specially the core group member, is encouraged to visit schools and conduct direct discussion with teachers who use the modules. In using all feedbacks to revise the modules, the Curriculum Development Centre provides facilities for the groups to conduct workshops. (see Ibrahim: Monitoring and Evaluation of the Modular Institutional System as the Teaching Learning Strategy).

Development of educational equipment and aids

It is recognized that effective implementation of learning programmes depends largely on the availability of educational aids that will facilitate the learning processes. As stated above, identifying educational media needed to support the implementation of the learning processes design to achieve instructional objectives is one of the steps in the process of designing and developing instructional materials. Since it is too much work for the modular writer or textbook writer to develop the module and the instructional aids simultaneously, a special team has been established to develop educational equipments and aids required to implement the learning process designed in the modular learning programme.

This team, consisting of educators working with the curriculum development group, experts in media and educational technology, and experts in media and educational aids development, identify and develop educational media and aids needed by each modular programme. It is important to identify the needs in order to find out which of the media have been available in most schools, which ones are feasible to be developed by the teacher, and which ones are important to be developed. Through close contact with the modular writers and textbook writers, the team then develop the following materials:

a) inventories of media and aids that are available;

b) guide for teachers on how to use media and how to develop media and aids that can be developed by the teachers; and

c) prototypes of educational media and aids relevant to the implementation of the learning programme.

The main functions of the media development team are: i) developing training programmes on how to develop media and to use media; and ii) developing prototype of educational media. The second function of the team is becoming the main function because there are many activities to be undertaken such as conducting trials of the prototype media, revising the prototype, and training teachers to use the prototypes.

This team has accomplished science kits for elementary schools. It is the intention of the Curriculum Development Centre that this team will be capable of supporting the programme of developing educational equipment based on the use of local resource materials.

Issues and problems in developing curriculum and instructional materials

After five years of experience in developing implementing the curriculum, the Curriculum Development Centre encountered the following issues and problems:

1. Issues on relevant curriculum: There is always the question of relevancy in every stage of curriculum development, such as relevancy to the interests of the learners, relevancy to the stage of mental development and relevancy to societal and national development needs. This issue by its nature is very complicated. It has been found that criteria for relevancy would usually be based on collective expert judgement and consensus among the experts and leaders rather than on scientific principles.

2. Issue on top-down versus bottom-up approaches in curriculum development: The Indonesian model of curriculum development has always been criticized for being too much top-down rather than bottom-up approach. In this respect the issue is not as simple as it seems to be. The basic problem is how to reform the curriculum of the school when the majority of the teachers do not realize the shortcomings of the system. Students of education have realized how slow the school education has been in responding to the change in society as well as to societal demands for education. This is largely due to the professional level of the teaching personnel. However, it is realized that no reform will be successful without the support and participation of the teachers. For this reason in applying the Indonesian model, selected teachers are involved in the planning and programming. The freely bottom-up approach will be possible only when the professional level of the teachers has been raised to the level of the other professionals.

3. Problems of implementing innovation and of adapting curriculum to the local conditions: The implementation of innovative methods, ideas and concepts will not be successful without the support of the teachers. However, the majority of the teachers in Indonesia are not used to innovations. For this reason, it is difficult to expect that innovative programmes which have been planned will be implemented effectively without the support of effective in-service training and supervision.

   Developing a curriculum that is relevant to the local conditions such as a rural area is also an innovation in itself. Therefore developing creative and intelligent teachers is a prerequisite to support the implementation of the curriculum which is suited to the local conditions.

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REPUBLIC OF KOREA: CURRICULUM DEVELOPMENT: DEVELOPMENT OF MATERIALS WITH REFERENCE TO SAEMAUL MOVEMENT

by

Tai Bom Chung

Introduction

The development of society in Korea, especially rural development has been accelerated through education. The Saemaul Movement which has become the new nationwide campaign for rural development since 1971 facilitated by a new type of education known as Saemaul education.

Modernization in Korea takes place under two aspects: one is to form the new society through industrialization and the other is to develop a new community through the Saemaul movement. Such being the case, the Saemaul movement for rural development has been strongly supported by the policies makers at the central level. Originally, its movement started in the rural areas with respect to agricultural society but at present it encompasses urban as well as rural areas. The basic principle of the Government policies according to Saemaul movement is to achieve a balanced development of agriculture and industry.

The Saemaul movement focused its attention on educating people and on making them perform productive activities. Accordingly, the movement was concerned with establishing work habits of people rather than providing verbal education. The Saemaul movement represents a determination to live a better life, and the spiritual guidelines of the movement are self-help, deligence and co-operation.

Saemaul movement has resulted in a remarkable achievement in the spiritual enlightment of the rural people, improvement of living conditions and infrastructure, and increase of income in rural areas. In this connexion, education has been the key element which brings about the success of Saemaul movement. In fact, the movement has grown along side with Saemaul education. Thus, all the schools at any level have participated in the movement through formal or informal means. For a better understanding of Saemaul education, a review of its curriculum, particularly the process of development and the development of instructional materials will be presented.

Process model for Saemaul education

Saemaul (New Community) education has been launched under the direction of the Ministry of Education as one of the basic national educational policies of the Korean government. The school are expected to carry out the policies accordingly.

The major policies are as follows:

1. The curriculum should be localized to serve the needs of the community, and should focus on solving the particular problems of the community.
2. Instruction should be diversified to meet the needs of the community by utilizing human, cultural and material resources which are locally available.
3. The school together with its facilities should be made available to the public as the centre for community development.

4. The school should offer educational opportunities for adults as well as youngsters in the community so as to meet their educational needs through a variety of programmes.

5. The school should participate actively in the community development programmes, particularly in the educationally planned service activities.

6. The school should co-ordinate educational and cultural activities in the community, and play an initiating role in implementing them.

7. The Saemaul Education of the school should be used to facilitate the reformation and innovation of general education. General education should link with community development and national progress.

Before the school puts Saemaul education into action, the above policies should be taken into consideration. The operational guidelines could then be developed which will enable the school to organize projects and programmes of action.

Through this process, it can be said that Saemaul education has adopted both the top-down and bottom-up approaches. Each school can develop its operational plan of the new community education and work out educational activities in accordance with the policies of the Ministry of Education.

The curriculum for Saemaul education has been developed through the process of planning, implementing, and evaluating educational programmes. In developing the curriculum for community development the whole process at which educational activities take place has been considered. Emphasis is given not only to the objectives or contents of new community education but also on the activities as well as the educational outcomes. The process of accomplishing any objective covers a reasonable procedure and system. The steps used in developing the curriculum are as follows:

1. Analysis of educational needs and problems

In order to effectively achieve the goals of the New Community movement in general and objectives in particular, the first stage of planning the New Community Education is to analyse the educational needs and problems concerned with community development.

The analysis starts with the identification of needs and problems faced by the school in the community. So, needs are concerned with problems which the school intends to solve. In general, the new community education will consider problems such as:

a) How a student at a school is brought up within the community surrounding?

b) How can a school make use of the community resources in implementing the curriculum? and

c) How can a school contribute to the development of its community?

The above questions can suggest the kind of educational activities the school should undertake. For example, the first question may give an answer on the kind of personality the school should develop in students through education, the second question on the development of the character of self-help in students, and the third question on contributions students can make to the development of their own community.

At this stage, need assessment can play an important role in establishing the planning of the new community education. Some steps in conducting a need assessment are as follows: (i) establish a planning body; (ii) identify problems; (iii) identify the areas for planning; (iv) identify possible need assessment tools and procedures and select the best one(s); (v) determine the existing condition; (vi) determine required condition; and (vii) determine ways to reconcile the discrepancies.

2. Establishment of educational objectives

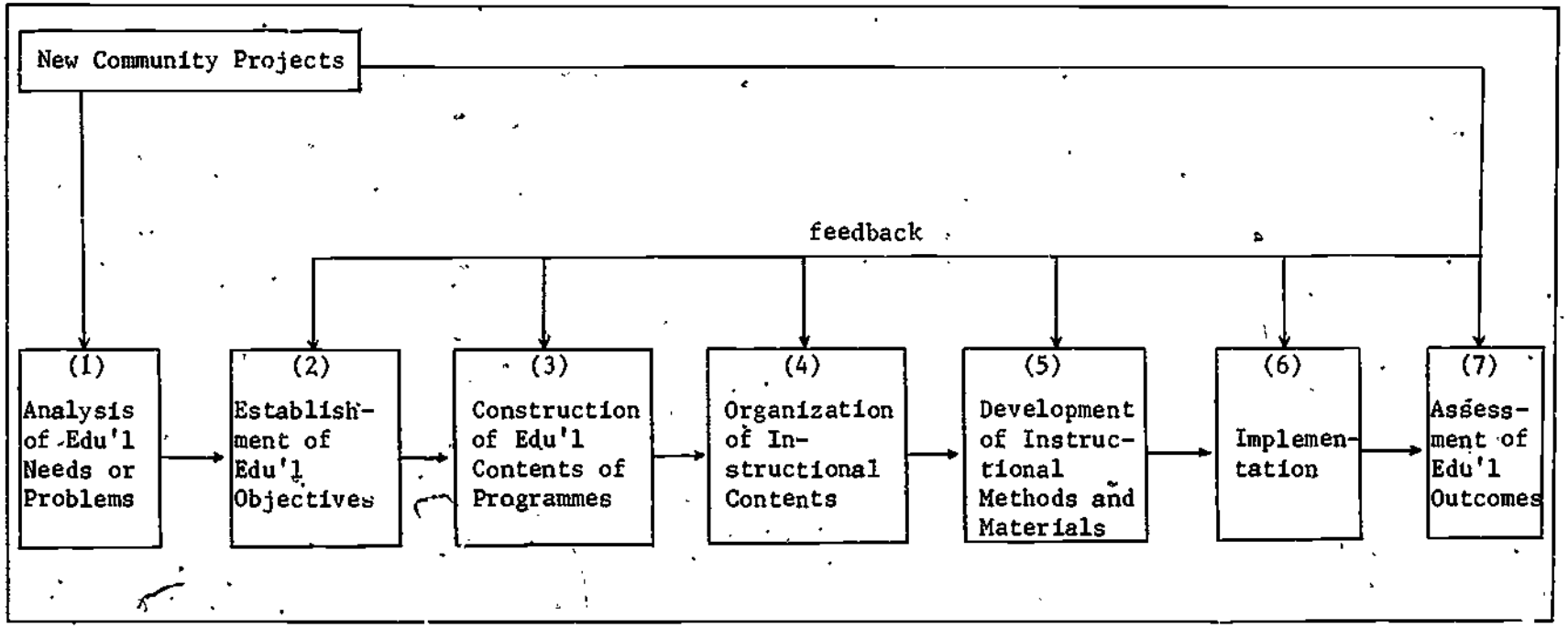
Educational objectives are usually set up on the basis of the results of the needs analysis. The goal of Saemaul Education is to bring about attitudinal reorientation reflecting the spirits of the Saemaul movement such as work ethics and national identity, thus enabling students and others to contribute to the development of their community and country.

Generally, educational objectives will be described in consideration of such factors as (i) clarification of instructional intent; (ii) contribution to development of meaningful instructional process or strategies; (iii) improvement in evaluation of learning achievement; and (iv) motivation of teachers and students. Schools have employed general and specific objectives for the new community education. General objectives are of value in describing what schools intend to accomplish. Specific objectives are those that tend to direct student activity toward acquiring clearly described traits, attitude, skills and knowledge. General and specific objectives of Saemaul Education are described in Table 1.

Table 1. Objectives of the New Community Education

General Objectives	Specific Objectives
1. To enhance spiritual revolution and national ethics through "Saemaul Spirit".	1. To solve community problems through classroom instructional activities.
2. To increase productivity by training productive skills and to improve the conditions for community welfare.	2. To guide student's community life through industrious, self-help, and co-operative attitude.
3. To increase adjustment to industrial society through "Saemaul Movement".	3. To acquire basic knowledge, skills and creativity for production.
	4. To participate in community activities.
	5. To open school facilities for community uses.

Figure 1. The process Model for the New Community Education



3. Construction of educational contents or programmes

Educational contents of the New Community Education are incorporated in school programmes in two parts: i) for students and ii) for youths and adults in community.

For students

a) Classroom instruction

i) understanding community;
ii) solving community problems;
iii) attitude to love community.

b) Guidance in schools and community

i) industrious attitude;
ii) attitude of service toward neighbourhood;
iii) co-operative attitude.

c) Education for production

i) basic knowledge and skills for production;
ii) creativity for increasing production;
iii) fund raising for school welfare.

d) Service activities

i) participation in community activities;
ii) providing a service for community development.

For adults and youths in community

a) Adult education

i) knowledge and skills for the increase in production and income;
ii) motivational programmes to change values and attitude;
iii) co-operation among community agencies for community education.

b) Provision of school facilities

i) use of school facilities for community activities;
ii) programme for leisure activities;
iii) co-operation among community people.

c) Support for the community activities

i) direct participation;
ii) indirect support: participation in planning the community activities.

4. Organization of instructional contents

As described above, there are two kinds of school programmes, one is for students and the other for youths or adults in community. Educational activities connected with Saemaul Education are carried out through classroom instruction on the one hand, and through out-of-classroom instruction such as extra-curricula or service activities on the other hand. Consequently, instructional contents of Saemaul Education which can be carried out through classroom instruction are derived from the analysis of subject matters.

The processes of developing instructional contents are as follows:

a) Analysis of subject matters with reference to Saemaul Education;

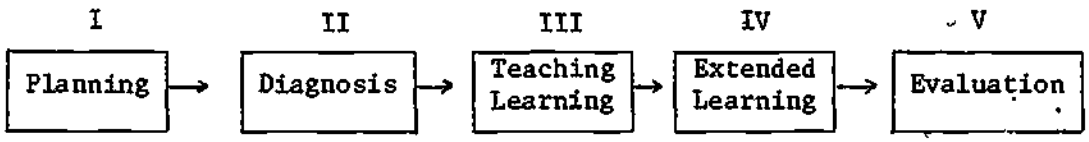
b) Drawing of instructional courses concerned with Saemaul Education from the subjects; and

c) Construction of instructional units.

An instructional unit is defined as a learning task or a task requiring approximately eight to sixteen hours of instruction. In designing an instructional unit, consideration is given to the unit structure in textbooks as well as to the internal structure of the learning tasks.

The Instructional System Model developed by KEDI is able to take into consideration the academic progress of individual students but does not overload the teacher with management problems. As shown in Figure 2, instruction for a learning task covers five stages according to the KEDI instructional model.

Figure 2. General Model of KEDI Instructional System

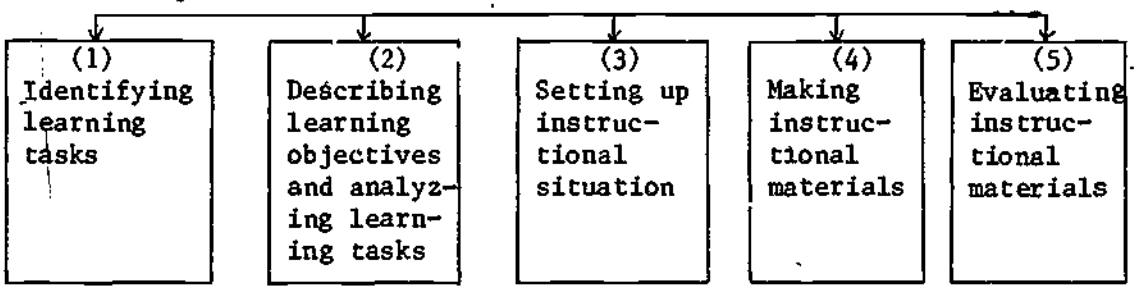


In planning, a teacher makes lesson plans and organizes the learning task; in diagnosis, a teacher identifies deficiences of students in pre-requisites for the learning task and makes provisions for remedial work; in the teaching-learning stage, main teaching and learning activities take place; in the extended learning stage, enrichment and/or remedial instructions are provided based on the formative test results; in evaluation at the completion of instruction for a learning task or tasks, an evaluation is conducted.

5. Development of instructional materials

In order to develop instructional materials, instructional objectives and content should be considered. As equally important is the availability of resource materials and the competencies of teachers to produce and use the materials effectively. The process of developing instructional materials are as follows:

Figure 3. The Process of Developing Instructional Materials



a) Identifying learning tasks: This step is concerned with sequential contents and background of learning tasks.

b) Describing learning objectives and analyzing learning tasks: At this stage making statements of learning objectives, selection of learning factors, analysis of learning hierarchy, making the sequence of learning, and selection of learning materials are the main activities.

c) Setting up instructional situation: Instructional situation such as condition or flow of instruction is set up on the basis of instructional materials which have already been selected.

d) Making instructional materials: At this stage instructional materials are made and developed for use in teaching and learning activities.

e) Evaluating instructional materials: Evaluation of processes and methods from the first step concerned with identification of learning task to the step concerned with making instructional materials, and that of learner's achievement are carried out. Instructional materials are revised on receiving feedback from the evaluation.

Various instructional materials have been developed such as (i) case books; (ii) teachers guides; (iii) student work books; (iv) test materials; and (v) other materials including instructional modules. These materials have been used, tried out and refined in schools, teacher training institutes and other educational institutions.

6. Implementation and training of teachers and other personnel

Instruction for the New Community Education is carried out with proper use of instructional materials. On the basis of instructional contents and materials, efforts are directed toward developing instructional units of each subject matters concerned with the New Community Education. Meanwhile, the contents of the New Community Education without reference to instructional units are carried out through extra-curricula activities or service activities. At this stage emphasis is given to teacher's role. Regardless of the clarity made in describing the spirit of the Saemaul movement, it would be useless if teachers cannot make good use of instructional media along with instructional processes.

Administrators and supervisors on the job are periodically brought to the National Institute of Education for orientation to Saemaul education.

A three-tier programme of central, provincial and local school level is conducted for different levels of administrators, principals supervisors and experienced teachers. The classroom teachers are also trained on the spot.

The Korean Educational Development Institute also trains experienced teachers for development of instructional materials and their use. The Korean Educational Development Institute training programme is centred around actual experiences of teachers on curriculum development and instructional materials.

7. Assessment of educational outcomes

The last stage is to evaluate educational outcomes such as increase in student achievement and growth of student attitude in terms of attainment of educational objectives. As far as Saemaul Education is concerned, most outcomes of the education are not confined to an achievement test like a paper-pencil test but concentrate on change in students' attitude and behaviour such as (i) industriousness and frugality in daily life, (ii) co-operative work for national identity, and (iii) participation in community activities. Therefore it cannot be said that teaching-learning activities in the classroom are more important than learning activities outside the classroom.

Outcomes of the Saemaul education programme were assessed in three phase: monthly or weekly, half-yearly and annually, in terms of industriousness on the part of the participants involved in the Saemaul education project, and the quality of the materials produced by them.

Review and examinations of the results of the Saemaul education have frequently been made in order to provide the incentive to those participating institutions and persons for their outstanding services. But annual evaluation of the results of Saemaul Education is conducted to reward people and institutions for outstanding services. Other incentive measures are also taken to boost the morale of those who have contributed to the promotion of Saemaul Education.

Problems and issues

Problems and issues encountered in the development and use of materials are as follows:

a) Lack of its quality to meet the learning needs of the students in the community;

b) Difficulties in recruiting experienced teachers to be able to develop the instructional materials;

c) Difficulties to find sufficient time to devote to material development due to heavy teaching loads; and

d) Difficulties in managing the over-crowded classroom when using instructional materials.

The strategy used to overcome the above problems is the efficient application of an incentive system by which teachers are awarded for their outstanding services. Three kinds of incentives are applied: (i) promotion on the basis of merit; (ii) giving opportunity to rotate into better schools; and (iii) awarding of prizes and given special recognition.

REPUBLIC OF KOREA: DEVELOPMENT OF EDUCATIONAL PROGRAMME FOR PRE-PRIMARY EDUCATION

by

Sang Ho Kim

Background

It is widely accepted that early childhood is of critical importance for future development of the child. If the child at the critical period of early childhood is provided with an enriched environment in terms of nutritional, physical, intellectual, and emotional stimulation, the child's development can be enormously facilitated. On the other hand, if the child is left deprived at this critical period of life, the mal-effects would be long lasting and even irreversible. In this respect, the development of early education for younger children, having not previously been given any government priority, appears to be urgent in Korea. Indeed, from the viewpoints of qualitative improvement of pre-primary education and the enlargement of educational opportunities for children particularly in disadvantaged areas, little has been achieved. Many problems remain unsolved.

First, there are extremely limited opportunities for Korean children to benefit from pre-primary education. The facilities for education at this level are so sparse that only 3.3 per cent of children from the eligible age group attend. Most of the existing opportunities for pre-primary education have been established by private foundations, usually having religious affiliation. In the whole of Korea there are only four public government - supported kindergartens, which are attached to public elimentary schools. The existing facilities are to be found in the more affluent areas within the large cities. In fact, children in the rural areas and in the majority of urban areas do not have access to pre-primary education. It follows that there is an urgent need for early education in the context of social equity.

Second, there are few learning programmes applicable to younger children in pre-primary schools. In recent years new understanding has been reached regarding how children develop and learn intellectually, affectively, and physically. Improvement and innovations in early education have followed these investigations in the field of child development and learning. However, in Korea the existing public and private kindergarten have not yet designed any programme systematically to enhance physical and mental potentiality of the child, except a few private ones.

Third, there are limited numbers of teachers who are competent and experienced in the field of early education. Special attention should be given to the role of play in education at the early childhood stage. However, it has to be admitted that education in the Korean context has mostly been a very formal activity. Merely providing materials for play and leaving the children to use them do not constitute the best possible learning opportunity. The teacher must be a good observer of child

behaviour. How, when and why the teacher intervenes in the play, and freedom, control and limits must be carefully considered because they form the backdrop of consistency and predictability of the environment in which the child may develop the confidence to play. It is anticipated that this will be a new area of concern for Korean teachers. It will be of great value to have a group of experienced teachers available when the Government strengthens pre-primary education particularly in less favoured areas.

Finally, there is little recognition concerning the importance of parental involvement through home teaching for the facilitation of children's physical and mental development. In order to maximize pre-primary education, the co-operation of the parents as child rearers, and of the community, are considered essential.

National Plan for Pre-Primary Education

Recently, however, the Ministry of Education has become aware of the need to address itself to this area of education. Firstly, it is referred to in the guidelines for the Fourth Five-Year Economic Development Plan (1977-81) and can be summarized as follows:

"Strengthening of Pre-Primary Education"

a) Demonstration kindergarten classes will be established at sixtynine schools.

b) It is intended that two classes, each of 40 children, will be formed at each demonstration school.

c) The mode of operation and the effectiveness of the demonstration classes will be studied with a view to extending a system of pre-primary education throughout the country.

Secondly, in a Long-Term Education Development Planning currently released by the Ministry, it is planned that a drastic expansion of kindergarten facilities will be made. Funds for kindergarten attendance is due to be raised from the national treasury. The Ministry also realizes that there is a lengthy gestation period for such a new educational policy and is anxious to commence work on our development research project on a Pre-Primary Education Project with UNICEF support.

A Pre-Primary Education Project

The Pre-Primary Education Project, being carried out by the Korean Institute for Research in the Behavioural Sciences (KIRBS) with financial supports from both of the Ministry of Education and UNICEF, is developmental in nature and involves both fundamental research and a demonstration programme for pre-primary education in Korea. Schools selected for participation in the demonstration programme will be situated in rural and urban areas where disadvantaged, underprivileged children aged 5 to 6 years predominate.

The purpose of the present project is to develop and try out teaching-learning materials that will give Korean teachers and children access to a modern system of pre-primary education especially suited to Korean conditions.

The project will be carried out in four phases during the period of 1978 to 1981 as follows:

a) First year (1978) - Completion of basic research, material development, and development of a teacher training programme;

b) Second year (1979) - Limited field trials, development of a parental programme, and revision of materials;

c) Third year (1980) - First dissemination stage and revision of the programmes; and

d) Fourth year (1981) - Comprehensive evaluation and preparation of recommendation pertaining to widespread diffusion.

The limited field trials to be conducted during the second year of the project will provide feedback data concerning the suitability of the programmes developed and the instructional strategies recommended to the teachers. The trials will be conducted in 17 schools on a country wide basis in co-operation with the Ministry of Education.

The number of schools involved in the project will be successively increased during the years 80-81. In fact, it is expected that the number of schools be increased to 38 in 1980 and to 69 in 1981. The wider dissemination of the programmes in 1980-81 should provide valid, broadly based data for evaluation purposes. This data will be used by the Ministry and its subsidiary organizations to formulate plans for a national system of government-supported pre-primary education.

The programmes and materials to be developed are as follows:

a) Development of learning materials

During the first year the project will focus on the development of materials for the use of both teachers and children. The materials will be designed to facilitate cognitive, socio-emotional, language, and physical development.

b) Development of a teacher training programme

The training programme will provide background knowledge and information concerning methodology appropriate to children of the target age group. The most recent studies concerning child development will be utilized. The principles that underlie the instructional strategies suited to early childhood education will be elucidated. The optimum use of the learning packages developed within the project will be demonstrated.

c) Development of a briefing/training programme for parents and other interested persons.

To successfully operate this exploratory and demonstration programme, the co-ordination and co-operation of the parents and others in the local community will be essential. Therefore, suitable training materials will be prepared for use by staff members. It is desirable to make all parents, and local leaders especially, aware of the importance of the child development and early childhood education.

Development of education programme

The education programme is based on the condition that it is addressed to poor children from culturally and socio-economically disadvantaged homes. This disadvantaged home environment is generally limited on its capacity to support the total development of the children. And, it is meant by poor children that they are disadvantaged intellectually, emotionally, socially, or physically. It is also anticipated that many teachers who are less qualified in terms of their teaching experiences and competencies will participate in our demonstration programme. Finally, it is clear that the costs involved in wider dissemination of learning materials, particularly play equipment, are prohibitive at this stage. Such a dissemination would be beyond the capacity of this project.

Under such conditions as poor children, less qualified teachers, and limited fund, the project attempts to develop a structured programme as oriented toward the development of the whole child. Comparatively saying, in the open education approach of providing unsupervised liberty for children to enable them to indulge in generalized play, the success of the programme is dependent upon the skill of the teacher who is not only aware of the developmental functioning of each child, but can also relate the child's present level of functioning to successive and developmentally appropriate levels of mastery. However, under the difficult condition of recruiting qualified teachers, it is inevitable to provide instructional materials systematically structured for the teachers so that these materials can be of assistance to them in the classroom. The instructional strategies call for the teacher to direct learning activities in which the children participate. This participation is prescribed, but it is often encouraged that participation occurs in a flexible manner to meet the needs of the children. In other words, the teacher plans activities on a daily basis and guides the learning of the children in a prescribed way. The teacher also is encouraged to respond to the children's needs by capitalizing the informal opportunities that are relevant to learning. In short, the degree of structure inherent in this programme may range from moderate to high.

1. Goals of the education programme

Early education programmes, fortunately or unfortunately, have not yet accepted a universal body of knowledge or skills that are considered most important to be transmitted to young children. For instance, some programmes such as the Bank Street Programme and the Weikert Traditional or Unit Programme, and the programme developed by many Project Head Start centre stress cognitive and socialization skills. Programmes such as the early childhood programme of the Institute for Developmental Studies and the DARCEE Programme emphasize the acquisition of academic and social skills. The programme designed by the Bereiter-Engelmann academic preschool accents skills in academic areas, with particular concentration on the verbal interaction that occurs between teachers and children. Finally, the Montessori Programme and the New Nursery School Programme focus on learning how to learn, the development of intellectual abilities and a positive self-concept.

However, when the educational goals are examined in detail, it becomes evident that there are large areas of overlapping concern in those different early education programmes. These areas extend along continuing of cognitive, social, emotional, and physical goals. KIRBS programme has set up general curriculum goals that are appropriate for young children, both poor and advantaged. The goals are socio-emotional development, cognitive development, language development, and physical development including health and safety.

a) Socio-emotional development:

i) To acquire basic skills necessary for interacting effectively with others and achieving personal autonomy;

ii) To develop self-identity, achievement motivation, curiosity, and persistence;

iii) To learn aesthetic expression and appreciation;

b) Cognitive development:

i) To develop cognitive abilities such as classification, verification, numerical construction, the structuring of time, and the structuring of space;

ii) To build physical knowledge about names and properties of all the objects in the child's environment;

iii) To learn social knowledge that remains in the realm of information concerning family and community roles and social conventions.

c) Language development:

i) To increase the child's ability to understand and produce basic language forms such as sound, words, and basic grammar;

ii) To develop communication skills to use language effectively for both general and specific purposes; and

iii) To enhance the child's confidence in speaking and listening in the context of imaginative experience.

d) Physical development:

i) To strengthen motor skills involving both gross and fine muscle co-ordination and physical fitness;

ii) To develop sensory-perceptual skills concerning visual discrimination, auditory perception, and tactile discrimination; and

iii) To establish habits in favour of health and safety.

2. The Process of the Material Development

The process used in translating the goals into a series of specific learning experiences for children involves:

i) defining objectives;
ii) selecting contents;
iii) making table of specifications;
iv) writing the teacher's guide to instruction;
v) conducting the try-out; and
vi) revising the programme.

a) Defining objectives

In order to be useful for instructional planning, objectives are defined in rather precise terms. The major reason is that commonly used words can mean different things to different people. Carefully defined objectives, however, should have the same meaning for all literate persons - i.e., conveying precise information about human performance.

We have two basic standards to define objectives. One standard is concerned with what the child is expected to be able to do following the instruction and not what the child is doing during the instruction. The ther standard is to avoid the tendency of stating objectives which are too remote in terms of time. Objectives should be stated in terms of the expected current outcomes of instruction, not the far distant future ones.

The followings are examples of statements describing specific objectives related to the goal of socio-emotional development.

This goal is divided into social, emotional, and aesthetic domains. In each of the domains, there are many objectives specifically defined. Some of them are presented as follows:

Social domain

(i) Intrapersonal skills

There are seven objectives related to the skills. One of them is:

"The child should be able to assume independent responsibility for completing his (or her) tasks."

(ii) Interpersonal skills

There are five objectives related to the skills. One of them is:

"The child should be able to play co-operatively by following rules."

Emotional domain

(i) Self-expression

One of two objectives related to this self-expression is:

"The child should be able to express his (or her) feelings appropriately - love, joy, sadness, fear and etc."

(ii) Self-identity

It includes two objectives. One of the two is:

"The child should be able to have sense of confidence to do his (or her) tasks."

(iii) Achievement motivation

Two objectives are included here. One of them is:

"The child should be able to initiate activities."

(iv) Curiosity

One of two objectives related to persistence is:

"The child should be able to attend to tasks for increasingly longer period of time."

Aesthetic domain

(i) Aesthetic expression

There are five objectives in this behavioural category. One of them is:

"The child should be able to enjoy to express his (or her) feeling by singing a song."

(ii) Aesthetic appreciation

There are four objectives in this category. One of them is:

"The child should be able to enjoy listening to music."

a. Selecting contents

Following the defining of objectives, the second step is concerned with selecting the relevant contents. Different labels may be used to describe the kinds of activities that are important for children. They may be subject-matter labels such as science, mathematics arts, and music, or other terms such as sensory-perceptual activity, cognitive development, motor activity, and creative expression. The content label is merely a vehicle for assisting the child in mastering a particular objective. It is a tool to be used selectively in order to motivate the child and hold his interest. In other words, the contents refer to specific subject matters to be learned by students through particular learning experiences in order to achieve the objectives. The decision regarding a content must be seen in the context of a unit to be developed in the latter stage.

The following are examples of the content areas selected for the programme of November:

November: "Preparation for Winter Season"

The third week:

1. Monday - "Preparation for Winter Season"
   a) Making sounds with plants
   b) How plants live in winter
   c) How plants grow
   d) Vegetables in winter
2. Tuesday - "Harvest"
   a) What harvest is
   b) Origin of Thanksgiving Day
   c) What thanks do we give at harvest
   d) Playing games of harvest
3. Wednesday - "Changes in Plants"
   a) Why leaves fall
   b) Body expression on falling leaves
   c) Playing with crops
   d) Collecting falling leaves
4. Thursday - "Seasonal Birds"
   a) What seasonal birds are
   b) Where do they come from
   c) Expressing winter garden
   d) Where wild geese travel
5. Friday - "Kinds of Sounds"
   a) Making a toy weather vane
   b) Matching animals to feed
   c) Word association
   d) Discriminating sounds

c) Making a table of specifications

Once the first two steps (defining objectives and selecting contents) have been accomplished, a table of specifications is drawn up. The table is a two-dimensional matrix or chart. Each objective is listed along one dimension and the different content areas are specified. The intersection of each objective with each content area results in objective-content cell. An example of such a table is as follows:

Specific Subject Matter	Socio-Emotional			Cognitive			Language			Physical			
	SD[1]	ED[2]	AD[3]	CA[4]	PK[5]	SK[6]	BLS[7]	CS[8]	LA[9]	SP[10]	Motor	Health	Safety
a. Making sounds with plants			1314										
b. How plants live in winter							3133						
c. How plants grow					2232								
d. Vegetables in winter												4322	

SD = Social domain
ED = Emotional domain
AD = Aesthetic domain
SP = Sensory perceptual
CA = Cognitive abilities
PK = Physical knowledge
SK = Social knowledge
BLS = Basic language skills
CS = Communication skills
LA = Literature appreciation

d) Writing the teacher's guide

Once a table of specifications previously described is made, the next step is to write teacher's guide to instruction for each class activity. An example of instructional guide for a section of unit programme is shown below:

PLAY WITH CROPS

Tuesday, the Third Week, November

1. Outline of activities:	Children touch various crops, talk about what they feel, and try to discriminate these crops.	
2. Expected outcomes:	Children will be able to identify individual crops. Children will be able to discriminate through touching various crops.	
3. Time duration:	Approximately 15-20 minutes	
4. Materials:	(For children) Rice, beans, corns, millets, barleys, and six containers.	
5. Instructional guide:		
		Remarks
How to identify the crops without looking at them	-Let the groups of children enjoy playing with various crops in the containers for a while.	*The grouping of children must be preplanned.
	(Key questions) "How can we find out what crops there are in the container?" - (looking at the crops) "If we do not have eyes how can we find out?" -(touching the crops with hands)	*To induce children to make the answer that we have to look at the crops, and in turn, to touch them with hands.
Telling different	-To raise the following questions in association with the previous ones. -"We have seen various crops that our parents harvested. Tell us what you feel when you touch the crops with your hands.	

	"Do you have different feelings or the same feelings when you touch different crops?"	
	-"Why do you have the same feelings (or different feelings)?"	*To encourage responses from children.
	-"Now, let's touch the crops again and see how you feel."	
	- While they are touching the crops, the teacher repeats the previous question; "Do you have the same (or different) feelings?"	*Do not interrupt children's enjoying playing with the crops.
Closing the activity	-"Do you have different feelings from different crops?"	
	-"Why are your feelings different?" - (The teacher explains) "As all of you look different, the crops are different. So, when you touch them with your hands, you have different feelings."	

e) Making materials

When the teacher's guide has been written, the next step is to produce materials for children. The major concern at this point is to make sure that the materials can be used by children, and that any advance preparation necessary is made.

f) Conducting the try-out

The try-out attempts to evaluate the validity and relevance of the programme, and to obtain information necessary for revising the programme. The programme will be evaluated in terms of interest, difficulty, feasibility, etc. Naturally, this try-out will be followed by revision of the programme.

Problems encountered in development of the materials

The following are problems encountered in the process of the material development and strategies used to solve them:

1. At the stage of selecting specific objectives to develop the materials, there was difficulty of matching the objectives to developmental levels of Korean children. The selection of the objectives was based on our subjective judgement on developmental levels with reference to literature on child development. At present empirical evidence on the developmental levels of the child of the Republic of Korea is very limited. The field trials to be conducted in 1979 will provide information necessary to solve this problem.

2. It was criticized that the teachers' guide developed was too specific and thus, it was likely to stifle the teacher's creativity and flexibility to manage the classroom effectively. The comment was valid to some extent. However, there is a reason why no change has been made in the structure of the guide. As previously indicated, most of the teachers who participate in our demonstration programme are not qualified enough to successfully manage the classroom with no teachers' guide for instruction. It appears likely that they need the teachers' guide specifically prescribed to facilitate children's learning experiences effectively.

3. At the stage of conducting the try-out to validate the materials developed, inappropriate application of them was experienced which caused the partial success in some of the instructional units. This may be due to many reasons. First, some of the teachers who participated in the experiments did not have sufficient understanding of the use of our materials, which indicated a need for a longer and more effective teacher orientation programme prior to the try-out. Second, some teachers did not use the materials at appropriate junctions of the try-out. Lastly, teachers in some experimental schools obviously did not have a sense of involvement in the try-out. It was suspected that because teachers in those schools were designated to participate in the try-out, while others volunteered. No instructional materials could be effective without a sense of involvement on the part of the teacher. Attention has to be given to how to promote the sense of involvement among the teachers.

4. There was a problem of identifying latent causes related to unsuccessful classroom management when it occurred. This may be due to too much attachment to formalized observation and assessment to examine the applicability of the materials in learning situations, and failure to find out hidden causes of the unsuccessful management of the classroom. In some cases, it may be desirable to employ human insight in assessment so that this failure could be avoided.

Mechanism for evaluating the materials

In general, the materials are evaluated in four phases during the period of its implementation, as follows:

a) First, evaluation of the materials through short-term try-outs;

b) Second, evaluation of the materials through limited field trials;

c) Third, evaluation of the materials through first dissemination; and

d) Final comprehensive evaluation of the materials through widespread diffusion.

Particularly, in the first evaluation of the materials developed, various human resources were involved.

First, the teachers who participated in the application of materials were asked to evaluate their experiences in the try-out classrooms. A checklist developed by KIRBS and a self-report of the teacher were used.

Second, experts in the area of early education were invited to examine the suitability of the materials in various aspects. They are those who have teaching experiences in kindergartens for more than ten years or are teaching students majoring in early education at teacher training colleges.

PAKISTAN: EXPERIENCES IN DEVELOPING CURRICULUM MATERIALS FOR PRIMARY/SECONDARY SCHOOLS

by

Mahmudur Rahman

Until the 1970s, various attempts at education reforms had been made in Pakistan. In all cases, voluminous reports were prepared and the reforms were introduced. But it may be said without hesitation that the curriculum was still overloaded with academic type of text. There was hardly any opportunity presented in the syllabus of the primary and secondary schools for crafts, practical work or pre-vocational courses. It was the great need of the time to include such subjects in the curriculum of the elementary education for a regular supply of bulk of skilled and literate workers. Students from the elementary schools should have enough knowledge and practical ability in the skills they learn so that when they go back to their ancestral vocations, they could be better artisans or farmers than their forefathers.

Education policy of 1972

Keeping the above-mentioned facts in view, a new Education Policy was formulated in 1972 according to which a comprehensive change in the curriculum was fully recognized. The policy had emphasized the designing of such curricula relevant to the changing socio-economic needs with a massive shift from general education to a more purposeful agro-technical education. For the achievement of this purpose, the inclusion of agro-technical courses as well as practical work in the primary and secondary schools was encouraged.

In view of the guidelines and objectives laid down in this policy, the curricula was revised in detail. The learning method employed fully ensured that those not proceeding to secondary education could be absorbed into the economy of local community and that the aim to eliminate the existing general education would be achieved. In this connexion the approach to curriculum development has been changed, using the following guidelines:

1. Vocational courses will be selected keeping in view their relevance to the present day needs of Pakistan.
2. While designing syllabi, the viewpoints of content specialists, method specialists, psychologists and class teachers will be accommodated as far as possible.
3. For those leaving school after Class VIII, special vocational skill training courses will be provided in the school workshop.

4. The syllabi will be framed to serve as adequate preparation for continuing activity in the 9th and 10th classes. Effort will be made to design the curricula in such a way that traditional method of theoretical teaching is prevented.

The following three groups for vocational and agro-technical courses were offered at the elementary school level:

1. Metal - Work, Wood - Work and Applied Electricity
2. Agriculture
3. Home Economics for girls

Keeping in view the modern approach to curriculum development for vocational education and in order to make this education purposeful, it was decided to make it related to specific aims. In designing the aims, individual development was viewed in three distinct settings: (i) Personal Life; (ii) Family Life; and (iii) Community Life.

It is expected that after thorough implementation of the agro-technical studies, the following broad objectives would be achieved:

1. Students will be in a position to make useful contribution to home, school and community life.
2. Sense of dignity of labour will be inculcated in the students.
3. Aptitude, ability and appreciation of particular fields will be developed in students.
4. The proficiency in the use of elementary hand tools of equipment will be developed.
5. The children, when dropped out after class VIII, shall carry with them enough skill to return to their local or ancestral vocations as: (i) better farmers; and (ii) experimented craftsmen.

While formulating Education Policy in 1972, the authorities concerned were fully aware of this fact that merely increasing the number of schools without taking into consideration the quality factors, the real purpose and philosophy of universalization of elementary education could not be realized. By using outdated approaches in teaching through chalk and talk method and conducting cook-book type experiments in the classroom, it was just impossible to improve the quality of primary and secondary education. They considered that the new curricula introduced by this policy, could not be implemented effectively until and unless the entire school system has facilities in terms of necessary minimum equipment and trained army of qualified teachers. According to them, it was only through new innovative techniques and effective use of instructional technology that we could achieve the desired long range goals of producing citizens who could positively contribute to the economic growth of the country in future.

It was because of these facts that the said Policy emphasized on improvement of teaching methods and provision of instructional materials and teaching aids to elementary schools.

The national teaching kit project

Keeping the above policy in view, the Curriculum wing decided to develop comprehensive project on teaching kit known as National Teaching Kit Project through which all existing primary schools of Pakistan could be provided with teaching kits.

This scheme envisages provision of teaching kits consisting of instructional materials covering a wide range of school subjects. Tools and equipment will also be provided for teachers to produce inexpensive instructional aids using indigenous materials.

The teaching kit also includes a teacher's manual. This manual consists of investigations children may make, instructional materials needed for such investigations, approaches to conducting the investigations/activities, suggestions for teachers, and suggested activities for bright students.

The development of this teaching kit is a unique experiment in the country to introduce innovation in the primary education. The development of appropriate equipment and other instructional aids have to be integrated with the new curriculum. It is felt necessary that mass production and distribution of teaching kits be taken up at the national level to help the learner to develop his/her potential through observation, exploration and understanding of the natural phenomena by using inquiry, open ended and do-it-yourself type of activities.

Teachers' education

While talking about the development of curriculum materials, one should not overlook teacher education which is the most important component of the educational system. It is appropriate to say that even with the best buildings, well-printed books, high quality of instructional materials and bright students, the standard of education cannot be improved if the teacher is not competent and keen to teach.

In order to effectively implement the curricula, the teacher education programmes, both at pre-service and in-service levels have been re-organized in Pakistan.

The Secondary Education Committee, formed in persuance of the recommendations of the First Educational Conference in 1947, had stressed that: "A properly trained and well-paid teaching profession was essential to the building up of a great state".

From the very beginning, considerable attention has been paid to the proper training of school teachers. After the promulgation of Education Policy of 1960, a series of in-service refresher courses had been organized to re-orient teachers on new techniques and new subjects arising from curriculum reforms. These courses were organized not only by the training institutions themselves but also by the newly set up education extension centres. As a complement of the extension centres, a number of pilot schools have been set up in each province to exemplify new teaching method and approach under the revised curriculum.

Production of guide books for the teachers in various subjects was undertaken to keep the teachers abreast of the objectives of the academic reforms.

Proper stress on the training of teachers and improvement of teacher education had also been laid in the Education Policy of 1972. It emphasised sound basic education and professional training of the right type. According to this policy, teachers should have enough insight in the process of education, the psychology of the learner, the philosophy of education - its aims and objects and the proper method of teaching. They should be honest in fulfilling their responsibilities towards the new generation.

As the training of teacher was a most crucial task, the Curriculum Wing invited experts from all over the country to train the key educational personnel in the use and maintenance of Teaching Kits during a workshop for in-service training of teachers. At the grassroot level training, a 2-week model was proposed according to which the teachers would be able to:

1) outline the philosophy of the National Teaching Kit;
2) perform activities utilizing the kit in accordance with the approach set out in the laboratory manual;
3) demonstrate skills, such as assembly, manipulation, observation, maintenance, safety, in the use of the kit;
4) analyse the effectiveness of the kit for the development of a particular concept;
5) design alternative strategies for the development of concepts when a given strategy for such development proves ineffective;
6) prepare a lesson plan which includes the utilization of the National Teaching Kit;
7) conduct an interaction analysis of a classroom situation;
8) design, perform and prepare instructional materials, for an additional activity facilitating the development of a particular concept or skill.

With the introduction of National Teaching Kits in the primary level curricula, it has been felt necessary that our existing Pre-service Teacher Training programme should also be revised incorporating the component of teaching kit as an integral part of the Programme in the country. Thus teaching kit would be integrated with both in-service and pre-service teacher education programme in Pakistan.

New curricula have now been developed in Pakistan. Teacher's guides have been produced for the new approach. In order to train the teachers for the new curricula, in-service teachers' training courses have been started by Allama Iqbal Open University. The instructions are imparted through sending the materials by correspondence. On qualifying the course, the teachers are awarded certificates and they are given advance increments as incentives.

Teachers' guides have been developed for use of the primary teaching kits. Provincial Textbook Boards are responsible for writing and publishing the textbooks from primary to higher secondary levels. The special feature of these books is that they are according to uniform curriculum and at the same time of low cost.

Supplementary reading materials

Education is not restricted only to the portals of schools and the prescribed curriculum of the country. It continues even outside the institutions and textbooks. Formal education up to a certain level does not help in the full development of the child's mind. Reading of supplementary books helps him in his mental and material development.

Supplementary reading material for children in Pakistan was almost non-existent. Whatever it was, it existed in the form of fairy tales and adventure stories of Tarzan and Red-Riding Hood. Moreover, these books were poorly printed and badly illustrated.

No emphasis was ever laid on the original writing so that the child's interest can be aroused in his own language, literature and heritage. In fact, the production of supplementary reading materials was the most striking area of neglect in our country. Cognisance of this book famine was taken by the Government and the National Book Foundation (NBF) was established in 1972 under the control of Federal Education Ministry, having a Board of Governors headed by the Federal Education Minister. The NBF has flooded the country by publishing more than 500 books on medical, engineering, commerce, law, economics subjects. It has the following departments for execution of printing works.

1. Editorial Board:

   a) Panel of subject experts
   b) Competent editors.

2. Illustration Wing:

   Containing well-established artists

3. Production Wing:

   Having competent proof-readers, printing experts, paper experts, etc.

The NBF claims to have made a solid contribution in the field of supplementary reading materials in the national language, covering five age groups: infants and children 3 to 6 years, 6 to 9, 9 to 12 and 13 to 14.

The topics covered are history, geography, unusual birds, plant life, sciences, Urdu classics, think and play, stories, novel and poetry. From 73 titles published by the Foundation so far, 21 titles are on topics of science or related subjects.

For the first time in Pakistan, books are available to children which are well-written, beautifully illustrated and highly informative and pleasing. The aim of these well-produced books is two-fold: to inculcate reading habits of the urban child to whom the only books available so far have been imported fairy tales and comics. It was the crying need of the day that our children should be weaned away from the so-called heroes such as Tarzan and Red-Riding Hood..

Designing instructional materials

The NBF pioneered the official production of supplementary reading materials in Urdu, the national language of Pakistan and created an enormous market. The first 19 titles were accepted as some of the best in Asia by a panel of judges at the Unesco Exhibition of Children's Books held in Tokyo in 1973. The same year, these titles were included in the first Pakistani Bookshelf abroad in the Munich World's Children's Library. In Pakistan, these books won Awards for Book Design, Illustration, Production, Printing and Literature.

A Children's Encyclopaedia, arranged in alphabetical order is the first of its kind in Urdu published by the NBF. It includes the universe, earth, science, history, civilizations, inventions, fiction, religion and nature. It has over 450 illustrations - 250 being in colour. It alone has won three awards for Literature, Production and Illustration.

Many of NBF's titles have been recommended by the Ministry of Education as supplementary reading, and from last year, have been included in the lists given to students by school authorities. Aside from printing of supplementary reading materials for school-going children children, the NBF has been entrusted with the taak of publishing textbook, and teachers' books for all the provinces. Because of good printing, colourful illustrations, tough binding thick cover, these books have been much appreciated by school children.

The NBF has a panel of subject experts belonging to schools, collegea, universities and literary societies. The manuscripts are given to them for evaluation and comments. If they need some amendments to be made in the text, the authors are advised to rewrite the manuscripts in the light of the given suggestions, otherwise, the manuscripts are passed on to the Editorial Board which edits comprehensively, removing all typea of mistakes and also checks facts and figures given in the text. Thereafter, the manuscripts are sent to the Illustration Wing which is required to go through the text for illustrating appropriately and making the design, lay-out and cover for the book. Afterwards, the manuscripts along with the relevant illustrations (black and white, and colour) are passed on to the Production Wing which is responsible for selecting the appropriate type of paper, type face, ivory card, etc. and for proof-reading as well (proofs of each title are proof-read four times to ascertain error-free printing). When the book is ready for sale, complimentary copies are sent to all leading newspapers, journals, radio and television centres for comments. Any concrete suggestions given in review, are implemented in further edition.

After having gone through the various development process of the curriculum in Pakistan, one can easily observe that continuous and constant efforta have been made to prepare an effective, purpoaeful and indigenous courae of studies for the school-going children. Despite a number of hindrances, such as rapid population growth, meagre resources, inadequate provision of physical and educational facilities, lack of competent and qualified teachers and non-existence of cheap and good printing materials, steps have been taken to make the education within the reach of students living in the rural areas. After thorough evaluation of the changing requirements and with the suggeations of the experta, Education Policies have been formulated to achieve the desired result.

Education policy of 1978

While this write-up was under preparation a new National Education Policy was announced by the Pakistan Government which highlights the following aspects of primary and secondary education:

1. Efforts will be made to improve the quality of primary education.
2. This will involve substantial provision of teaching aids, strengthening of pre- and in-service programmes of teachers and improvement of physical facilities.
3. A number of non-formal means will also be used to achieve universalization of education.
4. To impart useful skills in order to convert students into productive members of the society, village school workshops will be established.
5. Each school will be equipped with a small improvised workshop.
6. One specially trained teacher will be appointed in each school.
7. Assistance from the local craftsmen will also be utilized for imparting training to the boys.
8. Emphasis will be placed on indigenous agro-based trades and skills.
9. Physical facilities such as science laboratories, teaching and audio-visual aids will be provided to the secondary schools particularly in rural areas.
10. The present scheme of agro-technical subjects will be evaluated and modified so as to make agro-technical education purposeful.

It is hoped that the new programme for providing revised curricula, well-equipped workshops, and trained teachers will be extended to cover the development of agro-technical education in rural areas.

Suggestions for "New Outlook" in the Presentation of Curriculum Materials

1. Education in national languages

Language being the medium through which instruction is imparted and absorbed, its importance cannot be over-emphasized. The principal defect of the education system in the Colonial era was that it was imparted in a foreign language thus subverting the possibility of ever matching those in whose language it was imparted and, therefore, created an inferiority complex. It is necessary for educators, first of all, to decide that all the textbooks and reading materials would be produced in national languages. This will be a great service to the nation by creating a sense of self-respect and confidence in the children otherwise they may come to realize at any stage that having been deprived of education in their own language, they are nothing but a doll totally deaf and dumb.

2. Development of culture

In the colonial era, education in Pakistan was supposed to follow the education policy of the rulers only to become the clerical staff. And now, as a free nation, it has turned over a new leaf merely to earn bread as a mechanic and farmer. One should not forget that man does not live by bread alone. After the acquisition of material goods and comforts, he must understand spiritual values, cultural heritage, traditional influences, human cares, anxieties and aspirations. The great tragedy is that while countries possessing the most powerful science of the West that have dominated the whole world for about four centuries have started to redesign its priorities in order to achieve human values, the developing nations are still going through the same western cycle by overlooking their own culture.

It is high time that while preparing curriculum for the new generation to inculcate proficiency for a job. Rules for safeguarding culture, maintaining traditions and preserving heritage should be devised. If a balance is not maintained in the development of new brain, it would suffocate the young mind and result in the decay of the coming generation.

3. Production of textbooks

It is highly surprising that we frequently talk about reorganization of the curriculum, re-orientation of the teaching method and revamping of the entire education system, but we seldom speak of the very appealing feature of the textbooks - that is production. The following points may be considered as basis of the "New Look" in our future textbook production:

1) The paper used should be of a good quality. In any case, newsprint should be replaced by white printing paper.

2) Type size and variety should be carefully graded, according to age groups.

3) The illustrations should be relevant to the text and the subject matter.

4) Illustrations alone do not enhance the readability of any textbook. It is the quality of design and lay-out which makes the text much more readable to the child.

5) The pictures should be actual and graded according to a child's age and also there should be some differentiation between symbols and objects used in the rural/urban areas.

6) Colours should be allowed wherever possible, at least till the child is 8 to 9 years old.

7) Binding and cover paper should be tough so that textbooks may withstand a child's handling and may even be passed on to the next child in the family so as to ensure a great deal of economy.

8) The volume and the page-size of each book should be considered in almost all cases. The present textbooks tend to be very badly printed, crammed with all manner of type-faces and sizes, with very little spaces around the

illustrations. This is most essential because a badly laid out book where half the text disappears into the spine and the other half projects into the margin or on to the legitimate illustration space is, without any doubt, a frustrating and ugly experience for a child.

All these points, presented above, must be remembered when the printing of textbook or supplementary reading materials for the school-going children is undertaken, otherwise all efforts to upgrade and uplift the educational standard would go to waste. The NBF has always given them due importance.

THAILAND: CURRICULUM REVISION AND IMPLEMENTATION PROJECT

by

Swat Chongkol

Background information

Realizing that the 1960 curricula for primary and secondary schools have been in use for quite a long period of time and that educators and the public have expressed serious concern for their relev efficiency, and functional value, the Ministry of Education appointed a Steering Committee for Curriculum Revision in 1970 to revise the existi curricula and construct the new ones. This committee appointed several sub-committees and working groups to conduct curriculum analysis; prepa aims, principles, structures and details of curricula and curriculum materials for primary and secondary schools. After issuing curricula for senior secondary schools in 1975, primary and junior secondary scho in 1978, another committee was appointed in 1977 to implement the curri known as the Steering Committee for Curriculum Implementation. The following information is the summary of curriculum activities undertake in Thailand during 1970 and 1978.

A. Methods to identify the elements of the core-curriculum

1. Methods used in identifying core elements

a) Survey, systematic observation and interview were used t investigate problems and needs of people in rural areas.

b) Weaknesses and strengths of the 1960 curricula were identified by documentation analysis taken from researches conducted by departments concerned in the Ministry of Education, Ministry of Public Health, Ministry of Agriculture and Co-operatives, Ministry of Commerce Ministry of Interior, National Education Commission, National Research Council, Department of the National Education Reform Committee and Universities.

c) Questionnaires and interview instruments sent to teacher principals, supervisors, educational administrators in the urban and rural areas were used to identify and validate the information obtained from a) and b).

d) Work-groups appointed by the Steering Committee for Curriculum Revision were set up to analyse the findings obtained in c) and prepare recommendations for total curriculum revision to be submitted to the aforesaid committee.

2. Criteria used in identifying core elements

a) Relevance in terms of developmental needs of Thai children and youths;

b) Validity and feasibility in terms of psychology of learning as well as the rapid changes and progress of emerging knowledg and technology;

c) Logical sequence of learning hierarchy and the core-relationship among various subjects;

d) Individual, community and national needs in terms of socio-economic and cultural contexts;

e) Desirable total experiences needed by the children and youths in primary (compulsory and post compulsory age group) and secondary schools;

f) Educational needs and trends expected to occur during national curriculum implementation during 1978-1988; and

g) Flexibility and feasibility of actual implementation to suit varying factors, namely, time, individual, group of persons and community elements.

B. Strategies, methodologies and institutional arrangements used in the development of instructional materials for translating the core elements into teaching-learning materials and accompanying aids

1. Secondary school curricula

Curriculum construction for both junior and senior curricula was mainly based on the experiences gained from the Comprehensive School Experimentation Project conducted by the Department of General Education during 1960-1974 and the Vocational Education Improvement Project operated by the Department of Vocational Education during 1963-1974. During such periods, syllabi, teachers' manuals, curriculum guides, texts, supplementary readers, reference materials, job sheets, record and report forms, and teaching-learning aids were developed, tried out and revised. Students, teachers, subject specialists, curriculum developers, school principals, university lecturers and professors, supervisors, educational administrators, industrialists, farmers, businessmen and laymen were summoned to take part at various stages during experimentation projects run by the two departments mentioned earlier.

2. Primary school curriculum

Since primary education is regarded as the minimum education for a Thai citizen, the Curriculum Revision Steering Committee issued the policy of trying out syllabus, curriculum materials, instructional methods, evaluation process and teaching-learning materials two years in advance of the nationwide curriculum implementation. Steps were taken as follows:

a) Conducting documentation analysis of reports and experiences gained from various experimentation projects, namely, Bangkok-Dhonburi Education Project (1954-1961), General Education Project (1958-1963), Rural Education Project (1963-1966), Extension of Compulsory Education Try-out Project at Samut Songkram and Phuket Project (1960-1965), and the Improvement of Rural Primary School Project (1964-1970). The first three were assisted by USAID and the latter two were the outcome of UNICEF encouragement. This stage was conducted in 1970-1971.

b) Carrying out documentation analysis obtained from researches conducted by the Department of General Education and universities; workshop and seminar reports organized by the Department of General Education, Department of Teacher Training and Department of Educational Techniques, to find out weaknesses and strengths of primary school syllabi. This stage was done jointly with (a) above during 1970-1971.

c) Formulation of aims, principles and structure of the primary school syllabus was carried out by a task force responsible to the Curriculum Revision Committee during 1972-1973.

d) Content selection, textbook writing, lesson plan and teachers' manual preparation, and teaching-learning aids preparation were made during 1974-1975.

e) Preliminary survey and pre-project record of the situation were conducted in the 25 try-out project schools from five geographical representations in 1975 and later on, another 40 try-out schools were selected to represent all the 12 educational regions. Thus, the number of try-out schools was 65 for the whole country.

f) Training of grade I teachers, school principles, provincial and regional supervisors, teachers, college representatives, regional and provincial education officers, during school summer holiday in 1975.

g) Try-out project to investigate relevance, validity and reliability of curriculum materials began at grade I for the first time in 1976. The try-out of grade I was repeated in 1977 and simultaneously the first year try-out for Grade II materials was started. After careful consideration of the revised curriculum materials for grade I, nationwide curriculum implementation (grade by grade starting from grade I in 1978) was made in 1978.

h) Various people participating in the construction of secondary school syllabi and curriculum materials have taken part in preparing primary school syllabi since 1970.

C. Training of teachers and other personnel in designing, use and improvement of the materials developed

A one-day orientation seminar for the members of each working group preparing syllabus and curriculum materials was organized every time prior to actual writing. Regular meetings among chairmen of every sub-group were conducted to clarify the issues and to co-ordinate all the products prepared by every sub-group during group work. In addition, the Department of Educational Techniques appointed two important groups: the Consultant Group and Editorial Group. They were composed of school principals, curriculum experts, subject specialists, supervisors and educational administrators. Consultant regularly met the members of the working groups. Two general meetings among the editors, consultants and members of the working groups were held. The meeting were organized during the mid-term and the final stage of work, each lasted about four to six months. This practice has been adopted since 1974. Furthermore, 24 class teachers mostly from rural schools representing all 12 educational regions were invited to critically look at the curriculum materials prior to the general aforesaid meetings to validate relevance, feasibility and functional value of the materials under preparation.

The Ministry of Education upholds the principle of encouraging local educational personnel to develop curriculum materials to suit local situation and needs. Therefore, a team of curriculum developers from each of the 12 educational regions were invited to take part at all stages of the development of curriculum materials since 1974. By 1976, all educational regions were able to produce curriculum materials deemed suitable for situations and needs in their respective areas. It is expected from 1979 onwards that a high standard of curriculum materials would be produced. It is hoped also that the materials to be produced as planned would reinforce the efficiency and effectiveness of curriculum implementation which would serve both national and local needs.

The Curriculum Development Centre of the Department of Educational Techniques regularly obtains data and information on every developmental stage, from both the national and local levels. Feedback data and information are critically studied for continuous improvement of the syllabi and curriculum materials. It is hoped that this grass-root and cyclic process of curriculum development would be further improved with a view to developing the best possible outcome of educational development.

D. Problems and issues encountered in development or use of materials and strategies used to solve the problems.

As mentioned earlier, the Ministry of Education appointed two top steering committees; the first is the Steering Committee for Curriculum Revision and the second is the Steering Committee for Curriculum Implementation. The task of the first committee was accomplished in 3 October 1977. The second committee was appointed on 1 June 1977. There are two sub-committees. The first one is responsible for the preparation and follow-up of planning of student enrolment, school building and allocation of an appropriate number of teachers. The second one looks after the production and distribution of syllabi and curriculum materials, training of teachers, organizing workshops, and seminars concerning various aspects of the improvement of efficiency and effectiveness of curriculum implementation, and the supervision, follow-up and evaluation of curriculum implementation.

With the advent of the Steering Committee for Curriculum Implementation, problems and issues have been regularly considered to find ways and means of resolving them. Nevertheless, it can be summarized that the formidable task is to overcome the problems and constraints in the chronic and vicious problems of financial inadequacy, the lack of full understanding of curriculum aims and objectives as well as the lack of competency to conduct effective teaching-learning process in the classroom.

Presently, the Ministry of Education approved the strategy proposed by the Department of Educational Techniques to overcome the problems. Basically four types of strategies are being used. First is the production and distribution of the well-structured curriculum materials, simplified and practical enough for teachers to follow and carry out efficient and effective teaching-learning programmes at the classroom level. The second is to build up a group of resource persons attached to every group of schools (approximately 4,550 groups for primary school, 100 groups for junior and secondary schools and 20 groups for senior

secondary schools). The third is to encourage a number of good school volunteers to improve the quality of curriculum implementation. They are expected to help themselves economically but aim at achieving the best possible results. The volunteers are supposed to set up good examples for the other members of the group of schools so that they may learn and apply the experiences in their respective institutions. The last is to improve the supervision, follow-up and evaluation system. It is anticipated that this strategy will help the Ministry of Education to reduce problems and issues, and at the same time will improve the educational standard as a whole.

E. Mechanism and procedures for continuous evaluation, and periodic renewal of instructional materials

Evaluation and improvement of syllabi and curriculum materials in Thailand can be classified into two categories. The first category is related to administration and academic aspects. The second category is the "self evaluation" and "external evaluation" or formative and summative evaluation. The administrative aspects are handled by the departments which directly administer schools, namely, the Department of General Education which administers all government junior and senior secondary schools; the Secretariat of the Private School Commission which looks after all private schools; and the Department of Local Administration of the Ministry of Interior which co-ordinates the administration of local primary schools which is run by the Provincial Administration Authority and by the Municipal Authority. All the academic matters concerning the development and improvement of curriculum materials are handled by the Department of Educational Techniques.

In terms of technical process, the second category is envisaged as follows: First, the Curriculum Development Centre regularly sets its own curriculum evaluation during the group work and during the specified period of the curriculum try-out project. This procedure is classified as "self-evaluation". Then the Division of Educational Research of the Department of Educational Techniques will annually evaluate the outcome of each year during the curriculum try-out period as well as annual evaluation of the nationwide curriculum implementation. This is regarded as "external evaluation" and "summative evaluation" for the Curriculum Development Centre but it is "self-evaluation" and "formative evaluation" of the Department of Educational Techniques. It is agreed that the Office of the National Education Commission will conduct two nationwide evaluation of the curriculum implementation of the six-year curricula of primary and secondary schools. This is regarded as "external evaluation" and "summative evaluation" for the Department of Educational Techniques. As such, continuous evaluation and improvement of curriculum materials are expected to be efficiently and effectively undertaken with the hope that educational standards will be constantly improved.

SECTION II

SCIENCE AND MATHEMATICS INCLUDING TECHNOLOGY

INDIA: TEACHING THROUGH ENVIRONMENT

by

J.S. Rajput

The largest concentration of rural population is in Asia where the world's 35 per cent rural population lives. Even though urbanization is increasing, the population in rural areas is dominant numerically in this region and occupies a crucial place in the total national development. The rural sector in this region is marked by illiteracy, unemployment, under-employment, population pressure, inadequate housing, lack of transport system, etc. For the development of such a sector, development of human and economic resources, productivity and institutional resources are all inter-twined and have to be considered as a compact whole.

Development is frequently identified with economic growth but in the modern world it is being given wider connotation and is considered as a multidimensional concept. The resolution of the United Nations General Assembly of 1 January 1971, points out the following principal objectives of development:

1. A minimum standard of living consistent with human dignity;
2. Sustained improvement in the well being of the individual;
3. Sharing of benefits by all;
4. More equitable distribution of income and wealth;
5. A greater degree of income security;
6. Expansion and improvement of education, health, nutrition, housing and social welfare; and
7. The safeguarding of the environment.

The above objectives encompass the whol. gamut of a nation's economic, social and cultural life and development, therefore, it becomes a multidimensional concept and cannot be confined or equated to only economic growth.

In India the process of development started long way back and the nation paid adequate attention to improving its education towards development goals. Not only the quantitative aspect of education was taken care of as is evident from the increasing rate of literacy, but qualitative improvement of education was also attempted as is clear from our concern to continuously revise the curriculum of education for various levels. Not only has the educational system of our country been reviewed and restructured time and again, it has also been made science-oriented so as to make it more functional to help people live a "good life".

Science education in this country has been made a compulsory and important component of school education. This assumes special significance in the context of India's financial inability to provide huge sums involved in the teaching of science by way of expenditure required

for laboratory equipment, tools, apparatus, etc. But the country was not to be pegged down by such academic notions; teaching of science is not tagged to costly equipment, at least up to a certain stage. The approach to science teaching up to primary level could be made environmental and beyond that, much could be achieved by improvising science equipment required for teaching-learning process. The ten-year school curriculum as developed by the National Council of Educational Research and Training (NCERT) reflects this approach.

The academic soundness of the environmental approach is established by the mere fact that it is the child's own environment, with which the child is most familiar, which should become the starting point for all teaching-learning process. The environment in which the child lives, plays, handles and fights with is surely the most familiar element, which can be exploited for making child's learning sound and effective. An approach of this kind also cuts across all barriers of subject disciplines and the learning takes place across a very broad spectrum of curriculum. What is more important to the child is the knowledge on how best to explore and utilize his immediate environment and resources for making life more meaningful and good. It is immaterial for the child that the academician likes to call and divide his environment into such disciplines as Physics, Chemistry, Civics or Geography.

The curriculum prepared for classes I to V reflects this approach. The rationale for the same as enunciated by the NCERT is given below:

1. This is a very crucial stage in the life of a child;
2. The child's spontaneity, curiosity, creativity and activity, in general, should not be restricted by rigid and unattractive methods of teaching and learning;
3. The curriculum has to take into consideration the social, intellectual, emotional and physical maturity of the child as well as the socio-economic needs of the community;
4. Since for a number of children, this may be a terminal stage, it is necessary to provide them education which prepares them for life and self-learning.

With this rationale, the NCERT set the following objectives of education at this stage:

a) The first objective is literacy. The child has to learn the first language, which would generally be his/her mother-tongue to a level where he can communicate easily with others through properly articulated speech and in writing.

b) The second objective is attainment of numeracy. The child should develop facility in the four fundamental numerical operations and be able to apply these in the life of the community to solve practical problems;

c) The third objective is technology. The child should learn the method of inquiry in science and should begin to appreciate science and technology in the life and world around it;

d) The child should develop a respect for national symbols like the flag and national anthem and for the democratic processes and institutions of the country;

e) The child should acquire healthy attitudes towards human labour and its dignity;

f) The child should develop habits of cleanliness and healthful living and an understanding of the proper sanitation and hygiene of its neighbourhood;

g) The child should acquire a taste for the good and the beautiful and should take care of his/her surroundings;

h) The child should learn to co-operate with others and appreciate the usefulness of working together for the common good; and

i) The child should be able to express himself/herself freely in creative activities and should acquire habits of self learning.

With these objectives, the NCERT worked out the following curriculum for the primary stage:

i) Language;
ii) Mathematics;
iii) Environmental Studies (Social Science and General Science);
iv) Work-experience and the arts; and
v) Health education and games.

Later on in June 1977, the Government of India, Ministry of Education and Social Welfare appointed a Committee under the Chairmanship of Shri Ishwar Bhai Patel to review the whole structure of school education including the stagewise and subjectwise objectives identified by the NCERT as well as to scrutinize the NCERT syllabus and textbooks. The Committee took into account the difficulties envisaged in implementation of the curriculum and also the views of parents, teachers and experts.

So far as the curriculum for primary level of school education is concerned, the Review Committee generally endorsed the NCERT view pertaining to Language, Mathematics and Environmental Studies. However, in place of work experience and the Arts and Health Education and Games, as recommended by the NCERT, the Review Committee recommended 'Socially Useful Productive Work' (SUPW) and 'Games and Creative abilities'. The SUPW was found to be more realistic in terms of implementation and community requirements.

The attainment of objectives as laid down for the primary stage in the curriculum detailed above leaves much to be done at the methodology level and by the teacher. For the translation of these objectives into practical realities, newer approaches to the teaching-learning process are needed since the classroom teacher-lecture method or rote memory approach will not help. With this end in view, the Regional College of Education (RCE), Bhopal, Madhya Pradesh, a Centre of the NCERT, undertook a project in 1976 with the following objectives:

1. Identification of child's environment;

2. Weaving learning around child's natural and familiar environment;

3. Preparation of material for teachers to use the environmental approach to teaching-learning process.

The environment here is used not as an end in itself, but as a means to an end, the end being the all round development of the child's personality in terms of knowledge, skills, attitudes, understanding, etc. Such an approach to teaching-learning process will not only help children appreciate their surroundings better and work out solutions easily to the problems they may face in life but will also arouse and keep their interest sustained in vocations available locally, such as agriculture, animal husbandry, forestry, etc. Learning through the environment will also help the child to inculcate the habit of wisely using all natural resources, develop scientific attitudes, appreciate the process of science and help him/her to fight communalism and casteism especially in rural India. The Hoshangabad Science Teaching Project (HSTP) (described later) involves the community in a planned way in translating Curriculum into teaching learning materials.

The teacher's position becomes crucial in such an approach as it is the teacher's own efforts, ingenuity and resourcefulness that have a direct bearing on the success or otherwise of the system. The functions of a teacher are complicated here as he has to arouse the child's curiosity and interest, arrange for going out, explore the environment to child's benefit and learning of various aspects.

Identification of the elements of core curriculum for environmental studies

The college faculty associated with the Environmental Studies Project through deliberations over a period of time developed a consensus that, to begin with, for the purpose of the project the following topics out of the NCERT syllabus be chosen as core elements:

a) Air
b) Water
c) Rock and Soil
d) Housing and Clothing

Later on, other topics were taken up and developed in phases.

The selection of these topics is based on the rationale that:

i) Knowledge about air, water, rock, soil and housing, etc. is necessary for every child as they are the needs of every day life;

ii) Knowledge about these things is directly related to improvement of life and thus rural development;

iii) These elements are available in the immediate locality of the child.

Strategies and methodologies used in developing curriculum material

The NCERT has developed curriculum by identifying the elements of the core curriculum for Environmental Studies on the basis of:

1. Social needs;

2. Child's maturity level; and

3. Child's interests.

The topics prescribed by the NCERT for different classes had to be broken down into convenient learning units. The project team, therefore, set on the task of breaking the topics into still smaller units, rearrange them wherever necessary, and thus prepare a sequential list of sub-topics to be covered in the primary classes.

The strategies and methodologies used in translating the curriculum into teaching-learning instructional material are detailed below:

1. Identification of child's environment:

   a) Since the NCERT curriculum for primary stage is prepared on the basis of people's needs, especially of rural people, it was considered necessary first to identify those local resources in the rural areas which may be of immediate use and help to the child, such as sources of water, various agricultural products of a particular area, trees and plants, soil, rock and minerals available in the locality, etc.

   b) The in-service teachers from rural areas who come to attend the college for correspondence-cum-contact programme were involved to list down items from the local environment available in the locality of their schools. The teachers represented the States of Madhya Pradesh, Gujarat, Maharashtra, Goa, Daman and Diu and, therefore, could provide a fairly good account of local resources available in their area.

   c) A compilation of list of resources indicated certain broad pattern of things available in the rural areas as, by and large, India's rural life is homogeneous where people mostly depend on agriculture and allied occupations. Yet differences of resources could be observed in different regions.

2. Involving primary school teachers:

As a result, it was decided to arrange workshops for primary teachers belonging to different regions of four selected States, to prepare the instructional material.

Involvement of primary teachers was considered necessary as it is the teacher who knows the environment and who has to explore it for the child's benefit rather than some specialist sitting far away in the comforts of an urban environment.

To begin with, in December 1977, in collaboration with the Director of Public Instruction, Goa, a Workshop was organized at Panjim, Goa and subsequently, several others in the state of Madhya Pradesh to:

a) prepare the instructional material;

b) involve primary teachers in the preparation of instructional material; and

c) assess primary teachers' interest and attitudes towards environmental approach in primary classes.

The State of Goa deputed twenty eight primary school teachers for the Workshop who were not only to participate in the preparation of the material, etc. but also practice the approach on return to their schools. The group met and discussed the broad generalizations. The pattern was similar in other workshops also.

The consensus that first emerged out of the deliberations of the group was concerned with the role of teacher in environmental approach.

The teacher is rarely a dominant figure but has complicated functions to perform. The group worked out some of these as follows:

i) Since the study is to be made with the help of environmental aids, the teacher must be able to arouse children's interest in their environment and lead them to face challenging problems connected with their environment;

ii) Having aroused children's curiosity in the environment, the teacher shall have to discuss and decide the approach or method of tackling the problem;

iii) Having decided the method, the teacher may have to divide the class into various groups to work for sub-divisions of the topic with a leader for each group;

iv) The requirements of a topic may need visits or expeditions to placess which the teacher has to organize judiciously;

v) To enable children to grasp the work properly, supply of book/maps/charts/models may be helpful and preparation by the teacher is important. Providing material for practical work also has to be arranged by the teachers.

vi) Teacher may also enlist the help of knowledgeable persons from the community such as carpenter, potter, blacksmith, the village priest, the patwari, depending on the aspect of environmental studies involved in the work.

The second consensus that emerged was about the training of teachers for primary schools in view of teacher's crucial role in this approach. The group felt that when the role of the teacher in such an approach is so important, a carefully planned and scientifically devised training for him is a pre-requisite. The training colleges/ institutes for elementary teachers must recast their programmes to improve standard. To achieve this, the following were suggested:

i) The subject content should be taught to the trainees through environmental approach so that they have practical knowledge of handling an environmental aid in their own teaching;

ii) Integrated approach should be followed to cut accross all barriers of disciplines;

iii) Training in leadership qualities to enable the trainee to arouse children's interest in their environment and discover the truth by themselves;

iv) For the existing teachers of elementary schools, intensive orientation programmes may be organized to train them in the use of environment for teaching-learning process; and

v) In this context, Teachers' Handbooks or Guides gain importance. Production of Teachers' Handbooks at the district level based on the local resources/environment may be developed which would help the teacher to handle environmental teaching scientifically.

The group of twenty-eight primary teachers was divided into four groups of seven each with one project staff as the group leader. Each group was given one topic to prepare instructional material complete in all respects. For maintaining uniformity in the approach of all the four groups, a format as given below for preparing the instructional material was developed to be used by each group. In some workshops, three to four persons constituted the groups, depending upon the number of topics taken up.

Topic: _____

Concepts	Teacher-Pupil Activity	Environmental Aid	Concepts related to other areas
1	2	3	4

In the first column, the topic would be broken into concepts and then concepts into smaller units. The first exercise was, therefore, to convert the topic into smaller convenient, logical units. Once this exercise was done by the four groups, the converted smaller units were discussed by the whole group of twenty-eight so as to arrive at a consensus.

The next task before the groups was to work out teacher-pupil activities which will help in the teaching of the concepts. As far as possible, the teacher-pupil activities were to be of out-door nature where the teacher not only uses items from environment to make children learn the concepts but also involves children in discovering things for themselves. Only where it was absolutely necessary, the teacher-pupil activity was confined to classroom work (column 2).

In the third column, the aids from the environment used for each concept or sub-concept were detailed out.

This done, the fourth column would show if something pertaining to other areas of knowledge could be correlated and delivered to the child without, however, stretching the imagination too far. Knowledge directly related and pertaining to so called pure science and social science will be given in this column.

When the material for all the four topics was ready, each and every item was discussed by the whole group to reach a consensus and finalize the material.

In each workshop, one of the groups was encouraged, in addition to the assigned task, to develop material using a different technique. Instead of taking a topic, its concepts and sub-concepts, and then use environmental aid to make children learn, they used a single environmental aid to weave around it learning pertaining to various areas. The environmental aid selected was coconut as it is grown in a larger quantity in Goa and worked out how much of pure sciences and how much of social sciences could be delivered to the child.

3. Testing of the material

At present the material prepared for various topics is being tested to find out its reliability and validity in four different schools using a control group. The material prepared for one of the topics - Rock and Soil is given below:

Rock and Soil

Concept	Teacher-pupil activity	Environmental aid	Relations to other areas of knowledge
1	2	3	4
1. Many things are present on the surface of the earth.	Teacher takes the pupils to the nearby play-ground, field and asks them to collect different things from the ground/ field. He asks the students: i) Name the things collected- stone, iron etc.	Play ground- field.	Use of field/ play ground
2. Stone is broken rock.	Teacher shows (stone) and gives an idea that stone is rock broken into small pieces.	Stone and rocks if available.	Use of stones for making buildings, forts, bunds, etc. Uses of stone for various purposes in 'Stone Age'.
3. Rocks are of different characteristics.	Teacher shows the rocks in the near-by place and casually asks about their colour, size and hardness.	Rocks, Stones	

1	2	3	4
	Where rocks are not available, stones may be used to give the idea of different size, shape, hardness and colour of the rocks. To show that stones are of different hardness, teacher will take two stones and scratch one stone against the other. The one on which scratch marks are left is softer. The teacher can also use slate, chalk, coal which are rocks of different hardness.		
	Sometimes the liquid inside the earth called lava comes out. When lava becomes cold it turns into rocks. Such rocks are called igneous. The bottom layers of the earth gets pressed, becomes hard and does form rocks in layers. The rock thus formed, is called sedimentary. Sometimes due to great heat and and pressure sedimentary and igneous rocks change completely in colour, hardness and other properties. such rock is called metamorphic.	Pieces of different types of rocks, if available. Buildings, statues, pillars, forts to demonstrate different types and uses.	Uses of different types of rocks in various places such as statues, pillars, buildings and carvings. Role of forts to protect people.

1	2	3	4
	Teacher will show the pieces of different types of rocks if ible.		
4. Soil is form of rock. Several other things also get mixed with it.	Teacher takes the pupils out and shows and soil. The teacher will ask the students to identify different things present in the soil. Children find earth, leaves, dead ants, etc. He explains that soil is powdered form of rock when mixed up with humus. Humus is the organic matter derived from living things (decayed leaves, roots, grass, worms and insects). He asks the following questions: 1. What are the uses of soil? - crop growing, pot making, house making, etc. 2. Name the different colours of soil u have see..-black, yellow, brown, red. 3. What will happen if there were no soil?	Soil from different places	Uses of soil for agriculture, crops, housing, etc.
5. Particles present in the soil are of different size.	From the soil collected, students will find out that it consists of particles of different sizes.	Soil samples	

1	2	3	4
6. Soils are of three types.	The teacher will help students in collecting different types of soils from fields, pond-beds, etc. and will ask them to find out which samples of soil contains bigger, smaller and medium size particles. The sample with large number of bigger particles is called sand. While the sample which sticks together and has more of smaller particles is called the clay. The sample which has larger number of medium size particles is called loam.		
7. Different types of soils have different capacity to hold water.	Students collected different samples of soils in equal quantity. These may be dried completely and placed in three earthern pots like flower-vase with a hold in the bottom. Water in equal quantity is taken and slowly poured over these samples. Stop pouring water as soon as you find it coming out of bottom hole. Thus find out which soil has absorbed more water. You will	Soil samples and water.	Agriculture-Various types of soils are good for different crops. Local crops and the soil in which they are grown may be shown. Importance of loam, harvest festivals, means of transportation of grains, its storage.

1	2	3	4
	see that clay holds more quantity of water than loam, and sand the least.		
8. Soil is found in layers.	The teacher will take children to a place of digging or makes children themselves dig a broad and deep opening in the earth. Teacher asks them to observe the layers with different colours. The upper layer with dark colour is top soil and the lower layer, light in colour, is sub-soil.		
9. Layers are formed in the soil by rivers, rains and winds.	Rivers carry a lot of soil with it, which eventually settles down on its way. When this process goes on for a long time, more and more soil settles down and layers are formed. Similarly the rain and wind carry soil and form layers.		Layers formed by rivers, rain and winds have economic effects.
10. Different kinds of soils are formed by disintegration and movement of rocks.	Teacher takes a glass tumbler and heats it. While hot, few drops of cold water are sprinkled over it. The cracking of glass is used as an example to show that in the same		Why is the river bed Sandy?

1	2	3	4
	way rocks did crack when earth was very hot and subjected to heavy rain. Sometimes the underground rocks do crack up under heavy pressure. Also, rocks are beaten by the rain (the places where continuous water flow has left the mark on the rock may be shown). All this gradually leads to wear and tear of the rocks. The flow of stones in the rivers, their continuous rubbing with water and among themselves is also a source of soil formation.		
	Teacher shows those places where wind and rain water have left the mark on the rocks. Two stones may be rubbed against each other to show the wear and tear of rocks.	Places where rains, wind and continuous flow of water have left its mark on the rocks. Stone pieces. The bed of river.	
	Weathering is explained as the process by which rocks are broken up by the action of wind, moisture, cold and heat.		

1	2	3	4
11. Erosion of soil is caused by rains, rivers and winds.	Teacher takes the students to a place where there is a heap of soil and asks them to water it. After some time they notice that soil is washed away; transfering of clay part of soil from one place to another is called erosion.	i) Heap of soil ii) Places of soil erosion	
12. Soil conservation is helped by trees, plants and grass.	To stop soil erosion, trees, plants and grass are grown. Their roots keep the soil together and do not allow it to be carried away. This process is known as soil conservation. Teacher takes the student to a nearby field or where there are trees/plants/grass and explains how soil is stopped from being eroded by the roots. Students are asked to water with the same force at two places: 1) near the roots of a plant 2) away from the plants, and are asked to observe at which place more soil has flowed with water. In place	Place with plants, trees and grass. Bunds for soil conservation.	Economic, climatic and other effects of soil conservation.

1	2	3	4
	of plants, grassy and non-grassy sites may also be used to explain the same effects.		
13. Soil can be made fertile both by natural and artificial methods.	When the crops are grown they take away the minerals from the land and it becomes less fertile. If the same crop is grown many times the yield is still less. To increase the fertility of the land, animal waste and green manure is used. To increase the fertility, more artificial fertilizers are used such as ammonium sulphate, urea, etc. The soil is also made fertile by growing leguminous plants such as ground nuts, pulses, etc. The examples of fertilizers familiar to students may be used.		Development of civilization in those areas where lands was initially fertile.

Problems encountered and teacher-pupil interaction experiences

Several problems are being encountered at the testing level in schools; some of these are:

1. Administrative bottlenecks in getting experimental and control groups for the project. Even the parents in some cases express apprehensions in case their child is put in the experimental group;
2. Teacher resistance to changed approach. Practically most of the teachers invited to workshops initially expressed doubts

regarding its implementation. They were, however, enthusiastic and satisfied on having been invited and for the trust reposed in them. After initial hesitation, they assigned themselves to the task of preparing instructional material and designing activities with keeness and sincerity. The project staff were pleasantly surprised to find the elementary level teachers come out with real good material and could identify situations in the environment which were of immense educational value. With every workshop, the project group developed more confidence in the capability of the teacher. In some cases, however, more than average motivation may be necessary to bring out the best in the teacher. The other aspect which is being planned is to acquaint the heads of the schools also and explain to them the advantages and functional possibility of implementation of the new approach. It is envisaged that this would make the task of the teacher much easier.

3. The existing evaluation system consists of terminal evaluation at the end of the year within the prescribed framework of curriculum, syllbus and textbooks. This, obviously, is not in consonance with the spirit of the environmental approach. For the time being, in certain experimental groups, a compromise was made in terms of fifty per cent weightage to continuous evaluation and the remaining fifty per cent to the terminal evaluation. The continuous evaluation is to be done by the teacher and consists of discussions and performing of the activities. We experimented with a five point scale based upon the responses: no response (nr), wrong response (wr), right response (rr), good response (gr) and excellent response (er). This is, however, presently under scrutiny by the project group. In the terminal evaluation, main emphasis is on set of oral test items with different difficulty levels and also written answers mostly based on objective or short-answer type questions. It may be mentioned here that the teacher is also expected to carry out a continuous evaluation of the instructional material and possible variations in activities including the approach. The teacher is also encouraged to take note of and keep a record of suggestions which come from the pupils while the activities are being performed. It was our experience that children do suggest alternatives at the elementary level and on certain occasions. Their suggestions are extremely useful, particularly in terms of utilizing locally available materials.

Usually a class consists of forty to fifty children and it was our experience that when we tried to perform certain activities by dividing the class in groups, the teacher faced the real problem in being able to assist the pupils to the desired extent. When the groups consisted of eight to ten children, many of them could not get a chance to participate and for some it was a passive exercise. The teacher has a role to play in this situation but finds it practically difficult to do so. We immediately switched over to smaller groups and at the same time tried to enlist the voluntary assistance of other teachers who may be free and interested in assisting the teacher. This worked very well. In some

cases, redesigning of the instructional material and activities was also tried. While designing an activity, care has to be taken of virtually all the related skills that may be necessary as a pre-requisite.

Sometimes children suggest their own hypothesis which is encouraged and the child and the group is allowed to test its validity. In one of our units, we have mentioned that when ice-cold water is kept in a glass, it results in deposition of water droplets on the surface of the glass. One child suggested that it may be due to small holes in the body of the glass. The teacher in such a situation has to encourage the child and provide him an opportunity to test the hypothesis to his or her complete satisfaction. While the groups are busy in activities, it was found useful to record certain points of common interest briefly on the blackboard. This helps in focusing the attention of the children. In certain cases it was found that even after successful completion of the activity the child may not be fully conversant with the logic and concepts involved therein and the teacher will have to make sure about the same.

Hoshangabad Science Teaching Project (HSTP)

In 1972, a dedicated group of voluntary workers, which included scientists from the Tata Institute of Fundamental Research (TIFR), Bombay and the Delhi University, decided to translate into real action their genuine concern for integrated rural development. They were provided facilities in district of Hoshangabad by the State Government of Madhya Pradesh. The project, apart from other activities in community development, constituted a group for teaching of science using locally available resources of the environment and making science relevant the real life tuations. The group developed teachers' material, improvised activities and rearranged and the units and topics in a more rational sequence. They developed cards for children to help them in performing the activities. The group was initially permitted to experiment within thirty-two schools in grades sixth, seventh and eighth.

The project places full faith and confidence in the capability of the teacher, support and involvement of the community and the necessity of functional science teaching using environmental approach. The teacher training programmes aim at generating self-confidence in the teachers and acquaint them with the basic philosophy in terms of actual needs and requirements. Subsequent workshops, group meetings which the teacher attends, revolve mainly around the experiences gained by him in his schools. These experiences are pooled together and analyzed and alternative suggestions or solutions are worked out by common concensus.

During the first five years, continuous evaluation of the materials has been done by group meetings, workshops and discussions and these have been suitably incorporated. The project follows the evaluation pattern developed by the teachers and experts, keeping in view the existing constraints as well as the needs of the project.

After successful completion of the first phase of the project during the first five years, it has now been extended to about 206 schools of the Hoshangabad district. The NCERT has also joined the project through the RCE, Bhopal. The environmental project group of the college is now associated in the project through the teacher training programmes, kit-supply, renewal of instructional materials, evaluation and other academic activities. The University Grants Commission (UGC) has given permission to Delhi University teachers to visit the project schools and help in academic programmes for certain intervals. The project has inbuilt strategies to involve the elders of the community, the headmaster, the social worker and others, as no new project can be launched successfully without their interest and involvement. The achievements of the past few years in this project have received attention of scientists, planners and social workers from all over and symbolises a concrete effort and genuine manifestation of the concern of the society for rural development.

Conclusion

The Government of Madhya Pradesh have decided to experiment with the environmental approach in a few selected schools of the four districts of the State. The project has been sponsored by the World Confederation of Teaching Profession (W.C.O.T.P.), Canadian Teacher Federation (CTF) and All India Federation of Educational Associations (A.I.F.E.A.) and a Workshop to finalize the instructional material was held at the RCE, Bhopal from 10 to 16 August 1978 and was attended by delegates from Canada, Ceylon, Malaysia, Thailand and India along with a group of thirty primary school teachers from the aforesaid four districts. Prior to this, several workshops were organized at district headquarters involving local teachers.

The workshops adopted the material prepared by the Regional College of Education Project group for replication in accordance with local resources available in the locality of each school selected in the four districts. New materials and units were also developed.

The RCE, Bhopal which runs degree level preservice courses for teachers is considering to incorporate such changes in its curriculum as are necessary to give environmental orientation to the teacher training programme. The college has already introduced a Bachelors degree course in elementary education which will be further reviewed to incorporate the experiences gained through the environmental approach by different agencies and individuals involved.

Environmental approach to learning is one reform in educational sphere which needs immediate recognition and practice to overcome many of the ills permeating educational systems of the developing countries.

It is likely to help children appreciate their surroundings better and work out solutions to the problems easily that they may face in life. Specifically speaking, this will enable the child:

i) to arouse and keep sustained interest in vocations locally available, e.g., agriculture, animal husbandry, forestry, etc.;

ii) to develop appreciation for the process of science;

iii) to inculcate the habit of wisely using all natural resources;

iv) to develop an appreciation of the contribution of knowledge to modern life;

v) to develop a scientific attitude; and

vi) to help remove communalism and casteism from among the people.

The teachers at elementary stage and the students have responded to the new approach very favourably as the project has generated immense interest amongst both these categories. It has been our belief that full faith can be reposed in teachers' capability, students' keenness, readiness of the community to respond, willingness of the experts and other agencies to assist and finally the appropriateness of the approach.

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INDONESIA: THE DEVELOPMENT OF SCIENCE INSTRUCTIONAL MATERIALS FOR THE DEVELOPMENT SCHOOL PROJECT

by

Ratna Willis Dahar

Introduction

The Development School Project is designed to develop a new system of education in Indonesia. In its master design four problem areas were identified which were related to the quantity of education, the quality of education, the relevance of education and the efficiency of education. Several objectives have been generated to overcome these problem areas. It was agreed by the Ministry of Education that the objectives could best be achieved by using modules in the teaching-learning process. One of the reasons for the choice of modules was that the number of teachers of adequate quality produced each year cannot cope with the rapid increase of the number of school-age children.

The modular instructional system was adopted in 1974. Modules have been developed for 5 subjects: Bahasa Indonesia, English, Mathematics, Social Science, and Science.

This paper is concerned with the development of science instructional materials in the form of modules for the Development School Project. Problems and issues which emerged during the first trial years of the modules will be also discussed.

The Science Programme for the Development School

Before the modules were developed several seminars and workshops were organized by the Office of Educational and Cultural Research and Development (BP3K). Curriculum Development Teams participating in these activities consisted of subject matter specialists and subject matter teachers.

1. Curricular and General Instructional Objectives

During the activities mentioned above, the science curriculum team developed the broad aims of science education at the primary and secondary levels. These aims were called the curricular objectives, derived from certain problems and needs as they are found in the physical, cultural and socio-economic environment. The curricular objectives for the science course for the Development School is given in Appendix I.

To make these broad aims more operational, the team developed the general instructional objectives. In appendix II is shown the general instructional objectives derived from a certain curricular objective for the chemistry course at the secondary level.

It should be mentioned that after each stage of the curriculum development activity there was a chance for the administrators before implementing the new curriculum to review and suggest ideas concerning the educational objectives formulated by the curriculum development team. This activity was called the "Sanctioning" period, during which not only

administrators, but also Rectors of Several Universities, prominent scholars, and some influential leaders in the society were invited to participate in the meeting.

2. The organization of the science course

The science programme of the elementary school and the junior high school includes three areas: living things, matter and energy ,earth and space.

There is vertical approach in the sequencing of the content. This means a science idea or topic is developed in a spiral arrangement. The concept of living things for example, is treated from Grade 1 to Grade 8, starting with elements immediate to the student's concrete experience, leading to the remote and abstract. The concepts or topics in the other two areas are also treated in this way.

A horizontal integration across topics at each grade level is found in the teaching of the science processes.

The science course for Grade 9 (first Grade of Senior High School) which is compulsory for all students, is given as a General Science Course, which includes several topics on biology, chemistry, physics and earth and space science. In treating the content it is attempted to give more emphasis on the inter-relation between the branches of science.

Starting from the first semester in Grade 10, physics, biology, chemistry, earth and space science are offered as separate courses to students who are science and mathematics majors.

After a careful selection of the science topics or concepts relevant to each of the objectives already stated, the work of the curriculum team at this stage ended with three books consisting of:

a) The relationship between the Curricular Objectives, General Instructional Objectives and the Science Topics or concepts;

b) The Basic Course Outline; and

c) The Course Content of each Grade.

3. Time allocation for the science course

The Development School consists of eleven grades. The Elementary School is from Grade 1 up to Grade 5. The Junior High School is from Grade 6 up to Grade 8 and the Senior High School is from Grade 9 till Grade 11.

One period for Grade 1, 2 and 3 lasts 30 minutes; for Grade 4 and 5 it lasts 40 minutes; and for the upper grades, 45 minutes.

Table 1: Time allocation for the science course*

Courses	Grade										
	1	2	3	4	5	6	7	8	9	10	11
Science	2	2	4	4	4	4	4	4			
General Science									6		
Biology										4	6
Chemistry										6	7
Physics										6	7
Earth and Space Science										1	1

*The numbers mentioned against subjects relate to 'periods' allotted.

The Process of Developing Modules on Science

The development of modules on science is entrusted to the national working group of science module writers, consisting mainly of lecturers of the Institute of Teacher Education (IKIP) who have had some experiences in the teaching of science at the secondary schools. When we first started with the modular instructional system in 1974, some lecturers of the Bandung Institute of Technology (ITB) and experts in geology and astronomy also joined this working group. Since then up till now, the composition of the working group has undergone some changes. At the present time there are 15 science module writers.

The working group has been assisted by three consultants, two of them are from the ITB and one from Unesco.

1. The characteristics of the Indonesian module

A module is a small package of an instructional programme, consisting of the following components:

a. Teachers' manual. This contains the instructional objectives, the teaching and learning strategy, list of equipment and references, evaluation procedure, and a list of new technical terms.

b. Student activity booklet. This contains directives on what should be done by the students to achieve the objectives.

c. Student worksheet. This contains provision for recording main points from the student activity booklet and the execution of activities.

d. Answer key for student worksheet item. This will help the students to check their own worksheet after being through with the student activity booklet.

e. Student assessment sheet. This contains appropriate test items for the module.

f. Answer key and marking scheme for the test items.

2. Major steps in developing the module

The books used by the module writers as a guide are those produced by the previous curriculum development team and a general guide for developing modules.

The first activity conducted by the working group is to classify the topics and the subtopics in the syllabus into modules. So a list of titles of the science modules is obtained, together with the estimated time for the average student to work through the module. The suggested shortest time spent on a module is 2 periods, and the longest is 8 periods.

The list of modules is then distributed to all the Development Schools, so that each school will know in advance the modules to be given to each class, for a certain quarter term or semester.

Besides having a general guide in developing modules the working group finds it necessary to have preliminary discussions on certain topics such as: new trends in the approaches and methods of science teaching, learning theories, choice of experiments, evaluation in science education, how to get reference books, etc.

By conforming as closely as possible to the decisions made, the writer starts preparing a rough draft of the module.

This rough draft is then brought to the reviewing board. It is expected that all members participate in reviewing each draft. Ideas from the reviewers and consultants have proved to be of great importance in improving this rough draft. In the beginning each module was discussed by all members of the working group. Later on, it is expected that the writers have already gained some experience in writing modules, and therefore, each module is reviewed by only part of the team members. In other words, modules on biology are reviewed by the biology writers only. And this is also the case for the other branches of science. It should be mentioned that all members are free to contribute their ideas to the improvement of the modules.

Sometimes it happens that a module writer feels that a small scale try-out of his rough draft on his own children or children of his colleagu will give him some information on the difficulty level of his module, and also that he can check whether the estimated time is appropriate or not. Other module writers like to discuss their modules with a well-experienced teacher.

After the rough draft has been reviewed, the writer will make some revisions by taking into consideration the responses of the other team members, the consultants, the result of the small scale try-out or the opinions of the teacher. It is expected that each writer will try out the experiments he suggested in his module.

The result of this revision is then sent to the editor, and after some corrections and illustrations have been made, the module draft is ready for printing.

3. The process of writing the module

After each member of the working group has known his assignment, he starts writing. In his mind the following thoughts might come up:

a) What are the pre-requisites for this module?
b) How should the specific instructional objectives be best formulated?
c) How to devise a test relevant to the specific instructional objectives already stated?
d) How should a student activity programme in the teaching learning process be best developed?
e) What will be the best form of the worksheet?
f) What kind of guidance will the teacher need in the module?

3.1 Determining the pre-requisites

In order to determine the pre-requisites, the writer should know the content of the foregoing modules. This can be achieved by reviewing the Basic Course Outlines (BCO).

3.2 Designing the specific instructional objectives and test

The specific instructional objectives are derived from the general instructional objectives, following Bloom's Taxonomy of Educational Objectives. For the lower grades, stress is given to the aspect of recall and comprehension. For the higher grades the aspect of application also comes into consideration. The aspects of analysis, synthesis and evaluation have not been so seriously stressed.

After formulating all the specific instructional objectives, putting them in a logical sequence, then the writer constructs test items relevant to the objectives. Most of them are of the objective type.

It is now time for the writer to make a matrix consisting of three components, namely: the specific instructional objectives, the test items and the detailed subject matter. Through this matrix, the relevance of the three components becomes clear.

Although most specific instructional objectives primarily comprise the cognitive domain, the writers of the science modules by no means neglect the affective and the psychomotor domains. The change of behaviour in the affective domain, which concerns the values and attitudes the student is supposed to acquire, is expected to be achieved after completing several modules. It is for this reason that the objectives in the affective domain are usually not stated in specific form, but left in general form. The effort of the writer to develop values and attitudes is reflected in the way he is writing the "Student Activity" programme.

Since students are actively involved in the experiments suggested by the module writer, the change of behaviour in the psychomotor domain is expected to be achieved after the student have completed several modules. It is hoped that by having gained the skill of using tools and science equipment, there will grow a desire in the students to make simple apparatus they can use at home. One of the aims of the module on "Water Purification" for grade VI, for example is, that the student whenever necessary can purify water at home for his family.

3.3 Developing the "Student Activity" programme

The core of the module is the component known as the "Student Activity Booklet". It is in this part of the module that the writer takes the role of the teacher who guides the student to the formulated goals.

He tries to understand how a student learns, how to develop a certain concept, how to choose the appropriate method and approach. He is also asked to use various presentation methods, such as demonstration, discussion, experimentation, group work, etc. He should also take into consideration whether the learning materials and tools are easily obtained or made.

The use of the process approach is designed to make the student recognize and perceive the attitudes and working methods of the scientists who have produced our knowledge on science so far.

Since the very beginning the student has been introduced to such activities as: observing, classifying, comparing, measuring, using numbers, communicating and summarising. For the higher grades, grades relacing, explaining, predicting, estimating, interpreting, illustrating, formulating hypothesis, formulating operational definition, interpreting data, drawing conclusion, etc. also come into consideration.

Quite often a problem is brought forward by the writer. Much guidance is given to students of the lower grades in solving the problem. In the higher grades, however, only little help is provided. Questions are asked to encourage the modes of inquiry.

The writer also thinks of various presentation methods, such as experimenting, demonstration, discussion, group working, etc.

It is preferable that the student can carry out the experiment himself. The experiments assigned require apparatus which is simple to use and cheap to obtain in class sets. Where the apparatus is rather costly or bulky, experiments are carried out in groups. Through this group work development of the attitude of "being able to co-operate with others" are also tried.

Experiments which may be dangerous or too difficult for students to carry out themselves should be demonstrated by the teacher. Usually a demonstration will be given at the beginning or at the end of the module. It is desirable to keep demonstrations to a minimum.

In some modules the discussion method is also applied. This is usually done as the last activity in the module.

Activities outside the classroom are also encouraged so that children can have the most direct experience with the natural and physical environment, an important area of interest and concern in science teaching.

3.4 Developing the worksheet

The module writers are of the opinion that the instruction presented in the "Student Activity" should be mastered by the student little by little. To help the student master the content of the module in such a way, a system of continuous evaluation is necessary. It is for this purpose that the worksheet is developed. In this worksheet the student answers the questions asked in the "Student Activity", writes down the results of the observation made, the conclusions drawn, solves the problems presented, makes a required summary, etc.

3.5 Developing the Teacher's Manual

In developing the Teacher's Manual, the writer is requested to give specific directions to teachers in using a certain module. These directions include problems which might arise in the learning process and ways to solve them. This manual is completed with a list of names of the science apparatus used in the module, with the specification, the number, information as for which activity they will be used, and whether they will be used for individual or group work.

3.6 Devising the key to the worksheet and the test

The evaluation instruments, both the worksheet and the test booklet, are accompanied by a key. For the test the scoring scale is also included.

The number of modules on science written for all the grades of the Development School is given in Table 2*.

Table 2: Number of science modules for each grade

Grade	Course	Number of modules
I	Science	12
II	Science	14
III	Science	12
IV	Science	17
V	Science	20
VI	Science	21
VII	Science	20
VIII	Science	22
IX	General Science	30
X	Physics	15
X	Chemistry	10
X	Biology	12
X	Earth and Space Science	3
XI	Physics	25
XI	Chemistry	21
XI	Biology	18
XI	Earth and Space Science	4
	Total	276

*This table is obtained after the revision of the Basic Course Outline in August 1978.

4. Enrichment and remedial programme

One of the objectives in adopting the modular instructional system is to improve the quality of education. For this purpose mastery learning as a strategy is built into the modular system. A student may only move to the next module if he masters 75% of the objectives in the module on which he is working. The extent to which each student masters the objectives is measured by the formative test that accompanies each module. If a student fails to achieve the 75% level of mastery, he is required to do remedial work. Since the majority of the class will start simultaneously with the next module, enrichment programme is available for the fast learners.

The development of the enrichment programme was first entrusted to the science teacher with the help of the science consultant at each Development School. This programme might consist of an assignment to read additional information on a certain concept or a sub-topic, an experiment lasting a few minutes to verify a certain concept,or an activity to enable a student to become an assistant of the teacher in helping his classmates to understand certain parts of the written material.

Since the end of last year a group of module writers of various disciplines has been assigned to write some possible enrichment programmes for each course. The result of this group has been distributed to all Development Schools.

The development of the remedial programme did not seem to be so simple. A careful study in developing this programme is under way. In the meantime, remedial programme consists of re-reading the module or reading another relevant textbook.

5. Science equipment

As mentioned before, the module writers should also consider the kind of equipment which will be used in each module. Although we try to keep the equipment as simple as possible, we cannot avoid to have some complicated equipment or equipment which should be bought from foreign countries.

The equipment which is simple enough and easily available, should be supplied by each Development School.

For the equipment which is not easily available or which should be constructed, a small centre in Bandung was assigned to produce prototypes. This centre consisted of eight members, two consultants, two persons who made the design of the prototype, three persons who developed the prototype and one assistant. The workshop was attached to the Faculty of Science and Mathematics of the IKIP Bandung.

Because of the lack of facilities in this workshop, the centre was confined to the production of the prototype of science equipment for grades 4, 5 and 6. This was based on the assumption, that apparatus for the lower grades could be easily provided by the school and the higher grades could make use of the equipment supplied to the Junior and Senior High Schools by the Government as part of the realization of the second Five Years Development Plan.

The mass production of the prototype was carried out by two private firms, "Mukabaya" in Bogor and "Bumi Sewu" in Bandung.

Problems and issues emerged during the first trial years

The modular approach has been implemented since 1975 in the Schools of the Development School Project situated at eight places: Jakarta, Bandung, Semarang, Yogyakarta, Surabaya, Malang, Padang and Ujung Pandang. Each of these schools is under supervision of an IKIP. Because of limited resources the experiment was carried out in several stages. The first stage started with grades 1, 4, 6 and 9 in five subjects, Bahasa Indonesia, English, Mathematics, Social Science and Science. The try-out started in 1975 and by 1977 all grades already used modules. This experimental phase is shown in Table 3.

Table: Experimental Phase

Grade / Year	1	2	3	4	5	6	7	8	9	10	11
1975	x	-	-	x	-	x	-	-	x	-	-
1976	x	x	-	x	x	x	x	-	x	x	-
1977	x	x	x	x	x	x	x	x	x	x	x

Some problems and issues emerged during the trial years of the science modules were the following:

1. Quality of the module

The first problem was related to the quality of the module. It was realized that the quality of the first semester 1975 modules could be improved. The writer should have more experience in developing certain concepts for certain age-level, formulating good questions to guide the students in solving the problems, constructing good test items relevant to the specific instructional objectives, selecting appropriate experiments. More important was that the module writer should try-out the experiment first before writing.

It may be said that by gaining more experience in writing and receiving feedback from the schools through direct observation of the classroom activities or through various feedback forms issued by the National Evaluation Team, the quality of the modules has been gradually improved.

2. Attitude of the teachers and students

In using the modular approach it was anticipated that the role of the teacher would be changed from that of a disseminator of information into that of a manager and organizer who is always alert in assisting his students. The greater part of the teacher's time should be spent in giving guidance to the individual as well as to the class.

Although the teachers have had a special in-service training to adjust themselves to this new role in the teaching-learning process, the change was quite a chock for them. It seemed that time and attitude of the teacher were the determinating factors for this adjustment.

To the students especially at the beginning, the learning situation was quite different. They also had the feeling of being in an examination situation all the time. The students, too, needed time to get used to this modular approach.

3. Time allocation for each module

The third problem was about the time suggested by the module writer for each module.

Some times it happened that most of the students could finish the module in a much longer time than suggested. In some other cases the students needed a much shorter time.

It seemed that this time estimation was an experimental question. It could be only solved if the writer considered not only the average academic ability of the students, but also the classroom situation and teaching facilities in the various Development Schools.

4. Process and attitude goals

Another problem was how to assess the students in relation to process and attitude goals.

Up till now only the cognitive goals have been assessed. In revising the modules which has been started since August this year, this problem will be one of the main concerns.

The revision period

After a trial period of more than three years in the Development Schools and about two years in the Predissemination Schools, sufficient feedback has been obtained to solve the problems we have been facing so far.

The first revision was made when the modular approach was intended to be introduced to a limited number of schools in their natural setting. These schools are called the Predissemination Schools. The first stage was the revision of a very limited number of modules (two to four modules) for grades 4,6 and 9. The second stage was for grades 5, 7 and 10.

The feedback which should be considered by the module writer comes in the form of:

a) Teacher comments written in the module concerning words, sentences, or language in general, which are difficult for the student to understand.

b) Comments by the National Evaluation Team, such as:

i) test relevance to the specific instructional objectives in each module;
ii) difficulties encountered by the students in the words, sentences and other linguistic aspects used in the module;
iii) suggestions for the improvement of test items;
iv) teacher difficulties in preparing and using equipment; and
v) total test score for each school and the percentage of students not yet reaching 75% of the objectives for each school.

It should be mentioned, that besides all the comments mentioned above, the writer's own judgement plays an important role in the revision of the module.

APPENDIX I

THE CURRICULAR OBJECTIVES OF THE SCIENCE COURSE

The students should:

1. acquire knowledge of some facts and ideas concerning the phenomena in their environment;
2. acquire knowledge of the relationship of phenomena in their environment;
3. acquire knowledge of the inter-relationship and inter-dependence of living things and their surroundings;
4. show curiosity;
5. show willingness to solve problems;
6. show the attitude of acquiring knowledge based on observation of phenomena in their surroundings;
7. be able to recognize and understand phenomena in their environment;
8. be able to solve problems systematically;
9. be able to apply their experience and knowledge to solve problems;
10. be able to communicate carefully concerning the result of their observations and their ideas;
11. know the inter-relation and inter-dependence of several living things to understand the main problems concerning the ecological control of the human environment;
12. show curiosity and inquiring attitude;
13. be able to design and conduct experiments;
14. know the inter-relationship and regularities concerning natural phenomena;
15. know the structure of chemistry, physics, biology, earth and space science, and the inter-relationship among them;
16. understand and realize the relationship of science to other disciplines of knowledge to understand the ecological problems;
17. understand and realize how to benefit natural resources wisely and efficiently;
18. understand the role of science as one of the means to increase prosperity of the community;
19. know and realize the influence of science discoveries on the way of living and thinking of people in the society;
20. be used to solve problems scientifically; and
21. be able to know, understand and forecast natural phenomena.

Notes:

1. Objectives 1 - 10 for the Elementary School
2. Objectives 1 - 13 for the Junior High School
3. Objectives 1 - 21 for the Senior High School

APPENDIX II

DERIVATION OF THE GENERAL INSTRUCTIONAL OBJECTIVES
FROM THE CURRICULAR OBJECTIVES
(an example in Chemistry)

Curricular Objectives	General Instructional Objectives
1. The students should acquire knowledge of some facts and ideas concerning the Phenomena in their environment.	The students should 1. know that Chemistry is concerned with the properties and changes of matter; 2. know the chemical phenomena of nature and that there is certain regularity in these phenomena; 3. know that matter is electrical by nature; 4. know that molecules interact and that there is a quantitative relationship expressed by chemical equations; 5. know the properties of solutions and the laws concerning reactions in solutions; 6. know that the inter-action between molecules will come into a dynamic equilibrium; 7. know that a chemical change is a form of energy change; 8. know that all concepts in chemistry form a unity; and 9. know the limitations of chemistry.

MALAYSIA: DEVELOPMENT OF PRIMARY SCIENCE INSTRUCTIONAL MATERIALS

by

Kamaruddin bin Hussin

Background

The performance of the pupils in the rural primary schools, particularly in elementary science and mathematics, was relatively poor compared to pupils from urban schools. It was with a view to seeking an immediate remedy to this ailing situation that a Special Primary Science and Mathematics Project (known as Projek Khas) was established within the Ministry of Education in 1968.

The immediate task of the Project was to provide whatever facilities and services are possible to help teachers improve their methods of teaching science and mathematics in the primary schools. It was not a research project but an implementational undertaking centrally controlled and administered by the headquarters. In brief, it was a pragmatic crash programme.

Prior to the establishment of the Curriculum Development Centre, (a division of the Ministry of Education) in 1973, this Special Project was based at the Science Centre. The Science Centre then was charged primarily with the responsibility for the implementation of Science and Mathematics curricula reforms. After the formation of the Curriculum Development Centre (CDC) in 1973, the Special Project renamed as the Primary Science and Mathematics Unit, became a functional component of the CDC.

At the beginning, the Project staff consisted of nine officers drawn from schools as well as from Teachers' Colleges, under the Supervision of a Senior Organizer. Their tasks were to prepare Teacher Guide-notes introducing the inquiry approach and conduct In-service Courses, phase by phase, eventually covering the whole country. In short, the primary purpose was to develop curriculum materials and implement them within the shortest possible period of time.

The Project was first implemented in the schools in January 1970. Financial resources at the take off period were made available by the Asia Foundation.

2. Project Objectives

The overall objectives of the project were:

1. to provide some services and facilities to teachers with the view to improving the standard of the teaching of Science and Mathematics in the primary schools, particularly those in the rural areas; and
2. to encourage children develop healthier attitudes towards Science and Mathematics and also hopefully they would perform better in the Assessment Tests (Science and Mathematics) at the fifth standard.

Specific objectives are:

1. to prepare notes for teachers (Teacher Guide-notes) to assist them to implement the existing syllabuses more effectively. The Guide-notes provide the teachers with basic content background in science and mathematics, and information on methodology and the use of the inquiry approach in the classrooms;

2. to implement the programme by establishing numerous In-service teacher training centres (known as Centres of Excellence) all over the country and to train suitable key teacher-educators (Key Personnel) to help run courses at the State levels on the most effective ways of using the Guide-notes. Refer to appendix I for location of the Centres; and

3. to set up a network of communication systems between the Unit and the teachers through in-service courses, visits by curriculum developers and newsletters.

Development of Teacher Guide-notes

The Teacher Guide-notes were written only in Bahasa Malaysia, the National Language of Malaysia. The writing began in 1969, with a panel of eight officers, four officers each for mathematics and science, under the leadership of a Senior Organizer.

Prior to the preparation of the Guide-notes, it has already been decided that the existing syllabuses, weak and out-moded though they may be, would not be changed because teachers would already have been familiar with the substantive content. The rationale was to concentrate more on the pedagogical aspect of the problem, namely to introduce a new approach using the traditional syllabuses. It was hoped that this would be less likely to undermine the teachers' confidence in trying out the inquiry approach on content with which they were already familiar.

In view of the great urgency to get the Guides out to schools as early as possible, the Guides were written without elaborate systematic try-out or revision prior to dissemination to the teachers. However, school inspectors, lecturers from Teacher Colleges and others experienced in the teaching of Science and Mathematics were asked to identify and to organize, if necessary, the learning experiences that were provided.

The Guide-notes follow a certain format. First, the major topics found in the syllabus of a given standard are organized into units. Each unit is then divided into sub-topics. Each sub-topic consisted of suggested learning "experiences" (learning activities). Guidelines for preparing a unit are:

1. The inquiry approach for each unit and learning activity begin with the specification of some instructional objectives for the teacher.

2. The learning activities are supposed to be explored or conducted by the pupils with the guidance of the teacher.

3. The teacher guides the pupils to find answers from their own experiences and learn how and what to do with the instructional materials.

Example of Guide-Notes

The following specific objectives were translated into practical terms to suit the individual classroom situation and the topic being taught:

1. To develop an intelligent interest and appreciation of the world in which we live;
2. To acquire a background of useful information concerning environment;
3. To develop an understanding of the need to conserve useful natural materials;
4. To develop an understanding of cause and effect relationships;
5. To develop the skills of observing accurately, listening intelligently, and evaluating effectively; and
6. To develop wholesome interests for leisure time.

The concepts stated in the syllabus are arranged under unit headings. They should be arrived at through the scientific method of problem solving. Pupils will define the problems, discuss possible solutions, experiment, and test hypotheses before coming to conclusions. These concepts will not be "told" to pupils. The teacher provides the setting, the stimulation, and the materials to challenge the children's critical thinking; and observations and experimentation are done by the students to arrive at an understanding of their environment. The teacher should not hesitate to make additions or substitutions to the units in the syllabus in order to make science more meaningful to the children.

It should be strongly emphasized here that no other subject in the primary school curriculum provides a better opportunity for recognizing and practising the need for co-operation, selection of teachers, group planning and other aspects of human relations. If full use is made of this, the children will be greatly helped not only to acquire an intelligent understanding of their environment, but also a clear understanding of the essential social responsibilities for good and useful citizenship.

In listing the units for discussion, the developmental approach to curriculum planning as well as a modified spiral of learning approach have been considered. Some units which are touched on briefly in the lower grades are given in-depth treatment in the upper grades, along with new units suitable to the interests and abilities of upper primary pupils.

Below are the main topics to be taught from Grade 1 to Grade 6. They are merely a guide for the teachers:

Grade I

Living things.

Animals are living things.

i) Some animals are useful and helpful to men; others are harmful;
ii) Most animals need many things to help them grow;
iii) Animals have young ones of their own;
iv) Animals live on land, in the air, and in water;
v) Animals make homes in many places.

Plants are living things

(i) Some plants grow wild; some are cultivated by man;

(ii) Plants grow in a variety of ways and in many places;

(iii) Plants have many requirements.

Grade 2

Land, water and air affect animals and plants

(i) Animals adapt to their environment;

(ii) Animals differ in their structure.

Our earth

(i) The earth is very old;

(ii) The earth is very large;

(iii) The earth is round;

(iv) The earth moves all the time;

(v) The turning of the earth causes night and day;

(vi) Shadows are made when sunlight does not pass through objects.

The earth is composed of land, water and air

(i) Land features vary from place to place;

(ii) Bodies of water vary in shape and size;

(iii) Air surrounds the earth.

Grade 3

Adaptation to environment

(i) Animal adaptation;

(ii) Plant adaptation.

The atmosphere

(i) The earth is completely surrounded by an ocean of air called atmosphere;

(ii) Men, together with some animals and plants, live at the bottom of this atmospheric ocean;

(iii) The air of the atmosphere presses in all directions;

(iv) Changes in the atmosphere cause changes of weather;

(v) Differences of air pressure can be useful or destructive;

(vi) Cool air is heavier (denser) than warm air;

(vii) Air is necessary for the burning of fuels;

(viii) Only part of the air can be used for the (a) burning of fuel; (b) rusting of iron (c) breathing (respiration) of plants and animals.

Sound

(i) Sound comes to our ears through air;

(ii) Sound travels;

(iii) Some sounds are useful;

(iv) Sounds are pleasant or unpleasant;

(v) Echoes are sounds that reach an obstruction and are sent back;

(vi) Sounds can be made to go further by not allowing it to spread out in all directions;

(vii) Sounds can be made louder by allowing other objects to vibrate at the same speed;

(viii) Sounds can be used for measuring distances.

Grade 4

Life processes in plants and animals.

(i) Flowering plants;

(ii) Animals;

(iii) Characteristics of all living things.

Heat

(i) Plants and animals require suitable warmth;

(ii) Man and other animals require food to supply heat and energy for their bodies;

(iii) We get heat in many other ways from the sun, coal, wood, gas, electricity, friction, hammering;

(iv) Hotness (temperature) can be measured by means of a thermometer;

(v) Heat makes things expand;

(vi) Heated liquids and gas help to carry heat upwards;

(vii) Heat can pass through some substances more easily than it can through others;

(viii) Heat can cause things to change.

Weather

(i) Observation of clouds, measurement of rainfall, direction of wind, air temperature, air pressure and air moisture (humidity) are carried out so that weather can be described or forecast;

(ii) Charts are used to record weather measurement.

Beyond the earth into space

(i) The sun;

(ii) The moon;

(iii) The stars.

Grade 5

Life histories

(i) Light comes from many sources - the sun, electric lights, very hot objects, fires, fluorescence;

(ii) Light enables us to see things;

(iii) Light passes through some things better than others (opaque, translucent, transparent substances);

(iv) Light travels in straight lines at very great speed;

(v) Light may form shadows when obstructed;

(vi) Light may be bent when passing from one substance into another;

(vii) Light can be reflected or absorbed;

(viii) Polished metal surfaces make the best reflectors of light;

(ix) Sunlight contains light of many different colours.

Our solar system

(i) Our solar system is composed of the sun as the star, the planets and their moon(s);

(ii) Some familiar groups of stars are called constellations;

(iii) Man has used the stars for navigation.

The universe

(i) The universe is made up of many galaxies of which the Milky Way is one;

(ii) The stars are far apart in a galaxy;

(iii) The Milky Way is our best known galaxy;

(iv) Our sun, planets and constellations are parts of the Milky Way;

(v) Meteors are lumps of substances which enter the earth's atmosphere from outer-space.

Grade 6

Magnetism

(i) Magnets attract some objects but not others;

(ii) Magnets may be of different shapes;

(iii) A magnet has two poles; a north-pole and a south-pole;

(iv) Two unlike poles attract each other;

(v) Two like poles will repel each other;

(vi) Magnetic force arranges itself in fixed patterns around a magnet;

(vii) Some materials which are not magnets can be magnetized by stroking them with a magnet in a suitable way.

(viii) A compass needle is a magnet that can turn freely;

(ix) Magnetism can be removed by heat or hard blows.

Electricity

(i) There are two kinds of electricity;

(ii) Static electricity can be produced by rubbing some substances against each other;

(iii) Objects which have static electricity can attract or repel other objects;

(iv) Current electricity can be obtained from battery; it has a zinc container filled with a mixture of chemicals and a central carbon rode;

(v) An electric current can produce a magnetic field;

(vi) Current electricity needs a complete pathway or circuit in order to travel. The flow of electricity along a pathway or circuit can be controlled by means of a switch;

(vii) Some substances will allow electricity to flow through them;

(viii) Some dissolved substances will allow electricity to pass through liquids more easily;

(ix) When electricity passes through a solution, changes take place in the solution;

(x) Electricity can be used to make magnets (electromagnets);

(xi) Magnets can be used to produce electricity (bicycle dynamo);

(xii) Electricity passing through wires can make them very hot (light bulb filament);

(xiii) Handling electrical appliances can be dangerous.

Machines

(i) A machine is anything which helps man to do work more easily;

(ii) There are 3 basic machines (inclined plane, lever, wheel);

(iii) Some common machines are: the wedge, screw, pulley wheel and axle, the cog-wheel;

(iv) Friction;

(v) Energy is the ability to do work;

(vi) Machines can make use of different forms of energy, e.g., energy of moving air or water, electricity, fuel energy.

Science in everyday life

Science helps to

(i) Safeguard public health;
(ii) Provide better public services;
(iii) Improve agriculture;
(iv) Improve industrial production.

The initial edition of the Guide-notes (7,000 copies) were printed on offset machines at the Science Centre. These were used by the teachers in schools and also by the Primary Teacher Training Colleges. The latest edition of the Teacher Guide-notes for Standard 1-6 in Science and Mathematics were published by the Dewan Bahasa dan Pustaka, a quasi-governmental agency for sale to teachers and the public.

Since in-service courses are remedial in nature and that all newly trained teachers emerging from colleges in the future should be familiar with the new approach, therefore maximum involvement by the lecturers from the training colleges was thought to be very important. This is achieved by holding seminars and discussion groups with the lecturers a few days before the Key Personnel Courses were held, and comments and remarks of the lecturers on the Guide-notes have been found extremely useful. It has been mentioned earlier that a number of training college lecturers have in fact been re-assigned to the Centre to help with the Guide-notes on a full-time basis.

Organization and implementation

As stated earlier, the suggested learning activities in the Teachers Guide are supposed to be explored or conducted by the pupils with the guide of the teacher. As such it is evident that the production of the Guide-notes along is not sufficient in trying to cause a change in the actual classrooms. The problems of implementation and of holding in-service courses have to be tackled on a broad front. The new approach to the teaching of science and mathematics has to be practically demonstrated to the teachers. The Guide-notes themselves contain fewer prescriptions pertaining to classroom management and such related topics. More suggestions on how to help pupils develop basic concept in science and mathematics have exposed the teachers to the new approach. This requires training of personnel and establishment of training centres at peripheral and basic levels all over the country.

1. In-service Training Centre

The idea was to decentralize the nation-wide in-service training programme. The innovations were disseminated in every state simultaneously over a period of time through the regularly organized week-end courses.

To achieve this end, 32 centres known as "Centres of Excellence" were set up in 1970 throughout Peninsular Malaysia. Each centre was led by two experienced teachers who had received previously a centralized training at the Federal level. These trained Key Personnel would in turn train other primary teachers from schools that were adjacent to the Centre of Excellence. The centre was the focal point in the district where trained personnel, reference materials, basic equipment workshop tools, visual materials and other resources were made available

to teachers in the area. The teachers whose schools were too far from the Centre, received an intensive six-day period of in-service training at one time. These intensive in-service courses were held at residential schools all over the country where accommodation facilities were available.

2. District Primary Mathematics and Science Supervisors

In the implementation of the Project, the main emphasis was 'to get things going on' in the schools by assisting the teachers with the essential services and facilities. But 'the things going on' in the schools should he maintained in the desired direction. For this purpose, in early 1974, a batch of 23 Key Personnel had been selected from all over Peninsular Malaysia to function as District Primary Mathematics and Science Supervisors. They were relieved completely of their teaching duties and instead were charged with the responsibility to work very closely with teachers, supervising them in their daily teaching, helping them to create suitable classroom environment and solving classroom problems in relation to the learning and teaching of Primary Science and Mathematics. Besides they have other functions such as:

a) conducting primary mathematics and science in-service courses for teachers;

b) advising schools regarding the purchase of primary mathematics and science learning materials commercially produced (if any);

c) helping schools in the selection of student text books;

d) exposing teachers to new ideas and development in primary mathematics and science education;

e) acting as a channel for the communication and diffusion of ideas, views and opinions among teachers and curriculum officers of the Primary Mathematics and Science Unit of the CDC; and

f) helping the Primary Mathematics Science Unit of the CDC in research and evaluation pertaining to Primary Mathematics and Science Education.

In order to function effectively, the supervisors are exposed from time to time to new ideas and development regarding Primary Mathematics and Science Education through short courses and in-service training sponsored by the CDC. The following arrangements have been made:

a) The Supervisors serve under the State Education Services but are responsible for reporting the progress of their supervision on a monthly basis to the Primary Mathematics and Science Unit of the Curriculum Development Centre.

b) The CDC maintains contact with the Supervisors through meetings and field visits. In such meetings, problems pertaining to the teaching and learning of Primary Mathematics and Science were discussed, and solutions to the problems, if any are formulated.

c) It is hoped that this set-up will benefit more teachers in their local school in addition to already having received week-end courses provided earlier.

Extensive services

1. Prototype materials

From the visits made by the staff of the project and the District Supervisors, it has been found that there is an urgent need to assist teachers to develop some essential prototype equipment required for their daily teaching.

To fulfill the above need, officers in the Primary Mathematics and Science Unit together with the District Supervisors have been assisting teachers since 1974 in making such equipment through workshops held in various schools all over the country.

2. Mobile vans

Besides the on-going in-service programme, the Project established in 1973 mobile vans equipped with materials to serve the needs of remote schools. At the moment only five out of the eleven states of Peninsular Malaysia have had the services of the vans. These states are given such services because they have a relatively larger number of schools with small enrolments of pupils in the remote areas. Moreover, the schools are not accessible to most forms of educational facilities.

3. Newsletter

The newsletter issued half-yearly is used as a channel for the communication and diffusion of ideas, views and opinions among teachers, especially with regard to what children have achieved during the implementation of the Project. Besides, the newsletter also contains subject matter pertaining to science and mathematics.

Evaluation

It is recognized that in any kind of curriculum innovation, evaluation should form an integral part of the implementation machinery. But being the first major effort in curriculum reform undertaken by the Ministry, the priority of the Project since its inception in 1969 was mainly to develop the Teacher Guides in Science and Mathematics for Standards 1 to 6 and, at the same time, to train the teachers in the use of these materials. Hence, it was never intended to incorporate systematic evaluation as a component of the Project.

However, qualitative evaluations based on classroom behaviour as an outcome of classroom interactions have in fact been going on since the early stages of implementation. Issues, problems and alternative solutions arising from such evaluations are being constantly disseminated to teachers through newsletters released by the CDC. Very useful operational ideas are being exchanged between the centre and the teachers and among the teachers themselves by way of circulating such newsletters.

In 1972, quantitative evaluation questionnaires were distributed to randomly selected teachers who have used standards one and two materials for at least a year. These questionnaires were designed to provide information regarding physical conditions in the

schools, academic and professional training of the teachers, teachers' reaction to certain sections of the guide-notes, teachers' perception of the children's responses, questions and activities in guide-notes, etc. Completed questionnaires have been processed, studied and analysed.

Problems and limitations

Besides the usual problems associated with administrative 'red tape', e.g., finance and personnel (both in quality and quantity), the shortcomings of the Project are best summed up as follows:

1. The time element is perhaps the single factor in curriculum development that is not sufficiently recognized by many as a crucial problem. The cost of curriculum development. even excluding the lengthy process of implementation, has to be paid out in time and not merely in terms of cash and personnel. The ultimate price of having to untangle the knots of misimplementation as a result of hurried efforts will be more than whatever time is gained in pushing through the ill - conceived crash programme.

2. The ultimate goal of any curriculum development is to effect pupil change in the classroom. Our immediate task is to cause change in the teachers first so that this will have an impact in their interaction with their pupils. Most teachers tend to resist curriculum change and view the innovative ideas as an additional burden to an already overloaded programme. This wall of resistance is real. If teachers can be helped to perceive the new curriculum programmes as reducing their burdens, they are more likely to be receptive to the new ideas.

3. If teachers can be invited to be involved in the project right from the start and continue throughout the period of development, they are more likely to view the project as a means of solving their own problems, and their commitment at all levels is assured. At the in-service course, the silent Malaysian teacher can be anything from the most appreciative to the most negative, except that he does not think it polite to tell.

4. Teachers in the classroom very seldom find solutions to their classroom problems in books and journals or educational practice. Perhaps curriculum development can provide the bridge between the lofty educational principles usually aired in seminars and day-to-day grind of the classroom teaching with fifty children in each class. The CDC is doing its best to try to build this bridge.

5. Our experience has shown that in order to be effective and successful in developing curriculum materials the curriculum deve' per should have all the following qualities:

a) have had a successful teaching experience;

b) have a good understanding of science and mathematics;

c) have an understanding of how children learn science and mathematics;

d) have a good understanding of pedagogy;

e) be able to read and understand English in order to survey modern curriculum materials from abroad;

f) be able to write in correct and precise Malay (in order to prepare instructional materials);

g) be able to deliver talks and lectures in good Malay (in order to run courses); and

h) have an interest and willingness to prepare curriculum materials.

Suitable officers with the qualities described above may not be easy to recruit. Personnel without the above qualities are eager to join but their priorities are not curriculum development. It is suggested that personnel should be hand-picked and those who have proven themselves as suitable curriculum developers should be given recognition and remuneration in keeping with their important contributions to improve the quality of education.

Further extensive services - the development of multi-media self-instructional teacher education project

1. Origin

The feed-back from the quantitative evaluation mentioned earlier in this paper indicated clearly that the primary school teachers were generally weak in their initial educational background. Large numbers of these teachers, the majority of whom are in rural schools possessed academic qualification of Standard VI or below, and a professional training that is no longer relevant.

These teachers, despite having attended the in-service courses pointed out earlier, are still in need of more assistance to help them understand basic content concepts in Science and Mathematics, as well as more recent approaches to the teaching of Primary Science and Mathematics.

It was obvious to the Ministry that the existing efforts in in-service training cannot by themselves succeed without some additional supporting elements. Arising from this felt-need, it was then decided to develop an alternative approach that would supplement the on-going re-training programmes. The alternative approach utilizes self-instructional materials which are designed to help teachers to instruct themselves towards some mastery of the Basic Science and Mathematics concepts that are central to the effective implementation of the "Special Project" materials.

In June 1973, the proposal was put forward to undertake a project to develop and to supply multi-media self-instructional modules, geared to the needs of the teachers.

2. Project objectives

a) To develop self-instructional materials for the upgrading of selected, substantive and pedagogic skills of primary teachers, that

i) can be used by individual teachers, on their own, with minimal introduction;

ii) will supplement the present in-service training;

iii) will reduce the need for extensive in-service training;

iv) could be produced at a reasonable cost.

b) To try the materials in the field on a pilot basis to determine:

i) the willingness of teachers to accept the materials;

ii) the extent to which the materials will fulfil objective No. i);

iii) means and ways of further improving the materials to meet objective No. i);

c) To make recommendations concerning further development and implementation of such materials, based on an evaluation of the initial trials.

3. Development of the modules

As stipulated in the Project Proposal Paper, only two sample sets of modules were initially developed, one each in Science and Mathematics.

Prior to the development of the modules, the project team set out to prepare the Evaluation Design which is as follows:

Evaluation design

1. Presage stage - survey of needs

a) Objective

To identify the needs, both substantive and pedagogic, of and among primary teachers in the teaching of mathematics and science.

b) Ways of identifying needs

i) Review of existing information available at "Projek Khas" (questionnaires, reports correspondence) to identify needs of teachers (analysis of content and methodology);

ii) Interview of Federal Inspectors/District Supervisors supervising (content, methodology);

iii) Interview of Teacher Training Principals/Lecturers to ascertain what topics in content and methodology are covered by pre-service and in-service teacher training;

iv) Check-list of topics indicating priorities to be rated/ranked by 30 experienced/practising senior teachers.

c) Data processing

i) Identifying the needs in mathematics - content and methodology;

ii) Determining priority of topics.

2. Formative stage

a) Preparation of modules

i) Inspection of modules and comments by a panel consisting of selected Federal Inspectors, Curriculum Developers, Lecturers and teachers.

ii) Identifying 20 teachers in trial schools who are weak in content & methodology to try out the modules.

iii) Pre-test and post-test of 10 teachers in the form of:

(a) reactions of the teachers to the modules (Sealing Technique);

(b) observation by evaluators in the classroom; and

(c) test of content in the module.

3. Summative stage

a) Field officers

i) Identifying 44 field officers (the existing primary science/mathematics supervisors may be utilized);

ii) Orientation of the field officers with a 3-day course on the functions of the officers and the use of the modules and identification of the performance of the officers on a sample of teachers in their initiation of the teachers in the use of the modules.

b) Evaluation of project

i) Interview/observation by Inspectors, a Curriculum Developers and Evaluators to find out the effectiveness of a) the modules; b) the work of the field officers;

ii) Reactions of the teachers with reference to the effectiveness and helpfulness of the modules;

iii) Comparison between teachers who have been using the modules and those who have not (Experimental Group & Control Group).

Dependent scores:

a) Content test;

b) Rating by evaluators in the classroom.

iv) Comparison of costing between training of teachers using the modules and those not-using the modules.

4. Survey on teachers' needs

A preliminary survey was conducted to determine the topics (Mathematics and Science) of the modules. Selected teachers and District Mathematics and Science Supervisors were involved in the survey. The survey indicated that teachers needed help on the following topic areas:

Science	Mathematics
S1. Our earth	H1. Rational Numbers
S2. Machine	H2. Application of Numbers
S3. Electricity	H3. Volume
S4. Air Pressure	H4. Decimal Fractions
S5. The Universe	H5. Introduction to Fraction

As a follow-up of the first survey, a second survey was conducted. This survey was to determine a detailed specification of the content of the modules and also the instructional skills which the teachers needed and to collect all relevant information for the development of the modules. For this purpose, the views of a sample of primary school teachers, college lecturers, district supervisors and Federal Inspectors of Schools were obtained.

The information gathered from the two surveys led to the following decisions:

a) The two sample modules would be on

(i) Electricity (ii) Decimal Fraction

b) Each module would consist of the following:

(i) A set of booklets containing basic academic information;

(ii) Learning kits (for the teacher) to go with (i);

(iii) Teaching manual;

(iv) Slide and tape presentations to accompany (iii).

The trial version of the Electricity Module has been completed. The module on Decimal Fraction is still at its development stage and is expected to be completed by 1979.

5. The electricity modules

To upgrade the academic knowledge of the teachers in Electricity, it was decided to produce five self-instructional booklets, namely:

Book I - Introduction to Electricity
Book II - Electrical Circuits
Book III - Electrical Resistance
Book IV - Electric Current
Book V - Uses of Electricity.

In each of the above-mentione- booklet there are self test-items. The test-items are meant for the readers to assess their understanding of the concepts being discussed.

Simple experiments on Electricity and a step-by-step procedure on how to perform them are also discussed in the booklets, particularly in Book I - III. Also included are apparatus kits such as ammeter, voltmeter, wire, bulb, etc., so as to enable the readers to perform the experiments mentioned earlier.

The Electricity Module also contains a Teaching Manual. The topics discussed in the Manual included teaching principles, teaching strategies, questioning techniques, classroom organization, etc. In short, the manual provides readers with supplementary reading on 'how to teach' electricity.

Accompanying the Teachers' Manual are the tape and slide presentations on classroom teaching to illustrate examples of pedagogical skills and classroom events.

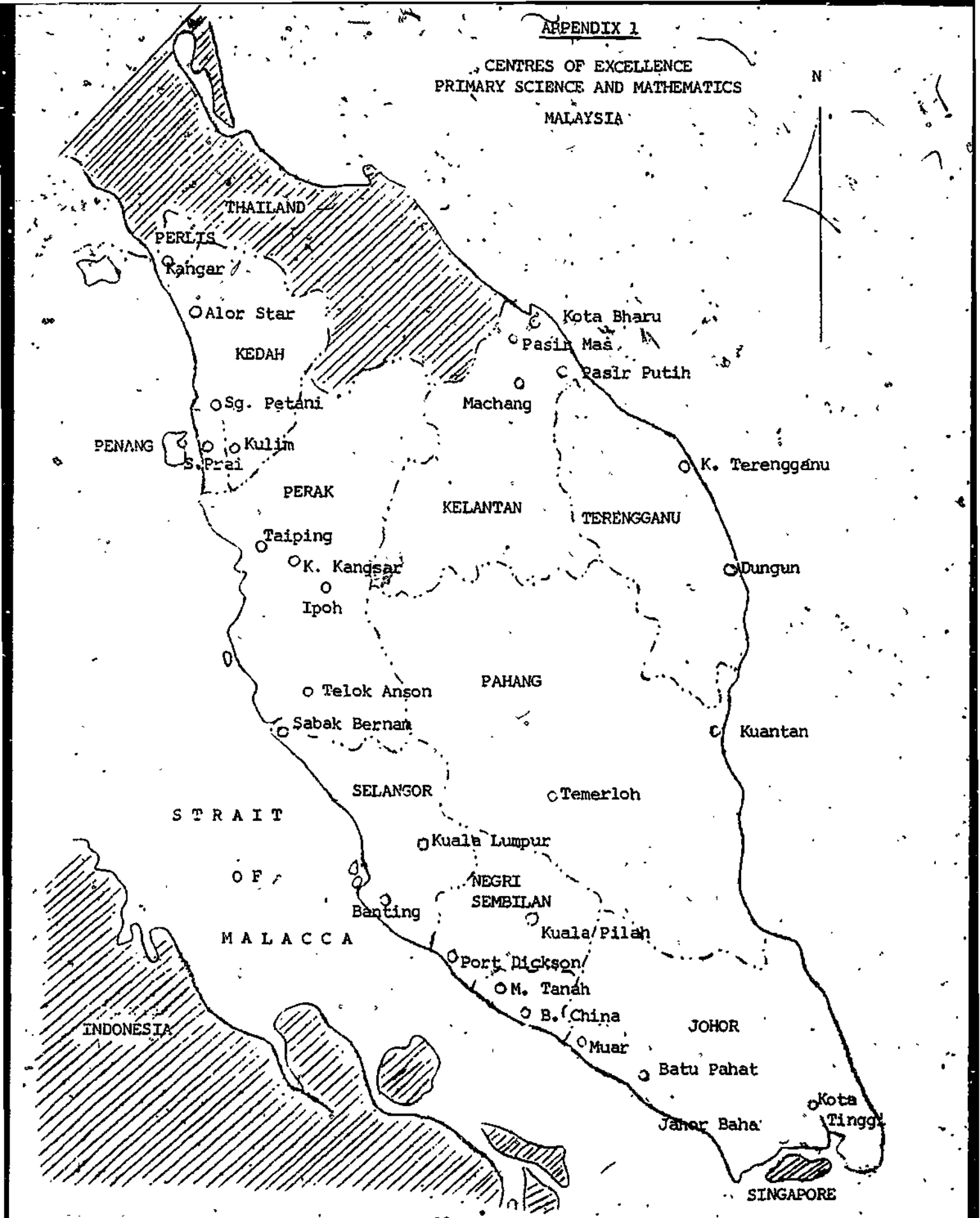
Since this learning package is self-instructional in nature, it is only appropriate if some forms of explanation is provided to the uses on what sort of help they could get from the module and also some instructions on how to operate the various electrical instruments provided. For this purpose, a booklet (introduction to Electricity) has been prepared. This booklet would also help the users to determine whether they need to go through the module at all.

6. Evaluation of the print-media of the electricity-modules

The drafts of the self-instructional booklets on Electricity mentioned earlier were tried out initially with twenty primary school teachers prior to being printed for broader retrial. The materials were then revised on the basis of this evaluation. The opinions of experts, Federal Inspectors of schools and lecturers from Teachers' Training Institution were also obtained for this purpose. Although the materials have been modified, a final evaluation has yet to be conducted before the material can be recommended for nation-wide implementation.

APPENDIX 1

CENTRES OF EXCELLENCE
PRIMARY SCIENCE AND MATHEMATICS
MALAYSIA



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MALAYSIA: EXPERIENCES OF RECSAM IN DEVELOPING SCIENCE INSTRUCTIONAL MATERIALS

by

Chin Pin Seng

RECSAM was established as the Southeast Asian Centre for Education in Science and Mathematics in Penang, Malaysia by the Southeast Asian Ministers of Education Organization (SEAMEO) in may 1967. Its main purpose is to help improve the teaching of science and mathematics of member countries in order to meet their respective technical and scientific manpower needs for national and regional development. The major activities of the Centre are the "on-the-job" training of key personnel from member countries in various areas of science and mathematics curriculum development and the development of innovative exemplar science instructional materials by Southeast Asians for their countries.

The development of instructional materials at RECSAM is unique in many respects. It is in essence a regional co-operative action. Senior level personnel from member countries, by attending course at RECSAM will have the best opportunities to study together the common problems in indigenous educational development, the diversity of their educational systems and educational practices, and foster greater mutual understanding and appreciation of the efforts of their countries in the improvement of education for their youths. At the same time, with the expertise assembled together at RECSAM, they can contribute their ideas and pool their talents, experiences and local knowledge together to develop and produce their own prototype science and mathematics curriculum materials, taking into consideration the success and future of curriculum projects elsewhere, the latest trends in curriculum development, their Southeast Asian environment, their rich cultures and their socio-economic and cultural needs and the limitations of their local resources.

An integrated approach is adopted where key personnel attending certain related development courses are brought together at the Centre to develop science instructional materials. Those participating in the courses, "Development of Primary Science and Mathematics Modules" and "Development of Evaluation Techniques in Primary Science and Mathematics" work together in developing teaching modules and evaluation instruments for these modules respectively.

Another integrated approach is used in selecting personnel for a writing team. The development of curriculum materials should not be left to any homogenous group of educators. A heterogenous group should be given the responsibility to carry out the work in order that the practising teacher, the supervisor, the college lecturer, curriculum developer, researcher and the school principal and other categories of educators can bring together the various dimensions in making the teaching of science more effective and relevant to the needs of their countries. RECSAM has taken such an integrated and innovative approach in indigenous curriculum reforms at the regional level and has achieved initial success in this direction.

Designing instructional materials

One of the major projects of RECSAM is the development of innovative science and mathematics instructional materials at primary level known as "Southeast Asia Science and Mathematics Experiment" (SEASAME). One distinctive feature of this project, which was launched in 1973, is its research base. A systematic means of collecting data, analysing it and feeding it back to the curriculum writers has been developed. Very few curricula in the Southeast Asian region have been developed along similar lines.

Other innovative features are in its systems orientation and science-mathematics correlation.

The main objectives of the packaged science instructional materials of this project are:-

1. To introduce the child to its environment and community through 'doing science' in a practical and enjoyable way, making full use of materials available in its environment, thereby helping him to gain an understanding and love of nature and respect for humanity.
2. To help him realize that science is part of his cultural and social heritage.
3. To understand and appreciate how simple concepts and principles of science and mathematics are applied or can be applied to improve the quality of life in his society and environment, e.g. applications to agriculture, community health, sanitation and nutrition.
4. To assist the child in applying process skills of science and mathematics such as observing, analysing, interpreting, etc. in dealing with day-to-day problems thereby applying the systems way of thinking to his daily problems.
5. To develop in the child ways of dealing with phenomena in terms of systems of interrelated and interacting facets in keeping with the requirements of a rapidly changing science-oriented society.
6. To provide him with some work orientation relevant to rural or urban development of the community in his environment.
7. To enable him to continuously acquire new knowledge and skills throughout his life.
8. To assist the child in developing an outlook for self-reliance and creativeness by using acquired skills and available resources in his environment for a better world of tomorrow.

Project design

a) The project should be designed to meet the objectives as stated above. It should be in the form of package modules correlating science and mathematics. While striving to teach a child to be able to look at things in various related ways, it also aims at teaching him to apply process skills of science in dealing with a situation, i.e. to take such necessary actions that underline the systems thinking and approach. It is also planned to use multimedia approaches in the units

100

of lessons to be developed. While the overall framework of the project gives emphasis on systems-oriented science due consideration will also be given to learning of concepts in the process.

b) It will also develop suitable teaching modules to cater to the needs of large classes of pupils.

c) The project should have the potential of transferring skills and knowledge to the key educators from Southeast Asian countries through practical examples and on-the-job training in developing and evaluating curriculum projects.

Problem-oriented project

The Centre is greatly indebted to Professor Sim Wong Kooi of the University of Malaya, for his suggestion that the overall framework of the project should give emphasis on systems-oriented science. In designing the project, use is made of systems as an organizing principle for the integration of substantive science and mathematics content.

The curriculum research and development work in this project will essentially consist of five main areas of problem-oriented activities:

1. The design, development and production of exemplar teaching/learning low-cost apparatus and other audio-visual supplementary materials.
2. The design, development and production of appropriate evaluation procedures, instruments for formative evaluation, and instruments for evaluation of achievement of basic concepts, processes, skills and attitudes.
3. The design and production of self-instructional training packages for teachers and evaluators in the tryouts of the SEASAME units in various member countries. Multi-media approaches will be utilized. As the effective tryout of new SEASAME units in member countries depend on the proper training of the personnel involved, it is vital that this training be carried out efficiently. The supply of self-instructional packages will ensure reliable feedback for consequent revision of those teaching modules.
4. Tryout of SEASAME units annually in two or three member countries which have agreed to collaborate with RECSAM in the project.
5. The evaluative data will be collected, processed and analysed by evaluation specialists and the revision of the teaching units will be consequently made on the feedback of such data.

Operational strategies

In order that the instructional materials may be designed and produced by Southeast Asian themselves, it is necessary to involve some promising key educators from Southeast Asia in curriculum writing and development of suitable evaluation instruments under the guidance of the project staff. Annually a selected group of curriculum writers will,

after going through a workshop on curriculum writing at RECSAM, develop and write suitable teaching modules based on a selected list of topics submitted by member countries to the Centre. Two types of a class lesson will be produced. One is teacher centred (class approach) and the other is pupils-centred (group approach).

It should be stressed that the designing and production of the teaching modules will be the task of key educators from the countries in the region and not that of the project staff. This will provide 'on-the-job' training and the transferability of relevant techniques and innovative and meaningful ideas to such key curriculum personnel assigned for developing curriculum materials in their own countries. This will fill the gap in member countries as they have realized that there is no short cut to curriculum development. Up to now, most of developing countries have relied too heavily on outside experts to produce suitable curriculum materials through adoption of curriculum projects developed in the countries of such experts with consequent disappointing results for the simple reason that such imported curriculum projects were written for the needs of developed countries. Developing countries have to rely on their own key educators, after 'on-the-job' training at RECSAM, for developing their own curriculum materials in order to meet their socio-economic, cultural and material needs.

It is a great advantage for key educators from the countries in the region to get together at RECSAM periodically in the development of a regional model curriculum project because the pooling of ideas and the sharing of experiences will definitely contribute to learning from one another and stimulate them to exert greater efforts in this co-operative venture. The cross fertilization of ideas will not be possible if the project development was to be confined to curriculum writing personnel from just one country.

Teaching units produced will be reviewed by the project staff before proceeding to the next stage.

Selected key educators from Southeast Asia will, after participating in an evaluation workshop at RECSAM and studying the teaching units produced by their colleagues earlier, develop appropriate evaluation instruments for those modules under the guidance of the project staff.

These are some of the evaluation instruments to be developed for the pilot testing:

a) Pupil Achievement Test for each sub-unit;
b) Pupil Interest Inventory for each lesson in each sub-unit;
c) Teacher Perceptions Questionnaire;
d) Classroom Interaction Analysis.

Evaluation studies

In the analysis of the evaluation data, the following evaluation strategy built round the three central questions will be used:

1. How effective are the materials in terms of such dependent variables as: (a) achievement, and (b) interest? In order that meaningful interpretation may be made, it is imperative that the reliability and validity of these measures be ascertained.

2. To what extent are these outcomes attributable to or dependent upon a number of independent variables, namely:

   a) Group/class approach
   b) Urban/rural location
   c) Grade level (Grade 4/5)

   In this comparative study, it is interesting to compare sub-groups arising from the combinations or interactions of these independent variables.

3. What are the inter-connections or intervening variables between the independent and dependent variables and how are they interrelated? For instance, we are concerned with:

   a) the nature and extent of classroon interactions;

   b) teachers' perceptions regarding conditions which can be obtained during the school tryouts.

The cycle of producing teaching modules and evaluation instruments will be repeated annually.

The normal strategy of a research project calls for the project staff itself to design, develop and produce curriculum materials. etc.

On the other hand, the RECSAM-SEASAME project is an action-oriented one that included elements of on-the-job training for key educators from the region in order that they can, on their return, carry out all aspects of indigenous curriculum development themselves. At the same time, the project staff are not representative of the whole region, the majority of whom are Malaysians. Consequently, RECSAM has to utilize the promising key educators from Southeast Asia for the production of suitable teaching modules and other related curriculum materials.

Pilot testing

Once the evaluation instruments have been produced for the teaching modules, production of the curriculum materials needed for the first tryout in a random selection of schools both in the rural and urban areas in Penang, Malaysia, will be carried out by the participants concerned.

The training of key personnel and their national project co-ordinators for the trial run will be carried out through workshops either at RECSAM or in their own countries. Schools chosen for the trials should represent the cross-section of schools in the country, such as urban/rural, different class sizes and homogeneous/heterogeneous groupings.

As the effective tryout of new SEASAME units in member countries will depend on the proper training of such personnel it is vital that the training workshop be carried out efficiently. In order to ensure this, it is proposed to develop self-instructional training pa kages at RECSAM for trial teachers and evaluators and translated into appropriate national languages of member countries. The multi-media approach will be utilized. This development will involve the project staff with the aid of visiting consultants from the region as the project staff may not have the full time to devote to the production of such materials.

The administration of the pilot project will be in the hands of national project co-ordinators and the organization of the tryout and its implementation techniques will be designed and developed by the national project co-ordinators concerned in close consultation with the project staff.

In the first year of the project, trial runs will be carried out in a number of countries which have agreed to collaborate and co-operate with RECSAM. Project staff will spend two weeks in such countries to assist the national project co-ordinators in training their teachers and evaluators and supervising the actual trial runs. It is necessary to include control groups in the evaluation process.

Analysis of evaluation data

This phase of the project is by far the most important one. The analysis of evaluation data collected from the tryouts may have to be carried out with the assistance of evaluation services available from Universities of Malaysia as RECSAM does not have sufficient evaluation experts and computer facilities. Various studies could then be made by the project staff and the necessary revision of the trial teaching modules should be undertaken.

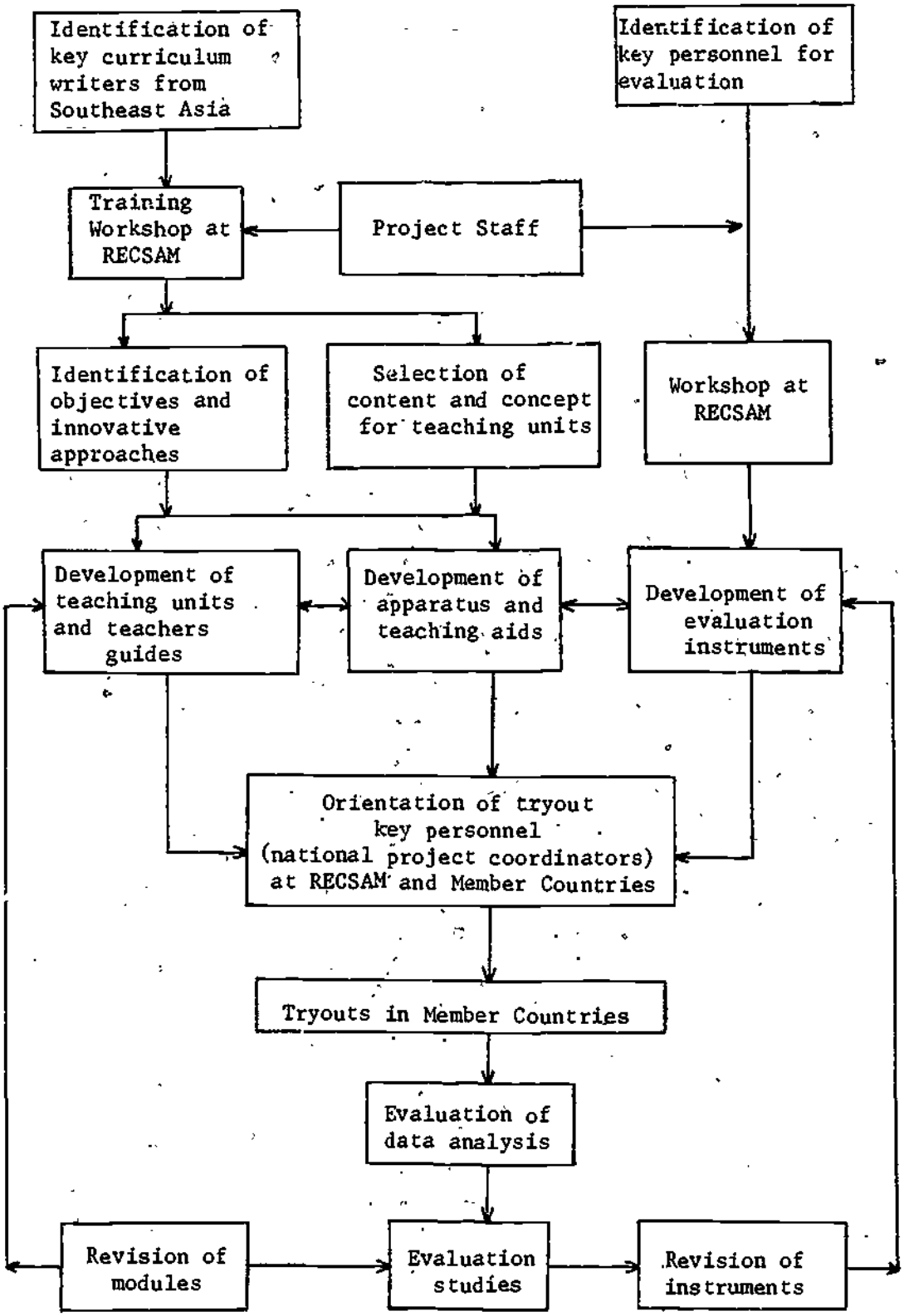
Time schedule

The anticipated termination of the whole SEASAME project is June, 1980.

'Systems thinking' is used as one of the main organizing principles in designing and implementing the SEASAME project, including the development of teaching modules. It is a methodical and orderly process involving the applications of systems concepts to help in decision making and problem solving. This approach used in dealing with a situation/problem is called systems approach. In so far as science education is concerned, it means in simple terms, the study of the various parts of a phenomenon, their interrelationships to one another and their contributory functions to the whole system. This is a more useful and purposeful study than just learning in detail the parts themselves. It thus provides an overview of the relationships, interactions and functions involved in dealing with the study of a phenomenon.

The use of systems concepts in the military, commercial and government sectors of a modern society which is facing rapid changes because of the advance of science and technology, has been successful. It is being introduced in the field of educational planning, administration and curriculum development. In the face of 'knowledge explosion' organizing curriculum through systems concepts will draw a lot of dead-wood out of the overloaded curriculum. It will provide economy of time to learning content, thus, giving pupils more time in acquiring learning and thinking skills and applying basic knowledge to problem solving in their present and future lives. In our rapidly changing society which is largely influenced by science and technology, we need to prepare our teachers for the future in terms of organizing their teaching based on a 'humanised systems' approach so that they can guide their pupils effectively in simple 'systems thinking' through science and mathematics lessons and activities. This project therefore attempts to encourage teachers and other educators to learn about 'systems thinking' and apply it in teaching science and mathematics to their pupils. The inclusion

Schematic Diagram Showing Developmental Phases
of SEASAME Project
RECSAM



of the use of systems approach in its simple form adds an innovation to the Centre's development of science instructional materials. The application of systems concepts to processes of curriculum development and instruction will make science learning more effective and relevant for pupils to learn on 'how to think'. Systems thinking is implicit in the units. It is not taught explicitly to learners. 'The intention is to inculcate in children a way of thinking about, or conceptualizing, systems in terms of various relationships within and among sub-systems, systems and suprasystems'. (Lau Kam Cheong - 'Review of SEASAME Materials' - RECSAM's Regional Workshop on Evaluation of SEASAME Project - March, 1977).

Six out of the eight systems relationships, that are emphasised in the modular units have been developed. They are extracted from the same paper by Lau Kam Cheong:

At the risk of over-simplification, the six relationships selected may be restated in the form of the following questions for easy understanding by pupils:-

1. Structural
   a) How can things be arranged, organized or sequenced?
   b) Why do things have to be arranged, organized or sequenced?
2. Interactional
   a) How do things affect (act upon/influence) one another?
   b) Why do things depend on each other as well as on other things?
3. Functional
   a) What are things for?
   b) Why do things depend on each other as well as on other things?
4. Part-whole
   a) How may smaller things be put together to make bigger things?
   b) How may bigger things be broken up into smaller things?
5. Isomorphic
   a) In what ways can things be alike or similar?
   b) Why do things belong together?
6. Observer-system
   a) Why are there different ways of looking at the same thing?
   b) Why different things may be viewed or observed (i.e. perceived) in the same way?

SEASAME materials are directed at providing children with learning experiences to seek answers and acquire understanding about phenomena with respect to the above questions. By being aware of these

relationships is the first step in the direction of utilizing them for dealing with complex phenomena and handling problems.

Topics for the curriculum content of the project are submitted to the Centre by the Ministries of Education of all the eight member countries. They are from the existing curriculum content of the respective countries. The selection of topics was carefully processed by course participants. One criterion is the extent to which topics can provide systems concepts. Another one is the functional aspect of the topics as the primary level in the context of actual situations in the various member countries.

The short-listed topics were then placed into one of the systems, natural, manipulated or conceptual. The major systems relationships of the chosen topics were identified. Participants further examined these topics using the following criteria:-

1. The relevance of the topic in introducing basic concepts which will illustrate some systems relationships.
2. Its relevance for pupil's learning in terms of national needs.
3. The likelihood of the topic to be taught to learners on the assumption that required facilities are available.

Topics for the teaching units at each stage of development were finally chosen after taking into consideration the responses of the participants and the desirability of having different systems fairly represented in the project.

The diagram below is represented with the topics lined up. (From Yeoh Onn Chye - 'Value Assumptions for SEASAME' - RECSAM's Regional Workshop on Evaluation of SEASAME Project - March 1979).

Course participants responsible for the design and development of the teaching units spent the first half of their ten week period attending lectures, participating in discussions, workshops and practical studies in the following areas:

1. Introduction to SEASAME: objectives and strategies
2. Indigenous curriculum reform
3. Systems concepts and systems orientation
4. Instructional and behavioural objectives
5. Learning theories and learning processes
6. Instructional designs
7. Teaching strategies/use of multi-media
8. Innovative teaching/learning techniques
9. Curriculum analysis
10. Analysis of materials from selected modern curriculum objectives (Methodology used)
11. Demonstration and analysis of SEASAME modules previously developed (Teaching/learning techniques used)

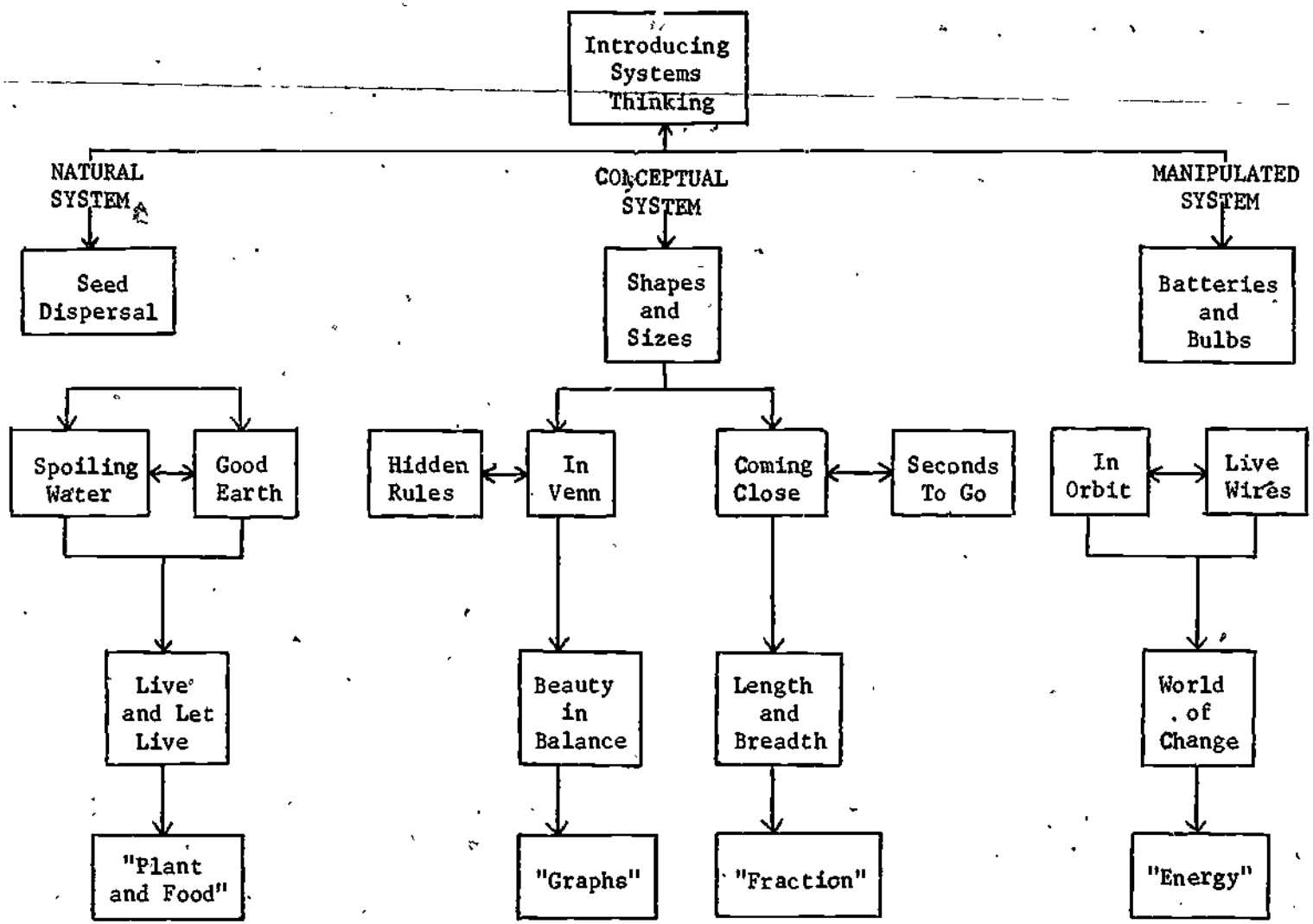


Fig. 1 POSSIBLE "INTERDEPENDENT INDEPENDENT" RELATIONSHIPS AMONG SEASAM UNITS

1973/74 Grades I/II PHASE I
1975 Grades II/III PHASE II
1976 Grades II/IV PHASE III
1977 Grades V/VI PHASE IV

Participants, working in groups, developed the instructional materials in the form of four lessons for each topic, due to the time constraint of five remaining weeks. Time was spent on researching, planning, designing, sequencing, organizing the lessons, writing the modules, mini-trailling and final write-up. Attractive titles were given to the units to indicate their relevance to countries in the region. Some of the units are given below:

YEAR	GRADE/STANDARD	UNITS	
		SCIENCE	MATHEMATICS
1973 - 1974	II and III	Introducing Systems Thinking Seed Dispersal Batteries and Bulbs	Shape and Sizes
1975	II and III	Spoiling Water Good Earth In Orbit Live Wires	Hidden Rules Invent Coming Close Seconds To Go
1976	III and IV	Live and Let Live World of Change	Beauty In Balance Length and Breath
1977	IV and V	Introducing Systems	Part and Whole At A Glance
1978	V and VI	Warming Up Let There Be Life	A Point In Place Interesting Trio

From Potenciana C. Cruz - 'SEASAME Project' - Journal of Science & Mathematics Education in Southeast Asia - RECSAM. Vol. 1/No. 1

Outlines of the lessons of each of the following four units developed in 1978 will indicate how the lessons are sequenced:

1. "Warming Up" (Heat energy)

The lessons deal with (1) sources of heat energy and their importance to daily life (2) expansion of solids (3) expansion of liquids and its relation to temperature and (4) objects of the same temperature having different amounts of heat energy.

The activities are carried out through demonstrations, experiments by pupils guided by the teacher, inquiry discussion, and use of worksheets.

2. "Let There Be Life" (Plant reproduction)

In this module, emphasis is given to the large green plants that grow profusely in gardens, farms, plantations, and streams. Such plants are an essential part of the ecosystems and many of which supply man with much needed products as well as beautify the surroundings.

The 4 lessons centre on the 3 main ways in which these plants reproduce their own kinds, namely: by spores, by seeds, and by vegetative parts.

Carefully prepared worksheets and handouts, which depict pictorially the step-by-step process of bud grafting and marcotting, are used to supplement the activities.

3. "A Point In Place" (Decimal fractions)

The module deals with introductory lessons of the understanding that decimals can be used to express a number that is less than 1, but more than 0.

The 4 lessons centre on the introduction of decimals to first place and to second place, conversion of fractions to decimals and vice versa, and addition and subtraction of decimals up to 2 places. There are activities by reference to actual usage in life through measurement and money.

4. "Intersecting Trio" (Triangles)

The module enables the pupils to discover the properties of the various shapes or types of triangles. The lessons are activity-based and required for the pupils to observe and appreciate the uses of triangles in daily life.

The 4 lessons deal with shapes, and angles of triangles, classification of triangles according to lengths of their sides, simple method of obtaining the sum of angles in a triangle, and appreciation of triangle.

Each unit of four lessons consists of the following notes for teachers.

a) Rationale - highlights the significance of the unit to everyday life and the application of systems approach and the various systems relationships.

b) Overview of lessons - gives the various concepts, processes and skills that are to be taught;

- describes how lessons are sequenced and related to each other;

- illustrates the analysis of concepts and systems relationships of the unit.

c) Unit objectives - specifying what pupils are expected to learn from the prescribed lessons and explains the underlying theme.

d) Lessons - describes briefly what each lesson is all about and the teaching/learning techniques to be used.

e) Materials - gives the list of teaching/learning aids/materials required.

f) Personnel - lists of authors who developed the unit and RECSAM staff and consultants who guided them.

g) Bibliography - lists the reference resources used for developing the unit.

As an illustration of exemplar 'notes' the extract below is taken from the module entitled 'Warming Up' for Grade 5/6.

SEASAME (Southeast Asia Science and Mathematics Experiment)
(Grade 5/6)

"WARMING UP"

Rationale

Energy has become a popular word nowadays as a result of the oil crisis. How to save energy and to find alternative sources have been the preoccupation of scientists, administrators, economists and political leaders. Such preoccupation with energy and its ramifications should necessarily be reflected in the school since education for the future is one of the aims of schooling.

In school, therefore, we are confronted on how to introduce the subject of energy in such a way that it becomes meaningful to the pupils. The concept of energy and the ramifications it has to our survival is rather too complicated to the elementary grade pupils, most of whom are in the concrete operational stage of intellectual development. There is a need to approach the subject in such a way that the concept becomes understandable in the light of the pupils' experiences.

Hence, we have in this teaching module focused on one form or manifestation of energy that is so essential to our environment - heat. Its effects and applications are quite familiar or can be demonstrated to the pupils without the need of sophisticated apparatus. We believe that the experience, knowledge, skills and attitudes that the lessons aim to develop among pupils in this module could serve as foundation upon which they could gain better understanding of the complex concept of energy later. Teaching with some amount of depth, one specific area seems pedagogically sounder than to cover a broader area but superficially.

Accordingly, this teaching module entitle "Warming Up" introduces the pupils to the different sources of heat and its significance to everyday living. Pupils are made aware of the effects of heat on solid and liquid and how these efforts are put to good use. They are also given the opportunity to acquire first experiences so that they will intuitively realize two relevant concepts such as objects at the same temperature may have different amounts of heat and that heat and temperature are two different things.

The members of the group who developed this module took into consideration the science curriculum requirements of standards 5 and 6 pupils for which it is intended as well as the limitation of teaching apparatus and laboratory facilities in the rural areas in the various Southeast Asian countries represented.

Some system relationships which are evident in the various lessons are as follows:-

Functional Relationships - how man adopt the effects of heat energy to his benefit and use it to provide for his daily necessities and comforts.

Interactional Relationships - the daily happenings in our environment as a result of the interaction of energy from various sources with matter, such as expansion, contraction, etc. and their concomitant effects.

Part-whole Relationships - the consideration of one heat source in relation to all the sources of heat energy in our environment.

A chart of the concepts included in this module is illustrated in the following diagram. Two most evident system relationships, functional and interactional are also indicated.

Finally, it is hoped that the pupils, through working with the different activities and guided by the teacher, would be able to understand and appreciate the significance of the various sources of heat energy in their own lives and that they are challenged and stimulated to think more scientifically.

The concepts of sources of heat energy and its importance to daily life are reviewed and further developed in the first lesson, through demonstration experiment by the teacher, pupils' experiments, inquiry discussion and the use of worksheet.

In Lesson 2 pupils are given the opportunity to experiment on the expansion of solids. Discussion of the concepts or principles and applications follow each activity. As in the previous lesson, pupils accomplish worksheets.

The expansion of liquid and its application particularly in the thermometer is treated in Lesson 3.

The last lesson introduces the concept that two objects have the same temperature may contain different amount of heat energy. Hopefully, the pupils will also intuitively realize the distinction of heat energy and temperature. The lesson is also devoted to review and consolidate the various concepts/principles and their practical applications taken up in the whole unit. Enrichment activities are provided in each lesson for the brighter group of pupils.

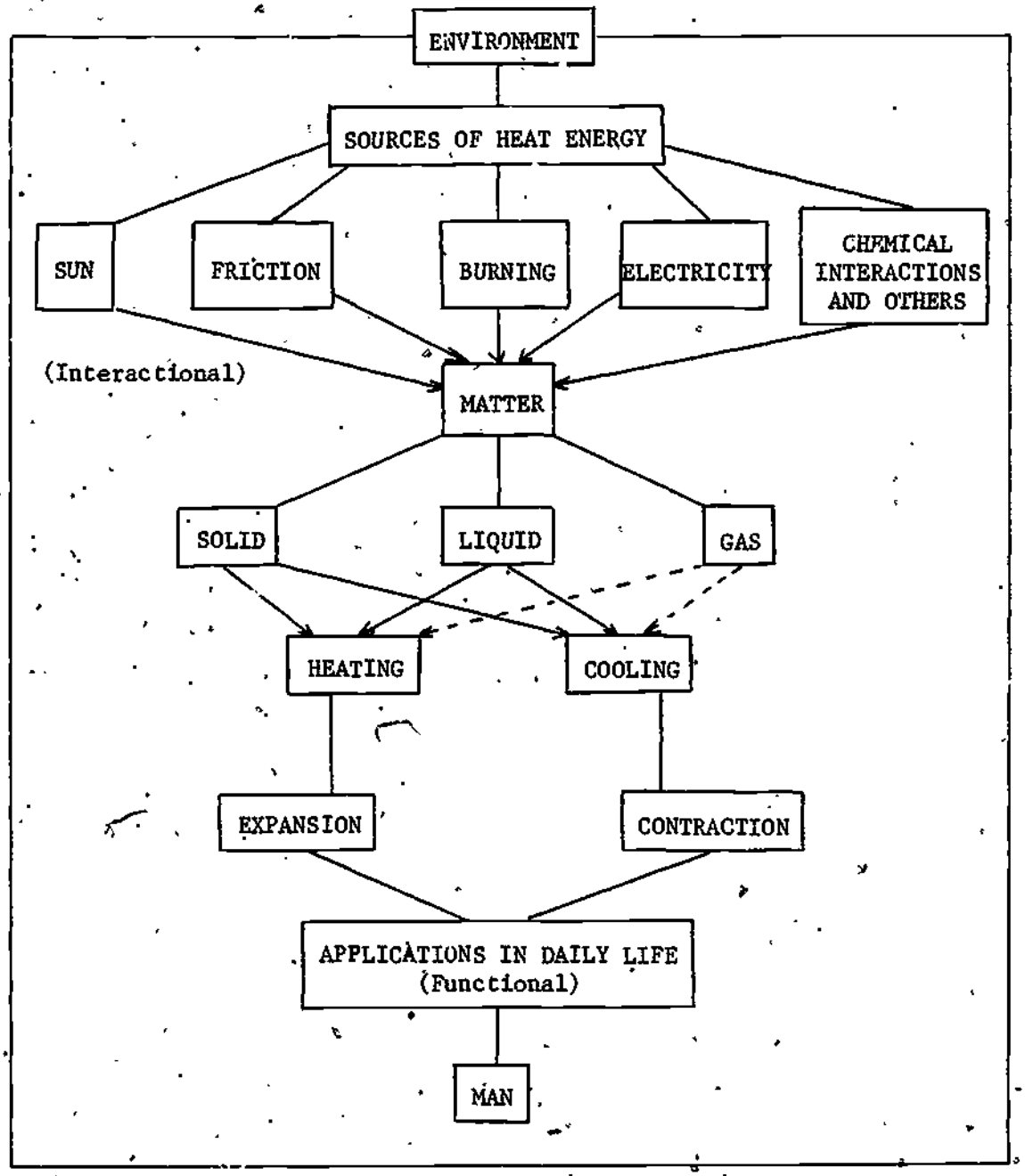
Although the class approach is somewhat predominant throughout the unit, there are however, ample opportunities for pupils to handle the materials, develop laboratory skills, group work, learning by inquiry and discussion. Hopefully, in the process, they also develop scientific attitudes.

Module objectives

At the end of this teaching module pupils are expected to be able to:

1. Acquire greater awareness of the sources of heat energy and recognize its importance in daily life.
2. Describe the effects of heat on solids and liquids and realize their practical applications.
3. Recognize that the amount of heat energy content of a body at a specific temperature increases with size or mass.

ANALYSIS OF CONCEPTS AND SYSTEMS RELATIONSHIP OF UNIT "WARMING UP"



Heat energy is essential to life. Its interaction with matter whether it be living or non-living things greatly affects the environment we live in. This teaching module has been prepared with the purpose of developing greater awareness among pupils to the importance of heat energy, its various sources, its effects which are applied in our daily life and at the same time giving the children opportunity to develop scientific skills and attitudes.

4. Relate the concept/principle in item 3 to practical life.
5. Develop further science process skills such as observation, recording of data, experimenting, etc.
6. Develop an interest and liking for scientific investigation.

Materials

- ice cubes
- water
- plastic papers
- sandpapers
- pieces of wood
- magnifying glasses
- papers
- boxes of matches
- plastic tubing/bamboo stick/ball pen tube
- bricks/tin stands
- tin cans
- metal
- spirit lamp/kerosene lamp/charcoal fire
- batteries (torchlight)
- copper wire/iron wire
- aluminium/tin foil/cigarette silver paper
- one coin
- washers
- string
- scissors
- glasses
- candles
- nails
- hammer
- screws
- screw-eyes (hooks)
- transparent plastic straw/tube
- cork/wax
- thermometers
- big nails
- small nails
- bottles
- dry leaves
- battery holders (improvised)
- pliers
- photos, drawings or pictures of (i) clothesline
  (ii) telephone wires/electric
  (iii) wires
  (iv) concrete roads
  (v) railway lines
  (vi) steam pipes
  (vii) iron rims on wooden wheels
  (viii) 2 saucepans

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DT-SM: Development of Teaching Modules for SEASAME Project (Primary Level)

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Each lesson consists of six parts:

1 Objectives, 2. Concepts, 3. Materials (for teachers and pupils), 4. Preparation, 5. Suggested Procedure (instructional techniques) and 6. Worksheets.

The first lesson in the unit 'Warming Up' is given below as an example of the exemplar lessons developed.

LESSON 1: SOURCES OF HEAT ENERGY AND ITS IMPORTANCE IN OUR DAILY LIFE

Objectives:

At the end of the lesson the pupils should be able to:

(i) observe and identify common sources of heat energy;
(ii) describe how heat energy is used in our daily life.

Concept:

Heat energy can be obtained from many sources and is essential in our daily life.

For each group of 6 to 8 pupils

(i) 6 - 8 pieces of plastic
(ii) sandpaper
(iii) a piece of rough wood 7cm x 15cm
(iv) a magnifying glass
(v) a piece of paper or dry leaves
(vi) 2 to 3 matchsticks
(vii) a bottle with plastic tubing/or bamboo tubing/or ball pen tube
(viii) brick or tin stand
(ix) tin
(x) 100 ml. of water (½ glass of water)
(xi) paper wheel
(xii) spirit lamp or kerosene lamp
(xiii) two dry cells and a battery holder
(xiv) 15 cm. copper (No. 31) wire (thin)
(xv) two connecting wires (35 cm. long) with paper clips soldered on both ends
(xvi) tin foil

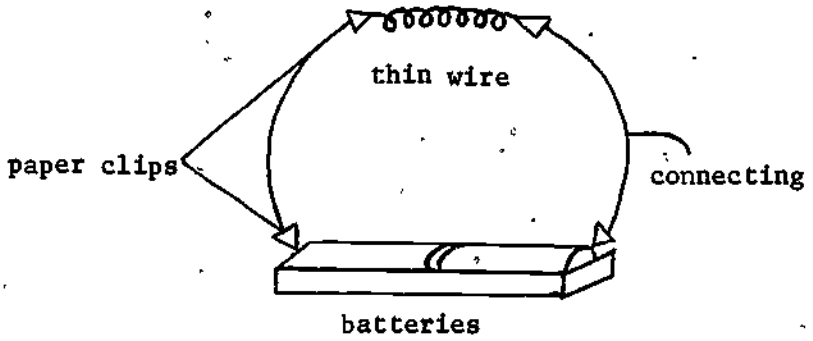
For each pupil

Worksheet A

Preparation:

The activities in this lesson except activity 1 and 5 are designed to be carried out by group approach consisting of 5 to 6 groups of 6 to 8 children. Before the lesson, be sure that the apparatus are available and in good working condition. The preparation given below is to be made for each group.

(1) In Activity 4

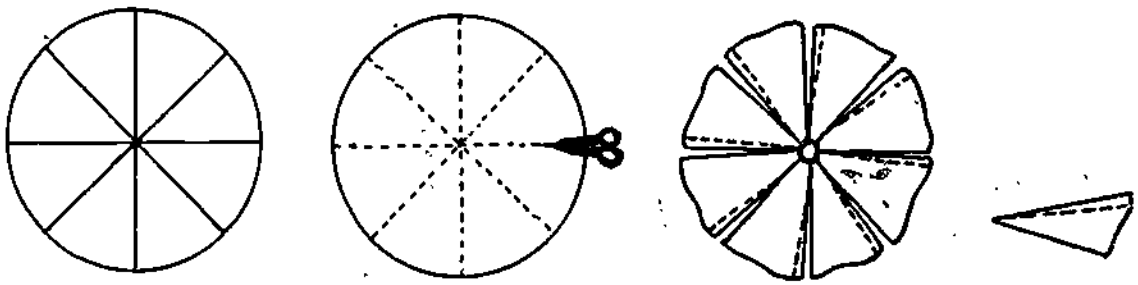


Place two dry cells in a battery holder. Coil a 20 cm. long copper wire. (No. SWG 32) and connect it to two connecting wires.

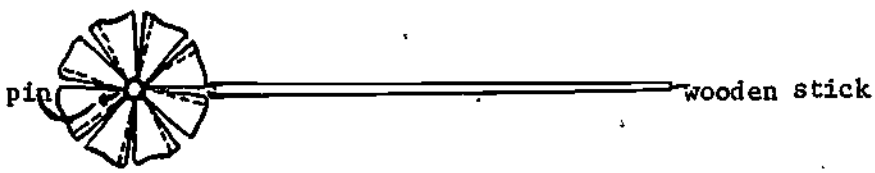
(2) In Activity 3

How to make a propeller?

Cut a circular disc with 4 cm. in diameter from cardboard paper. Make 8 intersecting line. Cut along the line 1½ cm. toward the intersecting point. Then bend each part in a little.

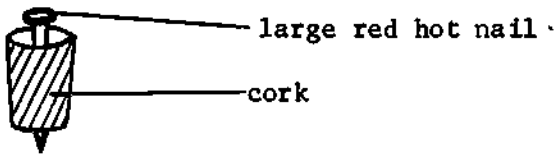


Punch a tiny hole at the centre. Have a pin pass through the hole Attach it to a 20 cm. long wooden stick.



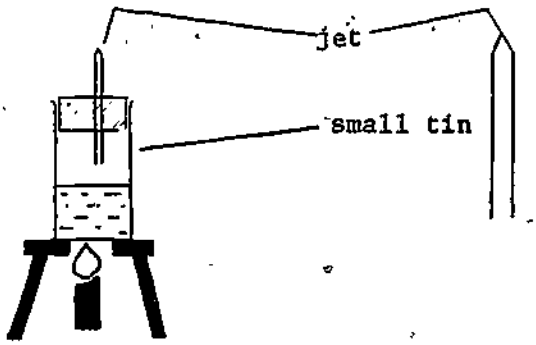
(3) In Activity 3

To insert a glass tubing to a cork: Heat a nail with the same diameter as the tubing to be used. Make the nail red hot. Push or insert at the centre of the cork. Remove the nail after a while. Insert in the glass tubing.



(4) In Activity 4

Pour about 50 ml. of water into a tin can with a tubing (with a jet end) attached to its cork. Place it into a tin of water, put them on a stand.



Procedure:

Activity 1 (Class Approach)

(For this activity 5 minutes are suggested)

Ask the pupils to rub their palms together and touch their cheeks to show that friction is a source of heat. Ask:

" How do you feel?"
(I feel hot/warm)

"Do you think there would also be heat produced if you rub your fingers with other surfaces?"
(Yes/No) Ask the children to support their answers.

Have them try rubbing plastic, rubber sheet, table top, book cover and cloth. Ask:

"Do you feel the same thing?"
(Yes)

Have them try rubbing two different objects together (sandpaper and wood)? Then, ask:

"What happens?"
(The materials become hot/warm etc.)

"What do you think causes the heat?"
(The rubbing action, movement or friction.)

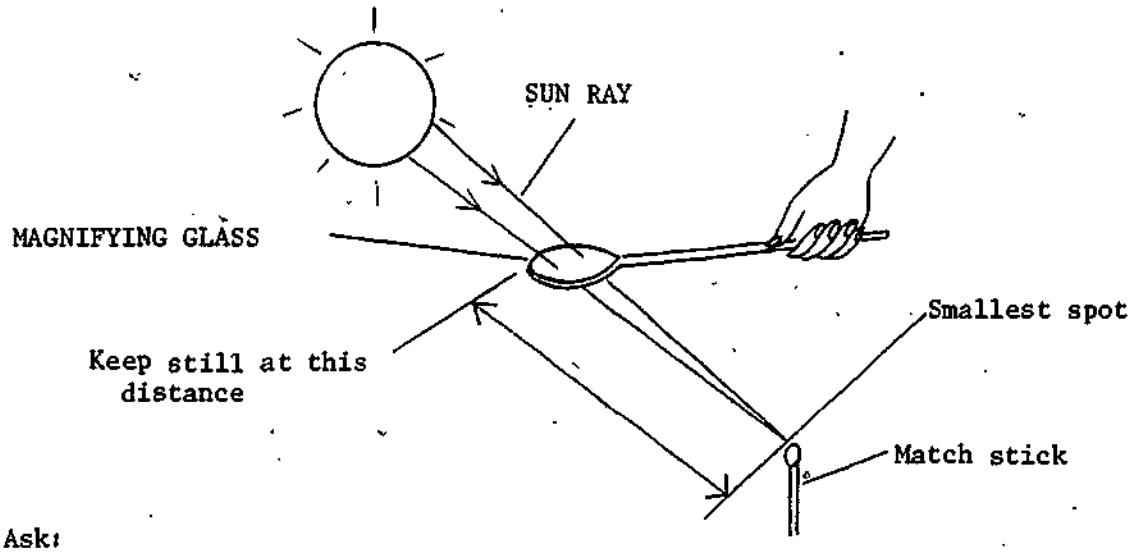
Stress that we get heat energy from the rubbing action.

Activity 2 (Group Approach)

(For this activity 15 minutes are suggested)

Distribute a magnifying glass, 2 or 3 matchsticks to each group. Ask the children to go outside the classroom. Demonstrate how to focus the rays from the sun by moving the magnifying glass up and down until the spot of light is smallest and brightest. Hold the magnifying glass at that distance from the ground. Ask the children to use one matchstick at a time. The head of the matchstick should be placed at the

spot of light which appears brightest. (Warn the children to look away from the bright spot after a while)



Ask:

"When the spot is kept very small for some time, what happens to the head of matchstick?"
(It starts to burn after a while)

"Why do you think the matchstick burns?"
(Because the heat energy from the sun is concentrated or focused on a small spot)

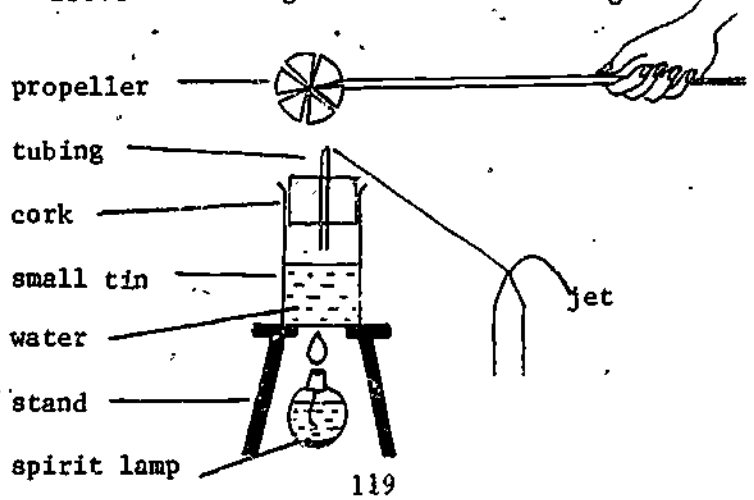
"Where does the energy that burn the matchstick come from?"
(The sun)

"In what ways is heat energy from the sun being used?"
(Drying our clothes, drying fish, salt making, etc.)

Activity 3 (Group approach)

(For this activity 5 minutes are suggested)

Give each group 50 ml. of water in a bottle, with a tubing a attached to the cork, spirit lamp, tin of water, match and the propeller. Instruct the children how to carry out the activity. Caution them to the use of the matches. As the steam comes out ask the children to put the propeller above the tubing as shown in the diagram.



Ask:

"What happens to the propeller?"
(It turns)

"What makes the propeller turn?"
(The steam)

"What causes the steam to come out with a strong force?"
(Heat energy from fire)

Teacher should elaborate that the heat energy given off by the burning fuel causes water particles to move very rapidly. The liquid turns to steam which moves the propeller.

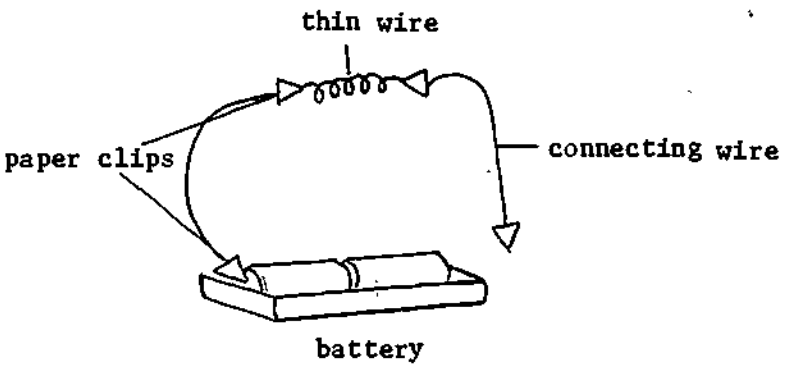
Activity 4 (Group approach)

(For ~~this~~, activity 5 minutes are suggested)

Distribute the materials needed as shown in the diagram for this activity to each group. Before connecting the nichrome wire to the battery, let the children in each group touch and feel the nichrome wire. Ask:

" How did you feel when you touch the wire? Was it warm or cold?"
(Cold)

Let the children connect the ends of the thin wire to the terminals of the battery with clips.



Then, let the children in each group put the back of their hands near the thin wire. If not too hot they could touch the wire. Ask:

" How did you feel when you touch the coil of wire?"
(I feel something hot/warm)

"What made the coil of wire hot/warm?"
(Electricity from the battery. Heat energy from electricity)

Activity 5 (Class approach)

(For this activity 10 minutes are suggested)

Start the activity by asking the children the different sources of heat energy (fire, sun, electricity, friction).

"Are these sources of heat energy important to us?"
(Yes)

"What makes the sources of heat energy important in our homes, in our neighbourhood, and in our community?"

Give each pupil a worksheet to write the uses/importances of the sources of heat energy.

(Possible answers: Fire - cooks our food, makes us feel warm, etc.

Sun - dries our clothes, dries fishes, provides energy for plants, gives warmth to people, etc.

Electricity - gives heat in toaster, hairdryer, iron, electric cooker, electric oven, etc.

Friction - helps to build a fire, etc.)

Then discuss with children what they have written. Continue until the concepts are clearly understood.

(Note: If radio, refrigerator, fan, etc. are given as examples of applications, explain that what is required or asked are appliances whose functions principally depends upon heat energy from electricity.)

WORKSHEET A

LESSON 1 NAME: _____

ACTIVITY 5 GRADE: _____

Here is a list of sources of heat energy. Beside each item write down how we can use heat energy in our daily life. You should try to think of the answers yourself.

SOURCE OF HEAT ENERGY	IMPORTANCE IN DAILY LIFE
1. Heat energy from fire	
2. Heat energy from sun	
3. Heat energy from electricity	
4. Heat energy from friction	

It can, thus, be seen that instructional materials to be used in the lesson activities are low-cost materials, simple teaching aids apparatus, diagrams and worksheets. As most of the schools in Southeast Asia are situated in rural areas with insufficient resources the use of readily available and economical materials for instructional purposes opens up vast opportunities for rural pupils to learn science much more effectively. This makes the development of instructional materials much more challenging to the curriculum writers but it can be done as shown in the RECSAM project.

As evaluation is an essential part of any curriculum project, various types of evaluation instruments have been developed for each teaching unit of the SEASAME project. They are actually used in try-outs of these modules as country level to find out whether the exemplar modules are suitable for schools in Southeast Asia, especially those in the rural areas and their interactions with other parameters. Key personnel who participated in the evaluation courses at RECSAM each year, studied the modules and developed appropriate instruments for feedback from learners, teachers and observers. Participants in the 2½ months evaluation workshop were given basic training in the following areas:

1. Systems concepts and systems orientation
2. Curriculum evaluation
3. Item writing and test construction
4. Item analysis and scalogram analysis
5. Classroom interaction observation
6. Descriptive statistics
7. Evaluation techniques
8. Analysis and interpretation of test results

Evaluation instruments that have been developed since 1973 are as follows:

1. Pupil Achievement Test
2. Pupil Interest Inventory
3. Teacher Perception Questionnaires
4. Selected Classroom Interaction Observation (SCIOS)
5. Approximate Likely Measures of System Thinking (for pupils)- ALMOST
6. Systems Thinking Appraisal (for teachers) - (STAT)

Apart from the first two, the rest have been simplified for use by teachers and observers.

The quality of instructional materials cannot be judged by Achievement Test alone as acquisition of content is just a part of evaluation objectives. So the SEASAME project with a research base, provides a comprehensive set of evaluation instruments as a total systems approach to evaluation desirable.

Given below is 'The Teacher Perception Questionnaire' for one of the modules to illustrate the actual design of the instrument.

SEASAME

TEACHER'S QUESTIONNAIRE

(TO BE COMPLETED AFTER EACH LESSON)

TEACHER ..... MODULE .....

SCHOOL ..... LESSON NO.* .1...2...3...4.....

DATE ..... GRADE* .....3...4.....

* Circle one

Please complete this questionnaire before the next lesson in the unit is taught.

Your answers and suggestions will help in the revision of the lesson.

Indicate your answers with ticks (✓) in the appropriate boxes.

Please write your comments and explanations of the separate pages provided (use additional pages if necessary). These pages for comments should be attached to the summary sheet to be completed after the achievement test at the end of this unit.

GENERAL

1. How much did you like teaching this lesson?

very much	
reasonably well	
not much	

TIME

2. How much time did you spend preparing this lesson? (Do not include time spent in the orientation course)

	minutes

3. How much time did you spend actually teaching the lesson?

	minutes

4. It is hoped that the lesson could be taught in about 30 minutes. Is 30 minutes ...

too long	
about right	
not enough	

VOCABULARY

5. The level of words for the children to read or write on worksheets or on the blackboard was .....

(Please list difficult words and suggest alternative words on separate page supplied)

reasonable	
too difficult	

6. The level of words used orally in the lesson was.....

(Please list difficult words on separate page supplied)

reasonable	
too difficult	

MATERIALS

7. Were all the materials listed for this lesson available?

Yes	
No	

8. Did you substitute other materials for some of those listed?

   (Please list any substitute materials which you have used on separate page provided)

Yes	
No	

9. Do you think that some other materials might be more suitable?

   (Please suggest other materials on the separate page provided)

Yes	
No	

WORKSHEETS

10. How much help did children need in using the worksheet? (Fill in the worksheet reference letter)

Worksheet							
Little (or no) help							
Reasonable help							
Too much help							

11. For the children, the diagrams and pictures in the worksheets were .....
    (Fill in Worksheet letter)

Worksheet							
Suitable							
Unsuitable							

OBJECTIVES (Please refer the objectives stated for this lesson)

12. For this class the objectives of the lesson seemed to be . . . .

Objective	1	2	3	4	5
Suitable					
Unsuitable					

13. The stated objectives seemed to be achieved . . . . . .

Objective	1	2	3	4	5
Very well					
Reasonably					
Poorly or not at all					

ACTIVITIES

14. Tick ( ) the activities which were actually used in this lesson.

Activity	1	2	3	4	5	6

15. The activities were designed to help children achieve the objectives. How suitable were the activities for this purpose?

Activity	1	2	3	4	5	6
Suitable						
Unsuitable						

16. Children found the activities . . . .

Activity	1	2	3	4	5	6
Very interesting						
Reasonably interesting						
Not interesting						

17. The level of difficulty of each activity was . . . . . .

Activity	1	2	3	4	5	6
Too easy						
About right						
Too difficult						

18. When this lesson is re-written, which activities do you think should be retained (as they are) changed or omitted?

(Please suggest possible changes on separate page supplied)

Activity	1	2	3	4	5	6
Retain						
Change						
Omit						

TEACHERS QUESTIONNAIRES SUMMARY

COUNTRY: ..... MODULE: .....

TEACHER: ..... GRADE: .....

SCHOOL: .....

LOCATION: RURAL/URBAN/SEMI-RURAL-URBAN
(Circle one)

GENERAL

1. How much did you like teaching the lessons?

Lesson	1	2	3	4
Very much				
Reasonably well				
Not much				

TIME

2. Lesson preparation time (minutes)
3. Actual teaching time.

Lesson	1	2	3	4
Preparation				
Teaching				

4. Is 30 minutes sufficient time for teaching the lesson?

Lesson	1	2	3	4
Too long				
About right				
Not enough				

VOCABULARY

5. Level of difficulty of words for reading/writing.

Lesson	1	2	3	4
Reasonable				
Too difficult				

6. Level of difficulty of words used orally.

Lesson	1	2	3	4
Reasonable				
Too difficult				

MATERIALS

7. Were all materials available?

Lesson	1	2	3	4
Yes				
No				

8. Were other materials more suitable?

Lesson	1	2	3	4
Yes				
No				

9. Are other materials more suitable?

Lesson	1	2	3	4
Yes				
No				

WORKSHEETS

10. How much help did children need?

Lesson	1						2					
(Fill in reference letter)	A											
Little (or no) help												
Reasonable help												
Too much help												

3				4					

11. Diagrams/pictures

Lesson	1				2					
Suitable										
Unsuitable										

3				4					

OBJECTIVES

12. Suitability of the objectives

Lesson	1					2				
Objective	1	2	3	4	5	1	2	3	4	5
Suitable										
Unsuitable										

3					4				
1	2	3	4	5	1	2	3	4	5

13. Were the objectives achieved?

Lesson	1					2				
Objective	1	2	3	4	5	1	2	3	4	5
Very well										
Reasonably										
Poorly (or not at all)										

3					4				
1	2	3	4	5	1	2	3	4	5

ACTIVITIES

14. Activities actually used.

Lesson	1						2					
Activities	1	2	3	4	5	6	1	2	3	4	5	6
Tick those used												

3						4					
1	2	3	4	5	6	1	2	3	4	5	6

15. Were the activities suited to the objectives?

Lesson	1						2					
Activities	1	2	3	4	5	6	1	2	3	4	5	6
Suitable												
Unsuitable												

3						4					
1	2	3	4	5	6	1	2	3	4	5	6

16. How interesting to the children?

Lesson	1						2					
Activities	1	2	3	4	5	6	1	2	3	4	5	6
Very interesting												
Reasonably interesting												
Not interesting												

3						4					
1	2	3	4	5	6	1	2	3	4	5	6

17. Level of difficulty.

Lesson	1						2					
Activities	1	2	3	4	5	6	1	2	3	4	5	6
Too easy												
About right												
Too difficult												

3						4					
1	2	3	4	5	6	1	2	3	4	5	6

18. Suggested changes.

Lesson	1						2					
Activities	1	2	3	4	5	6	1	2	3	4	5	6
Retain												
Change												
Omit												

3						4					
1	2	3	4	5	6	1	2	3	4	5	6

ORGANIZATION

19. Dates (day/month) when lessons were taught and tests given.

20. Length of time used for pupil inventory and achievement test.

LESSON				PUPIL INVENTORY	ACHIEVEMENT TEST
1	2	3	4		
/	/	/	/	/	/
minutes					

The try-out and evaluation of SEASAME modules in selected rural and urban schools at national level from 1974 to 1976 revealed that there was an urgent need for RECSAM to produce a manual on in-service orientation for SEASAME teachers as materials for such worksheets at country level were available from national project co-ordinators and their team members and RECSAM staff and consultants. Key personnel who attended the Centre's course on "Techniques in In-service Training in Primary Science and Mathematics" in January 1977 developed several training and orientation modules on indigenous curriculum reforms, systems concepts, instructional strategies, learner pupils, evaluation and organizing orientation workshops. Articles and papers on various aspects of the project and these modules were published as component parts of the Manual. It also includes evaluation instruments for in-service teachers to assess the orientation/in-service programmes.

This Manual together with the teaching units, evaluation instruments and other support materials make up a complete package which is available from RECSAM to member countries and others as an innovative and experimental approach in the indigenous development of instructional materials.

Revision of instructional modules and related evaluation instruments is the final phase of the SEASAME project as a follow-up of national try-outs each year. The course participants who were responsible for revising the units worked very closely with their colleagues and staff of RECSAM. They studied the data obtained from the trials and evaluation feedback. The analysis of wrong responses in the achievement tests provides useful insights for revising the activities and materials as it shows the difficulties of learners in understanding some prescribed concepts and percepts. Responses from the teacher perception questionnaire provide suggestions to overcome certain deficiencies in the units tried out such as inadequate time allocation, suitability of teaching techniques, excess content, vocabulary/terminology, ambiguous questions in the worksheets and indistinct diagrams and vague procedures, etc.

Conclusions

Feedback from the various national trials confirm that both teachers and pupils responded to the learning/teaching activities and the concepts very favourably. They were enthusiastic about innovative approaches used in the lessons. It was also confirmed that no major revision was necessary in the structures of the various units.

It was of interest to note that majority of urban and rural pupils in the experimental classes stated that although they enjoyed doing the various class activities, they preferred to learn 'by listening' rather than 'by doing'. This passive method of learning is part of the social-cultural setting in most developing countries and cannot be brushed aside in our search for effective teaching techniques. On the other hand, it should be utilized in combination with more dynamic teaching/learning approaches when the need arises. Hence, SEASAME modules use both the teacher (class) approach and the group approach at appropriate times. Although evaluation results show that there were no significant differences between the group and the class approach immediately after the lessons, the long-term effect could be in favour of the group approach. Pupils could be weaned from the class approach and get internalized with the group approach gradually. This change in the process of learning needs further study and research.

Primary teachers participating in the orientation workshops of 3 to 5 days duration, were keen to learn the application of systems concepts in organizing the project and the instructional materials. They found that the use of systems relationships in structuring the teaching of science and mathematics could contribute to more effective learning of science. However, it became apparent that they had difficulties in understanding the fine boundaries between different systems relationships as this was the first time they had ever seen the use of systems concepts in their teaching. This problem can be solved in subsequent orientation workshops by using four rather than eight main systems relationships in organizing the instructional units. This will undoubtedly provide reinforcement not only for teachers but also pupils in learning these four main system relationships which are the basic ones needed at the primary level. SEASAME units written since 1977 have emphasised the structural, interactional, functional and part-whole relationships.

Reports of the national try-outs revealed that observers found the evaluation instrument, 'Selected Classroom Interaction Observation Schedule (SCIOS)', difficult to operate. It had too many items for recording scores within a minute. The number of items have been reduced and simplified, thus, giving attention to basic ones. Scores have also been simplified for more correct recordings.

These reports also pointed out the need for the modules to give a wider range of alternatives, be their teaching techniques, learning materials or activities so that teachers could have the discretion to select the most appropriate ones in the context of actual classroom conditions. This has been done for revised and new modules since 1977.

The feedback from course participants who developed the modules, national try-out organizers, trial teachers and observers from SEAMEO countries stated that 'systems concepts are achievable through the units; they can be applied to real life situations and provide for the acquisition of science and mathematic concepts and processes' (Sim Wong Kooi).

A regional workshop was held at RECSAM in March 1977 to evaluate the SEASAME Project. Delegaces from Indonesia, Malaysia, Philippines, Singapore and Thailand and resource personnel with the project participated. Their main recommendations include the following:

1. RECSAM should continue SEASAME with Systems Oriented Science as its underlying principle.
2. RECSAM should adopt a multi-approach and expose participants to different schools of thought instead of just systems thinking.
3. SEASAME as conceived in 1973, was an experiment in curriculum reform based on Systems Oriented Science. However, it is recommended that the concepts of the experiment be enlarged to include other approaches.
4. RECSAM should continue to offer courses for SEASAME at regional level and also at national level, if requested by a member country.

5. Materials should be developed based on a country's needs and their development should be only incidental to training which is the major function of SEASAME.

6. SEASAME materials should be less teacher dependent and provide for more active pupil involvement.

7. The country try-outs of SEASAME are necessary but individual countries must decide whether they will be carried out.

8. For more effective in-service education, there should be longer periods of try-outs instead of just 2 weeks, together with a follow-up provided schools are not unduly disrupted.

9. Evaluation should continue to receive high priority in SEASAME.

The evaluation of SEASAME gave wide support for the role of SEASAME in curriculum development at national level and for the viability of using systems concepts. The country benefits from SEASAME are a growing pool of indigenous key personnel returned from RECSAM with greater experience and expertise in curriculum design, development and curriculum evaluation. By being exposed to innovative materials and methodology they are in a better position to improve the quality of teaching. Many of the countries concerned have made increasing use of SEASAME personnel for both production and try-outs of their national curriculum materials.

Apart from strengthening the capabilities of member countries in reforming their national curricula, SEASAME has come out with a package of exemplar instructional materials which have been tested and revised. Although they need further modification to suit the language and local conditions in the countries concerned, they can serve as resource/reference materials or examples for the development of instructional units in their own curriculum projects.

They can also be used in pre-service and in-service education as parts of a course in curriculum development/instructional design or in a methodology course to show the application of systems approach in teaching.

There was no simple solution to any educational problem of a national dimension. SEASAME should be viewed as an experimental and innovative approach for quality teaching and learning in science and mathematics for developing countries. It has made a contribution to the healthy development of science and mathematics education in Southeast Asia.

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PHILIPPINES: THE COMPREHENSIVE COMMUNITY HEALTH PROGRAMME: ITS ROLE IN TRAINING FOR RURAL DEVELOPMENT

by

Sergio S. Gasmen

The Comprehensive Community Health Programme (CCHP) of the University of the Philippines was conceived in 1965 as a response to the concern of the University, especially among the health science disciplines, to provide education relevant to the needs of the country. It has been felt that teaching and learning activities occur mostly within the school campus, and especially for the medical sciences, mostly within the hospitals. The University, therefore was considered an "ivory tower" quite separate from the existing communities, and producing graduates from among the health science discipline who are not really knowledgeable about the realities of problems that are presented by the people, especially in the rural areas where 70-90% of the population live.

Starting as a movement within the College of Medicine, the programme was launched in co-operation with the College of Agriculture in a rural area in the province of Laguna as an extramural laboratory for fifth year medical students of the College of Medicine. Soon, more health science disciplines joined the programme such as dentistry, nursing, pharmacy, public health, occupational and physical therapy, community nutrition and veterinary medicine. Other related disciplines also joined such as social work, community development, and those concerned with population and demography.

As a University Programme, its activities put together several colleges and institutes, and worked through an interdisciplinary group of faculty members and students in an effort to learn new ways of improving the health of the rural communities. In such an effort, the university has entered into a Memorandum of Agreement in 1967 with the Ministry of Health for a co-operative venture in teaching, research and extension services. This Memorandum of Agreement was renewed in 1977 to cover more rural areas and leave open the possibilities for more joint endeavours in health programmes for rural development. The Memorandum also reiterated the representation of the Ministry of Health through the Regional Health Director of Region IV and the Provincial Health Officer of Laguna in the CCHP Board.

The CCHP Board is composed of Deans and Directors of the other participating units of the university (College of Agriculture, College of Dentistry, College of Home Economics, College of Medicine, College of Nursing, College of Pharmacy, College of Veterinary Medicine, Population Institute, Institute of Public Health, Institute of Social Work and Community Development, the Philippine General Hospital and the School of Allied Medical Professions), with the Director of the Programme as an automatic member of the Board, aside from the two representatives coming from the Ministry of Health. The CCHP Board is a policy and decision-making body, formulating general guidelines and policies,

co-ordinating the participation of various colleges, and reviewing the performance and achievements of the programme.

Because of its interdisciplinary nature, the programme became a separate unit from the College of Medicine in 1969, but remained very closely co-ordinated and related with the "mother units" which consist of the participating units of the university. Through the full-time faculty members of the CCHP from each discipline (e.g. medicine, nursing, nutrition, etc.) co-ordination with the mother unit is facilitated.

The full-time faculty members are assigned to rural areas to train students coming from the participating units. The training of these students, called the "professional training programme", is of the "exposure type". The students live and learn with the faculty members in the real-life situations of rural communities.

Aside from the professional training programme, the CCHP also has research and extension service programmes to enrich the professional training programmes. Research programmes are usually of the action type, introducing expermentals variables (e.g. in training new types of primary health workers) to find out how to improve the delivery of health care services to rural areas in co-ordination with existing local agencies. Extension service programmes include direct health and related services to the community, extension training programmes (called the "para-professional training programme"), consultancy work to other agencies (within the university or to outside government and private agencies), and other services that can be extended.

With this background, it would be easy to understand the two levels of training programme handled by the CCHP: (1) the professional training programmes for students coming from the participating colleges, institutes, and units of the university, and (2) the para-professional training programmes for participants coming from among the community members, as a form of extension service programme. These training programmes will be described in the following section.

A. Methods to identify the elements of the core-curriculum

1. Professional training programmes

The curriculum for field placements of the students coming from the different health and related disciplines were initially dictated by "mother units" resulting to different types of objectives for each set of students. The problem was further compounded by the multi-disciplinary character of the staff, each discipline having a different frame of reference for teaching and learning activities for field placements of students.

The frame of reference held by each discipline dealt more with particular intra-disciplinary concepts that usually conflicted with other disciplines. An example is the family care plan method strongly espoused by the nursing faculty, which they recommend for all disciplines. After discussing the method in depth, it was concluded that such a method did not really differ from the approaches for family care done by other disciplines. After some modifications that would conform to basic tasks done in a specific discipline, the family care plan method for multi-problem families was adopted as part of the core curriculum.

To solve this problem of varying objectives for various disciplines involved in field work, an Interdisciplinary Curriculum Committee was organized in 1972 within the programme to come up with a core curriculum for the different disciplines as far as field placement is concerned.

Consultations with "mother units" were done, reviewing the colleges' or institutes' offerings, what their objectives are, how they would like to undertake the training programme and what particular skills, knowledge and attitudes they would like their students to acquire during their field placement as well as what will be included in the courses in the 'mother units' to facilitate a successful field placement. Also considered during the development of the core curriculum was the pre-placement capabilities of the students, and the task in a rural community that the students will be performing when he becomes a professional.

The analysis of pre-placement capabilities of students as well as consultations with mother units regarding what courses should be offered by them before field placement resulted to varying degrees of modifications in the entire curriculum of a mother unit. In the College of Medicine, even before such interdisciplinary consultations were made some adjustments and curricular modifications were already done. This change in the curriculum of the College of Medicine was further strengthened by these consultations, with an institutionalized exchange of information between the programme and the Department of Family Medicine of the College of Medicine and the Department of Community Medicine of the Institute of Public Health. Appropriate curricular changes were made in time allotments, sequencing, and content of course offerings. In other units, similar changes occur to varying degrees from a simple orientation course to community work and incorporation of community work principles in existing subject matters, crossing specialties within a particular discipline.

As the programme matured, as the confidence and ability of the Interdisciplinary Curriculum Committee became developed and strengthened, and as more experience were gathered from actual community work and field experience in training students, the core-curriculum has been changed when necessary, drawing from suggestions of students, the community, the CCHP faculty and participating mother units, and from the policies of the University and national goals.

Questions may be raised regarding the capability of students to know what they want to learn. The experience of the programme along the years has shown that students have become more and more socially concious, community-oriented, and aware of the development needs of the country. They have become more local and expressive on these matters, especially related to their own capacity and therefore their preparation to address their efforts to the problems of the country often called activism.

A similar question about the community people may be raised, i.e. their ability to perceive what should be learned by students to serve the community better. This problem appears to be heavily value-laden - especially among technocrats. From the experience of the programme, a less prejudiced approach to the community people, coupled with a sincere effort to provide them information to enable them to judge appropriately, resulted to concrete suggestions that should improve the curriculum.

Further changes in the core elements in the curriculum also came from results of previous researches, either undertaken by the CCHP staff or by other agencies involved in community work.

The main criterion (aside from those cited above) for identifying the elements of the core-curriculum is that what will be learned will not only make the student more competent professionally to work in a rural area, but also to make him more responsive to the needs of the people. As such, certain elements such as community work skills (establishing rapport, community organization skills, tapping resources, etc.); interdisciplinary and team work skills (working with other groups, disciplines, and agencies); skills in community diagnosis (identifying problems in the community, applied epidemiology and biostatistics); health project planning, implementation, and evaluation at the village level; and the corresponding knowledge and values that go with the skills. For example, in esteblishing rapport with villagers, they have to know the dynamics of village life, and assess their own attitudes towards rural folk.

Special elements are those that belong to a particular discipline such as ability to work in a clinical situation with few resources in a rural village for health science students (which become more specific for the particular specialized disciplines), or such as the ability to provide some nursing services at the village level for nursing students.

2. Para-professional training programmes

The programme has undertaken training of "hilots" or traditional midwives and "herbolarios" or traditional healers, "barangay" or village health workers, pharmacy aids, dental aids, mothers' and fathers' classes, youth volunteers, and "barangay" leaders. Other extension training programmes, not strictly under the para-professional category, are short courses and staff development seminars for the doctors, nurses and midwives, and sanitary inspectors of the Rural Health Units of nearby municipalities.

The core elements for para-professional training programmes are identified through an analysis of skills required of the particular para-professional, based mainly on felt needs, experiences in the field by CCHP staff, and findings of action research programmes. The staff of the Para-professional Training Section of the Division of Extension Services of the CCHP is mainly responsible for identifying the core elements of the curriculum, although they can draw expert help from other staff members of the CCHP and other participating units of the University.

An illustrative example is given below for the Pharmacy Aids Training Programme, together with the background data on how the programme was developed.

Recognizing the fact that one of the factors that hampered the effective delivery of health care services in rural communities was the poor distribution of available modern drugs, an action-research was undertaken by the programme with assistance from the National Science Development Board to study and develop a more effective distribution of medicine.

The action-research identified through community surveys the modes of utilization of medicine, which has revealed that a large proportion of the population still use traditional medicine, mostly

herbs; that modern medicine prescribed by doctors are acquired by rural people with difficulty because the medicine are dispensed only at the "poblacion" where private pharmacies are situated, aside from the fact that acquisition of these medicine have become very expensive for rural people. Findings further revealed that there are many instances when the rural people consult the pharmacist for the medicine to be used for certain ailments that they have, instead of consulting a physician. This shows the peoples' perception of a pharmacist as one who is knowledgeable too of clinical assessment and the management of illnesses aside from being a dispenser of the drugs.

The second phase of the action-research consisted of the collection of the medicinal herbs mentioned by the people and studying their active components and their uses; health and drug education of the community through the different media of community meetings, printed handouts and posters as well as radio; and the development of the "Botika sa Barangay" project with the training of pharmacy aids to dispense the drugs in this small village pharmacy.

Based on the earlier findings of the perception of the people on the role of a pharmacist or a pharmacy aid, the assessment of the pharmacy faculty of the programme, the recommendations of the private pharmacists in the locale and a further consultation with key community people, a curriculum was designed and tested for the training of pharmacy aids, specifying the elements of the core-curriculum. These are simple and basic pharmacology techniques in drug dispensing, drug education of the drug users as well as the rest of the community people, drug inventory and sales recording and accounting, simple clinical assessment and first aid measures and some tips of community development techniques.

B. Strategies and methods in translating core-elements to learning-teaching situations

1. Professional training programmes

The core-elements of the curriculum lent themselves easily to translation of learning-teaching situations, by the nature of the core-elements themselves, i.e. they require "exposure" of students to the community - its environment and its people. The direct contact provided situations from which the students learned by experience - not only skills, but more important, the sound attitudinal changes.

The Interdisciplinary Curriculum Committee specified various possibilities of interactions with the community and how they are related to the different core-elements. Much of the learning situations were chosen from previous experience of the CCHP staff along the years. The whole faculty contribute to the creation of various learning situations, as they also do contribute in programming and refining general instructional objectives, specific behavioural objectives, and the conditions through which these objectives will be attained. Thus, the field placement of the student as a whole becomes a complex of varied learning situations which eventually are integrated to achieve the objectives of the training programme.

Teaching activities include the actual field assignments of students from health and related disciplines. Despite their differences in disciplines, the students during their rotation are expected to be able to establish a working relationship with the people in the community

to work within an interdisciplinary team, to participate in on-going activities in the community whether general or special to his discipline, to plan and carry out a project with the team and the community, and to gain experiences in the innovative approaches being utilized by the programme in the delivery of services for community development.

During the placement, students stay with foster families in the villages, get involved in community social activities, participate in services provided by the existing agencies within the community, take care of special multi-problem families they find in the village, assess the community and help the community identify problems, plan and implement projects with the people based on identified problems and needs as well as in consideration of the long term community development plans. They also experience health education activities through sharing of know-hows to mothers' clubs, youth groups and other groups in the community through informal lectures during meetings, making of visual aids and radio broadcasting.

Students are assigned in groups consisting of different disciplines to a village, thus providing and interdisciplinary and team work atmosphere. The availability of multi-disciplinary faculty members and staff of the different existing agencies within the community help to foster an interdisciplinary approach in the different community activities. They also have weekly team meetings with or without faculty members around to assess the problems that the student team has met and to try as a team to come up with solutions. Student conferences are also held and student teams present and share their experiences in their own villages to the rest of the students situated in the other villages.

During field placement, students are required to document activities, accomplishments, problems met and solutions used in the community. They also collect statistical data which are collated and analyzed at the end of the rotation. During the earlier years of the programme, community profiles of the different villages were also written by students and spot maps with indicators placed for certain information based on a total household survey. The succeeding batches of students update these community profiles. The compilation of updated information about the barrio, its people and the on-going activities is called "Barrio Primer". The faculty member in-charge of a particular village team also participate in updating this primer. The logbooks, too serve as an important material for the student from which they learn vicariously from the experiences of the previous students.

Students also have individual "logbooks" where they write their impression and assessments of their own progress in terms of their own learning and the development of the community. These logbooks are regularly read by their perceptors and monitors who will discuss with the individual student or village student team whatever problems are met, what solutions can be formulated and comments not otherwise verbalized during the earlier meetings and individual consultations.

Other conferences are held on the experiences and problems met in the field. Students also have lecture-discussions on certain topics which they feel are needed to facilitate their stay in the community.

Faculty members are assigned to each of the villages with an interdisciplinary team of students. The perceptor, the faculty in charge of such a team, can come from any discipline and supervises them in all aspects of community activities, while the monitor looks after their

needs in relation to a particular discipline.

To support the field placement experience of the students, the programme continuously studies and develops new strategies and techniques for a more effective delivery of health services in the rural communities. These activities comprise the research and extension service functions of the programme which are undertaken by the faculty staff with the students. Application of these new approaches also require intensive co-ordination with and participation by the Rural Health Unit of the Ministry of Health; the primary, elementary and high schools of the Ministry of Education and Culture; the Local Community Development Office of the Ministry of Local Governments and Community Development; and other representatives of the other government and private agencies.

A lot of effort has been given to inter-agency collaboration and co-operation. It has already been mentioned that a Memorandum of Agreement has been forged with the Ministry of Health at the national level for joint work in training, research, and extension services. To give more meaning to this, the Ministry of Health is represented by the Regional Director for Health of Region IV (where the Province of Laguna is located), and by the Provincial Health officer of Laguna in the CCHP Board, which is the policy-making body of the programme. At the implementation level, there is a regular monthly meeting between the staff of the Provincial Health office of Laguna and those of the CCHP to discuss, plan, and evaluate joint activities such as extension services, training programmes, research and staff development. At more local levels, the concerned staff of rural health units and of the CCHP meet weekly to assess progress of activities in detail according to planned projects.

Similar linkage with other agencies occur to varying degrees, depending on what joint activities are being done or implemented. For example, in one school, the principal would be consulted in implementing a school health programme. Express permission would of course be obtained from the District Supervisor. If questions still would arise, the staff would explain about the letter allowing the CCHP to work with local schools coming from the Minister of Education and Culture which was secured much earlier. The letter would come very much handy in case of resistance. In most school health programmes, a free relationship occurs, so that staff and students of the CCHP become resource persons in the school, and the school staff become co-workers of the CCHP not just in the school, but in community work through the village council, the parents-teachers association, and other village organizations. The initiative can come from any or both the school and CCHP. In such school health programmes, community participation has become a common ingredient, whether in nutrition, health education, and others.

Although the field placement of students is a learning experience in a reality setting, the programme faculty and previous students together have developed instructional materials to facilitate and enhance such an experience. An orientation manual has been compiled by the faculty which includes the objectives of the rotation of the different disciplines, their expected activities, the activities of the service programmes of the CCHP and other existing agencies, the statistical indicators and methods used for programme and community assessment and important tips and reminders of living in the barrio. This is revised every school year or when changes in the programme occur.

2. Para-professional training programme

The translation of core-elements of specific para-professional training programmes to teaching-learning situations is the primary responsibility of the Para-professional Training Section of the CCHP, in consultation with other staff members of the CCHP, with other units of the university, and concerned agencies and individuals in the community. The guidelines mostly used are from previous experiences of para-professional training programmes. For example, previous programmes showed that learning situations in practicum are more important than theoretical classroom work. Thus, most training programmes for para-professionals are based on practicum.

Continuing the example of the pharmacy aids training programme cited in the previous section, the following illustrative explanation is given.

Since the "Botika sa Barangay", though financed by community people funds, required the support of the private pharmacists in terms of supervision of the pharmacy aids, the local pharmacists together with the programme's faculty in pharmacy developed the curriculum. They also formed a part of the training staff of the pharmacy aid training programme, the other of which consisted of the non-pharmacy faculty and the students from the different health science disciplines rotating during the training period.

The training programme is of two parts: the theoretical and the practicum or apprenticeship. The programme faculty and students imparted theoretical aspects and supervised some of the practicum but most of the apprenticeship was under the local pharmacists done in their own drugstores.

A training manual was developed which is a refinement of the curricula of the first three sessions undertaken after a continuous evaluation and revision at the end of each training session.

It is a voluminous one and contains the content and processes in the training of pharmacy aids and is intended for use of future training to be undertaken not only by the programme staff but for other communities who may feel the need of pharmacy aids.

The earlier training materials were assessed and revised in relation to their ability to communicate the subject matter. For example, the text in pharmacology and other aspects was gradually simplified from the very technical prentation. Illustrations were used to clarify some points. It is an observation that the faculty members have the tendency to be very technical during the start and later learned from feedback of trainees on how to simplify and use local frames of references.

An example is the attempt of one trainer to put across the idea to pharmacy aid trainees regarding the importance of following precisely the dosage of drugs. It has been pointed out that some patients take larger dosages than needed. To explain the bad effects through a dissertation on metabolism of the drug by the body would be meaningless. A simple analogy volunteered by a trainee, that overeating produced bad effects is similar to taking an overdose, settled the matter. The necessity for proper timing of taking the drugs also became clearer when another trainee volunteered that in placing fertilizers for rice plants, not only is overdosage harmful, but the wrong timing might also come out to be either useless or harmful to the plant.

More abstract concepts are harder to explain through analogies, but the constant exposure of the trainer on the way of thinking of the people has made them more innovative in drawing from experiences of the community to illustrate concepts and communicate more effectively.

C. Training of teachers and other personnel in designing, use and improvement of the materials used

The training can be categorized at several levels:

1) for the CCHP staff and faculty members who are trainers in both the professional and para-professional training programmes;

2) for the students coming from the various health science and related disciplines who help as trainors for the para-professional training programmes;

3) for the community resource persons who help as trainors for the para-professional training programmes; and

4) for graduates of the para-professional training programmes who are being trained to become trainers of other professionals.

For the CCHP staff and faculty members, after an assessment made by themselves that they need to improve their teaching skills, a series of seminar-workshops were organized to help them in developing skills for curriculum development, including development of student-oriented objectives, guidelines for assessing factors contributing to curricular objectives, teaching strategies, and methodology in evaluation. Many of these seminars were offered by the National Teachers Training Centre for the Health Sciences within the University. Within the CCHP itself, echo seminar-workshops were held by those who had already undergone training. Furthermore, special workshops like those for development of training modules were organized with resources persons coming from the College of Education and the Science Education Centre of the University of the Philippines at Diliman, and from the Department of Agricultural Extension and Education and the Department of Developmental Communication of the University of the Philippines at Los Banos, especially for tips in developing effective materials and ways of imparting of know-how.

Aside from this formal training workshops, the faculty members consult from time to time these various resource persons for immediate problems at hand. Most important, the CCHP faculty members have learned from experience, which they share with co-trainers through regular conferences and meetings.

For students from health science and related disciplines as trainers, the professional training programme has built in to its structure the skills, knowledge, and attitudinal learning situations when they actually participate in health education campaigns and para-professional training programmes. The same process is undergone by community resource persons, gaining experiences initially as they are tapped to help in the para-professional training programmes, and become more proficient along time as they get more involved with the programme.

For graduates of the para-professional training programmes, selected promising graduates are given continuing training not only in

their particular field but also the skills, knowledge, and attitude to become trainors of other para-professionals. Currently, some "barangay" or village health workars are being taught how to specify certain terminal behaviour for certain content areas as first aid and indicate the conditions by which such behaviour can be attained. Another group is the "hilots" or traditional midwives who were selected through their manifested leadership role-playing to explain concepts to other "hilots" on how to use the condom properly. For this latter training of "hilots", the CCHP has collaborated with the institute of Maternal and Child Health.

D. Problems and issues encountered in the development and use of materials

1. Problems related to the student from health science and related disciplines

An early assessment showed that many students experienced "cultural shock" upon exposure to a rural area. Owing to the fact that most of the students come from affluent and urban families, the transition was quite abrupt and resulted to difficulties in adapting to life in a less developed area. More vigorous orientation and intensive initial follow-up supervision were instituted. The foster family programme which was not initially used also became part of the training programme, to assist the student to adopt to rural life much faster and with less enstrangement.

2. Problems related to the community as a resource for teaching-learning situations

a) A latter assessment made by the programme showed that students felt that the community has already reached a certain level of development, and that there is a need to go to other less developed areas. Although the community members felt that the students and the programme still give a lot of help to the community, the staff of the programme also recognized the value of looking for less "saturated" areas in line with the assessment of students. The idea of putting up "outposts" in less developed communities in other areas became concretized. Still recognizing the factor of "cultural shock", the training design provided for initial field placement in the original communities for a short time, not only to soften the shock on the student but also for the student to get oriented to the strategies in community work developed by the programme.

The new "outpost" programme was put up also to address the problem of trying another approach in training students in community development. In the original communities, the point of entry of the student is through the established avenue of health provided by the Comprehensive Community Health Programme. Health as an entry point to community work is quite successful. However, the "outposts" were developed also to find out whether the entry point could be any area based on priority problems presented by the community. Initial surveys and community organization activities are done to pinpoint priority problems presented by the community members. Health would then come in later. The problem so far pointed out for this approach is the frustration of students not being able to do anything in the area of health immediately while attending to the other priority problems not necessarily connected with health. However, the students do appreciate much

better the intricacies of community organization and development, and have developed their skills in tapping and developing local resources for varied problems.

b) Changes in the community can also pose problems. The changing dynamics of the communities do affect the context of the teaching-learning situations, demanding great flexibility in the training staff. Changes in policies of the municipal governments (which may be brought about by change in leadership) is an illustrative example among the different systems in the community. In one particular municipality, for example, the sudden incapacitation of the mayor suddenly changed the pace of training for village health workers under his administration. Nobody would take up the responsibility promised by the mayor to support such a training programme. As such, the training design had to be modified to conform to the constraint by deleting some activities that heavily depended on such support. In this case, logistic support in terms of stipends for transportation of the trainees, and for allowances during their post-training six-month compulsory service were minimized.

Other types of changes in community life, like the encroachment of urbanization (e.g., the increasing levels of expectation of people due to exposure to television, newspapers, radio, and movies), can be very insidious. However, these changes are felt after some time, and corresponding changes have to be made. For example, the rising expectation could be felt in the use of medicine. There are over-the-counter drugs advertised on TV, comic books, newspapers, and radio that introduce people more to modern medicine. However, the danger of self-medication and overdosage may increase, such that the training for pharmacy aids need a wider coverage for over-the-counter drugs that they may need to know to properly advise their clientele in their villages. Another example in this category is the desire to buy refrigerators. More are now able to do so, what with the increasing income of farmers brought about by agricultural reforms and the electrification programmes for rural areas. This has implications in training programmes for possibilities in the economics of food storage versus daily marketing for family needs, and would have a new start on how the training staff would advise students how to deal with these specific situations rather than on a generalized view of rural folks.

Another type of community change would be the influx of great numbers of temporary residents that could be brought about by special projects sponsored by the government; or by a threat of loss of tenancy of land by many families brought about by sale of the proprietor to others who do not intend to pursue the tenancy relationship. These changes affect greatly the village people, and these have happened to them. The team of students and training staff assigned to these villages will have to exercise a great amount of flexibility within the framework of the training design.

c) Another dimension in the community that could pace as a problem is the following. In the beginning, some people felt that "they were being practiced on", since the personnel serving them were mere students, whether in the in-patient care facilities or the village facilities where the programme operated. This expressed feeling of some of the people proved to be a set-back to the programme, that students and faculty became either frustrated or angry. This reaction is an affective component of attitudinal formation in community work which could become disastrous to community development efforts. The problem

has been diminished by an explanation to the community people that the same students are already performing the services in other areas and facilities which they consider to be acceptable (like a big hospital, the Philippine General Hospital); that these same students have new methods learned in school, a fact supported by the staff of existing local agencies; and that these students may be able to render other services that indigenous workers may not give, as supported by the traditional healers. The traditional healers have been befriended and considered by the programme as co-workers. The curriculum change effected by this expressed feeling of the community people was in the methodology of orienting students to community work, particularly in how to answer questions posed by the people regarding their expertise and how to prove their ability through working closely with established agencies within the locality and with the indigenous traditional healers. In the latter aspect of how to work with indigenous traditional healers, the previous studies on traditional medicine done by Dr. F.L. Jocano for the programme helped a lot in the revision of the curriculum.

3. Problems related to teacher preparation

As has been mentioned earlier, the teachers felt that they need more training. Since most of them are professionals in the health science disciplines (doctors, nurses, dentists, pharmacists), few of them have skills to adequately implement training programmes, including management problems. So that aside from the special seminar-workshops specific for curriculum development, teaching strategies, and methodology of evaluation, another set of seminar-workshops were given to them on project planning which includes identification of problems design of strategies, cost benefit analysis, implementation, monitoring and evaluation, and supervisory techniques.

4. Problems related to inter-agency collaboration

Although there were covering Memoranda of Agreement or letters, direct arrangements with community agencies can be very demanding. Much effort has been exerted by the programme in order to establish linkages with other agencies. This is particularly true in terms of making the linkage operational and based on agreements. Initially, some conflicts of objectives occur. However, the continuing effort to link-up, plus the support that have been gained from upper levels tended to diminish the problem. The more collaborative projects are done, the lesser the linkage problem becomes. It is the initial effort that may prove difficult.

5. Problems related to formal and non-formal education

Questions are raised regarding the linkage between formal and non-formal education with regard to the professional and para-professional training programmes of the CCHP. These questions can be answered at two levels:

a) The first linkage level is at the community interaction linkage system provides opportunities to all professionals to work with para-professionals, such that both types learn the roles of each other in providing care to the community. In the institutional interdependence linkage system (i.e., within the CCHP), the activities of one type of training programme depends on the activities of the other type. For example, the training of students from the professional disciplines would include activities in training para-professionals wherein the

"professional" students learn how to become trainers of para-professionals. On the other hand, the training of para-professionals has been enriched by the experiences gathered by the "professional" students who act as trainers.

b) The second linkage level is at the upward mobility provided to trainees in the para-professional group. Mobility here would be defined as the opportunity to "go up" in terms of facilitating the para-professional trainees to become professionals, giving credit to their para-professional training background as a stepping stone to professionals status if given the opportunity for further training.

This particular linkage system is not emphasized within the programme, since the programme advocates a permanency of trainees in their village of residence, thus ensuring continuing services to the community. However, there is a considerable attrition due to trainees who eventually were stimulated by the training to go on further studies of their own to become doctors; nurses, or other types of professionals. The programme has looked at this as a healthy sign, although the attrition has caused some setbacks in the health programmes in the communities or villages where these trainees come from.

The University has considered this upward mobility problem and the permanency of trainees in their own villages. A new group has been recently formed, through the College of Medicine, with the establishment of the Institute of Health Sciences at Tacloban, Leyte. They are experimenting on a new curriculum which starts at the para-professional level (e.g. one can become a village health worker, then become a midwife, then a nurse, then a bachelor's degree holder in rural medicine, and finally a doctor after a series of training courses). They are in their second year of operation, and continuous evaluation is being done.

The CCHP, on the other hand, is operationally involved in introducing more and more community-based programmes to existing curricula of mother units such as the College of Medicine, College of Nursing, School of Allied Medical Professions, College of Home Economics, etc.

6. Problems related to non-utilization of skills after the training programme

The different source components during training apparently were used to varying degrees according to situations met in the community. For example, a pharmacy aid graduate would be involved to a higher degree in accounting and auditing sales of drugs than another. One would be given the responsibility by the village council for lack of expertise within the village itself. Another aid might only provide records to another group assigned by the village council to do the accounting and auditing. In this activities, the mothers class organization usually sponsor the community project.

Non-optimal utilization of the skills acquired can also have other reasons. For example, the nutrition component learned by the pharmacy aid may not have been applied due to lack of demand for such services by the people from the pharmacy aid. This is based on role perception, both of the pharmacy aid and the people themselves.

A severe problem is the non-utilization of skills learned. This is mostly due to attrition or loss of the trainee through migration or shift to other activities, such as further studies, employment in other fields, or simple full-time housekeeping for those who get married.

As such, this led to a re-examination of the recruitment and selection process for trainees, which has become a joint endeavour of the programme and the community. More stable members of the community then become targets as recruits, rather than very young people who tend to be more mobile and leave the village. Also, people who already have village "sari-sari" stores become special targets, since they are not only stable residents, but have ready-made outlets for drugs at the village level, and therefore do not need further investments in building a store.

7. Problems related to identifying the best modes of communication

Use of modes of communication belonging to other sub-cultures and apparently alien to the community may defeat effectiveness of training programmes.

Local modes of communication have affected both content and form of training designs. To illustrate a form of disseminating information effectively is through semi-formal social groups. In organizing groups of trainees this methodology is used. It is based on forming the trainees as semi-formal social groups, to be engaged in other activities aside from the structured learning the teaching situations described formally in the curriculum. As an example, for mothers classes, introduced in their learning activities are social activities like dances, outings, and others.

8. Problems of integrating local concepts of health, nutrition, and diseases with modern concepts

Introduction of modern concepts can be done by integrating them with local concepts, and giving due consideration to such local concepts. Though difficult and problematic, integration can be done.

Local concepts of health, nutrition, and diseases as gathered by the trainer along the years contribute to changes in training designs. An illustrative example is the use of the "lagundi" leaves (a local medicinal bark) for fever. In the orientation course for health science students, this particular herbal medicine and others similar to it are introduced to them by trainors. In fact, as the momentum for intensive orientation of students to local herbal midicine gained more speed, the design for orientation has been radicalized by inviting the "herbolario" or traditional healer to become the lecturer on the subject matter of introducing herbal medicine to health science students.

9. Problems related to use of trainers' manuals

The training manuals are intended for trainers to use according to their competencies and capabilities and the needs of the trainees. However, many trainors have perceived of the manual as some sort of a cookbook, to be followed to the letter.

Trainers dished out straight translations of English texts into the dialect, lifted from the instruction manual. More often, they are misunderstood by many, and for the few who understand the concepts being communicated by the trainer, a local frame of reference is usually given as a feedback by the trainee to the trainer to explain the concept more clearly to the others. The trainer learns from the trainee a better way of communicating the subject matter.

Moreover, the training workshops for CCHP staff helped, aside from the direct consultations with other extension units of the university for tips in developing effective materials and ways of improving technical know how.

A built-in strategy that will answer this problem and the other problems previously mentioned is the continuous interaction of the training staff with the community which have made them sensitive to local frames of references, local modes of communications, and local concepts of health, nutrition, diseases and socio-economic aspects of community life in which experiences and knowledge are used in the strategies and materials to be used in training programmes.

E. Evaluation

For continuous evaluation of the curriculum for field placement, the students are met as a group and oral feedback are elicited even as early as the first week of the placement, periodically during their stay and during their last day. Questionnaires are also being answered during the start and at the end of the placement. Community people, particularly foster families are also interviewed on the student and his activities in relation to its effects to the community. Meetings of community members are also held and opinions on the student placements and their activities are discussed. All of the feedback are collated by the "monitors" and "preceptors" and the findings are presented to the Inter-disciplinary Curriculum Committee during their meeting at the end of the rotation of each batch of students, recommending changes in specific methods as might be necessary.

As mentioned earlier, the students proved capable to express what they think should be their preparation to address their efforts to national problems. Community people give intelligent feedback once given the accurate information to be able to judge appropriately.

Congruence of the feedback from the students and the community was made possible by the structured questionnaires prepared by the faculty. The structured instrument for gauging the student and community reactions manifested what the faculty felt were important in curricular development. Sometimes, instruments did not cover what students and community members feel are important, and the process of interviews and consultations take care of these other areas not found in the questionnaire. An example would be the concern of some students regarding the ethics of "human guinea pigs in experimental projects. On the other hand, the people would express their feelings regarding certain incidents of student and faculty behaviour not elicited in the structured questionnaire.

Acknowledgements are hereby given to the community people of Laguna from whom we have learned so much, to our students who have learned so much; to our students who have helped us to implement our programme, to the staff of CCHP from whom many of these ideas come and without whose tireless effort and dedication the programme would not have done as much and possibly more in the future.

PAKISTAN: DEVELOPMENT OF PRIMARY TEACHING KIT

by

Muhammad Aslam Popalzai

Introduction

The Education Policy (1972-80) recommended a variety of measures to make education meaningful, productive and interesting. The Policy has also emphasized on improvement of teaching methods and provision of instructional materials and teaching aids to primary schools. Pakistan Government is committed to universalization of elementary education for boys by 1984 and for girls by 1990 and is actively designing the system of elementary education in such a way that those who dropout after 8th class must carry with them, basic knowledge, skills and attitudes which they can use in their future vocations and thus contribute positively to the economy of their local communities. Old methods of teaching, old approaches to teacher training and traditional system of education which have a colonial past have failed to deliver the goods in time to our emerging socio-economic needs and aspirations.

This is a commitment of the Government both in quantity and quality of instruction. If we continue increasing the number of schools without taking into consideration the quality factors under the given financial and human constraints, the real purpose and philosophy of universalization of elementary education may not be realized. By using outdated approaches in teaching through chalk and talk method and conducting cook-book type experiments in the classroom, it is just impossible to improve the quality of education. It is only through new innovative techniques and effective use of instructional technology that we can achieve the desired long range goals of producing citizens who could positively contribute in the economic growth of the country effectively in whatever jobs they may be assigned in future.

In order to implement this crucial aspect of the Education Policy, it was deemed necessary that some concrete steps must be taken to improve the quality of education at the elementary stage. The most strategic entry point in improving the quality of instruction is to reorganize and reorient our outdated and outmoded teacher education programme in line with the emerging socio-economic changes and national needs of the country. The new primary curricula which has recently been introduced cannot be implemented effectively unless and until the entire school system has facilities in terms of necessary minimum equipment and trained army of qualified teachers to understand and incorporate the new spirit and philosophy which has inspired the entire process of curriculum reforms in the country.

Philosophy

New curriculum for the primary classes has already been developed and introduced in the country. The development of appropriate equipment and other instructional aids have to be integrated with the new curriculum, if it is to be meaningful and purposeful. It was, therefore, felt necessary that mass production and distribution of Teaching Kits be taken up at the National Level to help the learner to develop his/her potential through observation, exploration and understanding of the natural phenomena by using inquiry, open ended and "do it yourself" type of activities.

Education is not a process of "telling and being told", it is an active and constructive process. Previously we have been relying on textbooks and lecture method of teaching by unqualified and unwilling teachers to disinterested students. With the use of these kit activities students will be able to think and reflect. An exposure to kit's instructional items may provide him experiences which may result in more activities at his own initiative. Trying (experimenting) and undergoing an activity is not necessarily experience. For example, our concept of the word pupil is not of one having worthwhile experiences but of one absorbing knowledge. In education we have such a dualism; the pupil brings both body and mind to school, but the teacher spends his entire time squelching bodily activities, insisting on silence, no questioning good posture and so on. This results in pupil strain, fatigue and frustration etc. The eyes and ears are used to take in what the blackboard, the teacher and the map or chart have to say. Thinking begins when something is incomplete or unfulfilled. We think in order to reach a conclusion. When conclusions or answers are already known, we do not think. There is no genuine need for further thinking in such a closed situation. Thinking is a search for answer. Thus, it is through the involvement of the learner in the activities, seeking to identify problems, searching their solutions, trying to interpret in one's own way that a proper climate for understanding can be developed. Learning by doing is, therefore, the basis of all learning.

It is on this philosophy, that teaching kit for primary level is designed and developed. It is designed to promote understanding of the process rather than mere facts. This unique innovation in experimentation aims at the total development of the personality of the learner through the effective involvement of the senses in observation, exploration and understanding of the natural as well as man made environments through inquiry and open ended activities which children can perform at home, at school or even under a tree with the help of a self contained and self sufficient package of essential curricula activities without necessary space, facilities and instructional materials, usually required in traditional type of experiments/activities.

Most people in real life encounter their environment as a whole. They do not experience Physics/Chemistry/Mathematics/Social Studies as such. Most citizens do not have to have all of contemporary knowledge at their fingertips, nor do they need to be able to conduct spohisticated scientific research. They do need, however, to learn how to seek information effectively, how to make sensible judgement from inadequate data, and how to answer to themselves about the situations they experience. It is this process of observing, investingating, exploring and analysing that can bring knowledge deemed necessary for living better in this world activated by science and technology.

Contents of the kit

Each teaching kit consists of instructional materials covering wide range of school subjects, particularly in Science, Mathematics, Social Studies and Languages. There is a Teachers Tool Kit consisting of tools and instruments which will help teachers to produce inexpensive instructional aids through indigenous materials.

The teaching kit also includes a teacher's manual for guidance of the teachers. This manual consists of investigations children may make, instructional materials needed for such investigations, approaches to conducting the investigations/activities, suggestions for teachers, and further suggested activities for bright students.

Designing and development of the prototype

Development strategy

a) A national committee on the development and production of teaching kits was constituted by the Federal Ministry of Education with experts having vast experience in this field.

b) A meeting of the National Committee consisting of Country's key educators, science educators, mathematics educators, Language experts and social social science experts, psychologists, engineers, scientists and working elementary teachers was called for 3 days at Lahore to finalize the list of activities/items which were going to be the part of the kit. The National Committee was then divided into four subject committees and one co-ordination committee. This co-ordination committee along with the Chairman of various subject committees finalized the preliminary draft of the list of activities and items which were likely to be included in the kit. In the same meeting it was also decided to make various subject committees responsible for the procurement and development of the items needed, in their own specialized fields. They were given two months target to complete the task assigned to them failing which they will be held personally responsible for the delay caused in this nationally significant project.

c) On the recommendations of the National Committee on teaching kits, the standardized lists of equipment in the subjects of science, mathematics, social studies, Urdu and teachers' tools were finally approved. In these lists, the quality of

the items and main specifications were laid down. According to these lists, the prototypes of the items were developed in the National Educational Equipment Centre for the assessment of the individual items before their mass production. After the manufacture of these prototypes they were tested in the National Educational Equipment Centre and put up before the National Committee for their final approval. The National Committee met again to assess these prototypes and suggest necessary modifications and improvements.

d) The National Educational Equipment Centre (NEEC) was then asked to immediately cyclostyle the lists of approved equipment alongwith their designs/blue prints, etc., and send it to all individual members of the committee and heads of the participating institutions for favour of necessary immediate action.

e) During the second meeting at the NEEC, Lahore, all the subject committees were asked to meet separately in the rooms where items of this proposed National Teaching Kit were displayed for quick and prompt decision by subject experts. Each subject committee then selected the list of equipment they felt was necessary to be included in the kit. This list was then discussed with the co-ordination committee for purposes of balancing the financial components of all subjects according to a pre-agreed formula. During a general session, all the chairmen of various committees were asked to present each and every item to the whole group and discuss the use and justification of the equipment/aid.

In this way each and every item of the proposed kit was discussed, questioned and was either approved, or rejected or modified. Thus all those items/activities which stood the rigorous test of survival at the hands of the experts were chosen as part of the teaching kit.

Development of the Prototype

The following steps were taken in the process of prototype kit development:

a) Content analysis: Content was analysed from level I-V keeping in view the sequential aspects of concepts from simple to complex.

b) Some major concepts were selected in view of their importance and role they play in understanding of the fundamental concepts likely to trigger the curiosity of child by creating interest and motivation in learning.

c) On the basis of these selected concepts, activities were planned and written.

d) Out of the numerous activities that could be performed in a classroom situation, only those activities were chosen which in the opinion of national committee were likely to be interesting, exciting and motivating for children of age group 5-10.

e) A comprehensive list of the equipment/materials needed to conduct these selected activities was then prepared.

f) Keeping in view the professional experience of the experts and their areas of specialization, the National Committee assigned specific activities to various experts to be prepared in their own institutions for possible use in the prototype of National Teaching Kit.

g) From among the numerous activities/models/aids/toys developed by the individual experts during their last 1-5 years' independent research, suitable activities/models/charts/ experiments/aids were chosen by the committee of experts for inclusion in the proposed National Teaching Kit.

h) On the recommendations of the National Committee, the NEEC was commissioned to develop a prototype of the teaching kit.

i) After the final approval of these prototypes, the production drawings were prepared keeping in view the requirements of the registered manufacturers for the purpose of mass production.

j) The National Committee also decided that a teacher manual on "how to use" the kit effectively should also be prepared.

k) This multipurpose teaching kit consists of self-contained and self-sufficient package of open ended activities in Science, Mathematics, Social Studies and Urdu along with a teacher's basic tool box and teacher manual, describing possible ways of conducting the activities for average learners, and suggesting additional activities for talented students, thus meeting the individual differences of children, a very crucial aspect of human learning.

l) On the basis of the continuous follow-up programme in the selected and diversified strata of school population, the kit may be further revised after one/two year(s).

m) Orientation workshops are now being planned by the Ministry of Education to train the master teacher trainers in the knowhow, use and maintenance of the kit so that teachers are acquainted well before they actually start teaching through kit. In this connexion, a comprehensive in-service and pre-service programme for training teachers is also under way.

n) The potential of this innovation in improving teaching-learning situation at primary level would be further explored as more research and experience is accumulated over a period of years.

Mass production

The NEEC registered the manufacturers from the province of Punjab, Sind, N.W.F.P. and Baluchistan in various fields of specializations such as:

a) Metal work manufacturers;

b) Plastic manufacturers;

c) Wood work manufacturers; and

d) Precision Mechanics etc., etc.

The total number of manufacturers registered with the Centre was about 300. The tender enquiries were sent to these specialized manufacturers and they were asked to submit their rates for the various items. After the approval of the rates, the manufacturers were given 15 days to one month period for the preparation of the mass production tools such as metal dies, plastic dies, etc. They were required to submit the samples after one month. After the final approval of the sample, they were given another one month for the production of first lot of 2,000 items. The items are now in the stage of regular supply from the manufacturers.

Teacher Tool Box-A provision for repair and maintenance

The special feature of the Primary School Teaching Kits is the teacher tool box in addition to the kits in the subject of Science, Mathematics, Social Studies and Urdu.

The basic idea of providing these tools to the teachers to conduct minor repairs and maintenance of the items of the kit. These tools can also be used in the manufacture of some of the kit items. It has been noticed that in most of educational institutions, the equipment becomes useless for want of minor repairs of simple parts. This equipment can be put to use with little attention and labour. The teachers cannot handle these repairs for want of simple hand tools. These tools have been provided for the purpose of enabling the teachers to work with their own hands to make simple items of the primary teaching kits. The tools added in the kits are claw hammer, screw drivers, a file, insulated pliers, wood saw, tin snips, scissors and a painting brush. Although due to cost constraints, the items are not much in number but they are, however, sufficient for simple operation. This number can be enhanced if the need arises. (List of the items in one box of teaching kit is given at Annexure I)

Quality control, storage and packing assembly line

The consignments of various items of equipment are received in the quality Control Section. The items are checked for their materials of construction, quality of manufacture, and other specifications laid down in the production drawings. The accepted lots are sent to the main storage and packing assembly lines while the rejected stuff is sent back to the manufacturers. The arrangements of packing assembly lines are shown in the attached flow diagrams (No. 1 and 2). Various steps in the packing assembly line are given as under:

a) Various items of equipment are sent to the main store.

b) From the main store all the items are sent to the 5 sub-stores.

c) In these sub-stores the items of equipment, grouped in various bundles, are sub-packed. These sub-packings and various other items are then brought to the main packing assembly line at various stations No. 1, 2, 3 and 4 as shown in the flow diagram No. 2.

d) At station 1 the empty G.I. boxes, duly numbered and painted, are loaded on the packing trolleys.

e) These packing trolleys are then brought to station No. 2 where all 100 items of the kit are placed at various predetermined points.

f) Different persons deputed for various items are responsible to put their assigned items into the boxes while the trolley is moving ahead manually.

g) At the end of station No. 2 the complete kit box is checked for all the items loaded into it.

h) At station No. 3 packing material is put into the box and the boxes are locked, unloaded and stacked at the despatch station No. 4.

i) At station No. 4 the boxes are handed over to the District Education Officer concerned and loaded into the truck for despatch to the various District Headquarters.

j) The District Education Officer or his representative accompanies the truck from NEEC to the concerned District Headquarters.

The distribution mechanism

The distribution pattern of the equipment has been shown in the attached flow diagram 'A' which shows the mode of development of the design and the pattern of distribution of the equipment to the Primary Schools. The NEEC is responsible to despatch the equipment up to the district headquarters. For this purpose, the concerned District Education Officers are invited on particular dates to the Centre to receive the consignment. National Educational Equipment Centre is also responsible to hire the trucks for them and lots of 150 kits are sent through trucks to the District levels. The District Education Officers or their representatives take charge of these kits according to the NEEC schedule and are required to accompany these trucks up to the district headquarters. From there, the kits are distributed to the individual primary schools. Various proformas have been devised for keeping a proper record of the handing over and taking over of these kits. District Education Officers are responsible to send back this information after properly handing over the equipment to the individual schools. This arrangement ensures the receipt of the kits in the schools.

Development of Teacher Manual

Every National Teaching Kit for Primary School is accompanied by a 158 page booklet entitled "Teacher Manual for Teaching Kit". This booklet contains everything a teacher wants to know about the teaching kit.

The writing of the Teacher Manual was undertaken as soon as the process of selection and designing of kit items was completed at the NEEC. The compilation work of this manual was entrusted to a sub-committee whose members were drawn from various subject committees of the National Teaching Kit.

The need for a teachers' manual

The idea of preparing a teacher manual grew out of the concern to make the best use of the kit in the primary schools where most of the teachers have little knowledge or skill to use instructional aids in classroom teaching. It was, therefore, considered very essential to provide necessary explanations and instructions to the teachers in the proper use and maintenance of the kit materials.

Basic Considerations

While the kit items were given final shapes, the members of the sub-committee for Teacher Manual met to draw a format for the write up of the Manual. It was agreed to include the following information about the materials in the kit:

i) General description of each kit item, i.e., its construction, specifications and quantity provided in the kit.

ii) The classroom activities that can be performed and the concepts that can be developed with the use of kit items.

iii) Explanations regarding the use of kit items in actual classroom situation.

iv) Safety, maintenance and duplication of kit items.

In addition to providing such information, an important objective of writing the manual was to illustrate the new methods and techniques of instructions as proposed in the modernized curriculum for elementary classroom practices. As all the kit materials are inexpensive items most of which can easily be obtained in urban as well as rural environment, an important consideration was, therefore, to show the teacher how inexpensive materials, available in his own community and school surroundings, could be used for developing portant concepts of various subjects.

With the exception of a few manufactured items, all other items can easily be fabricated by the teacher himself. The manual was, therefore, planned to include suggestions for the teachers to prepare their own teaching aids similar to the ones included in the kit and to modify or innovate upon the available items according to the individual needs of the teachers and the learners. Suggestions for replacement of perishable materials were planned to be incorporated in the manual so that the suppliers may not run short of the items and the usefulness of kit curtailed after a year or so.

Organization of the Teacher's Manual

The manual is divided into five parts. The first four parts relate to the kit items pertaining to four subject areas, viz. Science, Mathematics, Social Studies and Urdu. The fifth and the last part is about the teachers tool kit, a part of the total kit. Besides these five parts, a complete list of all the kit items alongwith their specifications is given in Annexure I. The manual opens with a foreward by the Chief Project Co-ordinator and head of the Curriculum Wing of the Ministry of Education explaining the government policy regarding the new curriculum and the project for the supply of kits to the primary schools. This foreword is an attempt to take the primary school teachers into

confidence by informing them about the curriculum innovations that the government is introducing and have them understand the implications of curriculum changes in their classroom practices.

Salient features of the various parts of the Teacher's Manual are given below:

Part I-Science

An introduction to this part spells out the nature of elementary science and the children's understanding of scientific phenomenon through their own observations and explorations. Learning science is a natural activity for every child as it stems from the inherent curiosity of all children to explore their surroundings. A child is a natural enquirer. He asks many questions and wants to find answers by experimenting. The job of the teacher is to provide access to such learning experiences and let children develop concepts and understandings through actual investigations.

The science experiences to be provided to the children should be carefully organized by the teacher so that such experiences may lead children to solve problems. For them the problem must be more directly connected with physical objects and concrete imagery. Problem solving as a goal of science education will be achieved only as children experience a variety of different kind of problem situations. No problem solving can be done through hasty investigations. The children must be given sufficient time to think, reflect and develop cognitive structures in a problem solving situation.

This investigative approach of teaching elementary science is well illustrated in the Teacher's Manual. Thirty investigations are outlined which can all be performed by using the kit materials. All investigations are structured as under:

a) Problem: A problem is presented or a question is posed. The problem or question is clearly spelled out. It is usually simple and appropriate for the age level of the children.

b) Materials: A list of materials that can be picked up from the kit is then provided.

c) Experiment: The procedure to solve the problem is briefly given as description of experiment. The questions that the teacher should ask to direct children's thinking at various stages of experiment/investigation are then given. Expected questions from children and how teacher shall respond to the questions are also discussed.

d) Suggestions for the teachers: Appropriate knowledge about the concepts being developed through the experiment is given in this section. The working of various components of the kit and what care the teacher should take in handling particular kit item are also described. What the teacher should do in case the item breaks and how he can develop alternate aids are also discussed.

e) Expected learning: The solution of the problem or answer of the question posed in the beginning is then provided and its implications discussed.

f) Further activities: In this section brief suggestions for extending investigations or for performing further activities to strengthen the concepts learned are given so that the children may not consider science as a finished business.

In the end, the most important concept developed is highlighted.

Part II-Mathematics

The teaching of Mathematics at elementary level has undergone radical changes during the two decades. The basic objective of the programme of mathematics in the elementary school is to make certain that mathematical knowledge functions in the activities of children both in and out of school. The emphasis is being placed to understand the structure of number system and how number system operates in various number processes as well as to develop an ability to communicate ideas involving quantitative relationships.

In order to facilitate such learning, the mathematics classroom should be converted into a learning laboratory which should be equiped with a wide variety of learning aids that may lead the child to develop mathematical concepts, work out solutions and to gain insight into number and its uses in daily life. For this purpose, a variety of meaningful learning situations must be organized by the teacher.

Part III-Social Studies

The structure of Social Studies curriculum at elementary level has been built around a few basic concepts relating to home, family, social and physical environment, social institutions, national resources and national cohesion, etc. The items include pictures, charts and models. A few introductory remarks in the beginning of this part in Teacher's Manual help to clarify the rationale of selecting these items for teaching the above mentioned concepts. It is stated that models and pictures are used only as substitutes for actual things. They are not intended to exclude other means of learning.

The Manual describes each item in detail and then discusses the concepts for which the items can be used. Any additional equipment required to make the item work is also enlisted and the method of procuring or preparing has been outlined. The activity to be performed with the items is then described in detail. Necessary instructions for organizing group activities are also given. In the end, care and precautions to be taken while using or storing the items are described.

Part IV-Urdu

It is now being increasingly recognized that the student's power in the language arts will develop through meaningful experiences, both group and individual, rather than unrelated drill assignments. Teaching materials included in the kit can be used as efficient means to develop this power.

Although there are only a few items in the kit for teaching Urdu, the Teacher's Manual describes multiple uses of these items and also draws upon the items meant for teaching science or social studies.

A comprehensive discussion on the use of various items has been given in the Manual. Individual and group activities with various items have been described. These activities relate to observing and listening, reading, verbal expression, dramatization, hand writing, word building, story telling, building reading speed and group competitions etc.

Part V-Teacher Tool Kit

An important component of the teaching kit is the Teacher Tool Kit with the help of which a teacher can himslef construct any item of the kit or even prepare new items of his own. The manual describes the tools in detail and explains how it can be used in a skillful manner. Only basic jobs that can be performed with the tool kit have been described. If a teacher can master some of the skills given in the manual, he will have no difficulty in duplicating a large part of the Teaching Kit.

Teacher Training Programme

Under the new Education Policy, new curricula are being introduced at all levels in the country. In order to effectively implement the curricula, the teacher education programmes both at pre-service and in-service levels have been reorganized from PTC to B.Ed. levels. Effective implementation demands immediate in-service training programmes for teachers at all levels in new concepts and teaching methods being introduced in the country. It is in this context that the Curriculum Wing of the Ministry of Education has established a National Institute of Teacher Education to organize Orientation Workshops to train 2,200 master teacher trainers who would ultimately train about 200,000 of teachers at the grass-root level.

The Education Policy has laid significant emphasis on the qualitative improvement of instruction. To implement this important aspect of the Education Policy, a comprehensive scheme for the development and distribution of teaching kits to all the primary schools has been prepared.

The following strategies have been adopted for the teacher training programmes.

In-Service Teacher Training Programme

Teachers are the builders of our new generations. Unless we have the most dedicated, hard working and trained teachers in our educational institutions, we cannot educate good citizens for tomorrow. No system of education can rise above the teachers who serve it and its quality depends ultimately on the efforts of the teacher. This in turn depends on the effectiveness with which they have been taught by their own teachers in the classrooms. Training of teachers, therefore, is a most crucial task which the Federal Ministry of Education has embarked upon to do. It is in this context that the Curriculum Wing invited experts from all over the country to train the key educational personnel in the use and maintenance of Teaching Kits during a workshop for In-service Training of Master Teachers held at the National Institute of Teacher Education (NITE), Islamabad. During the Workshop, the experts also developed a proposed 2-week model for in-service training of teachers in the use and maintenance of National Teaching Kit at the grass-root level.

A proposed model for in-service training of teachers at the grass-root level

Objectives

At the end of the workshop the participants should be able to:

a) Outline the philosophy of the National Teaching Kit.

b) Perform activities utilizing the kit in accordance with the approach set out in the laboratory manual.

c) Demonstrate skills, such as assembly, manipulation, observation, maintenance, safety, in the use of the kit.

d) Analyse the effectiveness of the kit for the development of a particular concept.

e) Design alternative strategies for the development of concepts when a given strategy for such development proves ineffective.

f) Prepare a lesson plan which includes the utilization of the National Teaching Kit.

g) Identify objectives which the use of the National Teaching Kit seeks to achieve.

h) Conduct an interaction analysis of a classroom situation.

i) Design, perform and prepare instructional materials, for an additional activity facilitating the development of a particular concept or skills.

Pre-Service Training Programme

With the introduction of National Teaching Kits in the primary level curricula, it was felt necessary that our existing PTC programme should also be revised incorporating the component of Teaching Kit as an integral part of pre-service teacher training programmes in the country. Keeping this consideration in view, the curriculum wing has very recently revised its PTC curricula in which a special teaching kit component has been added to enable the pre-service training institutions to integrate the use and maintenance of teaching kit in their training programmes. Thus teaching kit has been completely integrated both in in-service and pre-service teacher training programmes in Pakistan.

Strategies for Evaluation

The development of the kit, publication of the manual, establishment of the in-service training programme for primary teachers, and a systematic arrangement for the distribution of kits is a great accomplishment of a team of educationists planning the National Teaching Kit Project. But this is not viewed by these future oriented educationists as an end in itself. This is just the beginning. If this project has to survive to serve the cause of primary education in Pakistan today and tomorrow, it must remain an on-going ever-improving project. This necessitates a comprehensive evaluation programme of the various components of the project to provide feedback for revision and improvement of the project. (This is shown in flow diagram at 'B'.)

Five Dimensional Study Programme.

Five Dimensional studies for evaluation of the Teaching Kit are proposed as follows:

a) To study the effectiveness of the system of kits distribution.

b) To study whether or not the kit is being properly used and maintained.

c) To study the effectiveness of the national teaching kit items.

d) To evaluate the teachers' manual as a guide for using the kit.

e) Evaluation of the in-service teacher education programme in the philosophy and use of teaching kit.

1. Kits distribution

The national teaching kit project can only make the desired impact on primary education, if and only if, we ensure that every kit reaches its destination, i.e., the primary schools it is designed for. This necessitates the study of this dimension. The system of kits distribution in schools involves three agencies and completes the procedure in two steps. The NEEC which is responsible for the production of the kits also assumes the responsibility of handing over the kits to the District Education Officers (DEO's). Each DEO in turn assumes the responsibility of the distribution of kits to individual schools within his district.

The NEEC prepares a schedule and distributes it to all those concerned. According to this schedule the DEO or his representative from a given district reaches the NEEC, Lahore to take over the charge of the consignment on a fixed date. The DEO examines the lot, supervises its loading on the truck and accompanies it to his own district, supervises the unloading and storage. On receiving the consignment, the DEO sets on distributing the kits to schools. This procedure of distribution to schools varies from district to district depending upon its geo-physical conditions, the facilities and resources at hand, the discretion of the DEO and the directives he receives from his respective provincial government.

The possibility of break-down of the system of distribution at any level particularly at the district level, cannot be ruled out completely and such a break-down to say the least would result in displacement and disuse of the kit, which would, in turn, lose the impact of the project.

The DEOs are requested to provide us necessary information on the following:

a) Before receiving the instalment of 150 kits, list of 150 schools selected to receive the kits and a brief report of the planned system of distribution on the following lines:

i) Arrangements for unloading and storage of the kits in the district, the place and the system.

ii) The mechanism for reaching the kits in schools.

iii) Schedule for distribution.

b) On the completion of the distribution of 150 kits in the schools; forms duly filled in by the heads of recipient schools or their representatives in form of a receipt for receiving the kit.

c) A brief report of distribution of kits on the following lines:

i) How far was the original plan and schedule followed?

ii) The problems faced and how were they resolved?

iii) Suggestions for future.

2. Proper use of kits

It is quite possible that after reaching the primary school, the kit remains under lock and key and the teacher never gets an opportunity to see it, or else, the teacher may start using the kit but it gradually gets whithered away in parts and bits and in no time the kit box is found empty. Equally bad would be a situation where school administration and teachers, due to lack of knowledge or willingness to introduce any change in their teaching patterns, would put the kit items to misuse and disuse. Hence it is proposed that information regarding various components of maintenance and use of the kit may be obtained from teacher by means of personal visits, interviews and questionnaires.

3. Effectiveness of the National Teaching Kit items

This is the main concern of the evaluation project. The national teaching kit items have been selected after thoughtful consideration and care. Many items were tried out locally by Master Trainers at various in-service and pre-service teacher training institutions. Once the kit items have been selected and the kit reached the school in the assembled form, this is the time to put the items to the test of actual use in schools. If the item withstands the test of use and time, confidence in the item will be reinforced, otherwise this study would provide empirical basis for improvement, amendment or replacement of the National Teaching Kit Items for further production.

Two different designs for such a study are proposed:

a) Opinion of the users to obtain data on a questionnaire form X, in the form of opinion of the users.

b) Comparative study of gain percentages to compare gain percentage of classroom students regarding concepts development and clarification as a result of teaching with and without the use of kit items.

4. Effectiveness of the Manual as a guide for use of the Kit

Formal in-service training programme even if very effective would be quite limited in its impact for it is not possible to impart this training to all the teachers, who would be expected to use the kit. Hence the quality of the Manual as a guide for the kit becomes more vital for the effectiveness of the project. Even for those teachers who would receive the formal training the manual would provide a ready reference for use whenever they need it. The study of evaluation of this dimension of the "NTKP" is to provide a sound basis for the improvement and revision

of the manual. It is proposed that evaluation of the manual be based upon the opinion of two independent groups, the users and the experts.

Opinion of the users namely the school teachers using the kit and the manual and the National Experts in the field of Education will be solicited on questionnaire prepared for the purpose.

The following criteria is proposed against which the evaluation of the manual be evaluated by the teachers and the national experts.

a) Simple format
b) Simple and appropriate language
c) Clarity of expression
d) Illustrated description
e) Practicable instructions
f) Initiating inquiry approach
g) A substitute for or addition to formal training in the use of kit.

Problems encountered and strategies

1. The kits are sent to district headquarters on the predetermined scheduled time. Unexpectedly it takes long time to reach the schools. As a result the kits are kept lying in the district headquarters for 1-2 months.

In order to avoid such delays a comprehensive set of feedback programmes have been developed. The DEOs are directly to provide the information which serves and automatic check for avoiding un-necessary delays.

If the delays are unempectedly more, the Divisional Directors of Education are informed to take necessary steps to expedite the distribution.

2. The district education authorities take very little interest in the kit project as a whole. The main reason for this lack of interest is that the DEOs are carrying out multifarious type of duties relating to the administrative problems of the educational institutions in whole of the district. He does not find sufficient time to attend to this project.

The problem can be solved by establishing a small section at the district level. This section would be looking after the following aspects:

a) distribution of the kits;

b) organizing the safe custody of the kits in schools; and

c) motivation of the teachers to use and maintain the kits in the proper way.

3. The training of 200,000 primary teachers is a long term and huge task. Until and unless this is done kits would not be used by the teachers properly.

The teaching kit component has been completely integrated with the in-service and pre-service training programmes of teachers.

Allama Iqbal Open University has also initiated the training program e for the primary teachers thrcugh correspondence, and mass media. Teaching Kit Component has been completely covered in these programmes.

On the completion of this programme the teachers are awarded certificates. The teachers, who poss s the Comp. ction Certificates of this programme are awarded special in ements. The teachers are greatly motivated to take up these programmes with such incentives. It is hoped that under this scheme the problem of teachers training would be effectively solved.

4. The administrators and the teachers take less interest in sending the feedback information for the evaluation of the kit project. Steps are yet to be taken in this direction.

5. There are few imported items in the kit like thermometers, magnets and torches, etc. Sometimes the supply of these items is disrupted due to their non-availability. At the same time they are more expensive as compared to other indigenous items. Attempts are being made to create the facilities to mass produce items at NEEC.

ANNEXURE - I

LIST OF THE ITEMS OF THE PRIMARY TEACHING KIT

SCIENCE

Sr. No.	Item	Specification	Qty.
1.	Box for mounting insects	255x200x65 mm. Card board thickness 2 mm. Polythene top & thermopolene at the bottom	1
2.	Insect Net	with rust-proof frame. Dia=224 mm. , Length=600 mm. net length = 500 mm.	1
3.	Killing bottle for insects	A wide mouth bottle, Dia=90 mm. Height=85 mm. and 2 mm. thick screwed tin lid. (glass)	1
4.	Insects stretching Board	200x110x20 mm.	1
5.	Plastic cups for seed germination	Dia=90 mm., Height = 51 mm., Thickness = 1.5 mm.	4
6.	Plastic flower pot	Dia 102 mm., Height=103 mm., Thickness = 1.5 mm.	5
7.	Bag polythene black	240x180 mm.	1
8.	Bag polythene colourless	240x180 mm.	1
9.	Metalic cart with four plastic wheels	230 x 115 x 1 mm.	1
10.	Bar magnets (one pair with keeper)	65x10x5 mm. size	1 set
11.	Magnetic needle	Length = 75 mm. (North pole red painted)	1
12.	Iron fillings		2 oz.
13.	Magnifying hand lens	Dia = 50 mm., Length = 110 mm. with plastic handle	1
14.	Kerosine oil lamp	Height = 120 mm., Chimney length = 58 mm.	1
15.	Clinical thermometer	Centigrade fahren height both scales	1
16.	Alcohol thermometer	Centigrade only 0-110^{o}C	1
17.	Spring balance	0-500 Gm. scale	1
18.	Glass Rod	Dia = 9 mm., Length = 180 mm. (Pak soda glass)	2
19.	Silk & flannel pieces	100 x 100 mm.	2
20.	Plastic rods	Dia = 12.5 mm., length=153 mm.	2

Sr. No.	Item	Specification	Qty.
21.	Beaker	50 ml., German glass & polyproplene	2 each
22.	Test tubes	Dia=16 mm., Medium thickness soda glass	6
23.	Test tube stand	PVC, to hold six tubes	1
24.	Pulley (fixed and movable)	Fixed pulley, Diameter=37 mm (plastic) Movable pulley, Diameter=51 mm. (Aluminium)	1 set
25.	Nails (large and small)	Large nail size, length=1¼", 16 SWG, Small nail size length = 3/4", 16 SWG.	1/2 oz.
26.	Flask conical	150 ml. German glass	1
27.	Model of great bear	Box board 235 gm. base 330x 300 mm. Disc Dia= 280 mm.	1
28.	Earth & universe chart	762 x 508 mm., with tin strips on the top and bottom	1
29.	Ordinary balance with weights	Weights = 1 gm., 2 gm., 5 gm., 10 gm., 1, with tweezer	1 set
30.	Air water wheel with plastic funnel	Fan plastic with 6 to 8 blades, with greater water head arrangements	1
31.	Plasticine	Weight 100 gms.	1 pkt.
32.	Apparatus for light travels in a straight line, which includes the following items:		
32/i	Plastic stand	100x36x18 mm.	4
32/ii	Card board sheet	105x95x0.75 mm. (one without whole)	4
33.	Apparatus for reflection of light, which included the following items:		
33/i	Plastic stand	110x78x45 mm.	1
33/ii	Mirror strip	102x25 mm.	2
34.	Measuring cylinder	100 ml. Plastic cylinder with graduation in ml.	1
35.	Candles	Dia = 15 mm. Length = 100 mm.	6
36.	Test tube holder	Length = 210 mm. with wooden handle	1
37.	Two cell torch with bulb	Without battery cell	1

Sr. No.	Item	Specification	Qty.
38.	Animal picture cards	Comparable size with actual colour & skin	6
39.	Slotted weights with hanger	Weight : 5 gm. 2 10 gm. 2 20 gm. 6 50 gm. 1	1 set
40.	Tripod stand with wire gauze	Total height: 138 with slanting legs	1
41.	Electroscope	Length : 63 mm. Dia : 35 mm.	1
42.	Balloons		12
43.	Bell	Dia : 40 mm.	1
44.	Plastic Prism	25x25x25x25 mm.	1
45.	Iron stand with clamp	Base 150x110x27 mm. Height : 420 mm.	1
46.	Plants chart	762x508 mm. with tin strips on the top and bottom	1
47.	Copper Sulphate		110 gm.
48.	Alum Potash		50 gm.
49.	Sodium carbonate		50 gm.
50.	Boric Acid		50 gm.
		MATHEMATICS	
51.	Open abacus	141 Plastic boards Dia : 14 mm. in 7 colours (white, black, red, green, pink, blue, yellow).	1 set
52.	Counting tray	size : 300x300x5 mm. Hard board	1
53.	Number cards, place, value and expanded notation	Card board 1.5 mm. thick	1 set (46 Nos.)
54.	Numbers cards with picture cards	Card board Size : 102x38x1 mm.	18
55.	Number cum picture cards	Card board Size : 102x38x1 mm.	45
56.	String	Dia : 1.5 mm.	9.2 mm.
57.	Sign number card	Card board 100x75x1 mm.	20

Sr. No.	Item	Specification	Qty.
58.	Symbol card	100x75x1 mm.	7
59.	Model of geometrical figures (triangle, square, rectangle, parallelogram, quadrilateral, trapezium, circle)	Made of inflexible 16 SWG steel wire (black painted)	9
60.	Shapes showing regions of geometrical figures mentioned in item No. 59	Card board 1.75 mm. pasted with the sand paper on the back side	9
61.	Models of hollow cube and cuboid	Cube size = 50x50x50 mm. Cuboid size = 50x30x20 mm.	1 set
62.	10 mm., square strips	Plastic sheet 0.5 mm. thick	110
63.	Plastic models of cylinder sphere, hemisphere and cone	Cylinder Height = 80 mm. Dia = 50 mm. Sphere Dia = 66 mm. Hemisphere Dia = 66 mm. Cone height = 80 mm. Dia = 50 mm.	
64.	Meter rod	Metalic in two halves	1
65.	Decimeter	Metalic or wooden	1
66.	Coloured chalk	5 colours, (green, blue, red, white & cream), size length=76 mm. Max. dia=12 mm. Min. dia = 9 mm. Total weight = 775 gm.	1 Pkt. (144 Pcs.)
67.	Graph Paper	in centimeter size = 300x250 mm.	1
68.	10 mm. Plastic cubes	White plastic 10 x 10 x 10 mm.	125
	SOCIAL STUDIES		
69.	Flannel board	size = 584x584x3 mm. Hard board, flannel of superior quality (yellow) Back side painted with black board paint	1
70.	Picture of four types of building	380x254 mm. size of each picture (Kacha, Pacca House, Kothi, Mosque)	1 set
71.	Cut outs of buildings in item No. 70	Cut outs of 380x254 mm. picture each	1 set

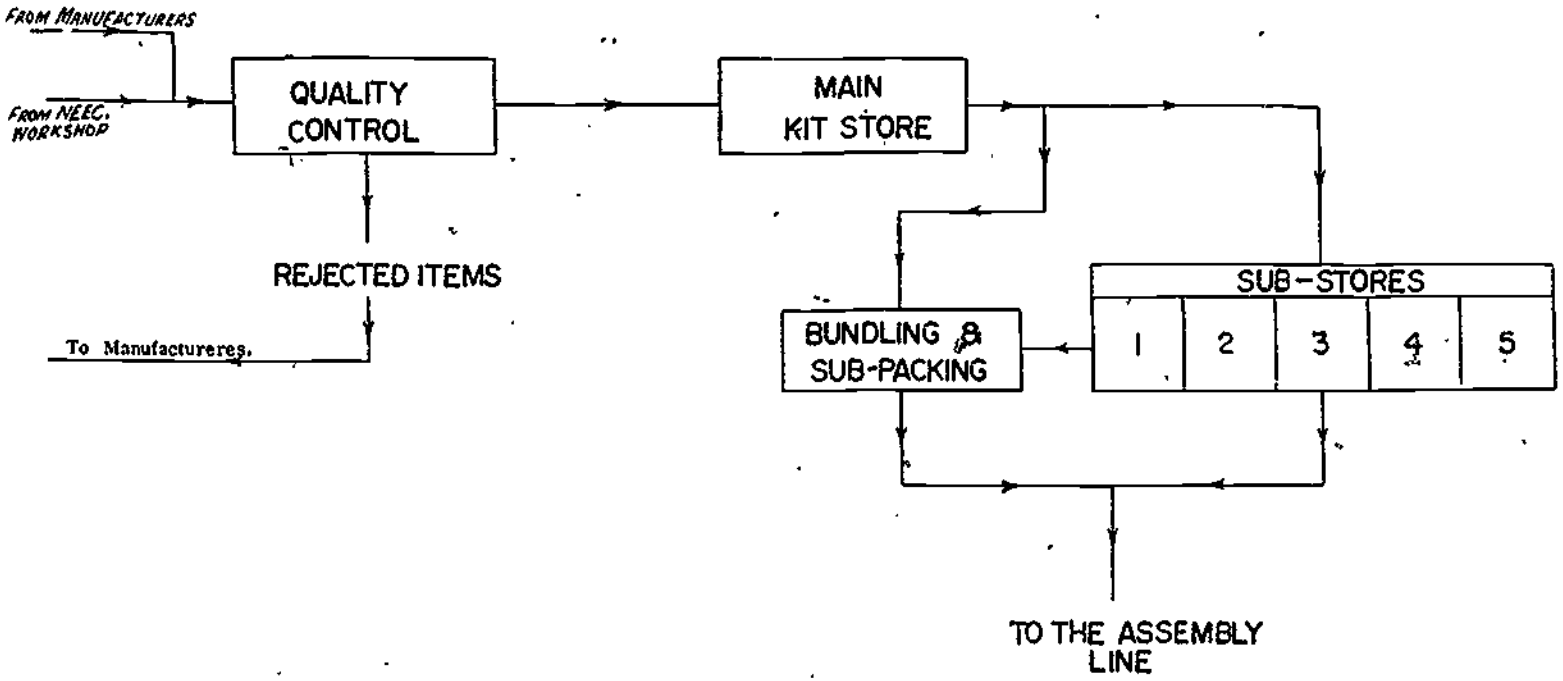
Sr. No.	Item	Specification	Qty.
72.	Picture showing a family	762x508 mm., with tin strip on the top & bottom	1
73.	Pictures of persons performing their duty	102x75 mm., (Doctor, Postman, Farmer, Shoe-maker, Barber, Carpenter, Weaver, Fisherman, Goldsmith, Tailor, Milkman, Blacksmith, Tailor, Constable, Washerman, Potter, Clerk)	16
74.	Chart showing different land features	762x508 mm., with tin strips on the top and bottom	
75.	Compass (Magnetic)	25 mm., North painted	1
76.	Rain gauge	Cap. 8 cm., Height = 90 mm. (Polyproplene), Dia=65 mm., Thickness = 1.6 mm.	
77.	Chart showing means of irrigation	762x508 mm., with tin strips on the top and bottom	1
78.	Picture of Agricultural products	762x508 mm., with tin strips on the top and bottom	1
79.	Chart showing traffic signs	762x508 mm., with tin strips on the top and bottom	1
80.	Chart showing means of transportation	762x508 mm., with tin strip on the top and bottom	1
81.	Tamplet of Pakistan	484x457x3 mm. Hard board, green painted	1
82.	National Flag	Flag 120x75 mm. Fine silk with string, star and crescent on both side and rod with two hooks Length = 375 mm. Dia = 7 mm. (Three step plastic base) 70x70x45 mm.	1 set
83.	National anthem and flag (chart)	762x508 mm., with tin strips on the top and bottom	1
84.	Mini Atlas	254x203 mm.	1
85.	Pictures of personalities	(Quaid-e-Azam, Allama Iqbal, Moulana Mohammad Ali Jauhar, Sir Syed Ahmad Khan, Mohtarma Fatima Jinnah, Kushhal Khan Khattak) Size = 280x216 mm.	

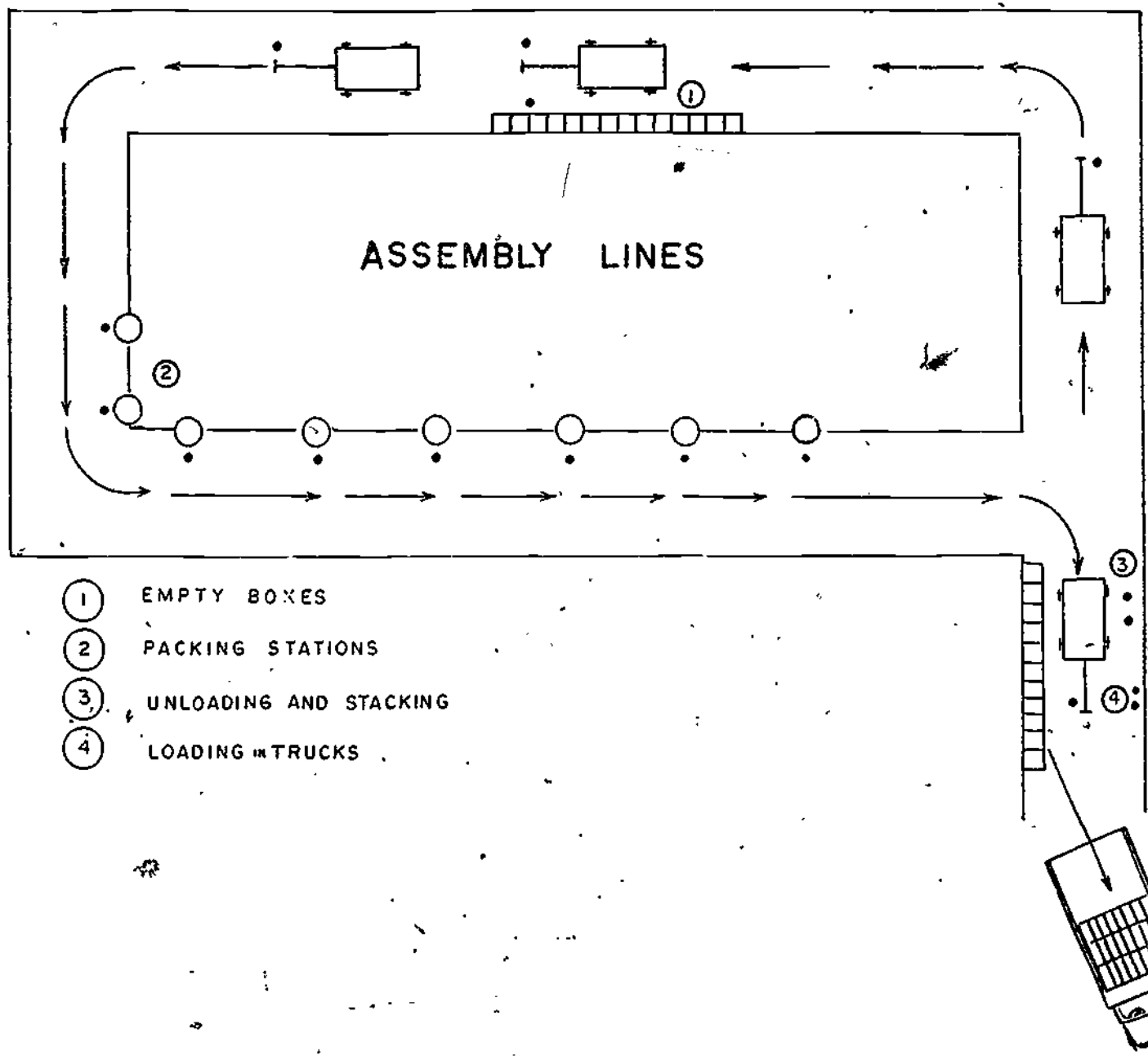
KIT MAINTENANCE TOOLS

Sr. No.	Item	Specification	Qty.
86.	Claw Hammer	Forged 1/2 lb. Handle 12"	1
87.	Screw Driver large and small	Large size = 178x6 mm. Dia. Small size = 152x4.7 mm. Dia.	2
88.	File flat	Bastered 8" with wooden handle	1
89.	Pliers (Insulated)	Size 7"	1
90.	Wood Saw	Size 12", 8 teeth per inch	1
91.	Scissor	Size 6"	1
92.	Tin Snip	Size 8" Blade 1" wide, weight 320 gm.	1
93.	Brush	No. 8 writing	1
		U R D U	
94.	Stencils of 32 Urdu Alphabets	Size 300x185 mm.	One set (Six Nos.)
95.	Alphabet cards	Complete alphabets size of card 50 x 75 mm.	5 Pkts.
96.	Shapes of Alphabets and word combination cards	128 Nos. of combinations size of card 50 x 75 mm.	2 Pkts.
97.	Principles of Calligraphy	Booklet	One
98.	15 Lessons of the First Primary book.	Art paper, Page size 250x375 mm.	One
99.	Compound cards of alphabets.	60 cards, size 50 x 75 mm.	5 Pkts.
100.	Face mask	Lion, Cat, Joker, Jinn(Demn)	One set
101.	Story cards (to be displayed on Flannel Board)	3 sets of stories on card board size 550 x 350 mm.	One
102.	Chart showing daily routine of Student No. 1.	Size 762 x 508 mm.	One
103.	Chart showing daily routine of Student No. 2.	Size 762 x 508 mm.	One
104.	Model of Microphone	Height 360 mm., Base dia = 80 mm. (Plastic)	One

NO. 1.

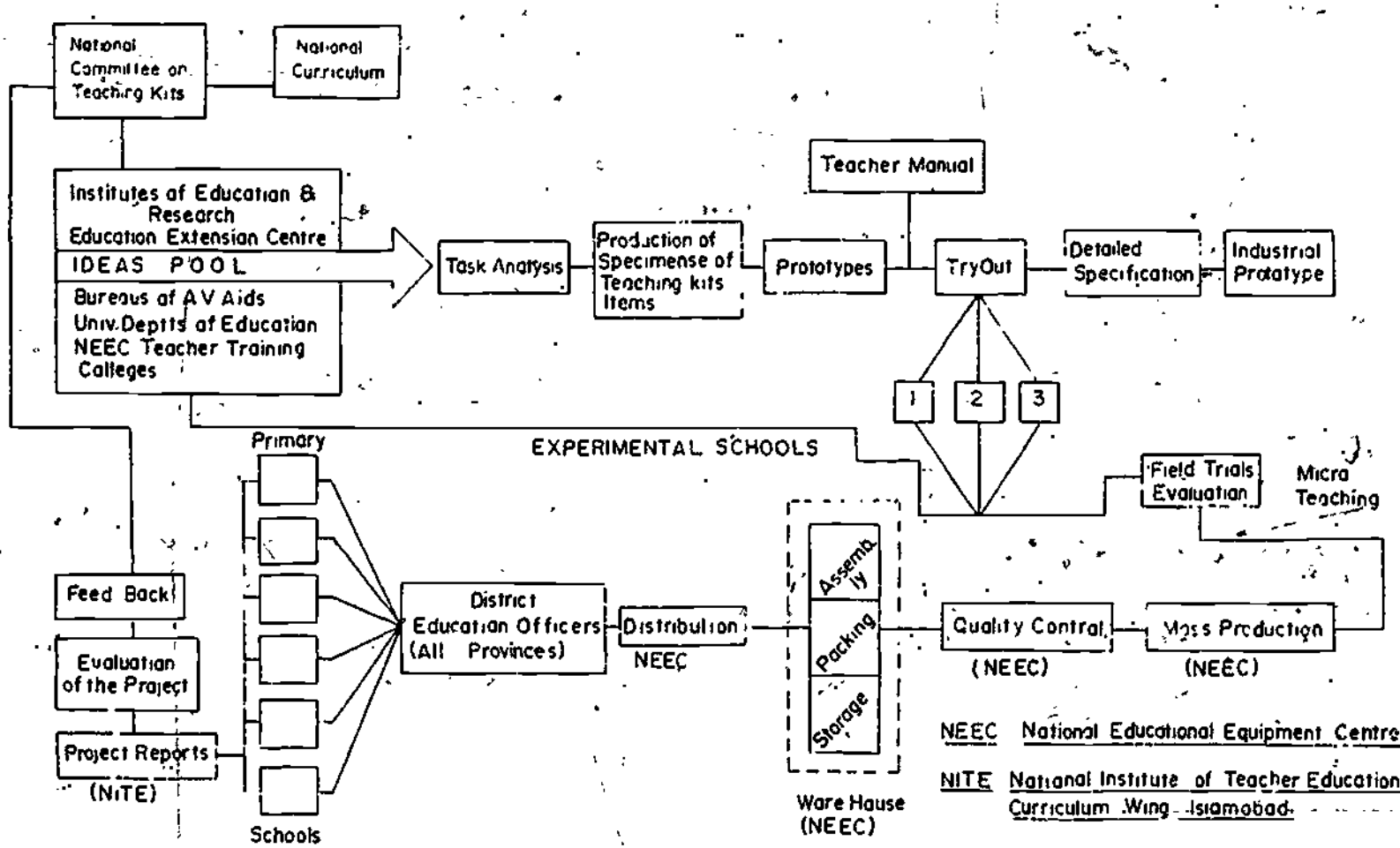
FLOW DIAGRAM FOR THE ASSEMBLY LINE FOR THE PRIMARY TEACHING KIT AT N.E.E.C, LAHORE, PAKISTAN.




ASSEMBLY LINES
1
2
3
4
1 EMPTY BOXES
2 PACKING STATIONS
3 UNLOADING AND STACKING
4 LOADING IN TRUCKS

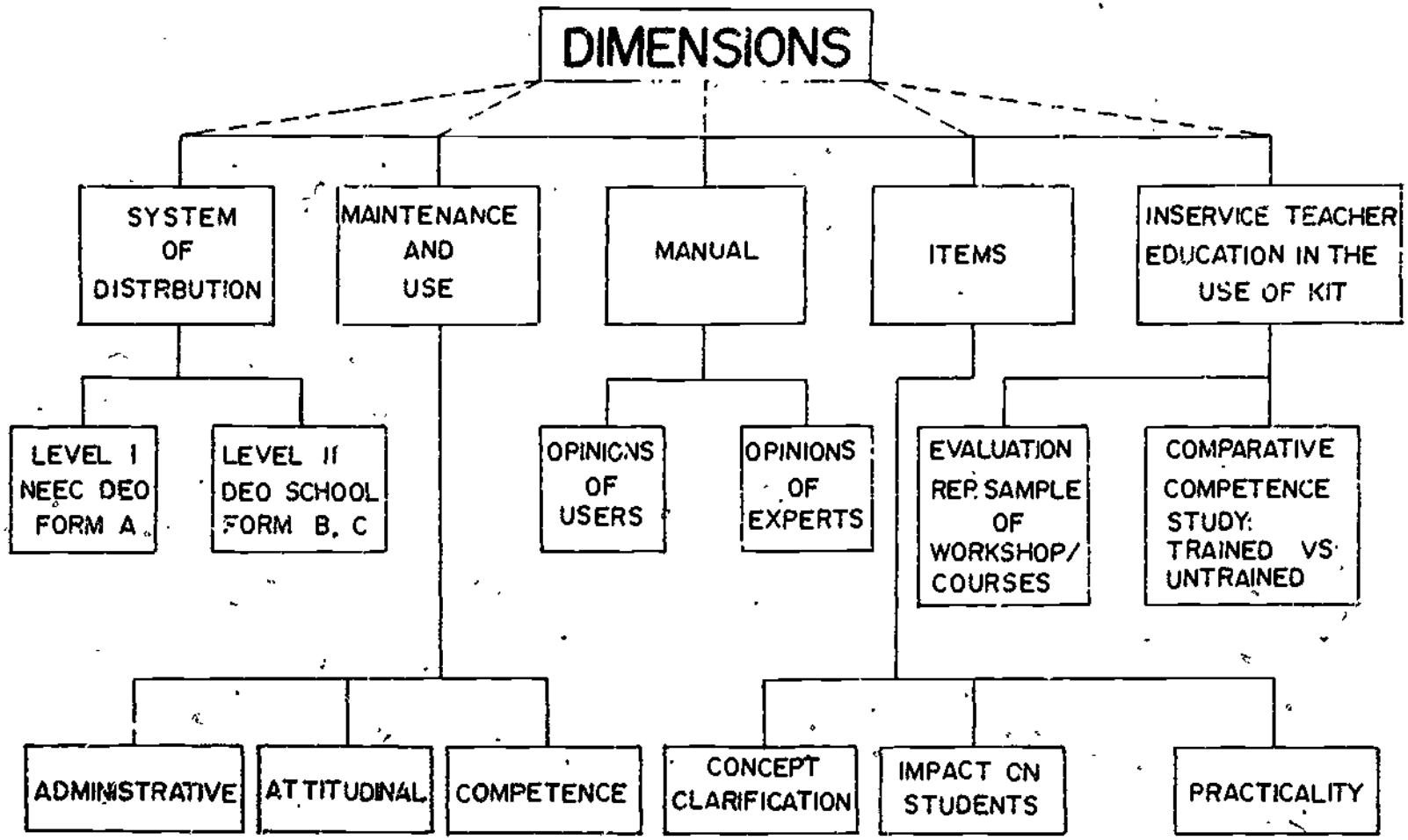
FLOW CHART FOR DESIGN, DEVELOPMENT, MASS-PRODUCTION AND DISTRIBUTION OF NATIONAL TEACHING KITS IN PAKISTAN.

Diagram A

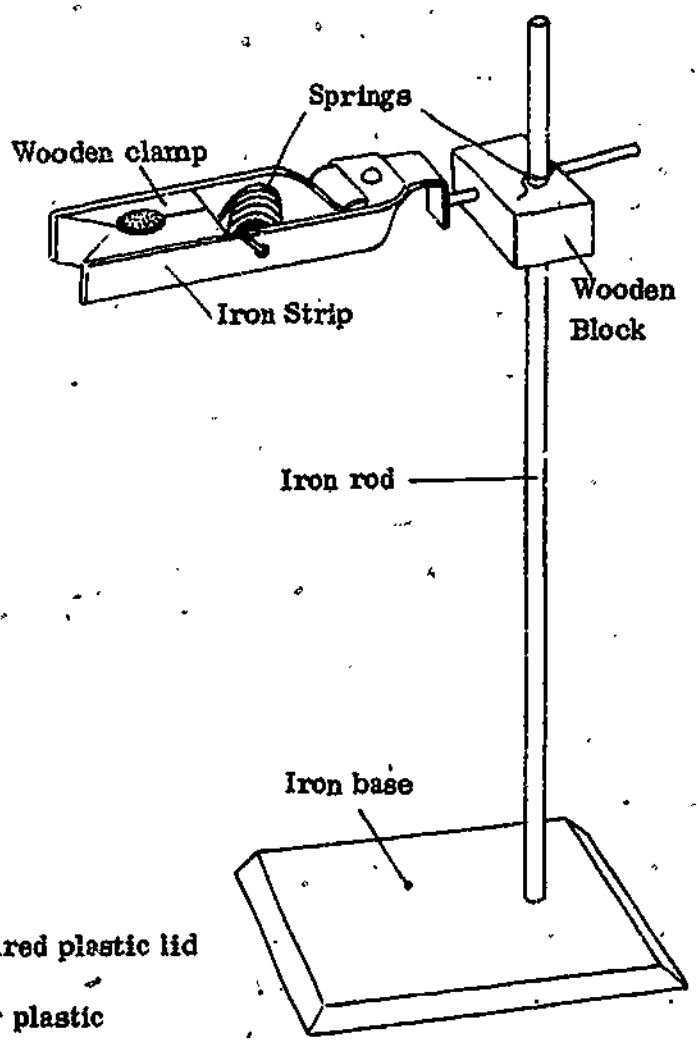


EVALUATION OF THE NATIONAL TEACHING KIT PROJECT

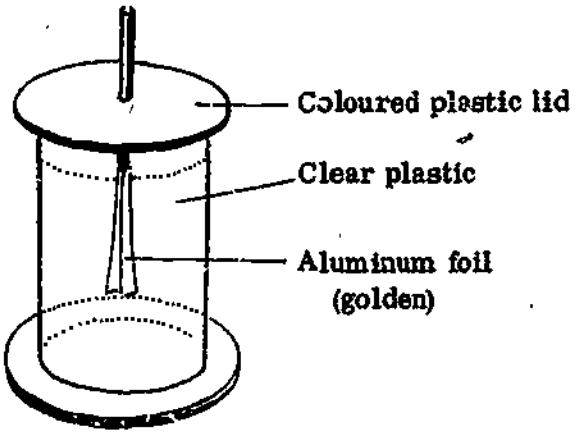
Diagram B



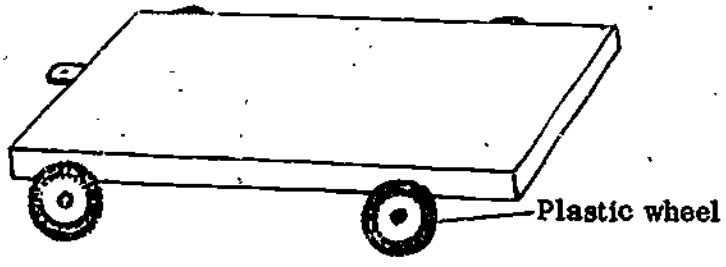
INNOVATIONS



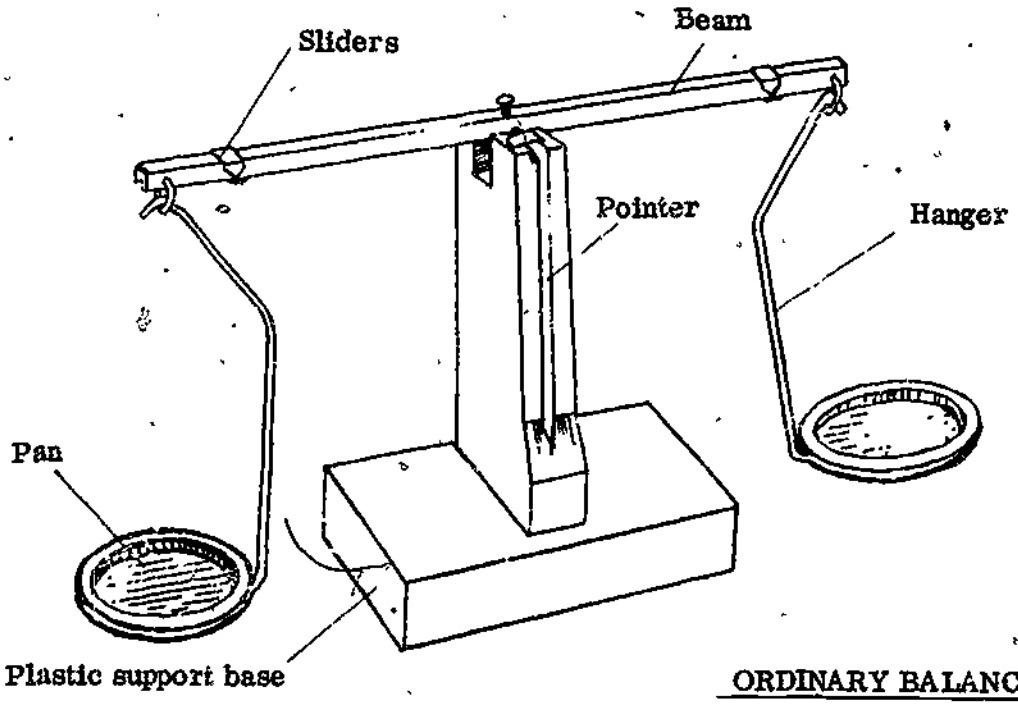
IRON STAND



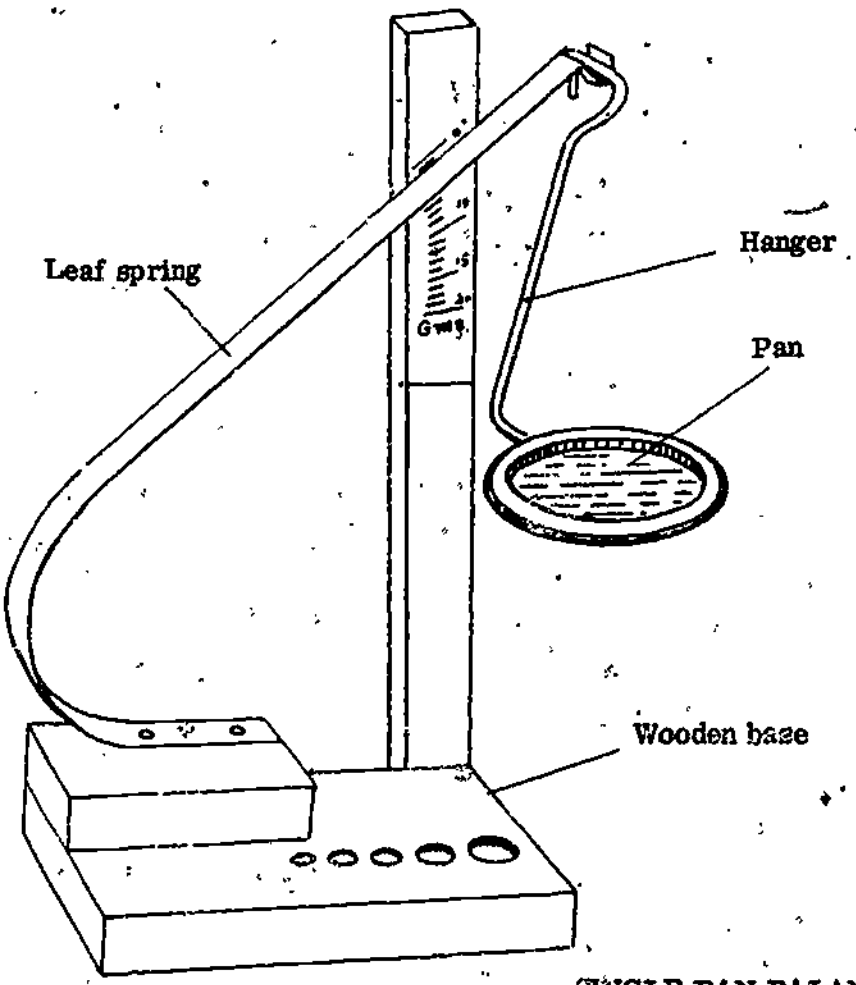
ELECTROSCOPE



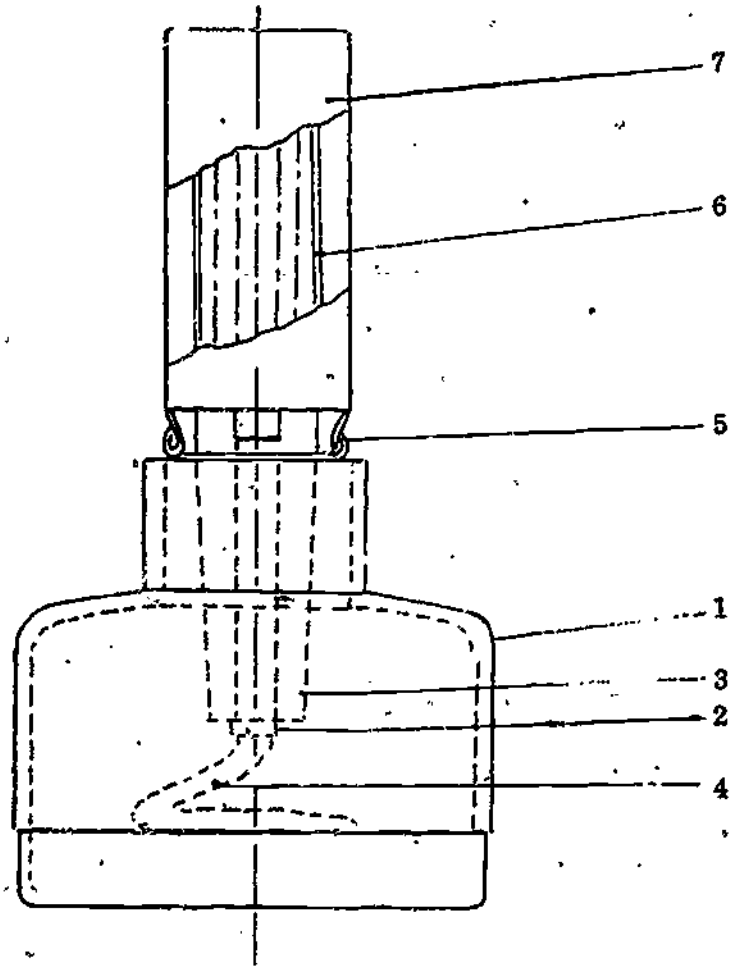
METALLIC CART



ORDINARY BALANCE

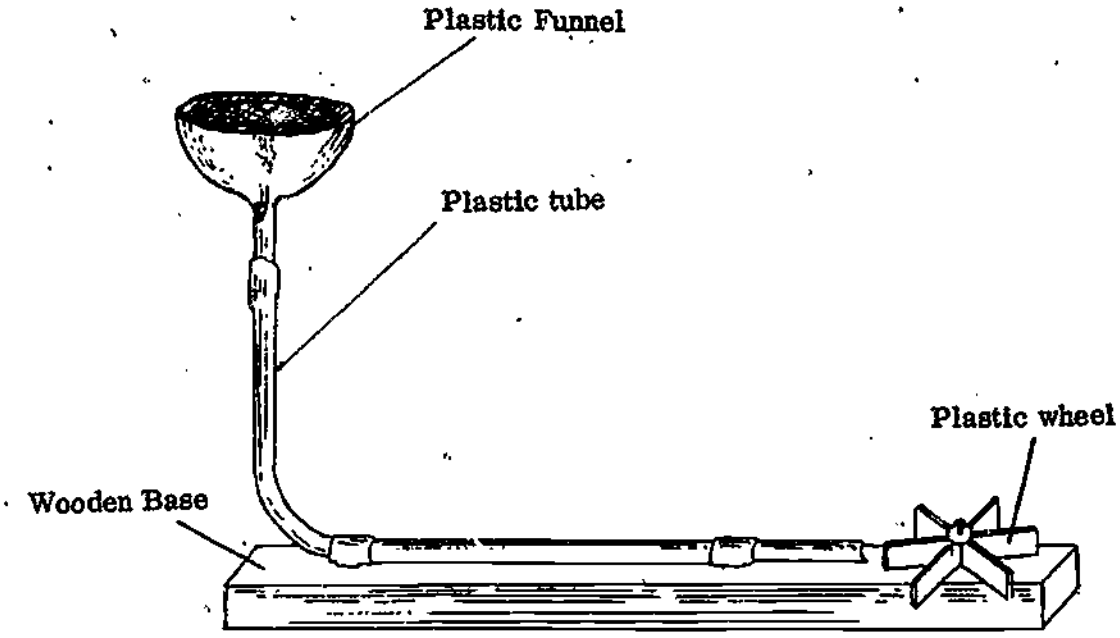


SINGLE PAN BALANCE

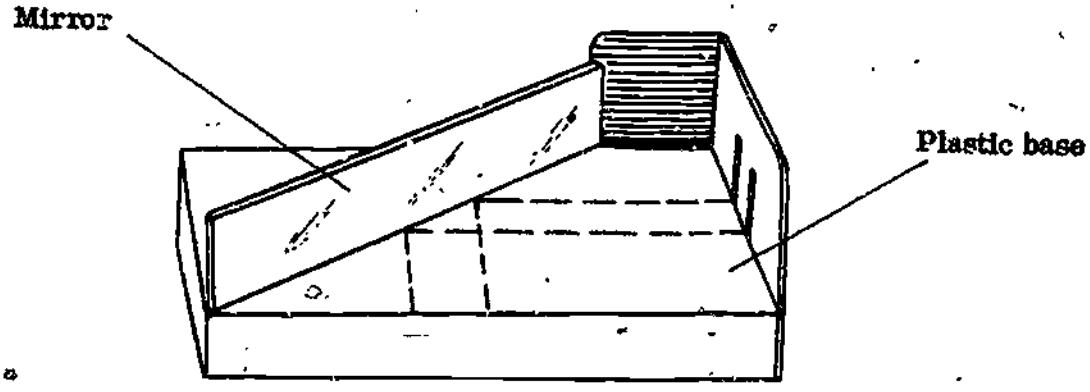


KEROSENE OIL BURNER

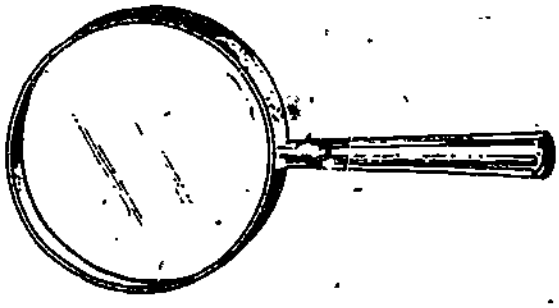
1. Glass Bottle
2. Wick holder
3. Wooden Cone
4. Wick
5. Bracket for chimney
6. Chimney with 90 holes
7. Chimney cover



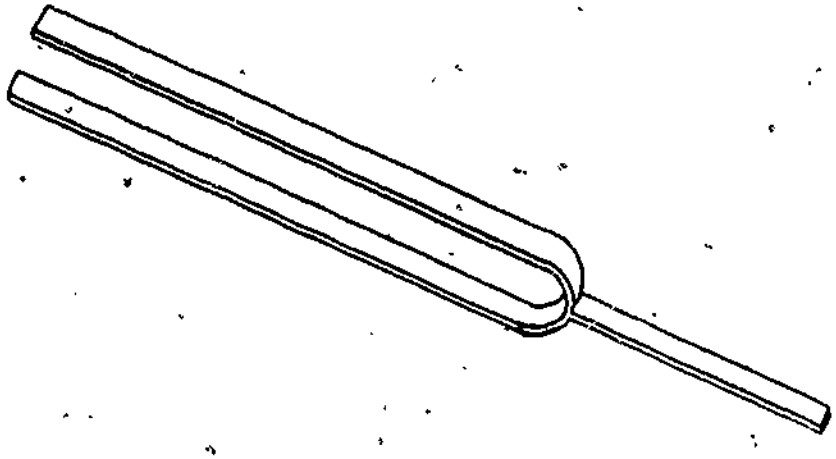
AIR AND WATER WHEEL



APPARATUS FOR REFLECTION OF LIGHT



Hand Lens (Magnifying)



Tuning Fork

SECTION III

TEACHER EDUCATION

INDIA: EXPERIENCES IN DEVELOPING TEACHER EDUCATION PROGRAMMES AND SCIENCE INSTRUCTIONAL MATERIALS

by

A.K. Sharma

Background

The four Regional Colleges of Education (RCEs) were established in 1963 at Ajmer (Rajasthan), Bhopal (Madhya Pradesh), Bhubaneshwar (Orissa) and Mysore (Karnataka) by the Ministry of Education and Social Welfare, Government of India, primarily to be focal centres for running pilot project for preparation of teachers for various vocational streams envisaged under the multipurpose higher secondary system introduced at that time. The preparation of specialized teachers in areas like Science, Technology, Agriculture, Commerce and Home Science was very important to cater to the diverse needs of the rural and urban youth and hence the founding of these institutions. The vocational courses run in these institutions in Technology and Commerce were of one to four years' duration but of one year's duration only for Agriculture and Home Science areas.

The RCEs were later taken over by the National Council of Educational Research and Training (NCERT), New Delhi 110 016, an autonomous body financed by the Ministry of Education and Social Welfare, Government of India, and their character modified appropriately to cater to the needs emerging from time to time in the field of teacher education.

Although the scheme of multipurpose education itself was given up because of operational difficulties, the RCEs have continually addressed themselves to the persisting problems of teacher education, particularly the areas relating to development of academic programmes both pre-service and inservice curricula, courses and instructional materials. Over the years these institutions have attempted to become important national centres to work out innovative experiences in the field in teacher education as well as development of appropriate instructional materials.

Presently, the usual curriculum for teacher education operates as follows: For the primary school level (class 1 to 5), there is a programme of teacher education, varying from one to two years' duration after class 10; for the secondary school level (classes 6 to 10), there is a one-year programme (B.Ed.) after the completion of the first university degree (which takes 14 to 15 years of education in humanities or sciences); for the higher secondary level (classes, 11, 12), hardly any programme of teacher education has been attempted.

The inadequacy of the one-year teacher education model for preparing school teachers has been reflected in the following:

1. The entrants to these courses are generally those not accepted in other professional courses;
2. Nine to ten months of 'teacher training' appears too short a time in inculcating values and skills relevant to the profession;

3. Subject competencies of the entrants are generally not found appropriate for emphasis on pedagogical training;

4. Role of teacher as an agent of social change, for all practical purposes, is dormant in the teacher training curricula.

As an experiment for preparing quality teachers in various subjects, the NCERT started integrated and interdisciplinary models of teacher education as the first innovative exercise in teacher education.

A. Common and special element in the core curricula for teacher education

The teacher education curricula developed at this Centre during its 15 years of existence are actually the responses to the challenges of changes in the philosophy of teacher education, the changing needs and aspirations of the youth seeking to cater to the teaching profession and organizational and administrative changes in the educational systems in the states of the region, the demands of universalization of education, besides a multiplicity of several other socio-economic and political factors as have influenced the quality and quantity of education in the country.

The following salient features comprise the common and special element in the core-curricula of the 8 semester teacher education programme in sciences, mathematics and English, in practice at this centre.

1. This has been the first experiment in the country in the integration of content and pedagogy and that of educational theory and practice, for developing teacher education model.

2. There is emphasis on inter-relatedness of the subjects and thus projection of interdisciplinary approach to teaching and learning.

3. By catching the students young for entry into this profession, it has been possible to draw the better stuff into the programmes; because of longer time available for interaction with content as well as pedagogical aspects together, it has been more rewarding to inculcate professional values and developing teaching skills and competencies.

4. In order to help total development of the teacher, organization of student teaching internship is an important part of the training programme.

5. There is emphasis on developing ability in the prospective teachers to improvise/fabricate apparatus, based on indigenous resources; for this purpose teaching of workshop skills in carpentry, woodwork and smithy are built into the curricula.

6. Two years ago the University of Mysore launched a project "Operation Bharani", programme of total rural reconstruction, and our centre is associated with this work regarding improving of science and teaching in 10 high schools of a rural complex. Our students work with the teachers of

these schools to prepare teaching aids from locally available materials.

7. The curricula developed in teacher education provide for both horizontal and vertical mobility in the profession, for example, B.Sc.Ed. and M.Sc.Ed. students can establish themselves as teachers or even go for higher studies in content as well as education areas.

The 4-semester M.Sc.Ed. courses in teacher education are the first innovative experiments of their kind in the country where relevant courses in education have been integrated with the M.Sc. level curriculum in chemistry, life sciences, mathematics and physics. It has been a tough experiment to try but has sustained its worthiness.

The methods and criteria for identifying the core elements of the curriculum are summarized in Table I. Based on the inadequacies of the one-year teacher education model as given in the introduction of this paper, the NCERT experimented with the integrated model. Experiments of running integrated programme at this centre have lent support to the worthiness of such courses for preparing teachers well qualified in both content and pedagogy.

Each teacher education curriculum developed at this centre is an outcome of an analysis of the demands from the states of the Southern region. The 8 semester B.Sc.Ed. and 4 semester M.Sc.Ed. courses, for example, were conceived to prepare college level teachers, research workers in the area of science/mathematics education, teacher educators, etc. The requirements of each one of these areas needed a specific curriculum to be evolved. This exercise yielded the course science education, and basic port-graduate level courses in chemistry, life sciences, mathematics and physics.

Table I. Needs in the area of teacher education vis-a-vis resulting curriculum development

Need	Processes/Strategies adopted	Resulting Curriculum Development
1. To prepare teachers qualified both in content and pedagogy at the secondary school level, in the following areas: i) Sciences/Mathematics ii) English/History	i) Integration of the content and pedagogy; ii) Working out the amount and the kind of pedagogy and the stage at which it is introduced (sequencing) iii) Integration of educational theory and practice	Development of the following courses: i) B.Sc.Ed. ii) B.Ed. iii) B.A.Ed. iv) The Course: 'Workshop in Teaching'
2. To provide preliminary experiences in practice teaching skills	i) Organization of observation/demonstration lessons ii) Organization of micro-teaching session	Development of courses for teaching methodology

Need	Processes/Strategies adopted	Resulting Curriculum Development
	iii) Introduction of team-teaching	
3. To provide training in technical skills to develop ability to improvise/ fabricate apparatus	Integration of workshop practice with the B.Sc. Ed./B.Ed. curricula	Development of curricula for workshop practice in carpentry, wood work, smithy, etc.
4. To give orientation to work experience and vocational areas to prospective teachers	Introduction of applied science courses at the B.Sc.Ed./B.A.Ed. curriculum	Development of courses like: i) Material and construction technology ii) Production processes iii) Circuit analysis. iv) Soil management and crop production
5. To ensure total development of the student teacher	Organization of student teaching internship	Development of "Workshop in Teaching" and internship activities
6. To prepare teachers of Mathematics, Physics and Chemistry at the junior college level qualified both in content and pedagogy	Integration of post-graduate level content in Mathematics, Physics and Chemistry with relevant pedagogy	Development of the following courses: i) M.Sc.Ed. Mathematics ii) M.Sc.Ed. Physics iii) M.Sc.Ed. Chemistry
7. To develop the concept of the area of Science Education	Integration of the related areas of education with the content	Development of courses, e.g. Science Education-I and Science Education-II in the M.Sc.Ed. programmes
8. To remove deficiency in knowledge of pedagogy in freshers who seek admission to M.Sc.Ed. programmes	Introduction of additional courses in education	Development of following additional education courses in the M.Sc.Ed. programmes: i) Philosophical Foundations of Education

Need	Processes/Strategies adopted	Resulting Curriculum Development
		ii) Phychological Foundations of Education
		iii) Sociological Foundations of Education
		iv) Teaching Methods
		v) Practice Teaching
9. To remove deficiency in content knowledge due to updating of the curricula	Content enrichment courses and organization of laboratory experiences	Development of correspondence lessons in content areas following contact sessions for laboratory practice

B. Translating the curriculum into teaching-learning materials

The strategies and methodologies used in development of instructional materials for translating the curriculum into teaching-learning materials consist of the tasks as outlined below:

1. Curriculum analysis (content analysis) into knowledge, understanding, skills specific teacher competencies and performance.
2. Classification of these on the basis of their adaptability, to be tackled through different strategies like:
   a) Contact classes
   b) Self-learning experiences
   c) Correspondence lessons
   d) Assignments
   e) Keller plans
3. The choice of an appropriate strategy depending upon requirements of a particular group for whom instruction is needed.

The following types of instructional materials have been developed at this Centre to achieve the various tasks and strategies outlined above:

a) Resource materials

The first resource material developed at this Centre was Physics Resource Material (PRM).

The central purpose of the PRM is to assist the teacher in both the content and the method of his teaching. As the method is woven into the subject content, the PRM is both a text and a teacher's guide.

Each chapter contains, in sequence, a brief introduction, a list of major instructional objectives, a list of key concepts to be developed, comprehensive development of the subject content, additional/alternate activities and a set of questions and exercises.

The INTRODUCTION defines the scope of the chapter, presents an overview of the subject content and places the chapter in the proper perspective in relation to other chapters in the unit.

The statement of INSTRUCTIONAL OBJECTIVES consitutes a vital part of each chapter. Only the major objectives pertaining to the subject content are listed. They are stated in behavioural terms and conform to an approach evolved at the RCE, Mysore, based on the pioneering work of Bloom and the NCERT.

The objectives are classified into three hierarchical categories - Knowledge, Understanding and Application. These three categories are further divided into a series of hierarchical Expected Learning Outcomes.

A list of key CONCEPTS, in the sequence of their development in the text, follows the list of objectives. These are to be developed through the instructional process.

Next comes the section on DEVELOPMENT which takes up most of the chapter. The subject content is divided into a number of convenient sections and sub-sections. In keeping with the modern approach to science teaching, the development of concepts is attempted through student-learning activities, teacher-demonstrations and classroom discussions. The main emphasis here is on student-learning activities.

The majority of schools in India are rather poorly provided in this respect. For this reason not many activities are included which require expensive equipment and facilities. For the most part, the activities require equipment which are commercially available at reasonably low cost or which can be improvised with a little effort from commonly available materials.

An important feature of this volume is the inclusion of a number of sequential developmental questions at crucial stages in the activities and discussions. The teacher can employ these questions to initiate classroom discussions and thereby lead students towards higher learning goals.

Some ADDITIONAL ACTIVITIES are listed in most of the chapters. They serve a variety of purposes. They can be used to supplement the activities in the main text. They can also be used as alternative activities. Some of them are designed with an accent on improvisation so that the teacher may give them as special assignments to students.

Each chapter ends with the section on QUESTIONS and EXERCISES. The questions are not mere repetitions from the main text. Many of them will prove quite challenging to the students. They provide useful tools for the evaluation of students' achievements at the Understanding and Application levels.

Although primarily intended for the practising teacher, the PRM can also be used effectively by teacher educators and trainees in teacher training institutions. They will find it easy to evolve lesson plans geared to specific learning outcomes, unit plans and resource units from the material in these volumes (Appendix IV).

b) Correspondence lessons

With the acceptance of the new curriculum in the country, it became necessary to update the teachers' knowledge of content and methodology so that they could effectively teach it. The orientation and training of teachers, therefore, in the new curricular re-organizations was one of the most urgent tasks which this Centre has undertaken through the Correspondence-cum-Contact Courses which are being offered with effect from 1 January 1977. These courses are hoped to be the best and most acceptable media for reaching out, within a short time, to a large number of teachers to enrich their professional competence, as it will not oblige them to stay away from their schools, thereby disrupting school work.

The correspondence materials developed cover the following eight school subjects, out of which almost the entire set of lessons in the areas of Mathematics, Physics and Chemistry and English were developed by the Faculty of this Centre (Appendix IV):

i) Art and Culture
ii) English
iii) Hindi (as a second language)
iv) Mathematics
v) Science-I (Physical Sciences)
vi) Science-II (Biology Sciences)
vii) Social Science-I (History, Civics, etc.)
viii) Social Science-II (Geography, Economics, etc.)

The topics of the lessons have been chosen in such a manner that major conceptual frames in the respective subjects are covered, keeping in view their relevance to the secondary school curriculum. This is done with a view to familiarizing the teachers with the basic concepts of the subjects in the new curriculum and helping them to make the transition from the old curricula.

Besides, the correspondence lessons are valuable resource materials for the teachers, particularly when there is a dearth of latest books in the school libraries on recent models in curriculum development in different subject areas. In Mathematics some lessons have been developed entirely on Programmed Instruction techniques.

Exemplar Material from a Resource Unit (Extract)*

Unit: Heat and Temperature

Introduction

Heat and temperature are two of the most common scientific terms used in the everyday world. But often the distinction between them is not clearly understood.

Before the advent of the molecular theory of matter towards the middle of the nineteenth century, these two terms were interpreted in a nebulous manner. Changes in heat were regarded as due to the addition or subtraction of a 'fluid' called caloric. Temperature was merely looked upon as the degree of 'hotness' of a substance without any clearer interpretation. Soon these ideas ran into difficulties and only the molecular theory could clear them up.

Under the molecular theory, changes in heat are interpreted as due to changes in the net energy of molecular motion while temperature is interpreted as a measure of the average molecular kinetic energy. A clear distinction is, therefore, made between the two quantities.

As in the previous chapter a formal mathematical theory is not attempted. However, some of the important consequences of the theory are introduced through simple experiments. Finally, the measurement of temperature and different scales of temperature are discussed.

Instructional Objectives

1. To infer that supply of heat to a gas or liquid increases the speed of translational motion of molecules while removal of heat decreases the speed.
2. To infer that supply of heat to a solid increases the amplitude of vibrational motion of molecules while removal of heat decreases the amplitude.
3. To generalize that supply or removal of heat results in an increase decrease respectively, in the net kinetic energy of molecules in a substance.
4. To infer that heat is a form of energy.
5. To see the relationship between heat energy and the mechanical energy of molecules in a substance.
6. To interpret temperature in terms of the kinetic energy of molecular motion.
7. To differentiate between heat energy and temperature.
8. To infer that the property of thermal expansion of a liquid can be used to measure temperature.
9. To recognize the special features in the construction of a mercury-in-glass thermometer.

*From Physics Resource Material, RCE Mysore

10. To recognize the relationship between thermo-dynamic and Celsius scales of temperature.
11. To recognize the special features of a clinical thermometer.
12. To recognize the special features of a maximum-minimum thermometer.

Concepts

1. Addition of heat to a substance increases the energy of motion of its molecules.
2. Heat is a form of energy.
3. Temperature of a substance is a measure of the average kinetic energy of its molecules.
4. Expansion of a liquid is proportional to its rise of temperature.
5. Two standard temperatures are necessary to construct a scale of temperature.
6. The reading of a thermometer depends on the scale of temperature employed.

Development

Heat and Molecular Motion

Activity 1 Put some saw dust or aluminium powder into a flask filled with water and heat the flask. Ask students to observe the particles (of saw dust or aluminium powder) as heating is continued. If the particles have settled down at the bottom of the flask there will be no noticeable movement at first. However, after sometime, the particles start moving and the speed of their motion increases as the heating continues. Discuss these observations with the following questions:

What sets the particles moving? Recall that the molecules of water are in random motion and, therefore, they are constantly colliding with the suspended particles. These collisions must be responsible for the resultant motion of the particles. Recall that this is Brownian motion.

Why does the speed of the particles increase as more heat is supplied? Students should be able to reason out that the speeds with which the water molecules collide with the particles must have increased, with the result that the particles are themselves moving faster. To confirm this, stop heating the flask. The particles will slow down gradually.

There was no perceptible motion of the particles before the flask was heated. Does this mean there was no molecular motion in water to begin with? Draw the attention of students to what they had learnt in the previous chapter about molecular motion. Guide them to infer that the molecular speeds in this case might be insufficient to produce any observable motion of the particles.

Activity 2 Fix a balloon to the mouth of an empty (and dry) conical flask. Heat the flask. Heat the flask over a flame and ask students to observe the balloon. They will see it growing in size as heating is continued. Why does this happen?

Students should be able to reason out that the pressure of air inside the flask (and hence, inside the balloon) should have increased.

What causes this increase of pressure? Recall that the molecules in the bottle and balloon are in constant random motion. They are constantly colliding not only with one another, but also with the walls of the container. The pressure on the walls of the container is caused by the impact of molecules. Since the pressure increases as a result of heating, it is obvious that the molecules are now hitting the walls of the container with increased speeds. To confirm this, stop heating the flask and let students observe the balloon. Its size will decrease, indicating a decrease of pressure which means a decrease of molecular speeds.

What about the speeds of molecules which are in random motion. Do they all move with the same speed or with different speeds? Since the molecules are constantly colliding with each other and with the walls of the container and since these collisions are also random, their speeds should be widely different at any instant of time. /This can be demonstrated with the model to simulate molecular motions which was described in Chapter 17, Activity 17.13 (figures 17.8 a & b). If we concentrate our attention on the marbles at any instant of time, we will notice that the marbles move with different speeds in different directions/ However we can attribute an average speed (or velocity) to the molecules at any temperature and hence an average kinetic energy per molecule at that temperature. This average kinetic energy increases with temperature and we actually regard it as a measure of temperature.

Students will now be in a position to infer that supply of heat increases the average speed of molecular motion in a liquid or gas, and removal of heat decreases the speed.

Additional Activity

Students may be shown how to improvise a simple air thermometer which was first made by Galileo.

Take a used electric bulb, remove its filament housing and fit a rubber stopper carrying a long glass tube. Ensure that the arrangement is airtight. Fix the arrangement against a vertical wooden board with the end of the glass tube dipping in a beaker of coloured water. Warm the bulb sufficiently to draw water half way up into the glass tube. Paste a mm scale along the length of the wooden board just behind the glass tube.

Due to changes in atmospheric temperature the volume of air in the bulb also changes. The level of water in the tube varies correspondingly and its position as read on the scale is a measure of the atmospheric temperature.

To be of any practical use the scale has to be calibrated. Ask students how best this can be done. Discuss also the limitations of this type of thermometer.

How do variations in the atmospheric pressure affect the performance of the air thermometer? Point out that the level of water varies due to changes in atmospheric pressure also. So how could we tell whether a temperature change or a pressure change made the water level vary? There is no easy way. Thus the devise is highly unreliable for measuring atmospheric temperatures. But can we use it to measure temperatures of other objects? Can we use it as a clinical thermometer? What modifications will be required?

Exemplar Material from a Correspondence Lesson in Chemistry

Lesson: Kinetic Theory: Development of a Model for Gases (Extract)*

Development of a Model to Account for the Observations

According to Dalton's Atomic theory (1810) matter is made up of tiny particles. Whether matter exists in solid, liquid or gaseous state does not alter the basic assumption of Dalton's Atomic Theory. Hence we can assume that gases are made up of tiny particles. Since we cannot see these particles they must be extremely small. Such tiny particles of gases are called molecules. Our first model for understanding gas behaviour is that all gases consist of molecules which are too small to be seen.

Let us try to find out if the property of gases mentioned in observation 3, viz.,

i) Gases can be easily compressed so as to occupy a much smaller volume than they occupied initially;and

ii) On decreasing the pressure on a gas it can occupy a much larger volume.

could be explained satisfactorily by this model. This compressibility and expansion of gases cannot be explained if we believe in the existence of molecules along without assigning some attributes to these molecules. Let us, therefore, propose models and test them for their validity.

Model 1; To explain observation (i) we may assume that the molecules themselves are rubber-like and highly compressible. Also to explain observation (ii) we may further assume that the reduction in pressure of gas results in the expansion of each of these molecules making them occupy a larger volume (Fig. 1-13)

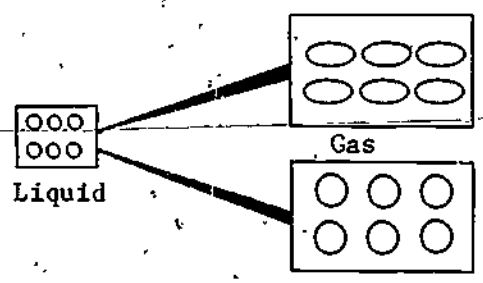


Fig. 1-13: A model for a gas.

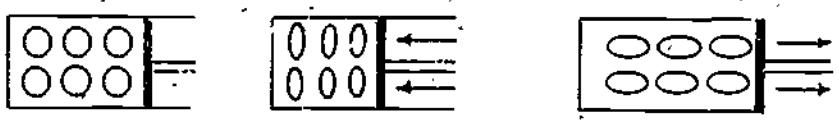


Fig. 1-14: A model for a gas.

From: Correspondence Lessons in Chemistry, NCERT, RCE Mysore

In this model able to explain the other observed behaviour of gases as, for example, the ease with which one gase diffuses into another?

Is this model able to explain the flow property of gases?

Experliment shows that when 1 ml of water is vaporized there is more than a thousandfold increase in its volume. If the change of state from liquid to gas has only resulted in the expansion of the individual molecules without any change in the inter-molecular space there should be no difference in the rates of diffusion in a gas and a liquid.

We can verify this by a simple experiment.

Release a drop of bromine on the surface of a tall jar containing water and watch the rate of diffusion of bromine. Compare this with the rate of diffusion of bromine vapour when a small drop of bromine is released at the bottom of a beaker (Fig. 1-15).

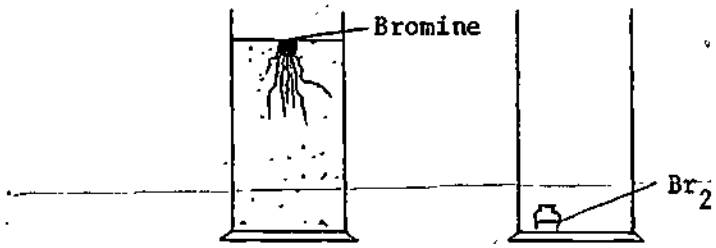


Fig. 1-15: Relative rates of diffusion in Liquids and gases.

If the molecules of a gas have expanded instead of dispersing, the rates of diffusion in a gas should not be very much different from that in liquids. Since this is not so, Model 1 does not seem to be correct.

Let us, therefore, consider Model 2.

Model 2: We may assume that there is a lot of empty space between the molecules in a gas and that the molecules of the gas separate and spread themselves out to occupy a larger volume.

Fig. 1-16: Another model for a gas.

Does this model help us to explain why gases can be compressed?

Exemplar Material from a Correspondence Lesson in Mathematics (Extract)*

Unit 3: Permutations and Combinations

1. There are seven types of toothpaste and every type is available in tubes of three sizes in a general store. How many different ways tooth-paste tubes can be chosen?

The above problem can be solved in following way.

Read the problem again and fill up blank places.

Ways of choosing type of toothpaste = _____

Ways of choosing size for each way of choosing type = _____

Ways of choosing size for 7 ways of choosing type = _____

Ways of choosing toothpaste tubes = _____

2. There are three sizes in a brand of toothpaste, in each size there are four kinds. How many ways toothpaste can be chosen?

Write complete solution:

Ways of choosing size = _____

Ways of choosing different types for each way of choosing a size = _____

Ways of choosing a size for 4 kinds = _____

Ways of choosing a toothpaste tube = _____

3. There are 5 Airlines and 4 ship companies operating between Bombay and Rome. You want to go to Rome from Bombay by Air and want to come back by ship. In how many different ways you can make a round trip?

Ways of choosing an Airline from Bombay to Rome = _____

Ways of choosing a ship from Rome to Bombay = _____

For each way of choosing an Airlines, number of ways of choosing a ship = _____

Ways of making a round trip = _____

From: Correspondence Lesson in Mathematics, NCERT, RCE Mysore

4. In step 1 choosing a type is one operation and choosing a size is another operation. Similarly, in step 2, choosing a size is an operation and choosing a kind is another operation. Also, in step 3, choosing an airline is one operation and choosing a ship company is another operation.

If first operation can be performed in "m" different ways and for each way of performing first operation the second operation can be performed in "n" different ways, in how many different ways the two operations can be performed together?

5. (a) 23 is a two digit number. Digit 2 is written at ten's place and digit 3 is written at unit place.

Can every digit be used at the ten's place in a two-digit number?

Yes/No

(b) In writing a two-digit number the first operation is writing a digit at ten's place.

What is the other operation?

6. In writing two-digit number:
First operation can be performed in_____ways. Second operation for each way of first operation can be performed in_____ways.
Ways of performing the two operations together =_____

If one operation can be performed in "m" different ways, and the other operation can be performed in "n" different ways for each way of performing the first operation, then the two operations together can be performed in "m" x "n" different ways. This is called "MULTIPLE-PRINCIPLE". (also known as the Fundamental Principle of counting).

b) Training of Teachers

Currently, the RCE, Mysore is working on such models and structures of Teacher Education at the Pre-service and the In-service levels as the following:

Pre-Service Courses

a) A 4-semester Master of Science Education (M.Sc.Ed.) course in Mathematics, Physics and Chemistry, incorporating post-graduate level content in the concerned subject integrated with relevant pedagogy. This is the first experiment of its kind in the country commenced from 1974-75 and many higher institutions in the country have since accorded academic recognition to this programme. This model prepares teachers to teach at the +2 and the +3 levels of education in the subjects in the broad pattern of 10+2+3 up to the first degree.

b) An 8-semester integrated Bachelor of Science Education (B.Sc.Ed.) course for preparing teachers in science and mathematics required for secondary schools.

c) An 8-semester integrated Bachelor of Arts Education (B.A.Ed.) course for preparing teachers of English required for secondary schools.

d) A 2-semester Bachelor of Education (B.Ed.) course with specialisation in Methods of Teaching Science, Mathematics, History, English, Work-Experience/Socially Useful Productive Work, required for secondary schools.

In-service Programmes

Along with the pre-service courses mentioned above, the College also organizes a number of in-service programmes designed to refresh and up-date the professional competence of serving teachers. The following are some of the important classified types of such programmes organized by the College as and when the needs emerge from the region.

a) Workshops, Seminars, Orientation Courses, Refresher Courses, to acquaint the working teachers with the latest trends in content, teaching methodology and evaluation in various school subjects.

b) Short term courses in Work Experience/Socially Useful Productive Work.

c) Summer School-cum-Correspondence Course (SSCC) leading to the B.Ed. degree, for serving teachers; course designed to clear the backlog of untrained teachers working in the schools of the southern region.

d) Correspondence-cum-Contact courses for secondary school teachers and elementary teacher educations to acquaint them with basic concepts of the new curriculum.

D. Mechanism and procedure for continuous evaluation and periodic renewal of instructional materials

This area is discussed in the following heads:

Pre-service courses

As has already been stated, each pre-service programme emerged from the analysis of the demands from the states in regard to preparation of teachers for various levels and indifferent subjects.

The B.Sc.Ed. courses have been evaluated with reference to their continuance or otherwise by Review Committees appointed by the NCERT from time to time. The terms of reference are provided by the NCERT. Broadly these include:

1. Trends in enrolment over the years;

2. Placement performance of the student teachers.

Instructional materials for in-service teachers

The Physics Resource Material has been evaluated through a research study which has validated it as an Advanced Curriculum of Learning Hierarchy in Cognitive Learning. This and other resource materials have received good commendation from teachers, student teachers and teacher educators.

The correspondence lessons were initially subjected to a try-out on selected group of teachers to ensure their applicability for the level for which they were written. These materials have now been in use for more than one year and are being revised for the second printing in terms of the following:

1. The authors of the lessons have given another look into their own work and based on their own insight, the lessons are being revised.

2. During the six-month period of correspondence instruction, the response sheets/assignments returned to the centre for evaluation provided a number of areas in each lesson where the teachers could not find the material easy for comprehension or even found relevant. Analysis of the kind of mistakes made by the teachers, the materials have been recast considerably.

3. The NCERT had sent the correspondence materials to some experts outside the organization for their comments and suggestions for improving the material. These have been received and the changes incorporated wherever acceptable.

E. Problems and issues

Some problems and issues related to the development of courses are as follows:

The B.Sc.Ed. and M.Sc.Ed. courses were started as innovative experiments on a pilot scale to study their academic viability and soundness. After the success of these programmes in teacher education, it was expected that other institutions will replicate these courses on a wider range. This has, however, not happened, perhaps because of the following:

1. There is a general resistance to change to anything new in educational experiments, most people liking to stick to status quo. Thus by and large, the one-year B.Ed. pattern continues with all its prevailing limitations.

2. The usual training colleges/colleges of education have on their faculty experts in psychology and education and methods masters but no subject specialists, who stand in the way of starting integrated courses in content and pedagogy.

3. The science colleges are the best places where this model could easily be introduced because it is far more easier to add the education faculty to these institutions rather than addition of science faculty in various branches and corresponding equipment and laboratories to the colleges of education mainly because of costs involved.

4. The subject specialists and the pedagogues do not come together easily and the two areas remain compartmentalized hindering improvement of teacher education programmes.

5. The RCE Mysore is affiliated to the University of Mysore and does not award its own degrees and has to follow the regulations of the University. This many times is a bottleneck in the experimentation.

6. The universities go by conventional labelling pattern for award of degrees. Any change in the nomenclature of the degree creates immediate problem of parity and stands in the way of employability of the products of the courses. In the case of the M.Sc.Ed. courses, the universities in the southern region did not accept the courses

as equivalent to M.Sc. courses in the concerned subjects of their universities. Doubts were raised that 20 per cent courses related to relevant education in these courses will not keep its parity; this was not appreciated that courses in mathematics education, physics education, chemical education enhanced the utility of the courses for those who were to take up teaching career or research in these subjects.

The B.Sc.Ed. experiment started in 1963 has now been equated to composite of B.Sc. + B.Ed. conventionally offered in universities. The M.Sc.Ed. experiment started in 1974 has also received recognition of many universities in the southern region and other institutions as equivalent to M.Sc. This has been possible mainly because of the following:

1. The college involved the faculty of the universities of the southern region to set question papers, assess the answer books in theory and conduct practical examinations. This afforded the external universities the opportunity to examine the courses from closer details and thus paved the way for making recommendations to the bodies of their universities.
2. The products of these programmes have given a very good account of themselves not only as teachers but also research workers. This is based on our placement records of the students.
3. Some universities are examining the idea of introducing relevant science education courses based on the M.Sc.Ed. experiment. The University Grants Commission is already examining the idea of science education centres in some selected universities to begin with.

Some of the problems related to the development of instructional materials, for example, correspondence education material, are as follows:

1. The faculty involved in the development of instructional materials is the same as those engaged in running the pre-service programmes and create a serious strain on them for this demanding work. The NCERT is considering the problem of work load of the staff to rationalize as much as possible the commitment to use the same faculty for both pre-service and in-service purposes.
2. The participants for whom the materials are to be designed have diverse backgrounds in subject competency, teaching experience and other abilities. This consequently raises a problem of finding a common ground on which the lessons could be developed.

   Some of the states of the southern region, as for example, Kerala and Tamil Nadu have revised their curricula to match with the correspondence package enrichment, others are on their way to updating their school curricula.
3. Different states of the region have diverse curriculum prescriptions and consequently there is a problem of motivating the teacher to learn those areas which are fundamental but which do not find any place in the curricula followed.

4. The communication is generally in a language which does not happen to be the medium of instruction in the school.

The materials are now being translated into Indian language to overcome the problems arising out of the materials being in English.

Some recent developments

The National Council of Teacher Education (NCTE) framework for teacher education draws its philosophical support from the concept of education as an instrument of social change and teacher as an agent of social change. While the framework suggests guidelines for organizing teacher education in India, it also provides for flexibility within the accepted principles, in the form of multiple teacher education modules catering to the peculiar needs of different communities and regions. Courses for this have been worked out primarily keeping in mind the principle of functionality towards the development of competence and skills of the teaching profession. Of particular importance are the following:

a) The new concept of the core curriculum which is largely determined from the point of view of its relevance to the task-oriented teacher education;

b) Increased weightage of working in the community; and

c) Organization of both the core and content-cum-methodology and practice teaching in special training programme packages.

Instructional materials based on the recommendations of the NCTE are under preparation for the core courses and are being designed by the NCERT.

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APPENDIX I

COURSES INCLUDED IN THE 4-SEMESTER M.Sc.Ed. INTEGRATED CURRICULUM IN SCIENCE/MATHEMATICS EDUCATION

(A) M.Sc.Ed. Mathematics

First Semester

Algebra-I
Analysis-I
Theory of Numbers
Mechanics
Science/Mathematics Education-I

Second Semester

Algebra-II
Analysis-II
Probability
Theory of Differential Equations-I
Science/Mathematics Education-II

Third Semester

General Topology
Analysis-III
Statistics
Theory of Differential Equations-II
Problems of Higher Education

Fourth Semester

Complex Analysis
Analysis-IV: Functional Analysis
Optional-I
Optional-II
Instructional Methodology

(B) M.Sc.Ed. Physics

First Semester

Mathematical Physics
Classical Mechanics
Classical Electrodynamics-I
Science/Mathematics Education-I
Practical-I (General)

Second Semester

Quantum Mechanics-I
Classical Electrodynamics-II
Electronics-I
Science/Mathematics Education-II
Practical-II (General)

Third Semester

Quantum Mechanics-II
Atomic and Molecular Physics and General Theory of Relativity
Electronics-II
Problems of Higher Education
Practical-III (Electronics-I)
Practical-IV (Electronics-II)

Fourth Semester

Statistical Physics
Nuclear Physics
Solid State Physics
Instructional Methodology
Practical-V (Nuclear Physics)
Practical-VI (Solid State Physics)

(C) M.Sc.Ed. Chemistry

First Semester

States of Matter and Molecular Structure
Atomic Structure and Chemical Bonding
Theoretical Organic Chemistry-I
Practical Physical Chemistry-I
Practical Inorganic Chemistry-I
Practical Organic Chemistry-I
Science/Mathematics Education-I

APPENDIX II

COURSES INCLUDED IN THE 8-SEMESTER B.Sc.Ed. INTEGRATED CURRICULUM IN SCIENCE EDUCATION

a) General Education

1. English (Semesters 1 to 4)
2. Regional Languages (Semesters 1 to 4)
   (Hindi, Urdu, Sanskrit, Kannada, Telugu, Tamil, Malayalam)
3. Social Science (Semesters 1 and 2)

b) Science Subjects (Semesters 1 to 8)

4. Mathematics — Any three combination such as Mathematics,
5. Physics — Physics, Chemistry or Chemistry, Botany,
6. Chemistry — Zoology
7. Botany
8. Zoology

c) Work-Experience Orientation

9. Workshop Practice (Semesters 1 to 4)
10. Applied Science (Semesters 5 to 8)

d) Education

11. General Psychology (Semesters 3, 4)
12. Philosophical Foundations of Education (Semester 5)
13. Educational Psychology (Semesters 5, 6)
14. Methodology Subjects (Semesters 5 to 7)
15. Sociological Foundations of Education (Semester 6)
16. Health and Physical Education (Semester 7)
17. Guidance and Counselling (Semester 7)
18. Internship (Semester 7)
19. Curriculum Development (Semester 8)
20. School Administration (Semester 8)
21. Problems of Education (Semester 8)

APPENDIX III

COURSES INCLUDED IN THE 2-SEMESTER B.Ed. CURRICULUM IN TEACHER EDUCATION

(A) B.Ed. Secondary

First Semester

Philosophical Foundations of Education
Educational Psychology (General)
Educational Measurement and Evaluation
Methods of Teaching-I (a)
Methods of Teaching-II (a)
Practice Teaching-I
Practice Teaching-II

Second Semester

Sociological Foundations of Education
Educational Psychology (Child development)
Trends and problems in Education
School Organization
Principles and Practices of Guidance
Methods of Teaching-I (b)
Methods of Teaching-II (b)
Health and Physical Education
Work Experience

(B) B.Ed. Elementary

First Semester

Principles and problems of Elementary Education
Educational Psychology
Teaching Methods-1
Teaching Methods-2
Craft/Work Experience-I
Art, Music, Recreational and Cultural Activities
Internship (Practice of Education which includes practice teaching, organization and participation in curricula activities and community service and living)

Second Semester

Elementary Teacher Education
School Administration
Child Psychology
General Methods of Teaching
Craft/Work Experience-II
Art, Music, Recreational and Cultural Activities

APPENDIX IV

INSTRUCTIONAL MATERIALS PUBLISHED BY THE CENTRE

A. Resource Materials

Physics

1. Prasad, S.N. Ed. and Physics Staff of RCEM: "Physics Resource Material: Vol. 1: Mechanics"
2. Prasad, S.N. Ed. and Physics Staff of RCEM: "Physics Resource Material: Vol. II: Heat, Optics and Waves"
3. Prasad, S.N. Ed. and Physics Staff of RCEM: "Objective Based Test Items in Physics"
4. Dave, P.N.: "An Experimental Project in Physics for the Validation of an Advanced Curriculum Model of Cognitive Learning-Hierarchy in Cognitive Learning"

Chemistry

5. Tantry, K.N. and Janardan, A.S.: "Instructional Material in Chemistry"
6. Tantry, K.N., Sharma A.K., Janardan, A.S., Kesavan V. and Singh B.N.: "Lesson Plans in Chemistry"
7. Janardan, A.S., Tantry, K.N., Kesavan, V., Setty, N.K.S. and Basavaiah, K.: "Objective Based Teaching and Testing in Chemistry"
8. Tantry, K.N., Janardan, A.S. and Kesavan, V.: "Objective Based Teaching and Testing in Chemistry" (In press)
9. Hopper, W.A.F. et al: "Sample Instructional and Evaluation Material in Physics, Chemistry, Mathematics, Biology and Commerce for Pre-University Courses"

B. Correspondence Lessons

Mathematics*

Unit I: Linear Programming

Lesson 1	Graphical Representation of Linear Equations and Inequations in two Variables and the Graphical Method of Solving a Linear Programming Problem
Lesson 2	Application to Transportation Problem
Lesson 3	Non-existence and Multiplicity of Solutions of a Linear Programming Problem

* Materials developed under the Chairmanship of Dr. A.A. Kayande, Professor of Mathematics, Regional College of Education, Mysore 570 006

Unit II: Matrices

Lesson 1 Information Matrix
Lesson 2 Matrix Operations
Lesson 3 Rules of Matrix Operations and their Interpretations
Lesson 4 Application to the Study of:
i) Systems of Linear Equations
ii) Transformation Geometry

Unit III: Permutations and Combinations

Unit IV: Probability

Unit V: Statistics

Lesson - General Introduction to the Unit of Statistics
Lesson 1 Collection and Classification of Data
Lesson 2 Diagrammatic Representation
Lesson 3 Measures of Central Tendency
Lesson 4 Dispersion

Unit VI: Sets, Relations and Functions

Lesson 1 Sets
Lesson 2 Operations on Sets
Lesson 3 Venn Diagrams
Lesson 4 Cartesian Products, Relations and Graphy
Lesson 5 Functions

Unit VII: General Enrichment, Geometry

Lesson 1 Parallelism
Lesson 2 Similarity
Lesson 3 Congruency
Lesson 4 Circle
Lesson 5 Mensuration

Unit VIII: General Enrichment: Nature of Mathematics

Lesson 1 Axiomatic Method
Lesson 2 Language and Mathematics
Lesson 3 Problem Solving
Lesson 4 The Exact and the Approximate

Science I: Physical Sciences

(Materials developed under the Chairmanship of Dr. A.K. Sharma, Professor of Science (Chemistry), Regional College of Education, Mysore 570 006)

Part I - Physics

Lesson 1 The Universe
Lesson 2 The Solar System
Lesson 3 Conservation of Momentum
Lesson 4 Simple Machines
Lesson 5 Inverse Square Law
Lesson 6 Heat Engines
Lesson 7 Meteorology
Lesson 8 Wave Phenomena and Sound

Lesson 9	Ultrasonics
Lesson 10	Lenses
Lesson 11	Electrostatics
Lesson 12	Fields
Lesson 13	Potential
Lesson 14	Magnetostatics
Lesson 15	Capacitance
Lesson 16	Principles of Radio Transmission and Reception
Lesson 17	Photoelectric Effect

Part II - Chemistry

Lesson 1	Kinetic Theory: Development of a Model for Gases
Lesson 2	The Concept of Mole
Lesson 3	Developing Models of the Atom
Lesson 4	Electronic Configurations of Atoms, Atomic Properties and Periodicity
Lesson 5	Why and How Atoms Combine?
Lesson 6	Shapes and Polarities of Molecules
Lesson 7	Oxidation and Reduction
Lesson 8	Rates of Chemical Reactions
Lesson 9	Chemical Equilibrium
Lesson 10	Solutions and Electrolytic Dissociation
Lesson 11	A Survey of the Descriptive Chemistry of Elements
Lesson 12	Introduction to Organic Chemistry: Nomenclature and Functional Groups
Lesson 13	Basic Ideas of Nuclear Chemistry

REPUBLIC OF KOREA: USING CRITICAL INCIDENTS FOR THE IDENTIFICATION OF TEACHER COMPETENCY IN THE DEVELOPMENT OF TEACHER EDUCATION MODULE

by

Hong Kyoo Byun

Background and objectives of the programme

It was in 1974 when a competency-based teacher education programme was first set up at the College of Education, Jeonbug National University. This was initiated for in-service teachers in the secondary school of Jeonbug Province in Korea in order to train them to be catalytic Saemaul leaders at their school and community. This training method is now opened to use for all teacher education programmes of the university. Through five years of experience, the new method has revealed many characteristic features with its tremendous advantages and effectiveness. But it is being undertaken without having solved several problems related to it. One of the serious problems is the lack of knowledge and skills of teachers in terms of generating competencies and of integrating them into a modularized instruction.

In order to overcome this problem, the university has been trying to apply a new technique since 1977. It is a method to generate competencies through the analysis of critical cases. Since the competency-based teacher emphasizes observable outcomes or outputs rather than inputs by specifying its clear goals and objectives in advance and by requesting students' learning outcomes to reach that level, it is being welcomed by most in-service teachers in the university and accepted as a reliable approach to appraising teachers' behaviour and also as an illustration of instructional accountability. But in the process of preparing prescriptive competencies, the teachers have difficulty and even tend to hesitate to accept the programme.

The objectives of this programme are as follows:

1. To train teachers to be able to interpret or translate critical incidents objectively and precisely into observable behaviours;
2. To train teachers to be able to identify, analyse and generalize specific competencies needed by the teachers in their major areas and in a given course of study;
3. To train teachers to be able to identify a level of proficiency of teachers and students in the generalized competencies;
4. To train teachers to organize the generalized competencies in units and modules for the efficient individualized instruction; and
5. To train teachers to be able to evaluate student outcomes or behaviours in relation to prescribed criteria, the competencies.

Critical incident technique: methods to identify the elements of training programme

The assessment of competencies to teach is usually conducted by two conflicting views: the judgemental and operational. The judgemental view, as a more traditional one, tries to judge most valuable and appropriate teacher training activities by experienced teachers and teacher educators while the operational view emphasizes pre-specification, analysis and objectivity in identifying observable and behavioural criteria. But as far as the competency is understood as "ability to do", in contrast to the traditionally emphasized "ability to demonstrate knowledge", the operational definition seems to be more acceptable. The Jeonbug National University has decided to follow the process of operational definition of competencies because it can be a systematic method of identifying and collating objectives and clear performance behaviours.

There may be several ways to process the operational definition of teacher competencies in a given subject area. Some of the typical procedures are direct observation of professional personnel, questionnaires and personal interviews. The university has chosen to use the Critical Incident Technique because it is a technique which can identify observable human activities through incidents of which the respondents have experienced as critical cases in their professional career.

The university assumes that the teacher competency can effectively be determined through the analysis and generalization of critical incident which teachers have experienced. The Critical Incident Technique is being understood as a systematic means of obtaining objective information on the performance criteria necessary to complete a task and of facilitating operational definition of the teacher competencies. It can be a means to control and reduce errors made by judgemental errors because it can more objectively report on observable teacher behaviour. Also, another characteristic of critical incident technique is that it may apply other methods such as observation, interview, and discussion whenever necessary.

An incident is an observable human activity which is sufficiently completed in itself to permit inferences and predictions to be made about the person performing the act. To be 'critical', the incident must occur in a situation where the purpose of intent of the act seems fairly clear to the observer and its consequences are sufficiently definite so that there is little doubt concerning its effect.

From this explanation, it is suggested that the critical incident technique can contribute to the determination of precise direction of classroom behaviours and to the specification of instructional activities and also place educational evaluation on a more objective basis than what our traditional concepts of educational quality would permit.

Strategies to be used in designing the teacher training programme

This training programme of competency determination from the translation of critical incidents proceeds in six steps using mainly the questionnaire form. The first four were used to determine competency through the selection and translation of critical incidents gathered from all participants and synthesizing them into specific statements of competency. The final decision in this phase is subjected to a panel discussion among participants and professors of the university. The remaining two steps are for competency evaluation and for construction

of instructional module. A description of how each step proceed in this programme is as follows:

Step 1: Determining significant incidents

The teachers are asked to recall one or two effective and ineffective impressive incidents which have happened in teaching or performing a given subject matter or course of study. These incidents are written in narrative form. In this step, teachers are also asked to specify who is to complete the questions and under what conditions and to what extent the questions are to be answered.

Step 2: Specifying the incidents

In this step, the respondents are asked to specify the incidents they have recalled in the first step by pointing out and identifying the critical behaviour in the incidents. They are also requested to describe the antecedents leading up to and the consequences from the behaviour.

Step 3: Analyzing the incidents

The third step is conducted by the participants under the supervision of professors. Each effective or ineffective incident which is interpreted as critical behaviour is translated into behavioural statements. To do this, the teachers are asked to read each incident first and then to write a behavioural description in a positive expression which best represents the contextual meaning of the incident. This is a step to train teachers to be able to translate each narrative description into a behavioural statement which is descriptive of a given competency.

Step 4: Generalizing the competencies

In this fourth step, the competency identification is done by making final generalization of the competencies under a careful panel discussion among participants and professors. A special group is formed for this task by the participants and they discuss and complete a list of competencies for teaching a given subject matter or course of study. They also group categories and sub-categories of those competencies.

Step 5: Finding relative importance of each competency

After completing the competency identification by making categories and sub-categories, it is necessary to find the degree of importance of each competency. This task is conducted by using another questionnaire. From finding the degree of importance in each category, it is possible to make a systematically organized frame of instruction in a given course of study. The questionnaire in this step is usually made in the form of five-point Likerts' type scale.

Step 6: Making a complete module

This last step is not actually related to the competency identification process from critical incidents, but it is important for teachers because all previous steps are undertaken or integrated into this step. Using analyzed and generalized competencies, the teachers should be able to demonstrate to design a complete unit or module in his teaching subject. For this reason, this step is also required for all participants to master. The teachers usually proceed as follows for meeting this requirement:

1. Write instructional objectives of students based on generalized competencies;
2. Examine the expected levels of competencies students have to reach before enrolling in a course of instruction;
3. Set the viable length of time of their learning;
4. Determine the rate at which students will pass through the instructional experience;
5. Provide a functional feedback schedule for the learner;
6. Construct pre- and post-test items to evaluate students' progress.

Training of Teachers in competency-based programme

Since this kind of practical approach to identify competency was adopted in 1977 at the Jeonbug National University as a prior process to construct an effective module, the university has trained a total of 875 teachers: 403 in 1977 and 472 in 1978. They usually participated in one of two types of programmes: a course of in-service education for having advanced level of certification or another only for the sake of self-renewal education. The choice was arranged by the Provincial Board of Education under its in-service teacher education schedule for the year. Through two sessions of in-service teacher education during these years, teachers were mainly involved in the identification of their own competencies.

From the reports on teacher competencies generated by several different groups of teachers, the university has finalized around 55 competency skills so far. One interesting finding obtained from this process was that personality factors were most frequently indicated by the teachers, specially, the attitude and commitment of teachers on the matters related to teaching-learning and educational reform was consistently and strongly emphasized.

The university has attempted to make a preliminary set of major categories and sub-categories based on those skills. Four major categories and nine sub-categories were formulated. Teachers were asked to make a try-out of their instructional module in reference to these competency skills and to bring the problems they encountered to the next session for discussion and review. The categories are as follows:

1. Diagnosis and Evaluation (major category)
   a) diagnostic skills;
   b) evaluation skills.
2. Professional Technique (major category)
   a) knowledge skills;
   b) preparation skills;
   c) behavioural skills;
   d) instructional skills.
3. Inter-personal Relationship (major category)
   a) personality factors;
   b) communication skills.
4. Administrative (major category)
   a) administrative skills.

Problems encountered in using the programme

Even though the programme is opened to all departments and courses for adoption, it is a fact that only some departments and courses are accepting it. Teaching professional courses and some in chemistry, biology, and agricultural courses have been accepted. Especially, the Saemaul education courses which were provided for the enhancement of Saemaul spirits of diligence, self-help and co-operation are most actively applying this method because it is very appropriate to identify crucially needed competencies of those values. The teachers usually try to find those competencies by analzing demonstrated cases among participants.

There are reasons why all courses do not apply this approach. One crucial reason is that the college professors lack understanding of this way of competency-based teacher training and are writing for the evaluation of its achievements produced by other departments or courses.

Some problems in the practical application of this programme are also appearing. One of these serious problems is the process of data collecting and their analysis. To translate narrative descriptions of critical incidents into behavioural competencies requires somewhat long time and detailed procedures and should ask for solicitation of the professional help from professors. It is very difficult to arrange a panel discussion group with busy professors for the task.

Another problem as pointed out is the process of generalization of competencies from critical incidents. In spite of using a final panel discussion by the participants and professors, it cannot completely be free from the influence of subjective factors in the process. This is why it is not easy to take a complete consensus process for competency identification. An eclectic collection of competencies tends to be presented as the products of a consensus process and not to be a sound substitute for competencies. The fact that there are too many similar vocabularies in the Korean language often brings about arguments.

Evaluation mechanism and some innovative features revealed

The effectiveness of the programme cannot yet systematically be assessed because of its short duration since its initiation, but some periodical examinations are being done in several ways. The first step in the evaluation is actually timed with the schedule of the National and provincial assessment of student achievements in reference to expected criterion since the Government and Provincial Board of Education have their annual schedule to evaluate student achievements under the criterion-referenced system of evaluation. This evaluation is held not only for the assessment of student progress in a given subject but also for providing supplementary strategies to overcome difficulties in teaching-learning processes and techniques at the national and provincial levels. According to some results already out, it was reported that there are positive effects due to this programme.

For this competency-based programme using critical incidents itself, the evaluation procedure is based mainly on questionnaire method and case demonstration technique, but sometimes letters and other communication channels are also utilized. The most effective way is to use demonstration technique because this method calls for realistic problems and experiences with intensive discussion processes. The final evaluation process is done by the meeting of teacher educators.

Comparing with other traditional methods, this training method has several innovative features. One finding is that this programme stimulates the growth of professional attitude and belief in teachers who have participated in the programme because the training process is first based on factual data and the realities of classroom teaching or community services are directly connected with their improvements, and give encouragement to the teachers from their accomplishments.

It is also recognized that this programme can contribute to the increase of curriculum integration more than any other. Instead of discrete courses in most conventional teacher education programmes, it is said to produce a high degree of relationship among learning activities provided for students. It is more oriented toward goals of an action or reality nature, rather than of a knowledge nature. The reports indicate that this approach also tends to foster teachers to be integrated persons.

The third innovative point is that it makes rethinking of completion or certification standards and procedures in in-service education programme and in recommendation of advanced level of certification. Not like those standards that encourage more formal education on the part of teachers, it designs its way from the point of more demanding standards.

The programme also shows its effect on the teacher educators themselves. To a considerable degree, it is an in-service growth experience. Instructors in this competency-based teacher education have found it necessary to develop many new competencies - such as translating and generalizing critical incidents into behavioural competencies, writing objectives based on these competencies, development of sequencing strategies, and goal-referenced evaluation techniques as well as skills in working as team members and in evaluating more objectively and scientifically than ever before. But since these requirements are accompanied by various abilities and efforts, teacher educators in the college tend to hesitate in accepting this programme.

Concluding remarks

Since the teacher training method to identify competencies by using critical incidents was adopted only in 1977 at the Jeonbug National University for the development of an efficient instructional module, it is still in its very early stage and so it is too early to conclude on its effectiveness or usability. But the university is being assured, from its several welcoming symptoms, that the competencies can be effectively identified by using critical incident techniques.

When particular importance is given to its clearly providing the direction for a complete module design consisting of competencies, it is valid to choose the method using critical incidents. Even though there is a serious difficulty in the analysis and generalization, the university feels that it can be overcome and that once a teacher is equipped with the competency to determine necessary competencies of a certain course, there will be no big trouble in dealing with successive situation.

The university is also sure that the teacher training method should be significantly improved by redesigning programmes to focus on the new principles and practices espoused by the competency-based design in relation to critical incidents analysis.

NEPAL: EXPERIENCES IN PREPARING TEACHERS FOR RURAL DEVELOPMENT

by

Aman Bahadur Shrestha

Introduction

Situated in the heart of Asia, Nepal is a land locked country. Out of 145,391 sq. K.M. (the total land area of the kingdom of Nepal) 111,244 sq. K.M. is Terai - the plain land. Thus, the mountains and hills cover 76.5 per cent of Nepal's total area. Only 13.6 per cent of the total area has been cultivated. About 71 per cent of the cultivated land lies in the Terai and Inner Terai Regions.

According to census of 1971, 62.39 per cent of the total population live on hills and mountains. The rest 37.61 per cent (i.e. 4,345,966 persons out of 11,555,983 persons) live in Terai.

Outer as well as internal migratory movements of population have recently taken place. Because of shortage of cultivated land and job opportunity, thousands of young Nepalese have joined the allied armies.

The internal movement has been mostly vertical one i.e. from mountains to hills and from hills to Terai. The Terai Region has gained between 1961-71 about 672,500 persons due to migration. The internal migration has been for search of cultivated land rather than for urban areas. The proportion of cultivated area in mountains, hills and Terai cover 4.9 per cent, 30.3 per cent and 64.8 per cent respectively. As the result of the downward migratory population movement, there is increasing stress on the density of cultivated land of Terai.

The main economic resources of Nepal have been agriculture and agricultural products. Agriculture alone counts 66.5 per cent of Nepal's GDP. The cottage industry occupies the second place. Mineral deposits have been suspected at several places. But these resources have not yet been suspected at several places and these resources have not yet been fully explored.

The census of 1971 shows 96.0 per cent of the total population live in villages. Only 4.0 per cent live in urban areas. The rural-urban distribution of the population since 1971 census remained nearly constant.

As two third of the total population have lived upon one third of the cultivated land, there is continued attempt to extend the cultivated land. The green forests of the hills are continuously destroyed resulting in land slides and depletion of water resource. There is a need for developing and strengthening hill economy and generating employment opportunities in non-agricultural sectors.

The labour engaged in agriculture is not fully utilized. A big portion of rural people (about 40 per cent of the rural households) live below poverty line. There is need of increasing labour productivity and improving the standard of living of the rural people.

With the expansion of transportation, communications and education in some parts of the country, the people are getting more conscious and their level of aspiration and expectation are on gradual rise. But a large portion of the rural population still experiences their basic needs not fully satisfied. They need clean drinking water, education and health services and transportation facilities. Hard attempts at different levels and sectors are needed to satisfy these growing needs of the people of Nepal.

Planning for rural development

A series of economic plans have been launched for the development of the country. The Fifth Plan (1975-1980) has given special priority to the agriculture sector for increasing production. For this, the irrigation facilities have been expanded, and minimum transport facilities in hills and remote areas are to be provided. Besides, the plan puts special emphasis on the production of agriculture tools and machinery, and the development of agro-based industries. Social services have been received special importance in the Fifth Plan. Twenty-five per cent of the total resource in the public sector have been allocated for social services. And forty per cent of the total allotment for social services has been proposed for education. Primary education is to be free from the first year of the Fifth Plan. Provision is to be made to establish one-teacher schools within walking distance in the sparsely populated rural areas. More facilities for training female teachers, and low and middle level technicians in agriculture, forestry and medicine will be provided.

The national education system plan (1971-76)

Among the different social services provided in the Fifth Plan, major emphasis and priority is rightly given to education. Any development programme is not effective till the people respond to it positively. Experience of implementing many development projects have confirmed this. So, education needs to be geared to national goals.

The indigenous and traditional system of education was more geared for spiritual knowledge and academic excellence than for national development. So, a new system of education was required for the development of the country.

The National Education System Plan (NESP) brought an overall change in the structure and purpose of education. Within the guiding principle of Panchayat Democracy, the plan envisages to establish a just, dynamic and egalitarian society through reformation and change in the educational system of the country. It endeavours to counteract the elitist bias in education and tries to link it more effectively to the productive enterprises and egalitarian principles.

Teacher education programmes for rural development

Education, as a matter of fact, cannot function in a social isolation, similarly teacher education cannot exist apart from the school education system. Teacher education along with education in general must respond to the changing needs and goals of the society, and adjust itself to the national, social focus and emphasis.

Teacher education in Nepal, however, seems to be slow to respond to the new social and national needs and demands. There is not a teacher education programme specifically geared to rural development goals and objectives. Certain adjustments in curriculum organization of a few teacher education programmes have, no doubt, been made to incorporated some elements with rural bias and relevance. But major change(s) in curriculum planning for rural development is still being waited for.

There are, however, agencies directly involved in the rural development programmes and projects, which seem to be gradually coming up to fill up this gap between the rural development needs and teacher education programmes. As social awareness and willingness of the people to participate in the national development activities is necessary for successful implementation of any plan and programme, these agencies have developed different educational programmes including preparing para-educational personnel. It would, therefore, be injustice not to mention these programmes while discussing teacher education for rural development.

The Institute of Education (Tribhuwan University) is responsible for training teachers to teach in the formal schools. However, there is a need of preparing teachers to take care of non-formal education programmes such as Functional Adult Literacy, Education for Out-of-School Youths and Equal Opportunity of Girls and Women to Education programmes. Agencies such as Integrated Hill Development Project (Ministry of Agriculture) and Women Training Centre (Ministry of Home and Panchayat) have been involved in training teachers and para-professional personnel for carrying out non-formal education programmes in rural development.

Regular teacher education programmes in rural development

The Institute of Education (IOE) has been conducting many different teacher education programmes. All of these programmes do not have rural relevance. Some of these programmes such as One Year and Two Year Teacher Training Programmes for preparing teachers in science and liberal art subjects do not have any rural orientation in their curriculum design and instructional strategy. These programmes are geared to the need of teachers in specialized academic subjects such as science, maths and language. However, some other teacher education programmes have a definite rural bias and relevance. Only the teacher education programmes with some amount of rural bias are described here.

1. Prevocational and vocational teacher education programme

In 1966 National Vocational Training Centre was established to train the Multipurpose High School teachers and also to upgrade the vocational-technical skills of the rural people. The NESP (1971-76) made prevocational and vocational subjects compulsory in lower secondary and secondary schools respectively. Subsequently, the National Vocational Training Centre was merged into Institute of Education and declared as a Vocational Teacher Education Campus.

At present, this campus prepares two types of teachers pre-vocational and vocational. Both of these teacher education programmes have rural bias and orientation in their curriculum planning and pupil enrolment. The curriculum has been more relevance and significance to rural situation and development.

2. "B" Level teacher Training Programme

The minimum qualification requirement for primary teacher is S.L.C. (School Leaving Certificate) plus one year training. But it is hard to get teachers with this qualification in the remote rural areas of Nepal. There are about 6794 primary* teacher serving different parts of the country without S.L.C. Supplying trained teachers in these remote hilly areas would remain a distant possibility, if this requirement were not relaxed. So, the draft report of Teacher Education Workshop (1970) proposed 'B' Level Teacher Education Programme for the remote hilly areas. This is a primary teacher training programme meant for VIII grade passed trainees from rural teacher schools of Nepal.

3. Equal Access of Women to Education - Teacher Training Programme

As only 5 per cent of women are literate and there is very low participation of women in teaching profession, a special teacher training programme is being conducted for women with the assistance of UNICEF. There are three levels of this women teacher training programme.

a) Upgrading programme: There are certain parts where it is difficult to get 8th grade passed women/girls for teacher training, so, women/girls with less than 8th grade qualification are picked up from such areas and enrolled in schools for upgrading their general education level.

Upon completion of 8th grade, these women/girls are given B level Teacher Training and employed as primary Teachers preferably in their own home area.

b) 'B' Level Women Teacher Training Programme: This has been described in 'B' Level Teacher Training Programme above.

c) 'A' Level Women Teacher Training Programme: This is a one-year teacher training programme meant for S.L.C. passed trainees. But this training programme has now been discontinued since last year (1977).

d) National Development Service: Every student preparing for masters degree in Tribhuvan University is required to complete one year National Development Services. These NDS students are deputed to rural areas for compulsory services. They mostly serve as teachers in rural schools. So, prior to deputing them to the schools they are given orientation to rural needs of education for development.

But there are many agencies involved in rural development projects. These agencies too run training programmes to prepare personnel for educational and other purpose. These training programmes have important bearing on teacher education for rural development. So, some of these training programmes are mentioned below.

A. Lahachok project

To develop and find out a model of Education for Rural Development an experimental project was conducted at Lahachok Village Panchayat in the District of Kaski.

*Need of Primary Teacher Training in Nepal: Planning Division IOE.

A socio-economic and educational survey was done to identify the community needs. The survey data revealed that most of the village adults were illiterate. The parents often restrained their children from going to schools. Most of the adults and out-of-school youths wasted their time idly when they did not have work in the farm. The village was very dirty. There was no public nor private latrines and kitchen gardening around the school was made for demonstration purposes. Documentary films on family planning and on causes of different diseases were shown. Posters on balanced diet were pasted at different places of the village.

As many villagers were not willing to participate in these programmes, a door to door campaign, with the help of the local leaders had to be carried.

The village school teachers and local leaders were involved in developing as well as implementing the community development programmes. The local teachers were oriented to the community needs and strategies to be adopted.

The project evaluation report has not yet come out.

B. Women Training Centre

Established in 1956 (2013), the Women Training Centre has been running under Ministry of Home and Panchayat since 1970. At present, there are four such centres located at four development regions.

The above training centres are involved in preparing Village Volunteers, Village Women Workers, Panchayat workers, project supervisors and so on. These centres also run women literacy classes and skill upgrading programmes.

C. Integrated Hill Development Project (IHDP)

This rural development project was designed in collaboration with Swiss Association for Technical Assistance (SATA) for the overall development of an area/district. Educational improvement of the project area people has become an integral part of this project.

Educational activities of this project cover formal as well as non-formal programmes. These educational programmes include:

i) Scholarship for teacher training
ii) School building improvement
iii) Functional Adult Literacy Programme
iv) Functional Adult Literacy Instructor Training Programme

Developing Teacher Education Curriculum for Rural Development

Curriculum is the major input in any educational programme. Desired behavioural output, the goal of education, is not possible without efficient curriculum planning.

Formal Curriculum Development Strategy and Process

The formal and non-formal types of teacher education programmes, as mentioned above, adopt different strategy and process of curriculum development. The Institute of Education, besides teacher education programme/s for rural development, runs many other types of teacher

education programmes. All these different types of teacher education programmes, however, have a common purpose or goal i.e. preparing competent teacher/s. So certain core elements enter into all teacher education curriculum planning and programming. Additional components/ elements are incorporated into the curriculum programme to achieve a new objective or an added behavioural output. So, methodologically this can be considered as a strategy of accommodation and adoption. The formal teacher education has often adopted this process of assimilating new dimension/s in teacher education. The teacher education curriculum of Institute of Education illustrates this process. Many new areas of vocational and non-vocation specialization are fitted in with the general framework of IOE curriculum organization. Attempts are being made to incorporate the new course entitled as Community Development in its revised curriculum of the primary teacher training programmes. Some such attempt would probably be soon made in other levels of teacher educat onal programmes too.

The above attempts in curriculum designing and organization should probably be considered as a multi-dimensional approach to teacher education. Such teacher education curricula try to combine diverse objectives into one curriculum package, and a teacher trainee who has gone through this package of curriculum offering is expected to develop multi-capabilities. Such a trainee should be able to teach in all situations and settings - urban or rural.

In regard to organizational strategy, the IOE and other institutes of Tribhuvan University (TU) try to involve as many persons and agencies in the process of curriculum design and development as possible. There is organization hierachy and mechanism of interaction relationship among the different organs involved in curriculum development. The curriculum development of IOE and other institutes of Tribhuvan University goes through the following process.

The National Education Committee formulates educational policy and issues directives and guidelines for curriculum, and programme designing and development. Each institute under T.U. has Faculty Board which, within the framework of national policy, determines the academic policy of the concerning institute. This Board has broad base representation. The IOE Faculty Board, for example, is represented by Ministry of Education Officers, Tribhuvan University representations, School headmasters, subject specialists and so on. The Dean of the Institute of Education is the ex-officio chairman of this Board. Usually the Faculty Board forms a Standing Committee to take care of the urgent academic problems of the institute.

However, the main body concerned with developing the curriculum/ course details of the different areas of study is done by the subject Committee/s.

The subject committee/s, within the framework provided by the faculty board, determines the number, and nature of the course to be offered in each subject area, the method/strategy to be used in teaching the course and evaluation technique/s to be adopted and so on.

As it is the core body of subject specialists and curriculum specialists, the subject committee plays the most crucial role in the development of the institute curricula, it also plays important role in determining the scope and size of the curriculum and the direction it should pursue. Resistance to change is mostly felt at this point. So,

if a major change in the curriculum planning and programming is desired for, close attention needs be paid to thecomposition of subject committee or committees and their modes of operation. At present there are eleven subject committees of Institute of Education.

As a matter of fact, the decision of the subject committee/s is not final. The Faculty Board has every right to change, modify or refer back curriculum/course framed by the subject committee partly or as a whole. But in practice, major change in the curriculum is seldom brought out in the Faculty Board.

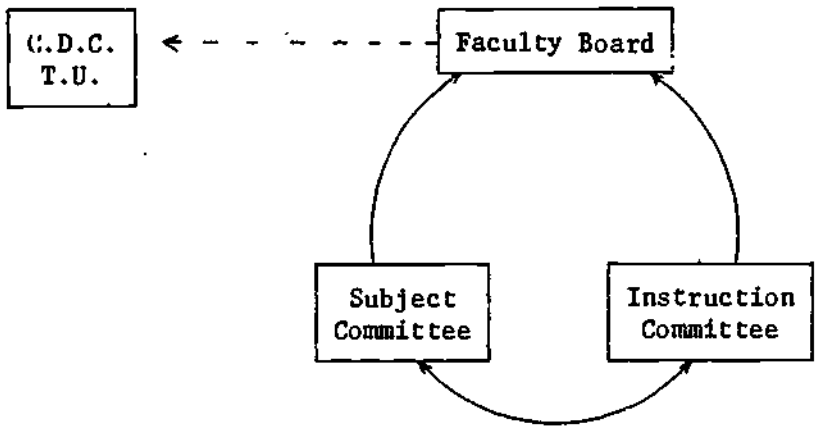
However, the Instruction Committee/s, the committee of teachers in different campuses - can play a very strategic role in the formulation and implementation of curriculum. It can show reluctancy in implementing the curriculum or try to bring changes by supplying feedback informations to the subject committee/s. There is, no doubt, provision for the feedback information to flow from the Instruction Committee/s to the subject committees and from Subject Committee to Instruction Committee.

The role of Curriculum Development Centre (CDC), TU has not been very clear in the curriculum development of different institutes under Tribhuvan University. Till recent back CDC, the central organ of curriculum development, has just been playing a spectator's role or at most the role of clearing house. However, it seems now to be claiming for its rightful place and role in determining and developing TU curriculum. It has succeeded to declare a few courses as compulsory courses of all institutes under TU, and taken up all the responsibility of framing these courses.

The present organizational structure of curriculum development stands as follows.

IOE curriculum development process

A feedback information model



In short, the formal curriculum development process is more influenced by a rational approach to producing a so-called good teacher more grounded in content and pedagogy than by an objective down-to-earth approach to meeting the needs of rural development.

Non-formal curriculum development strategy and process

There are many different agencies in preparing para-educational personnel and para-professionals. Regarding the development of the training curriculum, these agencies seem to be more concerned with finding out the specific information-activity package needed to be delivered to the rural people for change than developing a teacher education curriculum model. So, to frame out curriculum for their personnel training, these agencies actually start with a detailed survey of the project area to identify the socio-economic and other needs of the clientele. This survey leads them to determine the objectives of the teacher or para-educational personnel training curriculum package.

The Lahachoke project, for example, carried at the very start, a socio economic survey of the experimental project area. Similarly, the Women Training Centre and IHDP too carry out such a survey whenever/wherever it is considered essential. The training for teachers and para-professionals is undertaken to enable them to deliver information/s about health and other areas in which the clientele need help and services. The training curriculum, therefore, often has a very extensive coverage. The trainees, in a way, are made a "jack of all trades, but master of none". Consequently there is less flexibility in job opportunity. So, methodologically this should be considered as a functional approach to curriculum development strategy. The above non-formal teacher trainees and para-professionals work with narrower scope and limited opportunity for professional flexibility or change of job.

It is probably, to correct this deficiency in the present mode of preparing para-professionals that the Lahachoke project as well as IHDP tried to use the school teachers in their information and skill delivery system. The training of these in-service teachers often consists of pieces of informations with supporting activities, and methods of deliverying them to the clientele are integrated together into one core curriculum component. This is, no doubt, a new approach to curriculum development strategy. The IHDP is said to be using this strategy.

As regards organizational strategy, the non-formal teacher education agencies never want to be involved in theoritical discussions and academic exercises for developing curriculum. They mostly depend upon Task Force/Ad hoc committee of curriculum experts and teacher educators. They do not have permanent committee or curriculum board. Many times, the curriculum is developed and implemented by the same person or persons. For example, the Women Training Centre instructors themselves develop individual subject area curriculum and implement it in the classroom. There is no separate committee for developing curriculum. But most often, no doubt, the curriculum framed by the instructors are presented to the staff meeting for general reactions. But exceptions are not uncommon.

IOE too often uses this Task Force strategy in developing and revising the B level Primary Teacher Education Curriculum. It is as mentioned above, a non-credit teacher training package developed for

teachers from rural population. Its curriculum was developed anew just two years back by a committee of curriculum experts. This year again the teacher educators and curriculum experts sat down to examine the existing curriculum in the present context and brought necessary changes in it. This B Level Curriculum Workshop tried to integrate subject content with methods of teaching and evaluation strategy. The workshop also recommended to incorporate some new course such as home economic, and community development etc., which have direct bearing upon rural development, as additional compulsory course of the teacher training curriculum package.

Identifying core curriculum elements

Teacher education aims at developing in the teacher, competencies so as to bring changes in the pupil as reflected in the national goals of education. The NESP (1971-76) lays down the objectives of different levels of school education as follows:

Level	Goal
1. Primary	- To impart literacy
2. Lower Secondary	- Character building
3. Secondary	- To create useful citizens.

The aims and objectives of school education have direct bearing on teacher education curriculum planning. As teacher education aims at producing competent teachers to bring desired changes in the pupil, the teacher education curriculum must include content - knowledge, skill and attitude, the method of bringing this change effectively and the techniques of knowing if the desired change has been achieved. So, the elements of core curriculum of teacher education often consists of content knowledge, methodology of teaching and evaluation.

However, as the teacher in the rural area occupies a strategic position in the community development he/she is often expected to play an additional role/s. The rural teachers is expected to play an additional role/s. The rural teacher is expected to help bringing cognitive and attitudinal changes in the rural people and thus facilitate the process of rural development. It is for this reason that teacher education for rural development has recently received special focus and emphasis.

But if the rural teacher is to work and play a different role and responsibilities, the existing teacher education curriculum - more traditional and urban biased - is not considered to serve the new purpose and objective. The present curriculum content, method of teaching and technique of pupil evaluating etc. are not considered fit for rural situation and rural needs. So, there have been some attempts in this country to bring changes in the curriculum design of teacher education. The non-formal teacher education agencies seem to take the lead in this respect. The IHDP is said to have developed an integrated curriculum of teacher training for adult literacy. The new curriculum is said to integrate content, method and evaluation into one integrated curriculum package. This innovative approach to curriculum development for teacher education has not been published. Similar attempts have, no doubt, been made in IOE, while developing new curriculum for B Level Primary Teachers Education.

Attempts have also been made to develop a scientific method of identifying teacher competencies for developing teacher education core curriculum. A research project titled as Development of Field Oriented Sequence - An Action Research project was carried by IOE in 1974. This research project came out with a set of competencies listed as knowledge, skills and attitudes for primary school teachers. These competencies were then organized into nine different courses given below:

1. Teaching Resources;
2. Teaching Techniques;
3. Evaluation Techniques;
4. Group Techniques;
5. Construction and use of Instructional Materials;
6. Community Relation and School Welfare;
7. Extra - Curricular Activities;
8. Lesson Planning; and
9. Practice Teaching.

The above courses covered most of the then existing core contents of the primary teacher education curriculum. However, it introduced some new content concerning community relation, school welfare and extra-curricular activities.

The above is the only research project carried out to identify the core course for teacher education. There is, no doubt, need to identify teacher competencies in prevocational and vocational areas too.

The Lahachoke Experimental Project mobilized school teachers to take active roles in education for rural development. It also linked school activities to community needs and overall development efforts. The teacher training component of this project focused more on developing understanding problems and needs of the community, developing vocational skills, and techniques of changing attitudes and interests of the rural people and so on. The Women Training Centre, and NDS training too seem to be working on the same line. These training centres have identified certain courses as core courses of teacher education for rural development. These include health education, nutrition, kitchen gardening, adult literacy and so on. Poor health, malnutrition, and illiteracy etc., are found to be the main problems of rural development. In view of this, teacher education for rural development should be addressed to illiteracy, malnutrition, ill health and so on.

So, although tradition, social value system etc. have played very important role in determining core elements of curriculum, yet more practical criteria seems to be gradually coming up for use. Traditionally education is considered to be for enlightenment and spiritual purpose. The teacher educators used to be spiritual head/ leaders. Although this religious and spiritual criteria of determining core curriculum is still, to some extent, used in certain type of education programme e.g. Sanskrit Education; yet this is no more a criteria of deciding teacher education curriculum. however, there are still some people who believe that education is just for enlightenment and pure knowledge. Attempts to develop core curriculum on the basis of knowledge as the major criteria is still being made. Inspite of the fact that NESP (1971-76) puts major emphasis on vocational education and preparation for manpower requirement for national development, the Humanity and Social Science curriculum is not free from traditional bias. The teacher education curriculum is, no doubt, not based upon subject matter knowlege

alone. It includes child study, techniques of teaching and student evaluation etc. as its core elements. However, the formal teacher education programme/s cannot be said to be completely free from traditional bias. Traditionally general education, professional education and content specialization are the basic three components of formal teacher education curriculum. Emphasis on one or the other of these three basic elements has, no doubt, changed from time to time. But teacher education has not openly responded to the rural needs. Instead, attempts were made to adjust the curriculum of the rural biased teacher education programmes into the same general pattern. The prevocational and vocational teacher education curricula do not basically differ from that of general teacher education programme.

The non-formal teacher training programme, however, seems to have come up with a new criteria of deciding core curriculum. This type of teacher education programme base its curriculum on the problems and needs of the clientele. Elements considered relevant to achieve the educational goal of the programme are selected for core curriculum. Relevance and signif. nce are, therefore, the basic criteria of its curriculum determination. As mentioned above, community health, nutrition, forming, weaving, functional illiteracy are the main subjects inc'uded in the core curriculum of teacher training for rural development.

Translating curriculum into instructional materials

Effective implementation of curriculum depends largely upon instruction and other educational delivery system. However, development and use of teaching learning media other than classroom lecture have been very slow, although different organizational and methodological strategies have been adopted.

The main organization responsible for producing instructional materials in teacher education is considered to be Curriculum Development Centre T.U. CDC/TU used contract system of preparing learning materials. Writers/subjects experts willing to write textbooks and related materials are invited to make contract with CDC. This system, although seems to work well, could not, however, produce enough teaching-learning materials in teacher education.

The institutes and other agencies involved in teacher education are supposed to be the next concerned organization to produce necessary teaching learning materials in their concerned area/s. The Institute of Education, the parental organization of teacher education, has done some work in this respect, but not very significant. IOE hires or appoints, now and then, teacher educators or subject experts to write textbook and other learning materials. For examples, last year the IOE produced a complete package of self-learning materials for 'B' level teacher training. These materials are now being revised, and Teacher Guide for each course/book is being made ready for printing. Besides, IOE has been trying to encourage teacher educators to produce teaching-learning materials in the form of handouts,articles, working papers and so on.Such materials have now, no doubt, been produced in a larger number and have helped a lot in improving instruction and curriculum implementation. But so far nothing of much significance has been done specially in the area of teacher education for rural development.

The IOE organizes seminar-cum-workshops on unit planning and preparing other instructional materials. Such a workshop of 'B' level teacher educators was organized in July last at Kathmandu. A whole week of this one month long workshop was devoted to the orientation of the techniques of preparing classroom instructional materials.

Similarly, the Centre for Educational Research, Innovation and Development (CERID) has been organizing seminars and workshops on producing low cost materials for rural education. In September 1978, CERID organized three day long workshop on preparing low cost educational materials. Besides, CERID has produced some booklets on using local materials in science teaching, making bamboo works and so on. The National Development Service (NDS) office, has with assistance of Unesco, produced several booklets on different subjects of rural interest. But many of these materials are addressed to rural population rather than to rural teachers. Similarly, IHDP has been publishing news letters and notice boards specially geared to stimulate rural population for education and create proper educational environment.

In spite of all the above efforts no significant work on teacher education for rural development has so far been done. Probably a new strategy and method need be developed for preparing teaching-learning materials on education for rural development in general and teacher education in particular.

Some examplar instructional materials

There are, as mentioned above, quite a few materials produced on teacher education for rural development. The self-learning materials for primary teacher trainees produced by IOE was not considered so satisfactory. These are now being revised and improved. There is an attempt to gear these self-learning materials to the problems and needs of the rural population and also to put it on the line of programmed learning. Similarly, CERID is said to be at work to produce low cost educational materials for the use of rural teachers.

The NDS office has published a series of booklets on various subjects such as health and hygiene, farming, aforestation, nutrition and so on. However, there is some scope of doubt if all these reading materials are serving their purpose. For, one research study reports: "Educational materials are only rarely used in schools of Nepal..... The more sophisticated a piece of equipment is, the less probability there is that it will ever be used."*

To be useful and meaningful, the reading materials need, no doubt, be written in the rural people's language pattern, on the topics of their interest and in the form they can understand and pay attention to. Under this consideration, illustration of one learning material --- a news bulletin titled SAGHAN PAILA (Full Step) is made here.

SAGHAN PAILA is a monthly bulletin addressed to the rural population of IHDP area. The stencils used for duplication this bulletin are often handwritten because the village people whose literacy level is quite low cannot read printed or typed letters well. Th. are more used to read handwritten letters.

* Final Report of the Study of Supply and Utilization of Educational Materials at the School Level in Nepal.

The above bulletin usually begins with His Majesty's Message on the top of the front page. Royal message always draws the attention of the loyal village people. Besides, the topics usually dealt in SAGHAN PAILA are of the clientele's interest. The usual feature topics are: local news, local advertisements, stories, articles, and question-answer series. The main purpose/objective of this SAGHAN PAILA news bulletin is to create environment for learning. It does let the rural people to be aware of what is happening around, develop interest in learning and improve their knowledge and understanding.

Problems and issues

Education for rural development is a new concept in teacher education. Change in organizational set up and curriculum implementation strategy becomes essential, when certain new element is added to curriculum. But, as has been mentioned above, no significant change has yet been noticed neither in curriculum organization nor in implementation strategy. In such a situation, it becomes hard to expect much in educational material production. The basic difficulty being realized is to get the national policy or rural development reflected in school as well as teacher education curriculum.

In addition to the above, the following should be considered as some of the problems experienced in producing educational materials in teacher education for rural development.

1. Lack of trained personnel

   Adequate rural experiential background and special linguistic skill in writing are needed for producing satisfactory materials for rural education. IOE often tries to employ instructors with normal school teaching experiences in this work since majority of the normal school instructors have work experiences in different parts of the country. With a little training in writing skills, they should be very useful in writing instructional materials for rural development. However, there is difficulty to provide for such training in and outside the country. Consequently, the teaching-learning materials so far prepared for 'B' Level teacher trainees could not come up to the standard of meeting the needs of rural teachers.

2. Lack of qualified teacher educators

   Major responsibility of producing teaching-learning materials for teacher education lies with the teacher educators themselves. But majority of teacher educators at present are not capable of bearing this responsibility. More than 50 per cent of the teacher educators today hold just Diploma in Education (B.Ed.); although the minimum requirement is Degree in Education (M.Ed.).

3. Lack of adequate fund

   Monetary incentive is often needed for motivating the writers to produce good reading materials. But adequate fund is not available for alluring expert writers to such a work. For, there is less market for such reading materials. The urban people are not interested in these materials, and the rural people are not in a position to buy.

4. Lack of basic research

The kind of the information and the style of presentation that are comprehensible for rural population needs to be experically determined. But the basic research in this regard has yet not been done.

Issues

It looks less meaningful to raise issues in a field where very little amount of work has so far been done. But in view of the nature of the problems and difficulties being experienced in this field, the following issues are briefly mentioned for consideration.

1. Should the strategy adopted in producing educational materials in general be used to prepare educational materials for rural development?

   Arguments in favour of using separate strategy, and also against it could be given. In view of the urgency and importance of the case in consideration, a more dynamic and quick system of educational material production need to be developed. But considering the present shortage of money and expertise, such a strategy should be considered rather premature.

2. Should the production of these materials be open to private publishers?

   For quality control there is need of restriction on production. But considering the present lack of educational materials, the production right needs to be opened to all.

3. Some times questions of more technical and academic nature such as "Should the local words and coloquial terms, or standard Nepali terms only be used in such written materials? Should the technical terms of foreign language be used as it is? Or how could these terms be best translated?" are asked.

Strategies

To solve the above problems the following strategies should be adopted:

1. A number of potential writers should be deputed to rural teacher training centres for about a year. They should be assigned the task of preparing instructional materials for teacher education immediately after their return.

2. The rural teachers should be encouraged to prepare teaching-learning materials for their schools. Necessary expertise and guidance should be provided to them. The teacher educators in the rural teacher training centres should be able to provide this guidance and expertise.

3. To increase the number of qualified teacher educators, the Degree in Education (M.Ed.) classes should be started in some othef teacher education campuses; and the in-service teacher educators should be given opportunity to upgrade themselves.

4. The Institute of Education should be made responsible to prepare all different kinds of teaching-learning materials. Adequate facilities should be provided for this purpose.
5. Efforts should be made to prepare more low cost instructional materials.
6. Teacher education for rural development must be linked with distance learning and radio education programmes.
7. Some survey research should be carried out to identify the needs and problems of rural school teachers.

Mechanism and procedure for continuous evaluation

General reactions of teacher educators have been the main basis of evaluating the teacher education materials so far. Such reactions are collected either from the reports of teacher educators seminars/workshops, or from formal/informal interviews with individual teacher educators. On-the-spot observation concerning the use of instructional materials such as laboratory apparatus/instruments, and workshop equipments and tools have also been made for continuous improvement and renewal of the materials developed.

But as the above procedure depends more on subjective judgement of the teachers, it is considered not so very reliable. More objective and broad based procedural strategy needs to be adopted. Reactions of the student teachers, teacher educators, and principals on the relevance and effectiveness of the instructional materials would give more reliable and broader basis for the evaluation and renewal of these materials. Questionnaires and interview could be used as the basic tools of collecting these information.

Summary Highlights

1. Creating just, dynamic and exploitionless society being the goal of Panchayat Democracy - the political system of Nepal - plans and policy formulation to base education on egalitarian principles has been done. Consistent and concerted efforts in making education relevant to rural development needs appear to be lacking.

2. There are quite a few formal teacher education programmes with rural bias in curriculum offering. However, many non-formal agencies have come forward to fill up the gap.

3. IOE/TU works with Subject Committees (academic oriented) and Faculty Board in curriculum development, where as the other agencies use Task Force/Ad hoc Committees (field based, practical) in such a task.

4. IOE/TU adopts the process of gradual accommodation and assimilation as the method/strategy of bringing rural education in the formal system of teacher education. The other agencies, on the other hand, adopt a more direct approach to reach the community in achieving this goal.

5. Attempts are made to use scientific method of identifying core elements of curriculum. But objective fact finding and longitudinal research in this area is very rare.

6. More relevant criteria for determining core elements of curriculum is gradually coming up. But, tradition still has strong influence on determining teacher education core curriculum.

7. Some progress has been made in translating teacher education curriculum into instructional materials. But a lot has to be done in this regard.

8. Lack of expertise and adequate funds are major problems experienced in preparing educational materials in teacher education for rural development.

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PHILIPPINES: EXPERIENCES IN DEVELOPING EXEMPLAR TEACHER EDUCATION MATERIALS FOR ENVIRONMENTAL BIOLOGY

by

Lucille C. Gregorio

Introduction

In 1974, the University of the Philippines, Science Education Centre (UPSEC) organized a team to inventory teaching competencies or skills expected of secondary science and mathematics teachers. The inventory was to be made on the basis of a competency list prepared by the Science Teaching Centre at the University of Maryland. In May 1975, the inventory was sent for reactions to 788 secondary school teachers who had participated in the Summer Institutes of the Regional Science Teaching Centres. The reactions were analyzed in order to determine which identified competencies were useful, which were not. In May 1977, the inventory was again distributed among participants of that year's Regional Science Teaching Centre's Summer Institutes. This time, reactions constituted the main basis for a revised competency list later published in 1978. The revised competency list included the following areas: Equipment and Instruments; Laboratory Procedures and Techniques; Emergency Procedures; Mathematical Competencies; Curriculum Projects and Professional Organizations; Educational Technology; and Educational Fundamentals.

Based on the first two areas, Equipment and Instruments, and Laboratory Procedures and Techniques, the competencies specifically needed by biology teachers include the ability to:

1. Use the dissecting instruments, incubator, compound microscope, drying oven and water bath;
2. Prepare temporary slides, solutions, culture media, stains;
3. Use techniques involving paper chromatography, gas collection, handling and storage of chemicals;
4. Isolate and/or culture algae, bacteria;
5. Care for live animals in the laboratory i.e. amphibians, birds, small mammals, reptiles;
6. Set-up and maintain an aquarium; a terrarium;
7. Preserve plant and animal specimens;
8. Determine the number of bacteria present per unit volume of solution.

With this as a starting point, a decision was made by the UPSEC Biology Work Group to develop and offer competency courses and develop teacher education materials, with environmental education materials as the priority.

I. Teacher education activities for environmental education

A. Competency courses related to environmental biology

The offering of short-term competency courses for science and mathematics teachers is based on the idea that the Centre's efforts on improving teaching could not be confined only to teaching science education in connection with the degree courses and programmes of other professional colleges of the University of the Philippines, but UPSEC can strengthen its efforts at improving science education by being a Center for continuing education of science and mathematics teachers. The short-term programmes are flexible in nature, which may help bridge the gap between a possible innovation in science education and its innovation dispersed between theory and practice, between research and teaching. The short-term institutes fulfill the primary function of curriculum development of UPSEC. "Good teaching, underlies any effort at curriculum reforms; and therefore, two basic and associated aspects in any curriculum improvement effort," expressed UPSEC Director, Dolores F. Hernandez.

The courses developed by the Biology Work Group are the following:

1. Techniques in Ecological Study for High School Biology in 3 parts namely, Grassland Ecosystem, Freshwater Ecosystem and Marine Ecosystem.
2. Collection, Identification and Preservation of Plant Materials.
3. Collection, Identification and Preservation of Protists and other Microorganisms.
4. Collection, Identification and Preservation of Animals.

1. Techniques in Ecological Study for High School Biology

In October 1977, the course entitled "Techniques in Ecological Study for High School Biology" was held for twelve days for at least 8 hours daily. Those who participated were 21 high school biology and science teachers. Basic ecological principles involved in grassland, freshwater (lake) and marine ecosystems were taken up in the course Specific techniques needed by a teacher for ecological study were emphasized. These are: (i) identification of the physico-chemical components of an ecosystem; (ii) determination of physical and chemical factors affecting a specific environment; (iii) morphometric study of a habitat; (iv) estimation of biological productivity in terrestrial and aquatic environment.

The course was conducted outdoor most of the time, using instructional games and lessons on improvising equipment for outdoor biology study. Among examples of improvised equipment were plankton nets from discarded barong tagalog, insect net from used mosquito nets, forceps or tongs from bamboo sticks. Techniques in chemistry, biology and earth science were integrated.

The competency course was handled by UPSEC biology, chemistry and high school science work group members with ecology teachers from the U.P. College of Arts and Sciences as lecturers.

The participants were given the opportunity to use secondary level activities by playing the role of high school students. Using this strategy, the trainees become better prepared to go back to their schools to hold echo seminars, teach laboratory techniques or the improvising of apparatus in summer institutes.

2. Collection, identification and preservation of plant materials

Practical experience in the collection, identification and preservation of biological materials for classroom use was provided for in the 18-hour course held 5 consecutive Saturdays in April and May of 1978. Competencies were developed in the participating 14 science and biology teachers in the following areas: (i) collection, identification and preservation of plant specimens; (ii) preparation of improvised equipment for collection and preservation; (iii) preparation of fixatives, poisoning solutions and preservatives. Conservation measures needed in the study of the environment and its plant component were demonstrated.

The teacher participants were provided with information literature on: (i) general considerations in planning a field trip; (ii) how to collect mosses and liverworts; (iii) how to collect ferns; (iv) how to collect and process in the field, flower plants; (v) how to handle herbarium specimens; (vi) how to file herbarium specimens; (vii) list of some flowering plants collected during field trips. Also distributed were printed materials entitled: (i) A guide to the description of collected flowering plants; (ii) Key to selected families of flowering plants; (iii) Key to selected families of Philippines mosses; (iv) Glossary of technical terms (flowering plants, ferns and mosses); (v) How to care for seed plants; (vi) How to prepare a terrarium/dish garden; (vii) the preparation of improvised materials, fixatives, poisoning solutions and preservatives from local materials.

Examples of improvised materials used in this course are: (i) old newspapers instead of commercial blotters for drying herbarium materials; (ii) bamboo or wooden slabs for presses instead of the store-bought portfolio; (iii) tongs of bamboo instead of metals; (iv) discarded containers with attached dispensers for holding alcohol; (v) wide-mouthed empty glass bottles instead of beakers; (vi) razor blade inserted in bamboo or sharpened length of a bamboo piece instead of manufactured cutters; (vii) denatured alcohol instead of ethyl alcohol for use as fixatives; (viii) drier using electric/clay stoves or gas lamps to heat the oven. Teachers from the rural areas can easily get these materials for improvisation from their homes and their environment and can perform similar procedure for the preservation of plant specimens for classroom use.

UPSEC Biology Work Group staff members and botany mentors from the U.P. College of Arts and Sciences handled the course.

At the end of the competency course, teaching strategies, appropriateness of teaching aids, economic soundness, durability of improvised materials, availability of component materials, and timing of the course were evaluated by participants. The evaluation report has encouraged the UPSEC Biology Work Group to hold the second competency course entitled, "Collection, Identification and Preservation of Animals" towards the end of the next school term in 1979. The series of courses are timed when teachers are relatively free of their school work.

B. Teacher materials for environmental biology

The Philippines is nature's paradise. Flora and Fauna are available the whole year round. In view of this consideration, the UPSEC Biology Work Group initiated a project entitled "Using the Environment as a Teaching Resource". The results of this project will be a set of folio of materials to be used in studying a particular ecosystem. These supplemental materials are intended for teachers of ecology and related fields. Aside from it being a source of information, the folio is designed to improve the competence of the teacher and also to involve students in outdoor activities for a study of living things particular in their environment.

The first folio is called the Grassland Ecology. It will contain the following materials: (1) Handbook of Common Methods Used in Studying the Grassland; (2) Guidebook to Common Plants in the Grassland; (3) Guidebook to Common Animals in the Grassland. The materials focus on the grassland because in the Philippines, one is bound to find a grassland anywhere. Grassland has been defined as "an ecological community in which the prevailing or characteristic plants are grasses and similar plants". In this context, the UPSEC Biology Work Group is preparing the handbook contained in the folio.

1. Studying the grasslands

The HANDBOOK OF COMMON METHODS USED IN STUDYING THE GRASSLANDS take up techniques or activities required in the study of the grasslands. Activities include identification of the physical and chemical composition in a grassland, determination of the physical and chemical factors affecting the grassland ecosystem, morphometric study of a grassland habitat, estimation of the biological productivity in a grassland environment, and uses of grassland for pasture, agriculture, settlement and recreation.

Two reference materials or guidebooks accompany the handbook. The guidebooks are intended to help the user of the handbook in the techniques of collection and identification of organisms found in the grassland.

2. Common plants

The GUIDEBOOK TO COMMON PLANTS IN THE GRASSLANDS describes most of the plants in the grasslands and wastelands collected by the UPSEC Biology Work Group during fieldtrips. These are preserved and included in the herbarium collection of the UPSEC Biology Laboratory. The habit of the plant is line drawn to show the details of structure needed for identification. Descriptions of plants are done in very simple language based on the structural characteristics of the roots, stems, leaves, flowers and fruits. Also described is the specific habitat of the plant and its economic use. This guidebook can be used by teachers, students as well as layman who has a minimum of training in plant taxonomy.

In terms of presentation, the guidebook is divided into 5 parts according to the various uses of the plant as follows:

Part 1. Plants for forage (animal food)

Part 2. Plants with medicinal uses

Part 3. Plants with various economic uses

a. as land cover and green manure
b. as food
c. as source of fibers
d. as ornamentals
e. as source of essential oils

Part 4. Lower plant species associated with grasslands

a. mosses
b. ferns
c. fungi

Part 5. Plants without known economic use

Each part has the family listing in alphabetical order. The family listing has the scientific names also arranged alphabetically. Common names in English and in the major dialects (Tagalog, Bisaya, Ilokano and Bikol) are also included.

About 150 species of plants are described. Collections are identified by the UPSEC staff and counter-checked and verified with the herbarium collections of the U.P. Department of Botany, College of Arts and Sciences, National Museum Herbarium and the U.P. Los Banos, Natural History Museum.

In addition to the five parts, a Taxonomic Key for each part, and exercises for the use of the key are provided. A glossary and an index are also included.

3. Common animals

A GUIDEBOOK TO COMMON ANIMALS IN THE GRASSLAND is the second guidebook contained in the folio. During the time that plants were collected the common animals seen in the grassland were likewise collected and preserved. These animals are grouped accordingly for easy identification. The structures of the animal will also be line drawn, parts of the body and their economic uses are described. This guidebook is very valuable not only for teachers and students but for laymen likewise, who have a minimum of training in animal taxonomy. Like the first guidebook the animal guidebook will also include a taxonomic key for each part, and exercises for the use of the key will be provided. A glossary and the index will also be included in the material.

To complete the representation of organisms found in the grassland, microbial cultures of soil samples were done. The soil bacteria was identified and colony characteristics were described. This part will be appended in the handbook.

C. Other supplementary materials for teaching environmental biology

1. Plants of the Philippines

This supplemental material published in June 1971 shows awareness of the current trend which emphasizes the use of the environment in teaching. It is rich in illustrations and uses terminology easy to understand.

The high school teacher who needs information about plants in the area is the book's main target.

2. Philippines birds and mammals

The book, PHILIPPINE BIRDS AND MAMMALS published in July 1977 is the most recent resource material. This illustrated edition presents a broad view of Philippine birds and mammals. The book consists of two parts: the first part is a representation of Philippine birds and the second part on Philippine mammals.

II. Problems and issues in the development of materials

Several problems were faced by UPSEC staff in the preparation of teacher education materials. The problems were either in the area of teacher resources or competency courses.

A. On the preparation of teacher resource materials

In preparing teacher resources, the following problems were pinpointed:

1. There is a lack of basic biological research in the Philippines from which curriculum materials can draw examples.

   A challenge is posed to our country's researchers that they do basic researches which can be utilized when curriculum materials are being prepared.

2. There is too much to do for too limited a manpower.

   The present UPSEC staff has to cope with work involving curriculum development, teacher training, extension services, equipment development and participation in continuing education programmes for the country.

3. Insufficient training and background of teachers in the subject area.

   In spite of the fact that we have laboured to employ simple language in our materials, teachers in the field still find difficulty in comprehending these materials.

B. On the competency courses

The competency courses have presented several problems.

Although there are many teachers who are interested in courses offered, only few have the chance to attend them. Underlying this problem is the basic financial need of teachers who choose not to enroll if asked to pay their own fees. For this reason, schools or institutions are requested to shoulder all expenses of teachers who enroll in these programmes.

A heavy schedule of classes and school work also prevent some teachers from attending competency courses. To remedy the situation, UPSEC competency courses are offered on weekends and during school semestral breaks.

Competency courses are intended to solve the problem of the teachers' inability to use curriculum books and other materials because of insufficient training and backgrounds.

III. Relevance of the developed exemplar materials

Now under preparation, the project "Using the Environment as a Teaching Resource" is a good illustration of the relevance of materials. Included in the project are materials entitled HANDBOOK OF COMMON METHODS USED IN STUDYING THE GRASSLAND and two accompanying guidebooks COMMON PLANTS IN THE GRASSLAND and COMMON ANIMALS IN THE GRASSLAND, which are very useful to teachers, students and the ordinary man.

A. For teachers

The relevance of the materials to teachers is apparent.

1. Teachers can easily locate or gather specimens needed for the lesson.
2. Knowledge gained by the teachers in preservation of the specimens will save on time, energy and materials. Specimens properly preserved and maintained can be pulled out from a shelf as the need arises.
3. Knowing about relationships of organisms can be a basis for the teaching of taxonomy, genetics and evolution.
4. Information is useful in the teaching of environment and conservation principles.
5. The teacher's ability to identify common plants and animals may lead to development of sound attitudes towards the environment and understand better the principles of conservation.

B. To students

1. The materials, handbook and guidebooks should be relevant to students as well. These will be available at a very minimal price.
2. Materials can serve as references in their study of ecology, plant and animal taxonomy and conservation measures.
3. Students will be encouraged to produce improvised materials from locally available resources.
4. Students will find in it basis for encouraging their parents and other people of the community in practical conservation of natural resources.
5. Natural environment will be viewed readily as a laboratory.
6. Students will be aroused to biological challenges enough to take a career in biology in the interest of environmental problems.

C. To layman

For the ordinary man the folio can be used:

1. As promotion materials for the conservation of natural resources;
2. To develop greater appreciation of nature;
3. For identifying plants as food for man, for medicinal purposes, food for animals, for land cover and green manure, as source of fibers, ornamentals and essential oils.
4. As source of diverse information including the structures, parts, habitats and classification of organisms.

Anyone can benefit from the resource materials. They give scientific and practical information on, among others, ecology, aquatic and terrestrial biology, conservation of natural resources. This is what makes the exemplar materials relevant not only to rural communities but to urban and metropolitan communities as well.

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SRI LANKA: THE DEVELOPMENT OF INSTRUCTIONAL MATERIALS FOR AN INTEGRATED TEACHER EDUCATION PROGRAMME IN RURAL COMMUNITIES

by

S.B. Ekanayake

The legacy of the educational system

The system of education that prevails today in most of the developing countries is a legacy of the 19th century. The formal school itself is a western concept thrust on us to meet the needs of the elitist class. It has a 'clerical' and 'urban bias'. There has been a lot of miseducation that has gone into the people, in the name of education. Thus 'the educated people through out South Asia tend to regard education as a badge that relieves them of any obligation to soil their hands through manual labour'.* The attitudes seeped into the minds of the people through such education is a great obstacle for development of the country. Hence it is now a problem of finding ways and means of eliminate this miseducation. This was caused, inter alia, a large waste of resources and developing of prejudices both of which are hindrance to any overall planning of the nation.

The whole tradition of schooling in Sri Lanka, under the European conquerors, has been to take away the people from those whom they were expected to serve. Any service that occured was incidental and marginal. Those who received this type of education necessarily become apathetic because the content and the structure did not mirror the aspirations and needs of the community. A great majority of people received an education that was irrelevant to their needs, mundane problems and tasks. 'To many of them school (was) offering nothing besides inhibition and restriction.'** Very large numbers of those who received education were left at the level to make a living of their traditional skills which they had picked up through informal learning (Diagram 1).

The 'Guru Gedara' (Teachers' home) tradition

The Buddhist tradition of 'respect for all' is imbibed into our culture. Every aspect of Sri Lanka life - be it social relationships, political economy, art and architecture, education and literature were natured on the cradle of Buddhist culture'.*** Alien domination of four countries could not destroy these traditions. This concept coupled neatly with the 'Guru Gedara' tradition in Sri Lanka. This was an open learning centre where activities took place at a relaxed pace. Flexibility was the key note. It was also a place where discipline was borne of respect and admiration. As a learning community it handled the cognitive, psychomotor and the affective domains equally well and balanced.

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* Gunnar Myrdal, Asian Drama, London, Abriged, Penguine, 1977-p. 320

** Colin and Mog Ball, Education for Change, England Middlex, Penguine, Education, 1973-p. 160

*** A.T. Ariyaratne, A People's Movement for self-reliance in Sri Lanka, Sarvodaya Sharamadana Movement, Moratuwa, 1977-p. 2

The 'Guru Gedara' teaching was a way of life. Students were focussed to real life situations in their learning process. This was possible because the teacher possessed the qualities and the skills needed to mould them into life situations.

These aspects should be made use of today to bring a new dimension and light to the much needed rural community. It is where the role of the village school should be thou of not only in terms of conveying knowledge but also as a source or centre of development of the village.

Importance of rural areas in the development of Sri Lanka

The rural areas in Sri Lanka constitute the core of the country. Over 80 per cent of the people live in villages and in terms of land area covering over 99 per cent of the total land surface. It is mostly the village that preserves the unspoilt culture of our nation. These only indicate the importance of the village life.

The Government of Sri Lanka now has given a clear indication that the main thrust of development is to be in the rural areas. The supporting element in this would be the participation of the people and use of resources and skills available locally. In this effort, one could imagine the nature of the operation it would create when one considers that in Sri Lanka there are well over 20,000 villages and hamlets.

Most of the development schemes in Sri Lanka have been carried out up to now from offices situated physically and spiritually away from the masses. No channels of communications were maintained with the people who really matter in this. Hence the failure of many grandious schemes which were thrusted upon the villager, who treated them with mistrust and cynicism. This is taken amiss by the elitist planner as non co-operation or ignorance on the part of the villager.

Development would have different connotations in different environments and cultural patterns. In fact it would vary within even different communities of one nation. Social and political changes would also influence the pattern of development. However, in all these, the common factor would be that development is essentially development of the people and it should commence with what people have, their knowledge and resources. Each person has to create in himself by his own action the desired development. Individuals develop themselves by what they do, by taking their own decisions, by building what they know and have. They develop themselves as a comm ity by sharing their knowledge and ability and by participating fully in their common life. These statements make it clear that rural development is total development of the individual and the community. It should be a process that should make the villager to realize that he has the potential and develop confidence in his pattern of thinking.

Further, development programmes should not disturb and damage the cultural bonds of the villager. These must be respected at all times. This does not lend to the idea that the average villager is averse to any kind of change. In rural areas the need for changes exist, in a different and a lesser form may be. Margaret Mead in her book 'Culture and Commitment' states that 'conditions for change although hidden are always present, even when traditional procedures are merely repeated'. Hence rural developers should not take with them the idea

that rural folk are disinclined for change. What they are against is any programme of action or strategy that does not involve them.

A. Identification of elements of core curriculum

It is very pertinent here, in terms of education, to find out the felt needs of the rural areas. Locating all needs would be a formidable task for they vary from community to community. Nevertheless certain common needs could be identified.

1) Literacy and Numeracy. Even though in Sri Lanka the literacy rate is high there is still a great need for a fair number to learn these basic skills. A large number is from the women folk.

2) Health and Nutrition. The village folk could be made more healthy and strong it only they are made aware of simple facts about health and nutrition. The preventive angle could be explained to them and also eating habits, especially a balanced diet. In this respect the care of the toddler and the child is very important because invariably it is the small ones that fall prey to various diseases at the village level.

3) Development of Productive Skills. This should be based on the resources and needs of the village. Discovery of talents is a good exercise in this respect. It is common for out of school youth to waste their time and energy in unproductive and socially harmful activities. Hence in a programme of action this aspect should be given due weightage. This will be economically and socially beneficial.

4) Appropriate Technology. This is a very much desired field that should be promoted and there is a lot of scope at the village level for appropriate technology. Fostering this would help to create talented men and women at the village level. The existing traditional technologies should form the basis for further innovations.

Role of education

The role of education should be to meet these felt needs of the community. M.V.C. Jeffreys rightly points out in this connection 'that education is in fact nothing other than the whole life of the community viewed from the particular stand point of view of learning to live that life'. It is implied in this that education is nothing but a living process. Rural workers should be made aware of this philosophy.

Education should centre on developing self-learning habits and skills problem solving and decision making abilities individually and collectively. Such education should also possess self-valuating qualities.

A programme of action has to be formulated, on the basis of the felt needs of the community, to train the rural worker. This training will be (a) to give the rural worker the necessary skills; (b) to educate the villager on the contribution he has to make as an individual and as a member of the community. This would ultimately be again the function of the rural worker.

Developing the skill of leadership would be an important aspect of the role of education in rural development. The task for the rural developer would be three-fold:

a) To develop skills in himself through practical training;

b) To develop ability to transfer the skills to the community; and

c) To develop skill in identifying leaders at the village level.

Recognition of leadership of all types is essential for the teacher in community activities. He may have to use different ones for different purposes and functions. The teacher has to take note of the internal complexities in the village resulting from caste and class divisions. It is not advisable for the rural worker to depend on few indispensables at the village for his programmes. Examples of leaders at the village level are as follows:

a) Traditional leader - helps in the integration of the group;

b) Political leader - transitory nature but influential

c) Opinion leader - more informal

d) Natural or appointed leader - proficient in some skill/ arise in different occasions

Planning is another skill that should be introduced to the rural development worker. The capacity to develop a coherent whole out of individual development programmes is another vital fact in training of the rural worker. In this the important fact would be the ability to feel the pulse of the villagers regarding the planned project. Knowledge of resources and needs is equally important.

An awareness of the 'psychological structures' is another skill that the village worker should possess. Traditional cordiality to all ability to withstand problems, extension of helping system, inborn modesty and respect for all are part of this 'psychological structure'. Gaining a knowledge of all these is a major task but without an understanding of these the worker will not be able to win the confidence of the people.

Understanding of the exploicers at the village level is another aspect which deserves attention. Otherwise the desired effects of progressive measurers will not take place. This will result in the usual antipathy from the general mass of the people. Government servants fall a prey to these people. Hence if true village awakening is to take place the various exploitive forces at the village level should be shut off from taking decisions on behalf of the whole village. There are also outside forces that keep the whole village in bondage and dependence. The middleman, the absentee landlord, money lender fall into this category. The rural worker must guard against these elements.

One of the important functions of education should be to give the rural developer an understanding of poverty.

Development of felt needs

Literacy and numeracy are two aspects that deserve priority in rural education. The idea is not for the villager to pass examinations. In fact it would be not relevant at all. Knowledge about very basic matters related to life like reading a destination board or a time table in bus stand or following simple instructions on health care could be gained by literacy. They can be also on guard regarding sale and buying at the market or with the vendor. Above all it will assist them to help their children to learn.

Health and Nutrition and Family Health are other important aspects that should be considered in the provision of education for development. Most illnesses can be cured by simple application of preventive methods. Health care should be a part of an integrated plan of action. This could include the following:

a) Knowledge of poor sanitation, use of water, proper feeding habits, use of local vegetables and cooking habits to avoid waste and preserve ingredients/knowledge of traditional foods and their nutritive value;

b) Knowledge about common diseases/treating root causes;

c) Use of milk in different forms - cow/goat/buffalo;

d) Construction of latrines and wells;

e) Use and cultivation medicinal herbs;

f) Knowledge and interest in home gardening;

g) Childhood diseases/causes and remedies/first aid.

h) Importance of the environment and understanding of pollution;

i) Use of available clinics and health services;

j) Dental care;

k) Education in home economics;

l) Health groups for adults/too many people resulting to too many problems.

Development of productive skills in relation to resources should form another part of the education meant for rural development. The following items could be included in such a programme:

a) Understanding of resources and the ability to classify them;

b) Skills to develop resources;

c) Ability to use substitutes - implements/transport needs/ construction/fertilizer;

d) Training of youth for worthwhile crafts and industrial activities-brick making/basket weaving/coir making;

e) Training in sewing for mothers and girls;

f) Knowledge on how to obtain bank loans;

g) Providing library facilities - papers/magazines/ information about the government/books;

h) Transfering of the skills of older folk - cultural/ agriculture;

i) Methods to increase yields/use of relevant techniques;

j) Marketing facilities.

Development of appropriate technology (AT) is a very important aspect that is not much looked into in the development of the rural areas. It should form the basis of all development planning. This should be a process where there is a transfer of traditional technology and adaptation of modern methods whereas possible. The approach to use AT could take the following three forms:

a) Developing of traditional, indigenous production and servicing techniques;

b) Adaptation of new techniques used in developing countries in a suitable way;

c) Where a) and b) are not possible, doing research in finding techniques to assist indigenous requirements.

All these should be ones that the villager can develop with his resources and handle with his skills. Examples of such are as follows:

a) Wind, water and sun as sources of power;

b) Techniques in seasoning of wood for various purposes - harrow/wheels/timber/agricultural implements;

c) Use of the village blacksmiths - making of equipment to suit different purposes/various types of harrow blades/ fans;

d) Traditional methods of medicinal oil extraction;

e) Development of fishing gear for different varieties;

f) Use of local fertilizer;

g) Traditional curing methods;

h) Seasoning and preserving of food items;

i) Preparing of simple items as kitchenware/home use/religious festivals and ceremonies-funerals and weddings.

The above are only a few items of a vast array in appropriate technology which should form an integral part of the educational system in order to rejuvenate the rural areas. Creativity, self confidence and a sense of commitment would form the attitudinal and skills aspect of this education process.

All basic needs should be incorporated into a system of learning. There must be methods of incorporating any changes in the needs of the people too, so that aspirations of the villager will be reflected constantly in the education process. An education pattern based on this system would bind the child to the community and take him away from what Ivan Illich describes as 'institutional learning', because such education has to take place in the community and with the people.

B. Integrated development - translation of curriculum elements to learning situation

Rural development should take the form of an integrated unit. Unesco refers to this as an 'ecological approach' because it is the environment that determines the philosophy of rural development. This eliminates alien patterns of rural development creeping into and perhaps disturbing the socio-economic equlibrium of the particular community.

Unesco has conceived development in terms of three major components. It should be indigenous, meaning that development should emerge from society itself. Cultural identify is the second important aspect. Thirdly, development 'should take place everywhere without a centre any where'. These nullify the earlier concepts of development which made us obligatory to follow the developed society willy-nilly. This does not mean that we should not take a leaf from a developed partner wherever possible. What is detrimental here is the idea of 'catching up' with the developed world, irrespective of the socio-economic and cultural cosequences that would arise as a result. Hence this concept of development defined by Unesco is of utmost importance because for once it gives dignity and self-confidence. It helps to liberate people from their mundane problems that they experience daily.

Integration as practical exercise is worth examining here. One aspect would be the role of the teacher in implementing the curriculum in the rural sector. Here the teaching techniques could be formulated in such a way that the whole environment could be utilized for learning skills.

The other aspect would be an integrated learning approach. A survey conducted by Hinguragoda Teachers College in some of the villages revealed that in some villages, there was a large number of cattle. In such an environment this resource could form the basis of a learning programme related to life. Dairy farming could be the main lesson. The life activity could be a dairy farm. Grazing practices, types of cattle, different diseases, milk and by-products, grazing area per cow, cost and return per cow, marketing programme and many other associated activities could form an excellent learning programme. The attachment to the animal and the environment would be two important attitudes that would be created in the learner. The child will also learn to use simple tools locally turned out to suit the needs. He will also learn the importance of soil types and the need for soil conservation. All these skills he will learn by participating. He will be able to analyse the outcomes and find solutions where needed.

Science, mathematics, agriculture, economics or geography and all other traditional subjects could be taught through this method. Such learning would be life preparation. It will not be mere learning to reach the other class and so on but form an education itself. A child learning through this method will never be a failure in life.

The other integrated approach is inter-departmental co-operation. Under this method a large number of departments would be working together under one umbrella instead of the present water-tight compartmentalized approach. The fields of operation are carved out for different departments today. There are many draw backs in this approach.

a) Lack of co-operation at the village level;

b) Duplication of activity and waste of resources;

c) Unhealthy rivalry between departments;

d) Lack of commitment on the part of officers - objective to achieve targets and not development per se;

e) Difficulty for most departments to provide sufficient field staff at village level for supervision and organization;

f) Large scale perspective advocated by some departments making villages non entitles;

g) Lack of enthusiasm and participation on the part of the villager.

In an integrated programme of development the village and the villager would be the thrust of the programme.

C. The role of the teacher as an agent of change - teacher training programme

All activities mentioned above have to radiate around a few people. Someone has to take a greater share in these activities. It is not everyone who could perform this function well. Hence there is the need for a change agent who would act as a promoter and organizer of various activities at the village level. Of course this is not a new concept. It runs down the history of mankind.

The two main goals of the change agent would be:

a) To bring about a change in his clients; and
b) To develop certain skills and abilities to achieve (a).

Such a person should be able to 'take criticism, to admit error, to be self-critical, to suspend judgement, to ask for assistance... and to work harmoniously with difficult individuals'. His strategy should be 'to help others to learn to help themselves'.

There are a large number of government officials who operate at the village level. Of these it is only the teacher who resides at the village. Other officers cover a large number of villages and invariably stay far away from their places of work.

It is here that the role of the teacher should be viewed as an effective agent of change. 'In addition to his primary role as a teacher, the personality of the teacher should be moulded in such a way that he could comfortably assume the role fitting a community leader'. Thus the traditional 'guru' role could be brought back to focus again, in a different form and structure. This does not imply that he should forget his task and take all functions of other departments. His task would be mainly integration at the village level and act as a supportive agent - guiding, helping, co-ordinating, and evaluating.

His physical presence at the village level could give him the strength of authority and leadership. For this he requires a practical training. This would help him to be a resourceful person outside the precincts of the school as well.

In all these activities the teacher could co-opt students and villagers. For the student it would be a learning process. The villager will treat his participation with pride and a matter of recognition.

A case in point would be the assistance that the teacher could give to the Physical Health Inspector. Informing the people, explaining the need for lavatories, demonstration classes on health habits are some of the activities that the teacher could perform at the village level. The teacher could also do health supervision more frequently on the advice of the PHI. The best armour for him is the child through whom he could direct, organize and evaluate most of the health programmes at the village level. The following are examples of activities that teachers could perform.

Action programme - drinking water

a) Importance through posters drawn by the students to be displayed at important places in the village;

b) Date of visit of a physician to be informed by students as a part of classroom work; and

c) Discussion at village school/parents/children/Physical Health Inspector (PHI) material for posters, letters - wrapping paper, pieces from old cardboard boxes, colours-charcoal/colours from the environment as part of an innovation.

Be it agriculture, rural development, cottage industries, literacy, a similar strategy could be employed. This process would involve every one at the village level and it could be an educational programme at school. It will also awake the participation of the people. The needed psychological integration will come as a result.

Methodology and process-background

In Sri Lanka, out of a total of 8,673 schools, 2,364 belong to the small school category. There are schools where the total student population is less than a hundred. The total number of teachers do not exceed two. If the average attendance is taken into consideration the total number would be still greater. Hence over 22 per cent of the schools in Sri Lanka fall into this category. The land area they serve is very considerable because these schools are scattered all over the country. They belong to the under-privileged and few care to know their problems. The need to develop them is very great and in this, teacher training should take precedence.

It has been found essential that certain specific aspects relating to the socio-economic and cultural environmental factors have to be taken into consideration in a teacher training programme for rural areas. The important aspects that should be made part of the education of the teacher are:

a) Nature of the community he serves;
b) Poor facilities at his disposal;
c) Potential resources available around him in the village.

Because of the nature of the training, the average teacher is generally averse to work in rural environments. 'The training they receive is geared exclusively for the urban and suburban schools where many resources and facilities are available. The techniques and attitudes the trainee learns and gathers are unsuitable to satisfy the needs and aspirations of the remote, rural deprived school in Sri Lanka. The instructional techniques imparted at the Teachers College and the learning process of the rural and deprived child run at a tangent.'

The Ministry of Education in Sri Lanka with the assistance of the Teachers' College Branch and Regional Offices have addressed themselves to a series of studies at the regional level in order to develop the small school and its teacher in relation to its resources and the needs of the community. As a first step, a survey was conducted. The more important facts that came out as a result were as follows:

a) Lack of a commitment on the part of most of the teachers who serve in these schools;

b) Lack of incentives for the teacher;

c) No interaction between the school and the village;

d) Lack of basic needs for the children to attend the school - books/clothing;

e) Scant attention for children's education by parents;

f) Disinterestedness on the part of the children-drop outs/ repeaters/absenteesm;

g) Regulations meant for all schools applied regidly at the rural school as well time table/school terms/hours of work/courses and curriculum/bureaucratic control/rate of students per teacher;

h) Richer villagers disinterestedness in the school;

i) Hindrance from vested interests;

j) Poor teaching - not related to life;

k) Inability for the children who left school to re-enter the school system.

Organization

In every educational district of Sri Lanka a small school unit is set up. This is placed under an Education Officer. Regular meetings are held between the principals of the small school, the education officers and the teacher educators,who are the trainers in this field. The approach had been mainly practical but later a little theory was also introduced.

There are two types of programmes in operation today for preparing teachers for this new role. Both are in service courses and executed by the Teachers Colleges.

Course A. For teachers undergoing pedagogical training in a Teachers College, this is a practical course fitted into the general component of the teacher training programme. It is a part of the general education in the form of projects. These projects are carried out mainly during the teaching practice period in certain Teachers Colleges.

A project organized by the Teachers College of Hingurakgoda is a case in point where the Tescher Educator and Teacher Trainee live in remote villages during the teaching practice period and go through a practical programme of rural development in addition to teaching in the village school.

In other Teacher Colleges, the villagers are brought into the teacher college to use the resources of the teachers college.

Conducting of surveys, holding meetings with the villagers are some of their functions (Annex I).

Course B. For those teachers, including principals of schools, who have already had undergone a pedagogical training. This takes place in the form of workshops conducted for a duration of about four days, including the week-end.

The location of the course is always a remote village. A follow-up programme is also part of this workshop, which is conducted after a period of four weeks at the TC. This is mainly for evaluation. Representatives of departments are also invited. Progress charts are provided for the teachers to plot out the progress of the programme (Annex II).

Course C. This is a proposed programme for a special course for those who are interested in community development. This course, duration of which is one and a half month, is open for principals only (Annex III).

Summary of Case Studies (Course A)

Objectives

a) To deepen the teacher trainee's understanding of the following:

i) the development problems faced by rural people;
ii) the relevance of education to rural development; and
iii) the development of an integrated plan for rural development.

b) To develop certain skills of the teacher, enabling him to design and participate in village development programmes in a practical way;

c) To make the school the operational centre of all development at the village level;

d) To develop the concept of self-reliance among the rural population;

e) To enable the teacher to relate learning to life;

f) To provide the teacher an opportunity of learning problems connected with small schools.

Selection of Villages

All the villages were from the Polonnaruwa District, which is mainly an agricultural region in Sri Lanka. It is a newly settled area and a large number are from other districts of the country. Social amenities and other facilities are comparatively few and rare.

The structure of each village differed from the other. This was to give more experience for the planners - an old village, a new settlement, or mixture of both. They were all simple institutions. All were located within a radius of 25 miles of the Teachers College of Hingurakgoda.

Each group had less than 10 Teacher-Trainees under the care of one Teacher-educator.

Planning

Orientation course was provided for the Teacher Trainees at the Teacher College. This included methodology, sociology, health and nutrition, relevant departments and voluntary bodies working at village level.

Skill Development

Fact finding process under resources, cultural pattern, health and nutrition, mass media and educational problems (Annex I).

Reports were submitted on each of the above items by Teacher Trainees. In addition every TT had to submit a case study of a child in the village. Organization of exhibitions of children's work and village resources was also one of their functions. Implementation of new teaching techniques was an important activity of the Teacher Trainees (7.00-3). They were also expected to use resource personnel available at village level. A record of the daily activities were noted by the leader of the group. This record book was checked daily by the Teacher-educator. This included the people whom they met, summary of discussions, problems, ideas of the villagers, their thoughts as a group for that day.

Leadership Role

Each village group had a Teacher-Trainee as a leader in addition to the chief co-ordinating officer for all village projects.

Identifying of resource personnel at the village was another function of the Teacher Trainees. They were to be used in village projects wherever necessary.

Locating different leaders was also a function of the Teacher Trainees. For this, they had to mix with the people whenever possible. The technique was more of observation that any thing else. At the end of whole programme, the Teacher Trainees were able to categorise the leaders.

Plan of Activities

A. School and Educational aspects

a) drawing up of new curriculum on Health and Nutrition by Teacher Trainees;

b) getting materials from well to do schools elsewhere - books, stationary, clothing etc.;

c) organizing cultural activities and providing recreational facilities with the help of other bodies;

d) providing facilities for sports activities - building a sports ground, gymnasium, organizing sports clubs for children;

e) adult educational classes for men and women in handicrafts, English, health; and

f) clearing up of a plot for the school farm with the assistance of the rural development society.

B. Village based activities

a) providing bee boxes for out of school youth. This was based on their traditional occupation of collecting bee honey from the forest;

b) lime-making and handicraft projects both of which were based on the resources available in the villages. Up to now, lime and bamboo (raw material for handicraft) had been exploited by outsiders. This project helped the villagers not only to earn more income but to develop an array of skills such as technical skills, know-how skills and skills in organizing activities;

c) preparation of medicinal oil from herbs and seeds. The traditional skills and equipment were made use of for this purpose; and

d) collection of medicinal herbs on commercial scale. This was an occupation that was liked by the girls especially.

All these programmes were phased out. The priorities, number to be employed, income expected, promotion of sales, obtaining of loans and other facilities were discussed by the Teacher Trainees and the villagers with the respective departmental officials.

C. Health and Social amenities

a) providing health facilities in the form of regular clinics, first aid material for the schools, nutritional foods for the children demonstration of health habits for mothers and adults and lavatory facilities were some of the programmes in operation currently;

b) a bus service to two villages were provided;

c) pipe born water was provided for another village;

d) clearing a tank bund, working in a paddy field, repairing a temple preparing a play ground were some voluntary activities organized by the Teacher Trainee and villagers;

e) cultural programmes were very common in all training programmes. Villagers as well as Teacher Trainee participated in these but there is always participation from the outsiders varying from village to village.

Integration

A large number of other departments assisted in these activities. The teachers role was that of a co-ordinator. Health, agriculture, rural development, planning, irrigation, and public administration were the more regular ones. The District Development Council and the Political organization also participated in these programmes. Assistance comes from voluntary organizations - Sarvodaya Movement, and well to do schools in Sri Lanka. Assistance is in the form of equipment, transport and participation.

Strategies used for Feedback and Communication

This takes various forms - personnel knowledge/reports/checks.

a) Leaders of the village trained by the Teachers College and the Principal of the village school are in touch with the Teachers College.

b) The principal makes his observation and reports confidentially to the principal of the Teachers College. About the progress of the programme and also the participation of the Teacher Trainees;

c) The group leaders of the Teacher Trainees and the Chief co-ordinating office Teacher Trainees also visits the villages regularly;

d) The principal of the Teachers College and Teacher-educator also visit the villages;

e) Efficials from other departments also make a point to visit the village projects to give advice and assistance;

f) There is a regular correspondence with the villagers; (Annex IV).

g) The Teachers College also provides progress charts from the principal/teacher to plot out the progress/constraints and other features. The chart is to be sent to the Teachers College once in a month.

Problems and Constraints

a) Time factor - The duration of the programme was confined to the teaching practice period only. The time was not sufficient to go into details and deeply into all problems in all villages equality. Period of time was 3 weeks per term, i.e. 4 months.

b) Difficulty in keeping the same teacher educator in charge of the same group due to transfers.

c) Finding funds - the additional work involved was a financial strain on the Teacher Trainee and Teacher-educators.

d) Transport problem as some of the villages were without public transport.

e) Problems arising out of vested interests.

f) Legacy of miseducation in the village - learning for examinations and not for life activities.

g) Problem of getting other departments to act quickly and regularly.

h) The unhealthy relations between the school and the village.

i) Lack of confidence in government and voluntary organizations because of lack of a common language between the villager and the planner.

j) Delay in achieving targets due to over ambitiousness on the part of the agent - programming for 'big ones' instead of small scale projects.

Impact

a) The projects as they progressed created a satisfactory impact in the field of education in the country. As a result of the publicity given to the programme, a number of similar but different ones were attempted by other Teachers College in Sri Lanka.

b) The Ministry of Education introduced community education as a part of the teacher education programme as from 1977.

c) It was also decided to conduct a special course on community education for principals of schools. The course was to be conducted at the Teachers College of Hingurakgoda.

d) Two seminars on Community Education have been conducted at the National Level for Teachers educator and Circuit Education Officers in Sri Lanka.

e) A report on these projects were presented at the ACEID conference held in Colombo, Sri Lanka 1976.

f) Reactions of the Principals of the respective schools have been satisfactory.

g) Increase in attendance in these schools is another indication of its acceptability.

h) Enthusiasm shown by the parents in these villages.

i) Emergence of village leadership is very encouraging in the form of organization of activities, (conducting meetings, form of behaviour). All reveal that self confidence of the youth has been developed as a result of this education.

j) Development of confidence on the part of the teacher is also a factor that should be taken in this impact evaluation.

k) Organizing of similar programmes in all the villages where the Teacher Trainees have been working after the training period.

Summary of a case study; (Course B)

Extension work done at Hingurakgoda Teachers' College.

Objectives same as in 10.00

Planning

The location of the Workshop is always in remote villages. (In this case it was Dalukana, a remote village situated about 30 miles north east of the Teachers College of Hingurakgoda).

To this small school 15 principals and teachers of the small schools in the area were invited. In the Polonnaruwa District this represents about 40% of the small schools in the area. In addition representatives from each of the villages are also invited.

This is a four day programme and includes the weekend.

Phase of the Plan

1) Getting to know the villagers - 1st day evening.

(a) the venue was the school hall;

(b) large number of men and women, youth and children were present at this 'know each other' gathering;

(c) it was relaxed and there was no central direction or control;

(d) topics that came for discussion reflected the problems and needs of the villager.

This meeting helped the participants to get an insight into the nature of the structure of the village and also provided a basis for healthy rapport. This assisted them in their following days programme - fact finding mission.

2) Preparation for the Fact Finding Mission

(a) Preliminary discussion on the areas and to what depth the survey should be conducted/briefed on methodology;

(b) Based on the discussion with the villagers the following main areas were determined by the participants: resources of the village/Cultural pattern/Health and Nutrition/Mass media/Educational problems;

(c) All findings were to be oriented to development of the individual and the total community.

3) Fact finding mission - Field Work

(a) The time to visit the houses were fixed for the afternoon;

(b) Visited only selected Houses due to lack of time;

(c) Observation and discussions were the two techniques used often; and

(d) Presentation of data findings through pictorial and graphic forms.

4) Observations on the fact finding mission activity

(a) The villagers were ready for the visit ;
(b) The confident nature of the participants in their relations with the villagers/respect for poverty and skills ;
(c) The ability of the participants to know what to look for and what to ignore ; and
(d) Limited time factor.

Outcomes

Based on the above factors, small scale programmes were drawn up. These had two aspects. All activities were ones where immediate results were observed. In certain projects, the limited time permitted only to give the start. The rest of the project was either undertaken by the school or the villagers through the rural development society. Other departments and voluntary organizations too promised continuous support for some projects. In all these, however, the village organization or the school head had to take the initiative.

Activities

School based - 1) Sports gymnasium consisting of the following: a swing, balancing post, jumping pit, high jump posts, rope climbing, etc.
2) Agricultural plot for the school.
3) Formation of a sports club at the school.
4) Health programme.

Village based - 1) Clearing a tank bund - this tank had not been used for a very long time due to a breach.
2) Sewing classes for out of school girls.
3) Preparing a volley ball court.
4) Cultural programme.

Proposed Activities - 1) Net ball court.
2) Fence for the plot cleared by the participants to be done by the villagers.
3) First aid box-material to be provided regularly by the health department.

Integration - Health, Agriculture, Rural Development and Sarvodaya (voluntary organization) joined in the workshop. In the discussions that followed the participants were able to understand various aspects of getting aid, advice and assistance. Learning was also related to activities as in the preparation of the agriculture plot and gymnasium.

Inputs

Inputs were in the form of labour, equipment, stationery and clothing. These were supplied by various departments and institutions. The villagers supplied labour and assisted the participants in all such activities. Timber for the gymnasium came from the forest, working equipment from the villaters, sports equipment was supplied by department and institutions, stationary and clothing from well to do schools, nutritive food items from the health department.

Evaluation

The participants at this seminar (Principals and teachers and village representatives) were instructed that they would be brought back to the Teachers College for evaluation of work based on these experiences at the end of three weeks. The objectives of this three day evaluation session are:

1) To review and analyse the experiences of the projects undertaken by the groups and identify the weaknesses and strengths and propose solutions for improvement.
2) To develop guidelines to integrate all forms of learning for rural reconstruction.
3) To identify possible problems that arise in working with the other departments and propose strategies to overcome these problems.

The participants were the same as in the previous one. Representatives of health, agriculture and public administration and the Sarvodaya movement were also present.

Projects undertaken

All projects were need and resource-based. The projects on economic development were mostly agriculture based. All were small scale which did not require much capital. Constraints were observed in a number of projects. However almost all of these constraints have been overcome peacefully and satisfactorily both by the innovator and the villager.

Examples of such projects

1) Agriculture-based
   (a) Vegetable plot for the school, the yield of which to be shared by the children themselves.
   (b) Clearing of a chona with the assistance of villagers for highland paddy.
   (c) Preparation of land for cultivation of cotton.
   (d) Clearing of calas for irrigation.

2) Health-based

(a) Organizing regular clinics with the assistant.

(b) Making first aid boxes for the school and for the village.

(c) Clearing and cleaning of a bathing place for the villagers.

(d) Constructing lavatories on the advice of the public health inspector.

3) Culture-based

(a) Organizing a play, the plot of which is related to problems of the village-idea to awaken the village.

4) Sports

(a) repairing a playground with the help of the villagers and the police department.

(b) Organizing a sports meet for the village.

(c) Organizing an inter-small-school sports meet.

Education

Most of these activities are to be related into teaching learning situations.

Innovative Features

1) Use of village representatives for workshops along with the teachers. This has not been done before in Sri Lanka.

2) The location of the workshop in a remote village. This had the desired impact in that it was possible to provide practical and real-life situation for training the change agent.

3) The disregard for the normal approaches adopted by educators in formulating projects. This is a break-through.

4) The method of getting the teachers and others to sit and discuss problems with the villager, without preconceived notions of their education and professional competency.

Constraints

1) Divisions of opinion amongst villagers regarding the programme.

2) Control of the village by outside exploiters.

3) The need for an incentive for the teacher.

4) Regulations of the small school are still the ones that control all schools in the island.

EXISTING PATTERN

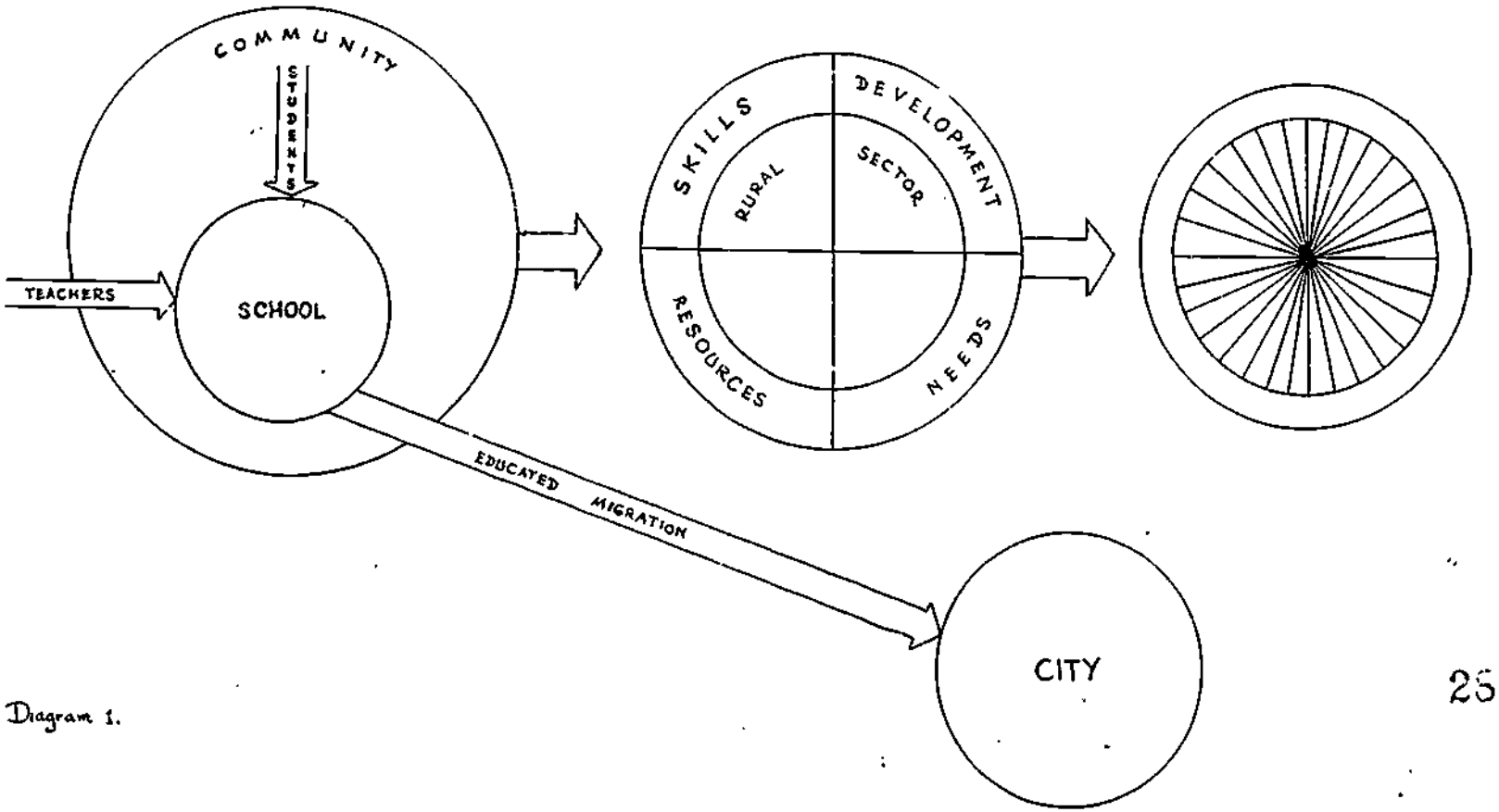
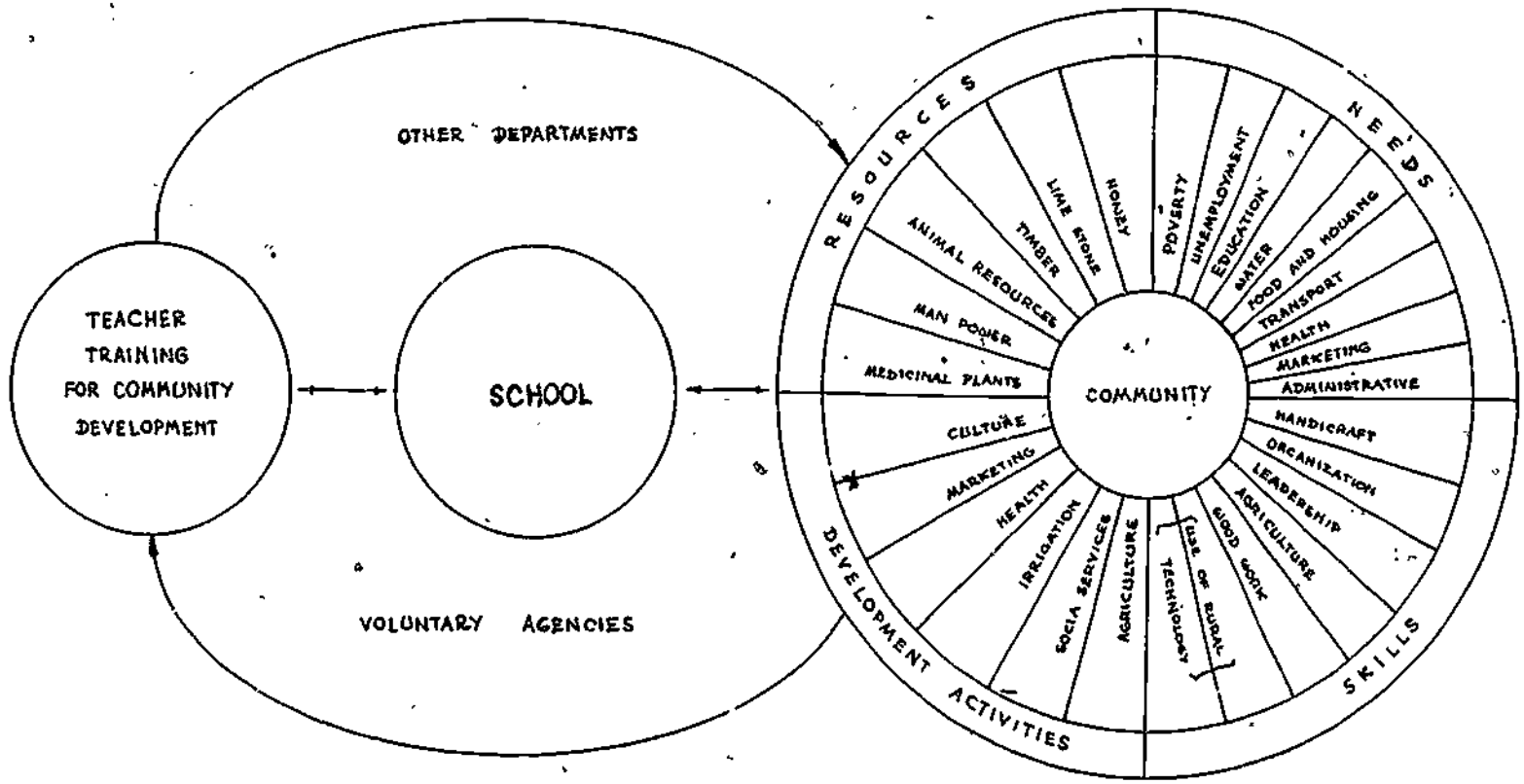


Diagram 1.

CHANGE AGENT



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ANNEX I

AREAS OF THE VILLAGE SURVEY

1. Resources of the village

Aim To give the teacher an understanding of the village resources

(a) Human resources
(b) Rural technology
(c) Physical resources
(d) Problems regarding resources/lack of skills/capital, knowledge to exploit resources, exploitation by individuals, unawareness of resources

2. Cultural pattern

Aim To give the teacher an understanding of the relevance of culture in development

(a) Study of behavour patterns/attitudes/beliefs/values
(b) Work/leisure
(c) Folk drama and ngs

Techniques-observation/informal conversation/get together

3. Health and nutrition

Aim To give the teacher an understanding of the health habits and priorities

(a) Common diseases
(b) Mortality rate and causes
(c) Attitude to health activities/sanitation/immunization
(d) Traditional curing methods/superstitious health beliefs
(e) Availability of health facilities/needs

4. Mass Media

Aim To train the teacher to find out ways and means of influencing the villager for development

(a) Availability of media/frequency of its availability
(b) Types of media/press/radio/local political agent/ enlightened leadership/gossip carriers
(c) Location of media/physical places where ideas are expressed
(d) Ability to make use of media

5. Educational problems

Aim To give the teacher an understanding of the relevance of institutional education to rural development

(a) Institutional drop-outs
(b) Non-school going population
(c) Impact of academic education on the villager
(d) Types of skills the village requires
(e) To locate needs of the villager
(f) Value of integration

ANNEX II

PROGRESS CHART OF THE PROJECT

1. General direction

(a) select a project in consultation with the villagers/base it on the resources of the school and/or village;
(b) the activity should be simple, need based and easily executed;
(c) discussions on its progress with the villagers;
(d) do not be discouraged and expect 100 per cent success;
(e) use of personnel/village, departments, voluntary organizations how often/to what extent/how beneficial/problem.

2. Use of the handout-specific directions

(a) select one or more activity mentioned in the scheme e.g. Cultural Pattern refer-survey module;
(b) under the selected main activity organize one or more projects as above in 1.(a), (b), e.g. cultural pattern - production of a play, health and nutrition - listing village good items of nutritative value;
(c) record the activities under the different heads e.g. (i) cultural-production of plays, (ii) mass media - conducting of meetings for various purposes, (iii) health-mothers' day, cleaning the village well, (iv) education - adult classes on agriculture, selection of seeds (v) resources-preparation of local fertilizer;
(d) record project progress daily or at intervals to suit your work on a project
If there are many projects recording dates could be varied.
e.g. 1st day education - teaching in a worksite
2nd day culture - children's playlet
3rd day education - discussing the progress at the worksite with villagers/irrigation technical personnel
4th day mass media- drawing pictures, posters regarding village health problems, needs;
(e) progress and constraints must be recorded;
(f) format of the chart to be designed to suit your needs;

3. Record number of participants/times/enthusiasm/weaknesses/achievements/special features/innovations

4. On this basis prepare separate charts for public display - villager, officials of other departments

5. Listing of teaching techniques adopted. - Lesson, place, resources needed, response

Specimen Education for Rural Development Progress Chart

.....village .....school

Programme category	1	2	3	4
1. Educational Problems				
(a)				
(b)				
(c)				
2. Resources/Needs				
(a)				
(b)				
(c)				

3. 4. 5.

Signature Principal

ANNEX III

COMMUNITY EDUCATION SYLLABUS

Theory lecturers	Hrs.	Practical and field work	Hrs.
Part I			
1. Basics of the course			
a) Human rights b) to give an idea of the rights which the community should enjoy. c) Methods of equalizing disparity in society. d) Role of the teacher as an agent of change. e) Proposed Janatha Centre-Co munity Centre.	05	Work on hand outs	
2. General Problems of Sri Lanka			
a) Economic b) Social c) Cultural	05	Group discussions	
3. Resources of the world and development patterns in the following countries. U.S., U.S.S.R., China, India, Australia, a country in Africa	05	Work on hand outs Preparation of documents	
4. Definition of Community and Society	01		
5. School and Community work			
a) Wardha b) Sarvodaya c) S.E.I. d) Religious organizations e) Rural Development Organization	04	Group discussions	
Part II			
6. Methodology			
a) Methods of data collecting b) Processing and Analysis of data c) Preseutation of data	04	Project work	14

Theory lecturers	Hrs.	Practical and field work	Hrs.
Part II (cont'd)			
7. Settlement concepts			
a) Traditional			
b) Colony		Survey and	
c) Other types-slums, 'Janawasam'	04	Comparative studies	28
Part III			
8. Psychology of the villager			
a) Cultural pattern			
b) Customs			
c) Traditions and beliefs			
d) Social Relationships			
e) Attitudes		Preservation	
f) Language		and project	
g) External contacts and influence	05	reports	14
9. Leader of the village			
a) Type			
b) Discovery			
i) Child			
ii) Youth		Interview and	
iii) Traditional	04	questionnaire	14
10. Population problems		Survey in re-	
a) World		lation to resources	
b) Sri Lanka/rural/urban	04	of the village-in collaboration with the Family Planning Unit	14
11. Resources of the village		Survey of the	
a) Natural, human, operational		resources of	
b) Technology for the village	03	the village	14
12. Economic and social problems of the village			
a) Poverty			
b) Ignorance			
c) Exploitation			
d) Malnutrition			
e) Sources of income and expenditure			
f) Unemployment			
g) Aspirations	07	Survey	07

Theory lecturers	Hrs.	Practical and field work	Hrs.
Part III (cont'd)			
13. Agencies which provide services to community			
a) Government b) Voluntary - Types of services provided	04	Pilot survey	14
14. Health, Sanitation & Nutrition		02 Surveys/ children/villagers collaboration with	
a) Curative b) Preventive c) Environmental pollution	03	the Health Department	14
15. Education and Problems			
a) Finding needs b) Non-formal education c) Relevance of education	03	Survey/ school, village	14
16. Womens education			
a) Talent identification b) Domestic work c) Cottage industries d) Food production	02	Survey/ practical work	14
17. Education and Society			
a) Constitution of Sri Lanka b) Awareness of rights and duties c) Respect for law and order d) Cultural activities at village level	04	Study of relevant agencies	14
18. Moral Training			
a) Values b) Ideals c) Attitudes d) Family life	03	Survey and reports	14
	70		189

DEVELOPMENT WORK - INNOVATIONS

Villager, youth, trainee, lecturer, official to meet and plan out a Programme of Development

Under sub-committees - a) Education
b) Health
c) Economic
d) Cultural
--- Time devoted 21 hours

Total number of hours-lectures-70 25%
practicals-210 75%

ANNEX IV

CORRESPONDENCE WITH VILLAGE/SCHOOL

Secretary
Rural Development Society,
Illukwewa,
Sigiriya
75.12.9

The Principal,
Training College,
Hingurakgoda

Relief for the suffering Villagers

Sir,

At a united meeting of the parent teacher association and the R.D.S. held on 1975.12.5, it was decided to place before the Government the decisions arrived at this meeting through you. So far except you, no one has taken any steps to bring relief to the Villagers relieve of their suffering.

All steps we have taken so far have failed. The suggestions made by the Pupil Teachers and the Lecturers of your Teacher College who visited our village recently were like a life giving medicine for a dying patient. It is a great act of charity on your part for the measures you have undertaken to improve our village.

The important relief measures we need are as follows:

i) To get at least one bus to our village from Minneriya.

ii) To get the services of the Mobile Medical Unit.

iii) To supply Drinking Water for the Village.

It was also decided at the meeting to convey our heartfelt thanks to the Lecturers and the Pupil Teachers of your College for the immence interest they showed in improving the conditions of our Village. It is the wish of the people of the village that your efforts will bring about a new awakening in the Village.

Yours sincerely,

Sgd. W.M. Bandara
Secretary, R.D.S., P.T.A.
(Rural Development Society
Parent Teachers' Association)

ANNEXURE V

M.J. John Singho,
V.C. Member,
Attaragallawa
14.12.75

The Principal
Teachers' College,
Hingurakgoda

Sir,

I greatly appreciate the line of action you have taken to throw a new light on the poor village of Attaragallawa. The survey conducted by your pupils teachers under the instruction of the teacher educators is a great activity to expose the problems of our village. It was a great success. It was encouraging to see the hard work done by your pupils under very trying and difficult circumstances.

I join with the villagers in thanking you and wishing you all success in all the activities under your scheme of your improvement of the villages.

Yours sincerely,

Sgd. M.J. Johnsingho
Village Council Member

THAILAND: EXPERIENCES IN DEVELOPING CURRICULUM MATERIALS FOR SCIENCE TEACHER EDUCATION AT KHON KAEN

by

Kingfa Sintoovongse

Introduction

The curriculum for science/math teacher education at Khon Kaen University is shown in Appendix A. This is to illustrate all the components of the teacher education programme before confining this write up to the specific courses offered by science/math education section which students take to fulfill credit requirements for their subject area of professional education.

To provide a clear picture of curriculum development activities, a review of the processes used in developing the curriculum for science/math teacher education at Khon Kaen University (later called "centre") will be firstly presented. Then, a conceptual framework of the curriculum showing the relationships between curriculum objectives and four major areas of studies will be shown.

Next, an attempt will be made to show the courses which are offered to meet the curriculum objectives--to produce science/math teachers who are capable to teach at both lower and upper secondary school levels. The method and criteria generally used in selecting course contents of science/math education will be presented later.

The curriculum materials will be presented after the methods of teaching have been discussed.

In the last section, some problems and issues in developing and implementing the curriculum and its materials will be presented. It is hoped that these problems will be recognized and later solved by those who are involved.

Processes for curriculum development

The processes used in developing curriculum for science/math teacher education at Khon Kaen University are as follows:

1. Studying demands of science teacher in the Northeast region. Realizing that science and technology play an important part in socio-economic development for this part of the country, and the lack of science teachers in both lower and upper secondary school levels, the Faculty of Education emphasized the production of science/math teachers and has attempted to encourage those teachers to work in the rural areas, particularly in the Northeast region. In making the study, teacher-student ratio, work load and job placement for science/math teachers were studied.

2. Studying science teachers' competency with referen e to teachers' educational background in three major areas which are most needed: (a) recognition of the new science curricula used in lower and upper secondary school levels; (b) capability in teaching science effectively at both levels; (c) implementation of the new curricula in both content and process.

3. Setting objectives. The curriculum developed for science-mathematics teacher education at Khon Kaen University was designed and aimed to meet the following objectives:

General objectives

a) To develop students' social understanding and desirable attitudes toward the nature of the world and human beings;

b) To develop students' aptitude and interest in special subject content in science and/or mathematics;

c) To develop students' teaching competency in science/math especially at both lower and upper secondary school levels; and

d) To give students' opportunity in selecting to study more of the subject matter areas to which they need.

Specific objectives

a) To produce science and mathematics teachers who are capable of teaching at both lower and upper secondary school levels;

b) To experiment and to do research in methods of teaching and learning conditions provided in science and mathematics curricula suitable for preparing a prospective teacher who is able to teach in rural areas of the Northeast region;

c) To produce teachers who are capable of designing and constructing learning materials and equipment which can be used in secondary school science and mathematics in the Northeast region;

d) To produce teachers who have knowledge and experience in general education, field of specialization and professional education which are fundamental for being a good teacher; and

e) To provide free elective courses in which the student can choose according to his aptitude and interests.

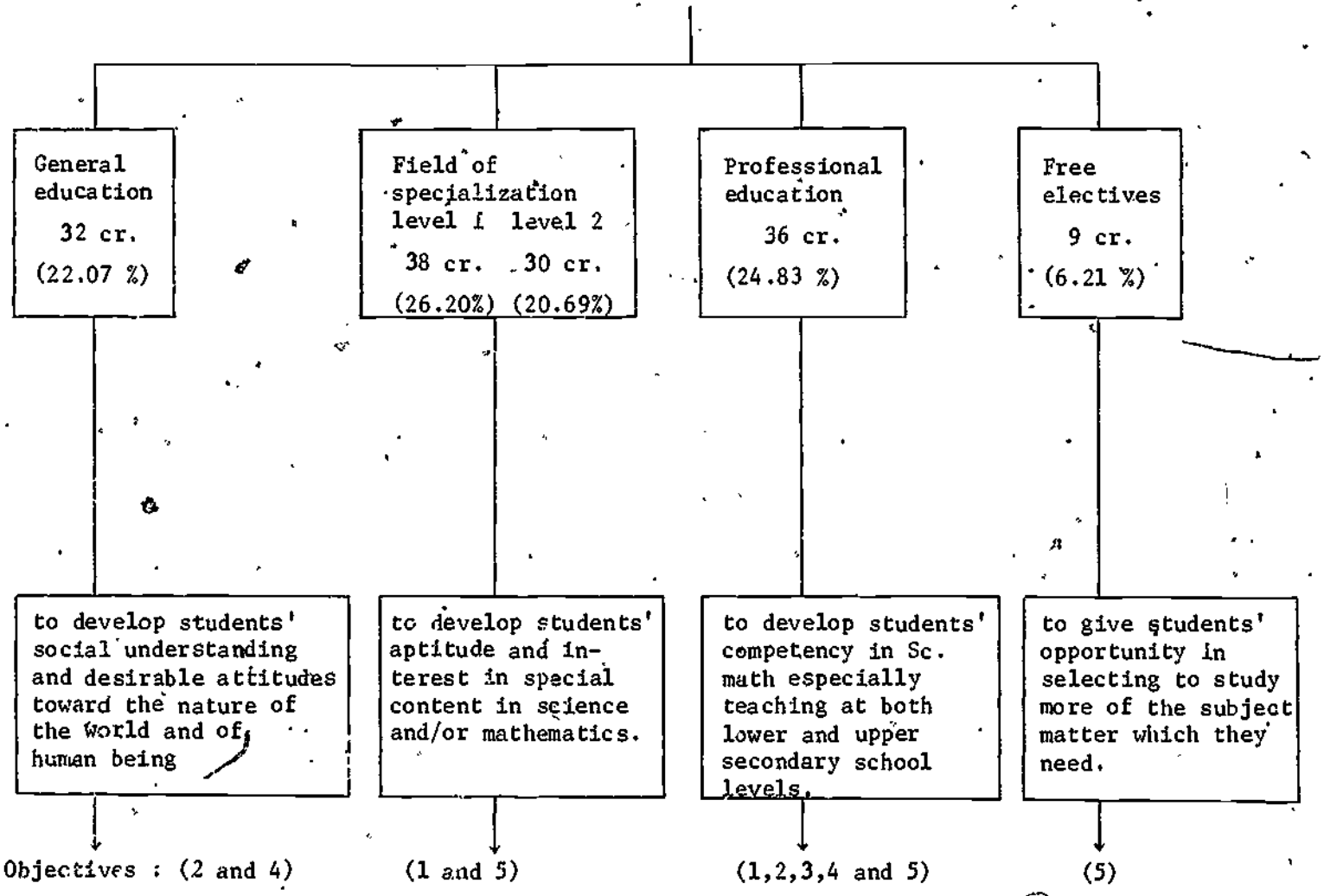
The relationship between general objectives and specific objectives is shown in Chart I.

Method and criteria used in selecting course contents

As observed in Chart I, the courses in professional education area are provided in order to meet the specific objective -- to produce science/math teachers who are capable of teaching at both upper and lower secondary school levels. In appendix A information of the courses provision for curriculum and instruction in both upper and lower secondary school science are illustrated.

Chart I

Curriculum for science-math teacher education (Khon Kaen University)



The attempt has been made in this section of the paper to confine the presentation to the following courses:

IS 340 - Curriculum and Instruction in Secondary School Science and Mathematics

IS 440 - Biology for Secondary School Teachers

IS 441 - Chemistry for Secondary School Teachers

IS 442 - The Teaching of Lower Secondary School Science

IS 443 - Physics for Secondary School Teachers

IS 401 - Student Teaching

The contents of these courses are selected on the basis of the criteria listed below:

1. The content of each course should be in accordance with the subject matter the student will teach when he/she practices teaching. For instance, the content currently used in science curricula at both lower and upper secondary school levels will be provided along with the practicum phase of those method courses (IS 440, 441, 442, and 443).

2. The content selected should lead to practice in utilizing science process skills. Not all of the content in the science textbooks can be taught to develop students' science process skills. Particular content is selected to be used for developing those skills in order that the students will be able to manipulate science experiments effectively. It is a preparation for their internship in student teaching.

3. The content should promote an opportunity of constructing materials and homemade equipment. In teaching science, it is essential for a teacher to devise simple materials and equipment. The teacher should not depend only on those materials and equipment available. He ought to be able to produce materials and equipment for teaching science from things in everyday life. There are courses in this teacher education programme offered for the students to enable them to construct teaching materials.

4. The content should be an example in implementing inquiry approach to teaching science. The inquiry approach is emphasized because it has been the method intended to be used as a strategy of teaching science. Then it is necessary for a teacher-to-be to comprehend the concept of "inquiry" and also implement the method while teaching.

5. The content should develop scientific attitudes desirable in the present society. One of the objectives in teaching science is to develop desirable attitudes in children. So, Science teachers themselves have to possess these attitudes. It is an aim of the teacher education programme to develop desirable attitudes towards science in the students. When they teach they eventually develop those attitudes in their pupils.

6. The content should be a part of everyday live in the rural area. Khon Kaen University is partly serving as a learning/academic resource center in the Northeast region of Thailand. It is one of the objectives of the University to produce science teachers who can really teach in the rural area. Then, the content of the courses provided must be selected in accordance with the real life conditions, particularly the Northeast region.

Teacher education --A pre - service programme

In Thailand, since the new curricula in secondary school science developed by the Institution for the Promotion of Science and Technology (IPST) have been introduced to schools, it can be said that the teaching of science as inquiry has become popular as an approach to science teaching. Contents and exercises in school science textbooks have been attempted to incorporate this approach to teaching. Most of the secondary school science teachers have been exposed to the inquiry process by way of attending an in-service training programme arranged and provided by IPST. Although the emphasis of science teaching is on inquiry as an investigative activity, it does not mean that the facts and the principles of science are no longer important-- they are important and ought to be taught along with the inquiry process. There is no doubt that the teaching of science as inquiry was introduced to teachers through the new secondary school science textbooks which are the products of curriculum development projects in science teaching. However, it is questionable how much of the impact the process of inquiry has on the teacher education degree programmes, particularly at the under-graduate levels. Khon Kaen University is serving partly as an in-service training center for upper secondary school science and mathematics teachers during the summer. But mainly, the university is responsible for teacher education programmes at under-graduate levels.

In the programme for teacher education in science/math at secondary levels, students are introduced to the method of inquiry and at the same time get acquianted with new curriculum materials, such as textbooks and other equipment currently used in secondary schools.

Other aspects of the programme for the students include:

1. The use of behavioral objectives;
2. Updating subject area specializations through special courses for teachers;
3. The use of new techniques of teaching besides inquiry in science teaching (innovation);
4. The use of formative and summative evaluation; and
5. The use of new curriculum materials available in secondary schools science.

These aspects are included in the method courses serving as a preparation for pre-service training-student teaching.

The students are expected to be able to specify their instructional objectives. The specificity with which they are formulated helps in giving direction to the selection of content and activities and also evaluating procedure pertinent to those activities. The use of secondary school science/math materials in the pre-service programme particularly in instructional methodology courses familiarizes the student teacher with actual teaching materials and methods of instruction for the subject area and the grade level at which they will eventually teach. This helps keep them abreast with developments in secondary school curriculum materials and approaches to teaching.

In the instructional methodology courses for the science/math teacher education programme, the largest block of each course (65%) is devoted to practicum phase followed by 35 per cent of lecture and discussion. This proportion cannot be used for the course of curriculum and instruction for secondary school science and math (IS 340). This is due to the fact that the students are introduced for the first time the following:

1. The new curricula in secondary science and mathematics;
2. The usage of new curricular materials; and
3. The method of teaching "inquiry" suggested in the curriculum materials, such as textbooks and teachers' guide.

Thus in the course IS 340 the lecture and discussion methods are the major proportion (70%) followed by 30 per cent of exercises as shown in the following table:

Table I: Percentage of Instructional Phase

Course Title (Code)	Practicum Phase	Lecture and discussion phase
Curriculum and Instruction in Secondary School, Science and Mathematics. (IS 340)	30	70
The Teaching of Lower Secondary School Science (IS 442)	65	35
Biology for Secondary School Teachers (IS 440)	65	35
Chemistry for Secondary School School Teachers (IS 441)	65	35
Physics for Secondary School Teachers (IS 443)	65	35
Student Teaching (IS 401)	100	-

As observed in the above table, the structure of the course in student teaching (IS 401) is devoted to practicum phase. Prospective science teachers are expected to be able to apply all the knowledge of curriculum and instruction from the instructional methodology courses. Senior students are required to take IS 401 as an internship for teaching practice as a fulfilment for graduation. The students teachers are assigned to practice teaching in secondary schools inside and outside

the city. This training programme provides opportunities for students to practice teaching in order to gain basic skills and relevant experiences in teaching. In addition to teaching, student teachers are assigned to be responsible for class activities and other aspects of being a teacher for example, classroom discipline, extra-curricular activities, etc. The student teachers have to work in schools for 4½ month period (a semester). Supervision is one of an important tools used in evaluating student teachers' performance. The staff, those who teach instructional methodology courses (IS 340, 440, 441, 442, 443) are assigned to supervise student teachers during their training period. Each student teacher is expected to be observed and supervised four times during their practicum. The supervision technique currently used at Khon Kaen University is similar to those of other institutions in teacher education.. But there is no final examination for the evaluation of student teachers' performances.

Each observation by the supervisor is graded. The total score of observation is then averaged. The proportion in evaluating student teachers' performance is divided into following categories:

People who give scores and grades	Percentage
Supervisors	50
Incorportive - teachers	30
Conferences and seminar	6
Daily lesson plans	9
Other activities	5

The internship period is vital to teacher education programme. Student teachers' performance will indicate:

(a) levels of comprehension and application of knowledge which they have learned;

(b) attitudes towards teaching career;

(c) teaching competency with regards to particular classroom conditions.

The structure of theoretical and practicum components of those instructional methodology courses are indigenously designed to remedy weaknesses found by research findings, students' practicum assessment, students' self-evaluation and questionnaire given to them. The research findings concerned indicate that science instructional methods of different curricula did not have any effect on students' performance on seven Piaget's logical operations.[1] There is also an evidence of research findings that displays that a teacher is still a centre of a classroom, although various methods of teaching have been introduced.[2] Information given by students in a form of questionnaire and self-evaluation shows that 60 per cent of the students who took some instructional methodology courses need more of a practice in asking questions which is leading to inquiry. Observation from students' practicum assessment shows that only some of the student teachers could utilize inquiry in science teaching. These evidences indicate that curriculum materials for inquiry technique of teaching science should be developed.

In addition to those curricular activities provided in the course IS 340, 440, 441, 442, 443, and student teaching, there are extra-curricular activities supplementary to science/mathematics teacher education programmes; for instance, science club, science exhibition, participation in teaching for remedial learning, joining some rural development voluntary programmes arranged by the University Students' Club.

Curriculum materials

As it was mentioned before, "inquiry" is a suitable approach to teaching science. This paper presents in Appendix B - inquiry training model for science teaching. In the model, there are:

(a) Supplementary reading or learning resource;

(b) Students' exercise sheet or worksheet; and

(c) Teachers' guide to provide an information about inquiry approach prior to working.

Problems and issues in developing the curriculum and its materials

Although the teacher education curriculum for science/math had just been revised and developed to meet the demands of the recent teaching career in science and mathematics and the new school science and mathematics curricula, there are some problems needed to be solved.

1. Processes and outcomes of the curriculum development have been mostly based on the judgement of the committee. The research or evaluative studies of science teacher education programmes in the country are insufficient. There has been a lack of factual information and criteria on how science teachers are actually prepared for their profession. The number of credits and the description of courses are not sufficient to be used for making judgement of the adequacy and the quality of the programme.

1/ Sintoovongse, et al. "Students' Ability in Using 7 Piaget's Logical Operations to Solve Learning Problems", Research Paper presented at SEAMEO-RECSAM, Penang, Malaysia, 1978.

2/ Suwannathat, Chancha. A Synthesis of 239 Research Papers. Institute of Behavioural Science Research, Sri-Nakarintarawirot University, Prasarnmitr, 1978.

2. The curriculum was developed without looking at the needs of the local secondary schools. There should be a study designed to find out the relevancy of courses in science teacher education programme to the practical needs of the local schools. To put it bluntly, at the undergraduate level, courses are, if not all, mostly theoretical. Students do not have enough opportunities to see how the principles they have learned are translated into practices in actual classroom situations.

3. There is a lack of research studies on science/math teacher education and the learning process of science and mathematics suitable for Thai children particularly in the northeastern region.

4. There are some problems of selecting students who are willing to work in the rural areas.

5. Courses which aim to promote rural understanding are inadequate.

6. There is a shortage of locally produced teaching materials which are appropriate for local school needs and its environment. Work books, source books and supplementary readings are needed for teachers' preparation and students' learning in dealing with various types of teaching approaches.

Strategies to solve problems

Actions initiated as ways to solve problems are as follows:

1. Curriculum development ought to be designed and developed by a team of selected experienced professionals, educational experts, official leaders, political leaders and representatives from the community. Instructors and those who are involved in the curriculum design and development should initiate more of the pilot studies in order to obtain factual information which can be used as guidelines for the preparation of the efficient science/mathematics teacher education degree programme.

2. Lectures in either content or pedagogical area should take into consideration of the relationship between content and method.

3. More research studies on science/mathematics teacher education and the learning process of science and mathematics appropriate for Thai children particularly in the northeastern region need to be carried out. The findings from these studies will help in identifying problems and specifying objectives in developing the curriculum and materials.

4. Students tend to return to work in their home towns. So, it is necessary to open more opportunities for students in the northeastern region to enter the university.

5. Syllabi for courses related to rural understanding have to be revised based on identified problems and needs. Instructors, lecturers and those who are involved in designing and developing the curriculum should have practically work in the area of integrated rural development.

6. Students, with teachers' assistance, should be encouraged to produce new materials which are locally appropriate for local school needs and its environment, rather than depending solely on the existing materials and equipment.

Mechanism and procedures for continuous evaluation

Attempts have been made to implement, revise and renew the materials. The evaluation procedures include:

1. A systematic observation technique for evaluating students' performance while using inquiry;
2. A questionnaire relating to the objectives identified for the implementation of the materials to be answered by students;
3. A form of self-evaluation to obtain students' suggestions for renewal of the materials;
4. Use of teachers' comments as a guideline for continuous evaluation and curriculum renewal; and
5. Use of all information obtained from above to facilitate continuous evaluation and renewal of the materials.

APPENDIX I

THE CURRICULUM

At Khon Kaen University, a total number of 145 credits are required for students to complete bachelor's degree in Education. The students are expected to complete their courses in 4 years (8 semesters). There are 4 fields of courses to be studied as in the following:

1. General education

Students are required to take at least 32 credits or 22.07 per cent of the total 145 credits for bachelor's degree of education majoring in science/mathematics. The courses are listed below:

Code	Title	Credit	Prerequisite
	Social Sciences (11 credits)		
IF 130	Introduction to Social Sciences	2	
IF 133	Principles of Economics	2	
IP 120	Introduction to Psychology	3	
IH 110	Personal and Community Health	2	
IH 130	Physical Education Activities I	1	
IH 131	Physical Education Activities II	1	
	Humanities (9 credits)		
IF 110	Music Appreciation	2	
IF 111	Art Appreciation	2	
IF 112	Studying Methods	1	
IF 120	Logic	2	
IF 142	Thai Literature Appreciation	2	
	Languages (12 credits)		
IF 140	Thai I	2	
IF 141	Thai II	2	IF 140
IF 142	Essentials of Public Speaking	2	IF 141
SE 101	General English	3	
SE 102	General English	3	SE 101

Code	Title	Credit	Prerequisite
	Science and Mathematics (6 credits)		
IS 101	Environmental Science	2	for non-
SG 104	Earth Science II	2	science
SM 101	General Mathematics	2	majors

2. Field of specialization

There are 68 credits, 46.89 per cent of the total 145 credits to which students are required to take. These courses are divided into two level, I and II as in the following:

Level I Course title (credits)	Level II Course title (credits)
Biology I (4)	Biology (15 to be chosen)
Biology II (4)	General Microbiology (4)
	Plant Morphology (3)
	Ecology (3)
	Genetics (3)
	Animal Physiology (3)
	Elective Biology * (3-4)
	(due to courses offered by the department).
General Chemistry I (4)	Chemistry (15 to be chosen)
Organic Chemistry I (4)	Organic Chemistry II (3)
	Analytical Chemistry I (3)
	Analytical Chemistry II (3)
	Inorganic Chemistry (3)
	Physical Chemistry (3)
	Biochemistry (4)
	Elective Chemistry * (3-4)
	(due to courses offered by the department)
Geology for Teachers (3)	

Level I Course title (credits)	Level II Course title (credits)
Algebra I (2)	Mathematics (15 to be chosen)
Algebra II (2)	Development of Mathematics (3)
Calculus with Analytic	Theory of Numbers (3)
Geometry (2)	Linear Algebra and Matrices (3)
Calculus (2)	Introduction to Modern Algebra (3)
	Advanced Calculus I (3)
	Introduction to Mathematical Analysis (3)
	Differential Equations (3)
	Basic Statistics (3)
	Elective Mathematics* (3)
	(due to courses offered by the department)
General Physics I (4)	Physics (15 to be chosen)
General Physics II (4)	Physics of Matter (3)
General Astronomy (3)	Modern Physics (3)
	Optics (3)
	Atomic and Nuclear Physics (3)
	Electronics (3)
	Electronic Laboratory (1)
	Advanced Physics Laboratory and Workshop (2)
	Elective Physics * (3-4)
	(due to courses offered by the department)

* Students may take other courses in each of the four areas, Biology; Chemistry; Physics; and Mathematics, which are offered by the departments with a permission from department chairmen from both faculties (science and education).

3. Professional education

The students are required to take at least 36 credits of the courses in this field (14.83% of the total 145 credits). These courses are listed below.

Code	Title	(credits)
IF 320	Philosophy of Education	(3)
IF 330	Education and Thai Society	(3)
IP 300	Introduction to Developmental Psychology	(2)
IP 330	Measurement and Evaluation in Education	(3)
IP 400	Introduction to Educational Psychology	(3)
IS 310	Utilization of Instructional Media	(2)
IS 300	Development of Curriculum and Instruction	(2)
IS 340	Curriculum and Instruction in the Secondary School Science and Mathematics	(2)
IS 442	The Teaching of Lower Secondary School Science	(3)
IS 440	Biology for Secondary School Teachers	(3)
IS 441	Chemistry for Secondary School Teachers	(3)
IS 443	Physics for Secondary School Teachers	(3)
IS 444	Mathematics for Secondary School Teachers	(3)

4. Free elective courses

There are 9 credits required in this field. It is about 6.21 per cent of the total 145 credits. Students are free to choose any courses in the field so as to make 9 credits requirement. These courses are as follows:

Course title	(credits)
Thai Government and Politics	(2)
World Civilization	(2)
Contemporary World Affairs	(2)
Thai Culture	(2)
Esan Culture	(2)
Introduction to Population Education	(2)
Introduction to Cultural Anthropology	(2)
Rural Sociology	(2)
World Geography	(2)
Music in the west	(2)
Thai Music	(2)
Thai III (Contemporary Prose)	(2)

Course title (credits) (cont'd)

Thai IV (Tahi Poetry) (2)
Dramatics for Teachers (2)
Introduction to Social Psychology (3)
Statistics in Education (2)
Mental Health in Education (2)
Guidance in the Secondary School (2)
Guidance in the Elementary School (2)
Elements of Educational Research (2)
Practical Work in Tests and Measurements (2)
Elementary Education in Thailand (2)
Administration of School Systems (2)
Micro-Teaching in Science (2)
Project in Instructional Materials (2)
Graphic Materials (2)
Introduction to Photography (2)
Programmed Instruction (2)
Technology and Contemporary Education (2)
Physical Education Activities III (1)
Physical Education Activities IV (1)
Scouting and Junior Red Croso (1)
Development of Biological Sciences (2)
Speaking/Listening Comprehension (3 and 3 and 3)
Reading (2) and II (2)
Writing (2) and II (2)
Pronunciation (2)
Report Writing (2)
Technical English (2)
Introduction to Literature (3)
Listening Comprehension (2)
Development of Physical Science (2)

Note

1. Students who major in science - math teaching may choose to take courses in their field of specializations as electives.
2. Students may choose courses other than listed above with the permission from their advisors and others who are involved.
3. Students must take the course, Statistics in Education, except those who have taken courses related to statistics offered by the university. To take these related courses students have to ask for permission from University advisors.

APPENDIX II

THE CURRICULUM MATERIALS

Supplementary Reading

Topic: Inquiry Method of Teaching

There are several methods of science teaching but all of them have one common aim - that is, of equipping the student with knowledge and skills in contents and processes of science. One of these methods is "inquiry." The inquiry method emphasizes the importance of student's participation in the process of acquiring and refining knowledge or investigation. The particular features of inquiry include:

- discussion, in the form of questions as a prelude to an experiment;
- the experiment; and
- discussion which is leading to conclusion of the experiment.

Discussion is oue of the important features of inquiry process. If the teacher can provide help when it is needed, he will enable the student to think independently and critically, to express his views, to respect other persons' views, and not to be irrational or superstitious. Experiment is considered to be the heart of inquiry method for science teaching, because it will lead to training for various science processes skills. These skills are regarded by educators as tools for inquiry training. The experiment also provides opportunity for teamworking, and learning to be a good leader as well as good follower. However, there are some circumstances under which experiment cannot be done in class, such as the problems of safety, availability of complicated and expensive tools, time limits, and etc. If such is the case, we might as well make use of previous experiments by other experts for our teaching with inquiry method. We, as a science teacher, can partly suggest the design of experiment to the student by duplicating the experiment so that the student can work on the experiment and then obtain the data which will finally lead to discussion for conclusion of the experiment.

1) Inquiry method comprises of what activities?

1.1 discussion 1.2 experiment

2) What is the significance of 1.1 in regard to inquiry method of teaching?

Discussion enables the student to think independently and critically, to be able to express his views, to respect other persons' views, and not to be irrational or superstitious.

3) What is the significance of 1.2 in regard to inquiry method of teaching?

Experiment helps in training the student for science processes skills, the ability to participate in teamwork, and to be a good leader and a good follower as well.

4) In inquiry method of teaching, who should be the inquirer, teacher or student?

Student.

5) It the teacher becomes the inquirer himself, do you think the inquiry method is useful, and why?

There will be little benefit to the student because knowledge and skills in science processes are gained be teacher. The more he teaches with this method the more he learns and becomes more experienced. Contents and processes are not transferred to the student.

6) If the student is the inquirer (an active participant), do you think the inquiry method is useful and why?

It will be useful, because the student gains knowledge and science processes skills. The more he inquires, the more he learns the knowledge and skills. He also learns how to study independently in the future.

7) If the student is the is the inquirer (active participant),what should be the role of the teacher in order to achieve the instructional objectives?

The teacher should switch his role from information giver to that of a guide and to provide tools and arrange learning conditions in such a way as to encourage inquiry process. In some instances, the teacher can suggest problems in order to carry on discussion but he should not try to lead the discussion and jump to the conclusion.

8) What causes the student want to inquire?

Curiosity, the desire to learn, and the desire to find explanation to his curiosity.

9) Who do you think is the most influential factor in the general condition of learning?

The teacher

10) What do you think a teacher should do to make the student interested in the subject under study?

The teacher should:

- provide adequate equipment and a suitable atmosphere;
- provide an introduction in a form of problems in order to stimulate interest and curiosity on the part of the student;
- provide opportunity for experiment so that the student can find answers to the problems; and
- encourage post-experiment discussion with students in order to help him arrive at conclusions.

To carry out the above practices, the teacher needs to observe question-making techniques which will foster the student to think and to find answers by himself.

11) Which items in No. 10 do you think is the most effective in making the student think and to start inquiry?

> Question making techniques which, if the teacher is skilful, will help the student learn how to find answers to the questions.

12) There are many types of questions in the teaching learning process. But in the teaching of science, the skill-training type of questions is the common practice. The followings are examples of different types of questions which lead to skill training in the process of science:

> - Questions leading to observation skills.
>
> - Questions leading to hypothesis-making skills.
>
> - Questions leading to explanation skills.
>
> - Questions leading to conclusion skills.

Exercise Sheet

Topic: Inquiry Method of Teaching

1. Choose subject content to be used with inquiry method.

   .....

   .....

2. Identify behavioral objectives.

   .....

   .....

3. Build up content-related conditions in the form of problems which will lead to discussion.

   .....

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4. Construct questions which will lead to discussion for solutions.

   .....

   .....

5. Construct questions which will lead to the setting of hypotheses.

   .....

   .....

6. Setting up an experiment.

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   .....

7. Construct questions which will lead to discussion for conclusion of the experiment.

   .....

   .....

8. Classify those questions in 7.

   .....

   .....

Teachers' Guide

Topic: Inquiry Method of Teaching

1. Choose subject content to be used with inquiry method.

   To find center of gravity and use it to explain some phenomena.

2. Identify behavioral objectives.

   After the completion of the lesson the student should be able to:

   - define center of gravity;
   - explain how to find center of gravity; and
   - use knowledge of center of gravity to explain some phenomena.

3. Build up content - related conditions in the form of problems which will lead to discussion.

   Demonstrate each of the followings:

   3.1 Show a picture of a gymnast walking on a rope with a long pole in hands. Either tape it to the board or show it to the class with your hands.

   See Figure 1

   3.2 At the corner of teacher's desk, use two forks, tongues intertwined together, insert a wooden stick at the intertwining point and let the tip expose about 3 cm. Place the set at the corner of the desk. The forks can flost in the air.

   See Figure 2

   3.3 Let the student walk on a tiny pole, about 3 meters long, supported by 2 chairs, by

   - not spreading arms; or
   - spreading arms; or
   - using a pole, longer than arm-length, to support balance of the body.

   See Figure 3

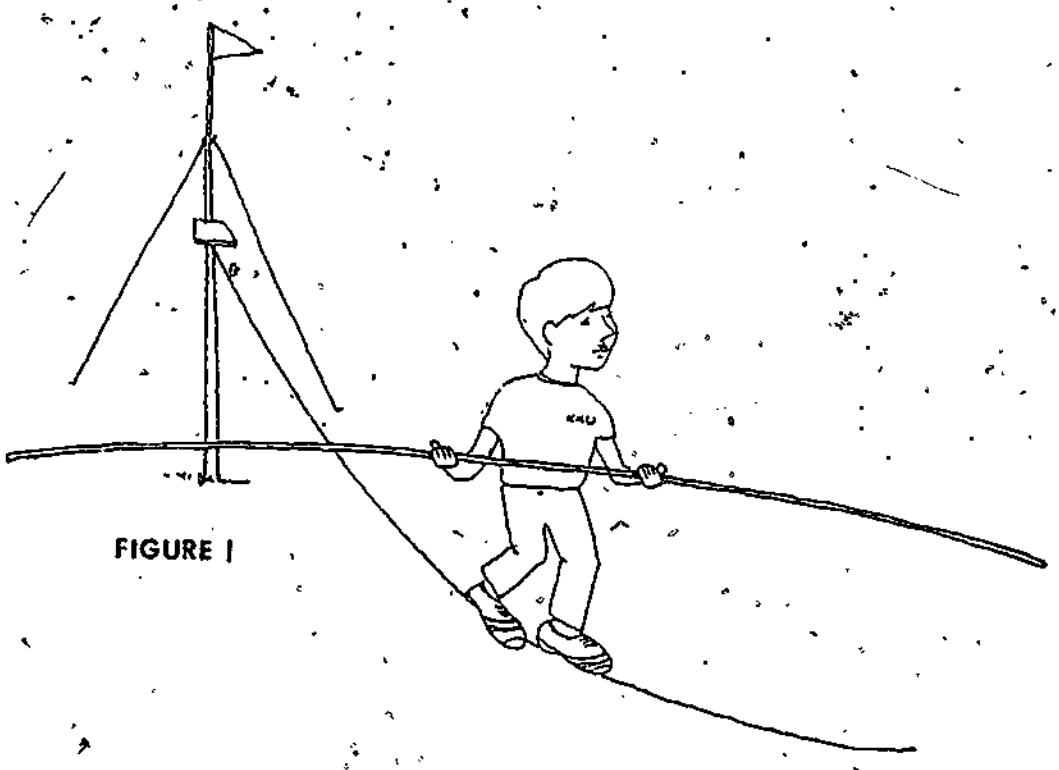


FIGURE 1

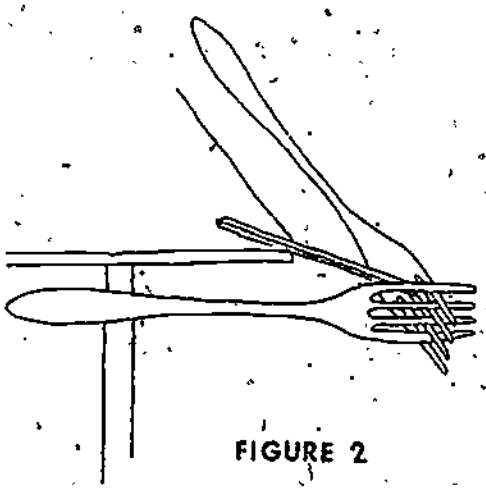


FIGURE 2

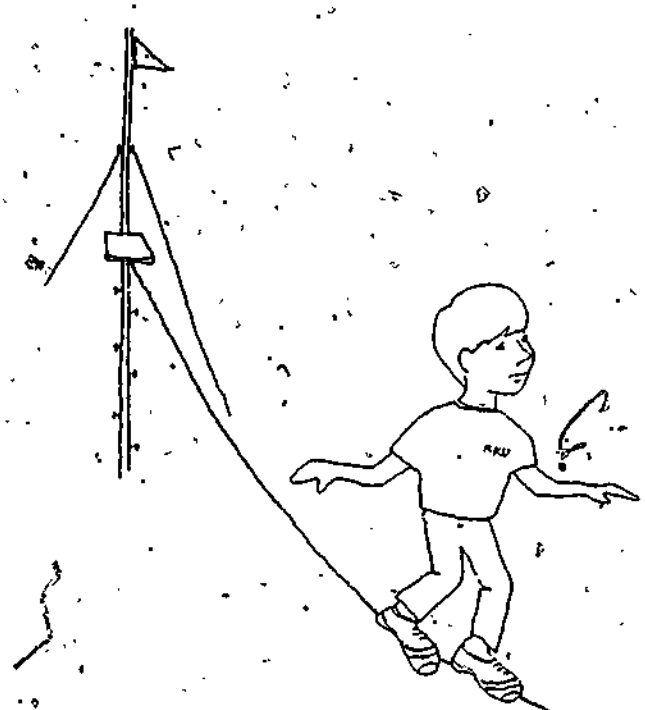


FIGURE 3

4. Construct questions which will lead to discussion for solutions.

Condition 3.1

- How can someone walk on a rope and not fall down?
- What role does the pole in the gymnast's hands play in keeping him from falling down?
- What role does the length of the rope play in keeping him from falling down?
- When someone stands on the rope without falling, do we say that the equilibrium exists?
- What kind of equilibrium is it?
- When it is stated that equilibrium exists, what state of equilibrium is it?
- What does body-adjustment of the man on the rope contribute to the existence of equilibrium?

Condition 3.2

- Is there any part of the set that holds or fastens to the desk?
- If no part of the set was not fastened to the desk, how can the object remain stable?
- How to use principles of physics to explain stability of objects?

Condition 3.3

- Which is the more convenient way to walk on the rope, spreading or not spreading arms?
- What does arm-spreading contribute to body balancing?
- What is a good body balancing in this condition?
- What does the length of the pole contribute to body balancing?
- How to use principles of physics to explain the body stability?

5. Construct questions which will lead to the setting of hypotheses.

Condition 3.1

- If the ends of the rope were not tied at the same level, what would happen to the rope-walking?

Condition 3.2

- If the wooden stick that was inserted between the fork tongues were double in length, could the forks still remain equilibrated?

Condition 3.3

- If the tips of the pole are not equal in size, what would happen to body balancing of the man?

6. Devise an experiment.

Purpose: To find center of gravity of objects.

Tools: 1 Thick paper sheets of different shapes, make 5 or 6 holes at the edges

2 Tiny threads each thread tied to a match handle, and the other end was covered with crayon, to work as a plummet

3 A ruler and a black pencil

4 Nails

Methods

Step 1. Hang the sheets on the nails which were hammered to the wall.

Step 2. Tie the threads to the nails, one to each nail, letting the plummets stay still in vertical positions.

Step 3. Mark the lines of the threads on the sheets.

Step 4. Draw the lines on the sheets.

Step 5. Remove the threads and the sheets from the nails, and hang them back again by using new different holes.

Step 6. Repeat the experiment from Step 1 to 5 until all the holes on the sheets are used.

Step 7. Hold each of the sheets in horizontal position, use the tip of a pencil to support the sheet at the crossed point which was created by drawing the lines, then remove the hand from the sheet, what would happen to the sheet?

Step 8. Do the same experiment as in Step 7 by using the rest of the sheets.

7. Construct questions which lead to discussion for conclusions of the experiment.

7.1 When tying the threads with nails, would the lines of the threads be straight?

7.2 Where would the lines of the threads stay?

7.3 If the positions of the sheets were changed, would the lines of the sheets remain the same?

7.4 If the positions of the sheets were changed, what would happen to the edges of all the sheets in relation to the walls?

7.5 Why do the lines of the threads always remain in the vertical positions?

7.6 How do the lines of the threads which were drawn on the sheets look?

7.7 What are the lines of the threads can explain when compared with the sheets?

7.8 Why do the lines of the threads which were drawn on the sheets meet at one particular point?

7.9 What is this point called?

7.10 How could this point be explained clearly according to the principles of physics?

7.11 What would be the results of placing the tip of a pencil under a sheet which is in the horizontal position?

7.12 How to explain the results of question No. 7.11, using the principles of physics?

7.13 If the pencil tip were not placed at this particular point, what would be the results?

7.14 How would you use the conclusions from the experiment to explain the phenomena in conditions 3.1, 3.2, and 3.3?

7.15 If we do experiment with the same sheet in the space where there is no gravitational force what would be the results?

8. Classification of questions in No. 7.

8.1 Questions which provide training in experimental observation skills are No. 7.1, 7.2, 7.3, 7.4, 7.6, and 7.11.

8.2 Questions which provide training in explanation skills are No. 7.5, 7.7, 7.8, 7.9, 7.10, and 7.12.

8.3 Questions which provide training in setting hypotheses are No. 7.13, and 7.15.

8.4 The question which leads to the utilization of knowledge from experiment is No. 7.14.

THAILAND: EXPERIENCES IN DEVELOPING INSTRUCTIONAL MATERIALS FOR TEACHER EDUCATION

by

Mr. Supol Wuthisen

Introduction

About 80 per cent of the population in Thailand live in rural areas. The smallest administrative unit is recognized as the Mu Ban (hamlet), which is a community with approximately 500 - 5,000 inhabitants. The larger units are Tambol (village), Amphur (district) and Changwad (province). Presently there are 72 Changwads in Thailand. On the average one Changwad has 650,000 inhabitants in 10,600 square kilometers. There are 16 Changwads in North Eastern Thailand.

The development of human resource in the rural areas has predominantly been the target of national development, as has been emphasized since the National Economic and Social Development Plan I (1967 -) to the present National Economic and Social Development Plan IV. (1977 - 1980). However, the related problems of human resource in education, health and practical skills prevail in various forms. As indicated in the National Economic and Social Development Plan IV, the major concerns are food and nutrition, ability and vocational skills compatible with economic and social development process in rural areas.

The means to the development of rural human resource, accepted by every concerned agency, is education. Education, here does not mean simply teaching/learning in schools, but implies evr y condition of learning which influences desirable behavioral changes. It applies to the whole population, not limited to children and youth. The school is one major component, among several, involved in the educational process. Thus educational activities indicate a variety of methods to impart knowledge to the masses. In other words, they are not confined to the work of teachers, but also to development, health, agricultural workers and mass-media as well. Necessarily, in order to ensure the effectiveness of efforts in rural human resource developments, every concerned agency has to work cooperatively in planning, implementation, evaluation and development. It is impossible for each individual agency to work on its own. To avoid the problems of overlapp ng and disagreement, which now exist, 'integrated development' is the key-word.

If one considers Thai society from the smallest unit, teachers will be found to be the most essential personnel. The figurea in 1977 reveala that there are 316,787 teachers all over the country. Of these, 197,945 teach in 28,580 primary schools with 5,397,250 pupils in rural areas.

It is accepted that teachers are effective change-agents in developing human resource. The study of Udorn Thani Teachers' College in 1978 showed that in the rural areas of Udorn Thani and Nongkhai teachera are the change-agents for development as effective as village headman and mass-media. Teachers are influential in every aspect of rural development: in education, culture, politics, health, etc. One of the key elementa to rural transformation is the qualification of the teachers.

Teacher training in Thailand is generally supervised by the Faculties of Education of Universities under the University Bureau. They train teachers, mostly, at degree levels. Their products, however, perform tasks which are oriented to urban areas. Rural teacher-training it could be said, is practiced by the Teachers' College under the Ministry of Education. The conclusion is drawn from the fact that many career teachers graduated from Teachers' Colleges. Individual Teachers' Colleges practice pre-service as well as in-service teacher training in specific areas. One Teachers' College takes care of the training of teachers in 2-3 provinces. Moreover, Teachers' Colleges of the same region (North-East cluster, for example) co-operate in academic affairs which include the development of teacher training curriculum for their own locality.

Udornthani Teachers' College deals with the training of teachers, pre-service and in-service, in the areas of Udornthani itself and Nongkhai provinces. Its present student population of 4,153 students is decreasing, as it plans to focus more on the training of career teachers. Statistics in 1977 show that there are 11,609 career teachers in Udornthani and Nongkhai, of which 7.32 per cent are bachelor degree holders. Among these degree holders, 1,5 per cent teach in rural schools, whereas the rest hold administrative posts. The figures also reveal that the 9,378 teachers or 80 per cent of the total number educational personnels not included, are found to teach in rural schools.

The Council of Teacher Training specifies the master curriculum of Teachers' Colleges in terms of structures. Individual Teachers' Colleges are independent since they are able to develop methods and teaching programmes related to educational and local needs. Everything, however, must be exercised under the structure of the master curriculum of the Council. At present, every Teachers' College is seeking for trends and structures in such a way that they conform in quantity and quality to local needs, under different methods and projects.

In 1975, during which the National Educational Reforms were proposed by the National Committee, Udornthani Teachers' College set up its "Research and Development Center" (R & D Center), in order to study current educational movements. Beside the mentioned purpose, the Center analyses the national educational policy of teacher training and conducts educational research for the development of its own college. Many research projects of the Center were supported academically as well as financially by some government agencies at the national level and by some international development agencies whose offices are located in Thailand.

The Udornthani Project for Educational Reforms by means of Teachers' Training (UPERTT), an operational research, was conducted during 1975 to 1977, by the Research and Development Center of Udornthani Teachers' College. It was an attempt to search for alternatives to train teachers, in both formal and non-formal education, to be effective change-agents for the development of rural human resources. Besides the ability to teach in schools, this project prepared student teachers to live happily in rural areas and be able to help the creation of an educated community. A total number of 795 student-teachers practice their field-work in 275 villages scattered in Udornthani and Nongkhai (the areas of the two provinces are of 23,919.95 square kilometers). They went out in groups, 3 in each group, for the period of three months per group and per village. During the three years of experimentation, college supervisors and local educational personnel including career teachers participated in the project, using different types of instructional materials developed for this particular operation.

The outcome of the research and study were presented to delegates of teacher training institutions in the national field operation seminar on "Teacher Training for Rural Transformation" held at Udornthani Teachers' College in 1976. It was agreed from the seminar that in order to develop rural education, continuing teacher training should be provided with emphasis on career teachers. This idea was later expounded in the National Economic and Social Development Plan IV. The Department of Teacher Training, through the Council of Teacher Training, announced the operation of this policy in 1977. Thus Udornthani Teachers' College, like other Teachers' Colleges, is starting the implementation of Educational Extension Centres for Teachers In-service Training to provide training to career teachers. Instructional materials are being developed for this "distance learning", to create the open learning system to all career teachers.

The UPERTT project was temporily stopped at the end of academic year 1977 due to economic limitations and the introduction of the new curriculum. However, it is expected to re-operate when the present continuing teacher in-service training programme has been firmly established. That is to say,more college teachers will undertake their tasks in rural sites and more co-operation will be exerted among the consuming and producing agencies. What has been recently developed based on the similar principles and methods is the Project of Clustered Field-work in rural areas. The arrangement has been done by having the academic courses which are related to rural community taught in genuine situations. The Project of Clustered Field-work will extend the former period from 2 months to 4 months under new curriculum. By this method, besides the reduction of transportation cost, theory can be evidently put into practice, which consequently implies the effectiveness of teachers' training of college teachers. The instructional materials of UPERTT are effectively employed with the on-going project of clustered field-work. It is also expected that in the establishment of Educational Extension Centre for Teacher In-service Training (EECs), strategies and methods used in UPERTT, including instructional materials will be widely used to help promote its development.

Thus, this short study is written from the experiences obtained from the aforesaid projects : the Udornthani Project for Educational Reforms by means of Teachers' Training, the Project of Clustered Field-work of Udornthani Teachers' College, and the commencement of the Educational Extension Centre for In-service Teachers' Training. Some instructional materials are being used, some are being improved, while many have been discarded. The details will appear in the following sections.

Processes and strategies used in developing teacher training curriculum for rural development

1. Curricula of primary and secondary education

The Ministry of Education specifies the master curricula of the levels of primary and secondary education. Local educational agencies, the Educational Regional Offices in particular, conduct the experimentation, development and usage of local curricula within the specified scope of the central administration. With respect to this local development, career teachers and college teachers participate in every process. Teachers' Colleges, furthermore, are responsible in introducing local curricula to student teachers.

2. Teacher training curriculum - identification of core elements

Teacher training curriculum of every level has to be approved by the Council of Teacher Training. In other words, structures or master curricula are specified by the central administration. Individual teachers' colleges perform their teacher training, following the curricula approved by the Council of Teacher Training. But, more specifically, they have to function in such a way that they may serve the educational development trends of their responsible areas. Udornthani Teachers' College, for example, trains teachers, pre-service as well as in-service, to serve the educational needs of Udornthani and Nongkhai provinces. Different teachers' colleges, therefore, conduct different methods and projects in order to determine possible alternatives to develop their local structure and methods of teachers' training.

Under the context of central curriculum by the Council of Teacher Training, Udornthani Teachers' College used the following three administrative bodies and strategies in developing its local curriculum for teachers' training (see Chart I).

(a) Office of Academic Affairs: This office, supervised by the Academic Vice President of the college, directly controls different academic departments. It is responsible for the arrangement and scheduling of courses as specified by the master curriculum for each level. The development of the master curriculum is initiated by central academic offices such as the Supervisory Unit and the Academic Deputy Director-General of the Department of Teacher Training.

Other methods are obtained, for example, from the outcomes of academic seminars (which are officially proposed), the suggestions of the Research and Development Centre of the College, and recommendations from the local educational agencies such as the Regional Educational Office.

In general, the development of curriculum through this office focuses on policies which are directly obtained from related academic agencies.

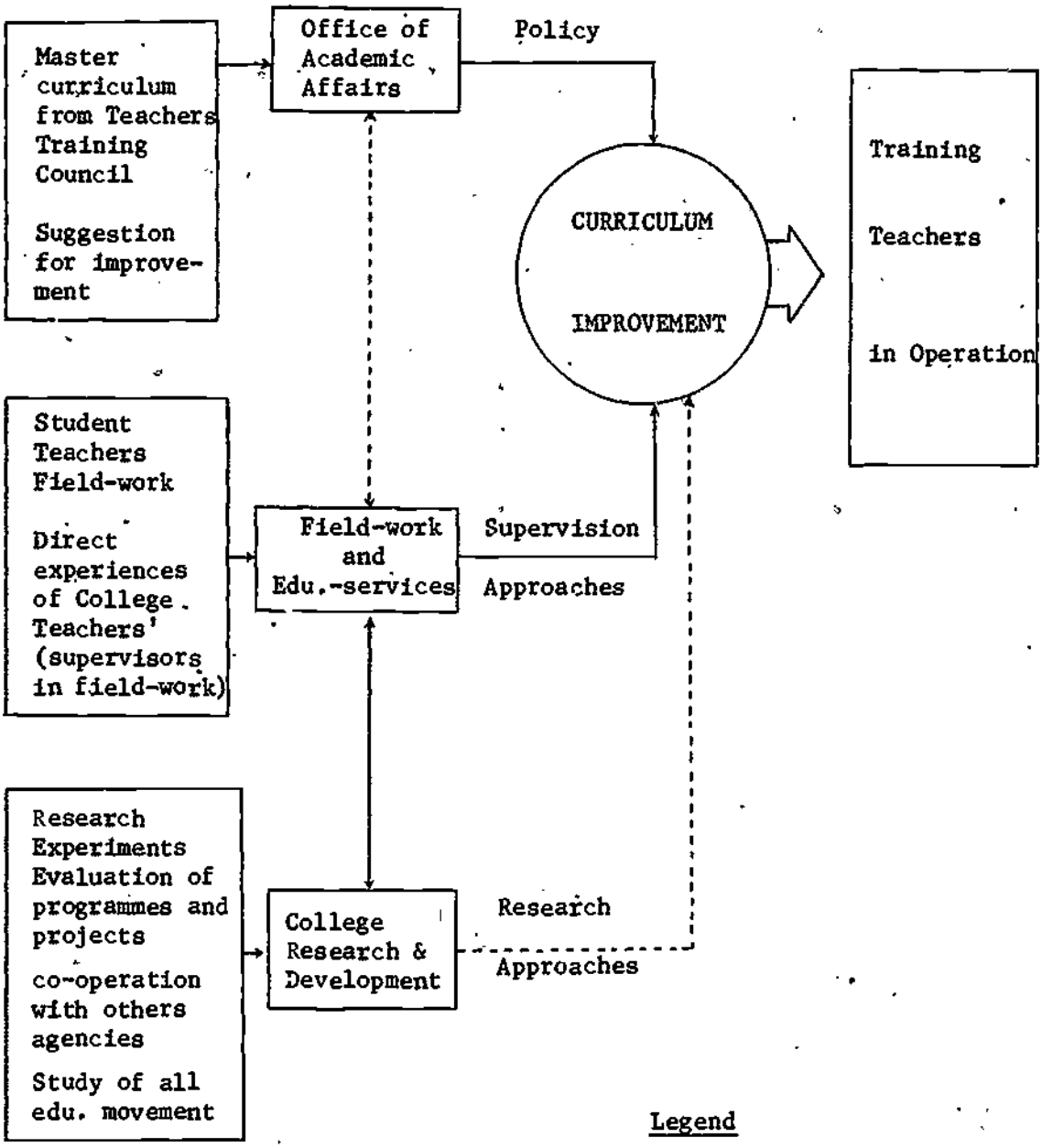
(b) Division of Field-work and Educational Services: It is the division, under the office of President of the college, to organize field-work of the student-teachers and provide educational services to community. It co-ordinates with other departments so that every department has the opportunity to evaluate the field-work of the students.

Supervisors of this division are teachers from every department of the college. They supervise student teachers and teach some regular courses in the field-work sites under the Project of Clustered Field Work. The outcomes of the supervision are feedback for the improvement of students' field-work and the teaching of college's teachers. Through teachers who supervise and teach in genuine situations, faculties and departments improve their curriculum based on the in-put obtained.

In each semester, 600-800 students practice their field-work in 85-115 villages under the supervision of 5-8 full-time supervisors and 30-50 part-time supervisors.

(c) Research and Development Centre (R&D): The research, survey including the experimentation of projects (within the college/ with outside agencies) and the interpretation for implementation are under the responsibility of the Research and Development Centre. Conducting the planning and evaluation of other projects, it was renamed the Programmes, Projects and Evaluation Office.

CHART I. Operational Chart for Curriculum Improvement of the Udornthani Teachers' College.



In-put	Offices	Approaches	Out-put

Udornthani Project for Educational Reforms by means of Teacher Training was an attempt under the co-operation of the Research and Development Center and the Division of Field-Work and Educational Services. The present on-going co-operation is the Project of Clustered Field-work of Udornthani Teachers' College, and the Programme of Extension Centers for Teachers In-Service Training.

The major study of the Research and Development Center is the search for alternatives to implement the Programme of Extension Centers for Teachers In-Service Training. This programme is expected to be the continuing teacher training for rural transformation. It also co-operates with the Regional Educational Office, Region IX to develop and experiment on local curriculum, and with the Provincial Non-formal Educational Center on the Project named "Mass-Education for Integrated Rural Development".

The result from these programmes and projects are directly fed back for the improvement of teachers' training in both structure and methods, and curriculum and instruction.

Methods and Criteria Used for Identifying Core Content of the Teacher Training Curriculum

1. Local curriculum of primary and secondary level

As aforesaid, the Educational Regional Office, Region IX acts as co-operator to develop local curriculum to serve local needs under the context of the central administration. Operational seminars are organized for career teachers, college teachers and local educational personnel to work on the development. Having intepreted the policy, purposes and content of the master curriculum, the local curriculum is developed and experimented in primary and secondary schools in Udorn and other provinces in Educational Region IX. (There are 12 Educational Regions in Thailand Headquarters of Region IX, consisting of 5 provinces, is located in Udornthani). This local curriculum is being experimented in 3 primary schools and 11 secondary schools.

2. Teacher training curriculum for rural transformation

Many teachers' training projects for rural transformation were operated/have been operated for a long time by teachers' colleges particularly the Department of Teacher Training. The outcomes of those projects have much influence on the on-going methods of teacher training for rural transformation.

Due to the rapid movement of society caused by the importation of technology and innovation, and the outcomes of national development, it is necessary that the teacher training project for rural transformation be continuously changed. Individual teachers' colleges, as many times mentioned, are able to develop their local curriculum to serve the rural development of their locality, within the scope of the master policy.

At Udornthani Teachers' College, the development of UPERTT plays an important role in identifying the major elements of teacher training curriculum for rural transformation using the following methods and criteria:

(a) Translation of policy into master curriculum for practical use

The structures and general objectives of teacher training are specified in the master curriculum of every level. However, in order to obtain the correct content to serve local needs of Udornthani and Nongkhai provinces, the policy has to be translated to behavioral objectives. Questionnaires were constructed and sent to student-teachers and some sample teachers who had completed their field-work. It was an attempt to investigate the kind of behavior and ability students and teachers need to be trained besides regular courses and other previous training they already had. The answers of 1,400 field-work students and teachers to the questions revealed that they needed more training in and more emphasis on the following aspects:

i) the ability to live happily in rural community.

This was found to be highly significant. The content comprises 56.94 per cent of the whole teacher training curriculum, which students would like to be trained for their field-work. This aspect includes self-adjustment, economic ability, public relationship, and ability to work with people of the same and different professionals. In other words, they wanted to live in the rural community happily and properly in accordance with their status and role.

ii) the ability to teach in formal education setting particularly in the local school.

It was found that 20.83 per cent of the students needed to be trained more in this ability, which, as a matter of fact, is much emphasized in regular courses. What the students needed, however, were the skills and ability to practice more in genuine situations for more confidence.

iii) the ability to perform community education.

This aspect of functioning as co-ordinator to create learning conditions in community was found to be 22.23 per cent.

From the study, it could be said that the students found that the ability of self-improvement was the most essential to successful teaching in schools, and organizing of continuing education to villagers as well. In training rural teachers, Udornthani Teachers' College has the above three characteristics in mind.

(b) Analysis of behaviours of field-work students on rural sites

While the students of UPERTT project were performing the field-work in rural sites, they had to report their activities which include self-development, teaching in schools and working in community. This was done through:

i) daily check-list; and
ii) diary writing/diary report (see Appendix I for example of diary writing)

The questionnaires for diary check-list were constructed by the R & D Center of the college. As to the diary, student wrote everyday at the length of 60 lines. They were suggested to focus the content on activities involving the three elements of self-improvement, formal education, and community development. In the end, problems were concluded along with suggestions and recommendations.

From the analysis of the check-list and diary, it was found that:

i) The role of rural teachers was new to them. In order to live happily in the community, the first three weeks of field-work should focus on self-improvement. Student were engaged in the management of housing, food, safety and other adjustment.

ii) The first week was the observation on the operation of career teachers and school activities. More activities were operated from the third week till the eighth week. After that school activities decreased as they were more involved in community work.

iii) The first week was the acquaintance with community members through general meeting, official as well as non-official. Community activities, increasing from the seventh week on, centred around the establishment of reading centres, organizing of youth groups and various forms of activities, in which students had to learn and develop day by day from their surrounding.

Besides the above findings, the R & D Center studied the major elements of curriculum from other sources. They are, for example, reports on orientation of field-work students, attitudes of villagers towards field-work students and operational seminar among career teachers from the field-work schools. The outcomes were found to be in agreement that major emphasis in either organizing teacher training programmes or arranging instructional materials before and during the field-work should centre around:

i) The individual ability to function as rural teachers;

ii) The ability to teach in formal schooling in village or rural community; and

iii) The ability to participate in community development activities.

Strategies Used in Translating Curriculum into Teaching-Learning Instructional Materials

The construction of instructional materials are based on the three elements of training to live happily in rural community, to teach effectively in schools, and to efficiently co-ordinate for the development of the community. The teaching-learning instructional materials do not aim simply at the field-work of UPERTT project but are introduced to college teachers and local educational personnels for training of their teachers as well.

In addition such factors as consumers, target population (students, career teachers) content, distance media, and management are being used as guidelines for developing instructional materials.

The development of instructional materials are divided into five stages (Chart II):

Stage 1 : Identifying core elements from the study of the outcome of field-work and research work of R & D Center of the college.

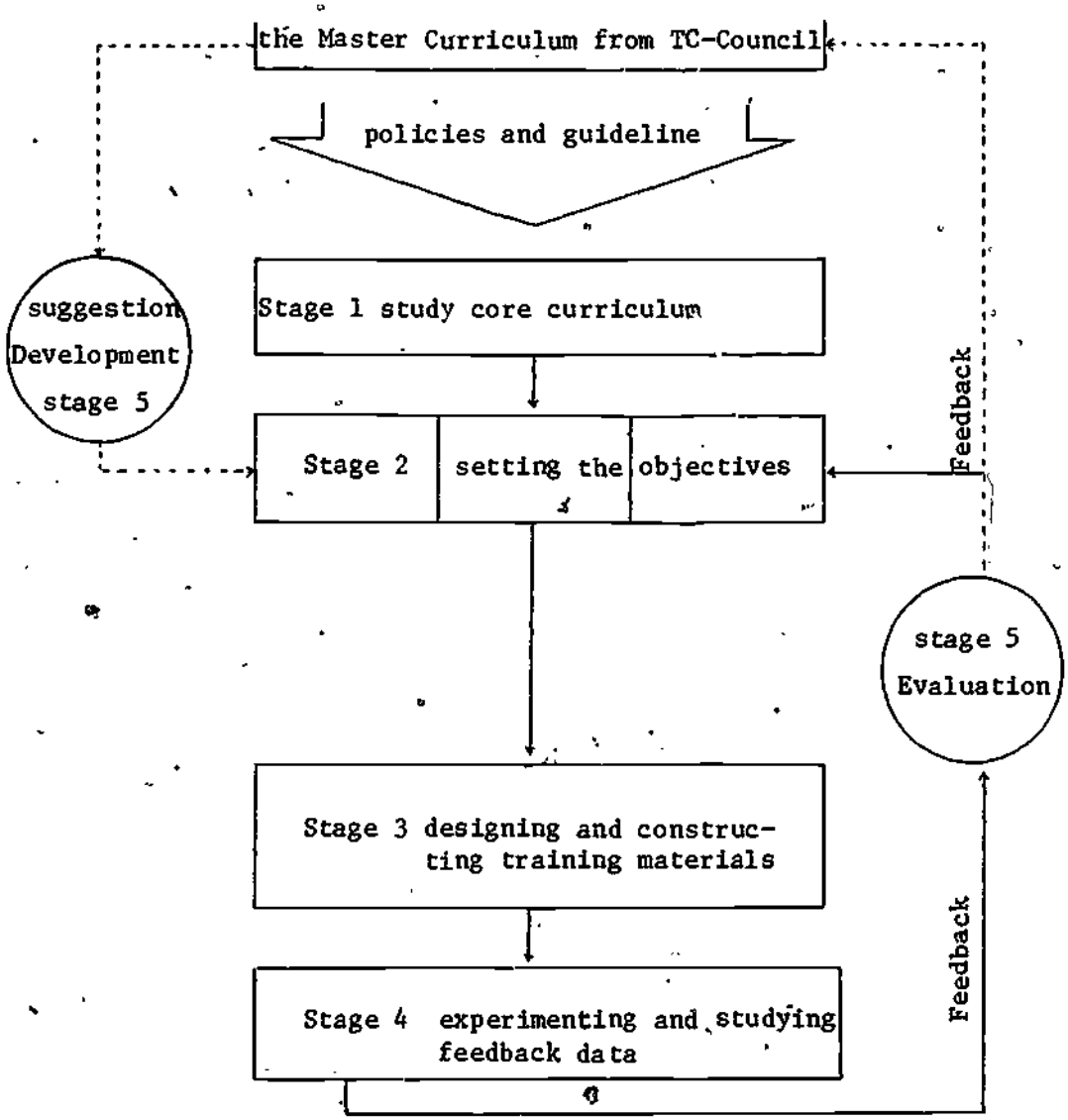
State 2 : Setting the objectives of individual instructional materials by considering relevant factors, e.g.; producers, content, distance, time and other limitations.

Stage 3 : Designing and constructing of instructional materials.

Stage 4 : Experimenting and studying the outcomes as feed-back data for improvement.

Stage 5 : Evaluating and improving the materials.

CHART II. The processes of developing instructional materials for teachers training



Although instructional materials vary according to the objectives and limitations, general characteristics, however, could be pointed out as follows:

1. Instructional materials to train individual ability of field-work student .

The overseeing and follow-up during the field-work were conducted in the wide area of 23,919.95 square Kilometers of Udorn Thani and Nongkhai provinces. Some villages are at the distance of 200 Kilometers from Udornthani Teachers' College. Instructional materials thus are developed in the form that enable students to use by themselves. A system of two-way communication between student in village and college teachers has also been developed. Some examples of the materials are:

a) Handbooks/manual on field-work;
b) Postcards and local post services; (See Appendix II)
c) Lessons recorded on cassette-tape;
d) Exercise and work-sheet send by postal services;
e) Programmed lessons;
f) Self-published newspapers; (See Appendix III)
g) Radio programmes;
h) Seminars; and
i) Mobile recreational sets, i.e. mobile films, and weekly newspapers, etc.

2. Instructional materials to teach in rural schools

The major responsibility of field-work students is to teach in primary school in the village the subjects as prescribed by the curriculum. The participation of pupils, understanding of the subject and the application of subject matter to daily use are the first priority in teaching.

Teaching guides and handbooks were developed for local primary and secondary schools under the co-operation of the Educational Regional Office, Region 9 and other local educational agencies. College teachers and career teachers developed, experimented and improved the local materials to serve local needs. The materials published by the Education Regional Office of Education, Region 9 are:

a) Time-table and guideline for teaching Pratom 1;
b) Handbook for teacher on using local curriculum;
c) Handbook for teaching skill training and rural transformation Pratom 1;
d) Handbook for teaching vocational skill Pratom 1;
e) Supplement reading "Our home" part 1;
f) Supplement reading "A Good Boy";
g) Local Curriculum for lower-secondary on vocational skill;
h) Local Curriculum for lower-secondary on rural development; and
i) Local Curriculum for lower-secondary on health/nutrition.

Udornthani Teachers' College, besides the mentioned participation, employed the published materials in regular teaching and field-work operation. Student teachers were trained to produce various types of teaching aids to teach in rural schools, for example teaching kits, charts, models, and etc. These aids were collected at the college "Teaching Aids Center" and at some schools in rural area, which students can borrow during their field-work. Furthermore, at rural site, field-work students assisted in producing aids for particular subjects. These

teaching aids, for practical purposes were of portable size, for example, learning kits, models, pictures, flip chart, maps, exhibition sets, etc.

3. Instructional materials for non-formal education or for community education

Besides teaching the prescribed subjects in schools, field-work students and career teachers practiced the leadership role in facilitating community development activities. Directly, they imparted relevant knowledge to villagers. Indirectly, they functioned as co-ordinators for other government workers for example community workers, health workers, agricultural extension workers to perform their tasks in the community with convenience.

Community activities found to be widely conducted by field-work students were the establishment of reading centres, mobile library, organization of recreational group, interest groups and radio listening group, film shows, and exhibition.

Field-work students presented these material to the villagers by themselves. In some instances, they were introduced by college supervisors as requested by field-work students.

4. Some examplar instructional materials for teacher training

Many of the instructional materials are presently in use, while some had been discarded due to various limitations. However, according to the new trend of teacher training - the continuing teacher training - there is high tendency that these instructional materials will be reintroduced.

Instructional materials listed in this short study are those that can be used and will be used in the continuing teacher training programme for rural transformation of Udornthani Teachers' College.

1. Instructional materials for the training of individual student

(a) Handbook for field-work and postcards

Rationale

Living in remote sites for three months, it could be said that teachers' students learned and practiced everything almost by themselves. To help facilitate their adjustment to the new situation, college supervisors developed a handbook for them. The main issues during the field-work such as self-preparing, surveying community, house keeping and public relations were incorporated in the handbook.

Objectives

Field-work students improved themselves according to suggestions found in the handbook. In all problems they found, they sent questions to their supervisors through postcards. The supervisors then answered the questions by different possible methods. This way of communication was meant to build up confidence of field-work students during their three months away from the college.

Methods

This handbook for field-work was developed from the former handbook of practice-teaching by re-arranging the content to suit the new objectives. The book suggested all important steps to be followed by the students, namely, the first week of preparation, living in the village, self-introduction, house-keeping, working in school including group work and community work. One copy of the handbook was provided to students in one village.

Postcards were the 25 Satang (¼ Baht) government postcards. Students in one village were provided with 16 postcards addressed to the Research and Development Center. Students sent the postcards every Monday reporting weekly activities and problems faced by them. The postcards were delivered to local post offices to be mailed to the college, by villagers or village trucks.

Having summed up the problems, supervisors offered their advices by means of letters and radio broadcasting programmes. They sometimes discussed their problems during the visits or the seminars.

Outcomes

The methods used for communicating between students and supervisors seem to be quite practical and economical and have facilitated the objective of two-way communication. In addition students become more skillful in writing short-reports.

(b) Lectures on cassette tapes and postal exercises

Rationale

Field-work students needed to further their knowledge in different subjects, particularly those which were concerned with community work. The best solution was to produce cassette tapes of the lectures. After listening to it, field-work students completed the exercises and mailed them back to the college.

Cassette tape recorders are widely available in every village nowadays, particularly among the village teachers. Most career teachers, also possess tape-recorders of this type. During the UPERTT project, career teachers of field-work schools shared the lessons with field-work students. Therefore, this type of instructional materials are expected to be used in the continuing training of career teachers - the Extension Center for In-Service Training of Udornthani Teachers' College.

Objectives

It was an attempt to provide an opportunity for continuing training for career teachers and field-work students in remote areas.

Methods

Lecturers or supervisors prepared the lessons, usually one tape for one topic. The college then recorded the lectures on cassette tapes which were sent to rural sites by college supervisors and returned to college during the field-work meeting and seminars. Exercises for each tape were developed in such a way that they could be mailed back for corrections with ease.

Outcomes

This method was found to be convenient that students could manage to learn by themselves. Besides being able to change from one tape to another without trouble, students found the tapes to be easier to keep and borrow than ordinary textbooks.

The problems were the ability of lecturers in recording the content and organizing exercises. Technical problem was also an obstacle. Having no laboratory for this particular purpose, they had to record these tapes in ordinary rooms.

It is hoped that the development of this type of instructional materials will be helpful to the continuing training of career teachers. Besides its cheaper price, students can re-play the tape to repeat the lessons by themselves at any time. In order to strengthen the establishment of the Education Extension for In-Service Training for career teachers, Udornthani Teachers' College has put great emphasis on its improvement.

(c) Radio broadcasting programme

Rationale

Radio is one of the instruments which influences learning of the villagers. The survey in 1977 discovered that the population in Udornthani possessed 130,688 radio receiving sets. Because of the cheaper price, radio receivers are so wodely available that almost every family possess one. With more than six broadcasting stations in Udornthani and Nongkhai provinces, they listen from morning till bedtime. (Radio becomes a part of their daily life).

The programmes, if arranged in relation to daily life, will be of great influence to the learning of the villagers. However, the listening habit of the villagers has not been formed in a constructive way. They prefer entertainment programmes to the educational programmes. Therefore, one of the responsibilities which field-work students should focus is the formation of good listening habit. The programmes should also be arranged for this purpose.

Objectives

The programme aimed at facilitating the supervision of the college teachers and simultaneously to enable field-work students to organize more community activities.

Methods

College teachers broadcasted the programmes through local stations every Sunday from 19.30 to 20.00 p.m. Programmes consisted of elements that were thought to be useful to villagers, for example health, nutrition, education and vocation. Activities of field-work students were discussed during the programmes.

Field-work students motivated the villagers to listen to the college programmes, forming a group of around 6-60 persons. Discussions were held after every listening session. Listening sites were usually either at the temples, or the students' houses, or the headmen's houses.

The listening was reported in the daily activity plans of field-work students. Some problems, if there were any, were reported to the college by postcards for clarification. College teachers or programmers improved the programmes.

Outcomes

From the report of the students, it was found that the number of listeners was increasing. They show great interest in the programmes, particularly when their activities were included. By this method, students could persuade villagers to participate in many other community activities. The most important thing was that students did not feel deserted, which helped build up the completeness of supervision.

Problems were found in the scheduling of programmes - that they could not be broadcasted during the villagers' free time. In addition, the college could not afford the high rent of the time for the broadcasting. Due to these limitations the programmes have been stopped.

In conducting the continuing teacher training programme, the method of open learning should be taken into consideration. The college should possess its own educational broadcasting facilities whose radius covers the responsible area of Udornthani and Nongkhai provinces.

(d) Newspapers for supervision

Rationale

The number of field-work students in each semester is more than five hundred, scattered in rural villages. Not only these students, other personnel such as former field-work students, prospective field-work students, career teachers, college teachers, and villagers are also involved in this rural teachers training programme.

In order to get feedback and disseminate the work of teachers training among the concerned personnel, Udornthani Teachers' College published 'college newspaper' which has been started since 1976.

Objectives

i) to report the activities of field-work students to interested persons and to exchange the experiences of rural teachers;

ii) to oversee field-work students by presenting problems and their solutions, cases studies and academic articles;

iii) to provide feedback data to supervisors and teacher trainers, particulary college teachers, for the improvement of curriculum and their teaching performance.

Methods

Published weekly/monthly newspapers with articles relevant to the field-work and delivered to teachers in college, schools and field-work students.

The newspaper was printed at about 500 - 2000 copies per issue depending on the number of students and villagers.

Outcomes

It was found to be an effective way to get feedback and a great help to supervisors.

2. Instructional materials for teaching in schools

(a) Teachers' handbooks

Rationale

It is specified in teacher training curriculum that student teachers study the curriculum of the level they are going to teach, i.e., the study of the curriculum of primary level is the requirement of the curriculum of primary certificate, while the study of both primary and secondary levels are the requirements of higher certificate and degree level in teachers' college. To be effective, the study must be arranged in such a way that it includes the ability to implement the curriculum and to develop instructional materials in each course.

Methods

The Educational Regional Office, Region IX conducted operational seminars in order to study the details of central curriculum and to develop the local curriculum including its evaluation, improvement and plan for implementation.

Udornthani Teachers' College sent some of its instructors to work with the Educational Regional Office on this development. It, then, made use of the local curriculum in training their student teachers to teach in rural areas.

Outcomes

The results of experiments in some schools was found to be satisfactorily effective.

The problem was caused by the inefficiency of in-service teacher training. There was a gap between the pre-service and in-service training of teachers, both in theory and practice. The establishment of the Educational Extension Center for In-Service Training Programme is believed to bridge this gap and lead to more effective development and utilization of the local curriculum.

(b) Teaching aids for individual courses

Rationale

Teaching to serve local needs could be best performed by teachers of that locality, which includes the development of teaching aids and teachers' handbooks.

Udornthani Teachers Colleges taught their students to design and develop the materials. These teaching aids would be kept at the Centre of Teaching Aids where field-work students and career teachers could borrow them for use. In some instances students developed the materials by themselves while undertaking their field-work activities.

Objectives

To enable student teachers to produce and utilize teaching aids which were applicable to teaching/learning situations.

Methods

During regular courses of methodology and teaching aids development, students would be taught to design, develop and experiment on specific instructional materials. It is essential that the materials developed are relevant to the content of each individual course.

The teaching aids are kept at the center as examples and for borrowing purpose. Some sets would be donated to field-work schools, and other local schools.

What the college emphasized was the utilization of low cost local resources. These materials would be collected in portable kits to make it convenient for transporting to rural schools.

Outcomes

The teaching aids were found to be very useful for students but problems of transporation of the aids and financial problem to develop them had made the programme ineffective.

Attempts to solve these problems by establishing the centres of development and borrowing at the centres of these clustered schools were not found to be effective. This was caused by the fact that teachers did not use teaching aids, besides their rarity. It frequently happened that these teachers used these aids for exhibition, instead. The Education Extension Centres for In-Service Training Programme was established with the hope that career teachers, teacher trainers, teacher superintendents, student teachers, all other concerned personnel could work together to solve the problems.

3. Instructional materials for community education

(a) Adult education newspapers

Rationale

In most rural communities that there are no qualified and suitable printed materials. The provision of newspapers for this particular purpose will inevitably enhance reading ability and impart knowledge to them.

Objectives

To disseminate knowledge, through the stimulation of field-work students.

Methods

The Division of Adult Education, Department of General Education, Ministry of Education, Department of Community Development and some concerned agencies produced printed materials for villagers. The Division of Adult Education, in particular, distributed its newspapers in wide and regular circulation.

Having received the Adult Education newspapers, Udornthani Teachers' College circulated through the field-work students, who not only posted them at the reading centres but motivated villagers to read them as well.

Outcomes

The villagers showed great interest in the reading despite the inadequacy of circulation and irrelevance of content. It was also found that the reading would not have been of great benefit, if there had been no field-work students and career teachers who acted as stimulators.

(b) Mobile book cases

Rationale

Field-work students were usually suggested to establish the reading centres in places where the villagers in the community also realize its importance. But once it was established, they was faced with the problem of finding publications of high quality and of interest to the villagers. The establishment of mobile book cases to circulate books to the existing reading centres would hopefully improve the situation. Furthermore, it was believed that mobile book cases is one method which facilitates learning in the community.

Objectives

To help field-work students to efficiently establish reading centres through the circulation of qualified publications.

Methods

i) search for books and publications by any possible methods i.e. donation, allocation of college budget, request to other agencies, etc.;

ii) build up book cases at the size of 1 m. x 1.20 m. x .40 m. (there are at present 6 book cases);

iii) fill the book cases with books and publications which are available;

iv) circulate them among the field-work villages, for considerable length of time (2-4 weeks) in each site, by either college supervisors or field-work students; and

v) take the book cases back to the college after the termination of each field-work session.

Outcomes

It was advantageous that there were more books to read, which monks and members of youth group helped with the management and borrowing service. Still, the books were found to be inadequate, obsolete and irrelevant to villagers' interest. Furthermore, some villagers were not able to understand what they read and lost interests in reading the materials. In many instances the villagers wanted to keep the books, whose needs could not be served by the college.

The establishment of more mobile book cases will be one of possible solutions. Books should be more widely circulated and reading should be done under the guidance and motivation of career teachers and field-work students.

Problems and Issues in Developing the Instructional Materials for Teacher Training and Trends

From the evaluation on UPERTT project and the field-work of students in rural areas, Udornthani Teachers' College has discovered many operational obstacles concerning the development of instructional materials. The problems could be listed as follows:

1. The training of rural teacher is not very effective to fill the gap between theory and practice. It is evident, for example, that college students, though well-prepared, when become career teachers, do not develop their own instructional materials for their teaching

2. The management of borrowing service, particulary for schools or clusters of schools in rural areas is not well-organized. The developed instructional materials are not well kept and maintained. The process of service including utilization of the materials needs to be improved.

3. Monitoring of the utilization of existing instructional materials is a problem. Some schools well-equipped with teaching aids, do not employ them in teaching.

4. Most of the instructional materials are classified according to their types and not in relation to individual lessons. This makes it difficult when it comes to selection of materials for use.

5. Instructional materials are found to be inadequate and low in quality. The objective of their construction focuses on the teachers instead of pupils.

6. The open or distance learning has not yet been earnestly organized for rural teachers training. Thus, the necessity for the development and utilization of instructional materials is neglected. The interest is found simply in the process of pre-service training. Even so, it is conducted only during the field-work session which is now reduced from 3 to 2 months.

7. There are limitations in terms of materials and facilities to construct printed materials, teaching aids and learning kits. This includes facilities in organizing seminars, workshops and educational broadcasting programmes.

8. The ability to organize instructional materials for producers and consumers is somewhat unsatisfactory.

APPENDIX I

DIARY WRITING OF FIELD-WORK STUDENT

by Somboon Jantawong: student
Chompuporn Village
Buengkan, Nongkhai

Tuesday 7 October 1976

After routine work, I went to the village to establish closer relationship with the villagers. Having ovaltine with them at the shop, I, at the same time, invited the villagers to join the Youth Group. In the afternoon, I played football with some members of the Youth Group at the school field.

Teaching in school, I have found out that the pupils are still poor in many subjects. At 14.30, I attended the regular school meeting.

After the meeting, I went to the village again to discuss about the fair and the donation we expected from the villagers. Things went on well. Besides money, we were promised to get some vegetables and rice which would be enough for the activity. In the evening, I went out fishing at the nearby dam and got a lot of crabs for dinner.

Tomorrow after teaching, I'll ask for the permission from the principal to help with the Youth Group, as planned.

APPENDIX II

POSTCARD FROM STUDENT FIELD-WORK

by Mr. Peerapong Thanasoot
Village: huana, District Nongbualumpoo
Udornthani

21 June 1976

Dear Archarn - We've just finished with our nursery and also with the flower garden. Really, we're very proud of them. The next piece of work is the construction of reading seats and we're looking for suitable location and wood for the construction. We'll report to you of it progress, in the near future, we hope. As for the villagers and their cooperation, we're facing with a problem that they are now working on the rice-field, only few stay at home. Coming back, they are too tired to stay up and talk with us. However, we get along with them well. We join every activity and they all know who we are. Everything is going on well, Don't worry too much about us - UPERTT students, Ban Nongkhai.

APPENDIX III

ARTICLE IN THE COLLEGE'S NEWSPAPER

by Boonruam Boonla (Miss)
Village: Pan, District: Poonpisai
Nongkhai

August 1978

Primary School Teachers

"Town is like a big building whose stability depends on its foundation. The foundation is primary education whose constructors are teachers".

In order to build up this stability, there are many components - adequacy of teachers, of classrooms and also the administration of administrators. Teachers in the municipal area, at present, are overcrowded - so much that there is no class for them to teach. The ratio of teacher per students is said to be 1:20 in town. This is related to the educational administrators whom the transfer of teachers is dependent. The reason for transferring is, always, for suitability. But, that suitability is considered in terms of the satisfaction of the bosses. You play up to them, then you get it.

Not even a glance from them, no choice, no hope. We are deserted.

Building is a major component. Teachers teach better in less-packed classrooms with seats, or even with some facilities. What can we do? Making the best under these conditions - pupils in ragged clothes staring at you. We all are indifferent to the results - the blame that grade four holders cannot read and write, and cannot do even simple numeration. Yes, we are to blame and we have to accept it.

In town, pupils are well equipped, well-prepared and of course they are from well to do families whose parents hire tutors after school. What a comparison! Rural primary school teachers are, moreover, over expected that they are able to teach at any level, any type of pupils - deaf or blind!

Someday, under these on-going conditions, the foundation will be broken and the building will collapse. One may argue that Thailand does not belong to you only - then have you ever thought of the end - the coming doomsday?

Even though, we have been in the field-work session for a short time, we have faced these real problems - these facts of life. We expect to have more when we become real teachers. After all, this is just a few words to all educators that we have to start from where we are.

The *Asian Programme of Educational Innovation for Development (APEID)*, initiated on the recommendation of the Third Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia (May–June 1971, Singapore) and the authorization of the General Conference of Unesco at its seventeenth session (Paris, 1972), aims at stimulating and encouraging educational innovations linked to the problems of national development in the Asian region.

All projects and activities within the framework of APEID are designed, developed and implemented co-operatively by the participating Member States through their national centres which have been associated by them for this purpose with APEID.

The 18 Member States in Asia and Oceania participating in APEID are: Afghanistan, Australia, Bangladesh, India, Indonesia, Islamic Republic of Iran, Japan, Lao People's Democratic Republic, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Singapore, Socialist Republic of Viet Nam, Sri Lanka and Thailand.

The Asian Centre of Educational Innovation for Development (ACEID) has been established at the Unesco Regional Office for Education in Asia and Occania in Bangkok to co-ordinate the activities under APEID and to assist the associated national institutions in carrying them out.

The aims of APEID are:

- to stimulate efforts of the Member States to improve the quality of life of the people through creating and strengthening national capabilities for the development and implementation of innovations in education, both formal and non-formal;
- to encourage the Member States to make all groups (students, teachers, parents, village and community leaders, administrative personnel and policy makers) aware of the need for relevant changes in education (both formal and non-formal) as an essential pre-requisite for the improvement of the quality of life of the people;
- to promote understanding and appreciation of the differences in educational practices and approaches of the Member States, and thereby contribute to international understanding and the creation of a new international economic order.

APEID PUBLICATIONS RELATING TO INSTRUCTIONAL MATERIALS

Unesco, P.O. Box 1425, Bangkok G.P.O., Bangkok, Thailand

*1. *Modules on the construction of modules for: (a) Teacher education; (b) Curriculum for development. 1975*

2. *Design, development and evaluation of low-cost educational materials; report of a Regional Workshop. 1978*

3. *Developing instructional modules for teacher education - a handbook. 1978*

4. *Developing instructional modules for teacher education - selected exemplar modules. 1978*

5. *Selection, maintenance and repair of school science equipment; report of a Technical Working Group Meeting. 1978*

6. *Making and using low-cost educational materials; report of a Sub-regional Workshop. 1979*

7. *Universalizing education: Strategies for the development and use of instructional materials; report of an APEID Study Group Meeting. 1979*

8. *Self-learning modules for teachers (two of a series)*

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* Out of stock