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SEAMEO REGIONAL CENTER FOR
EDUCATIONAL INNOVATION AND
TECHNOLOGY

# 8TH THREE-MONTH TRAINING PROGRAM
JANUARY 6 – APRIL 5, 1975

AID/ASIA/TR/THR
PN-AAD-565

SOUTH EAST ASIAN MINISTERS OF EDUCATION ORGANISATION

*With the Compliments*

*of*

REGIONAL CENTER FOR EDUCATIONAL
INNOVATION AND TECHNOLOGY

# INTRODUCTION

A continuous process of feedback and modification has been largely responsible for the development of the thirty-one (31) modules contained in these two volumes.

Stress in these learning modules is placed on the practical application of essential concepts to actual situations rather than on mere acquisition of facts and data. Such practical application is provided through individual as well as country-group practica contained in each module in which the participants apply these skills to actual educational problems in their own countries.

The modules themselves are grouped into six major blocks, the whole of which is designed to achieve the objectives of the course.

As far as is possible, the situations and problems contained in the modules are characteristically Southeast Asian to insure maximum relevance to key educators of SEAMEO countries for whom this program has been designed.

## THE THREE-MONTH TRAINING PROGRAMME

**PURPOSES:**

1. General Purpose: Provide key educators of the region with skills and knowledges necessary for educational planning, decision-making, and application of realistic change strategies.

2. Specific: After the three-month training program, each participant should be able to:

   a. Create an educational planning system model appropriate for use in his own work and in his educational system;

   b. Devise efficient and innovative solutions to identified national and on-the-job problems through the application of the Systems Approach;

   c. Apply innovative strategies for change and acceptance of the solutions devised to national and on-the-job problems.

**CONTENT:**

The course content is composed of six major units or blocks as follows:

I. OVERVIEW OF EDUCATIONAL PROBLEMS IN SOUTHEAST ASIA.

This block is designed to enable the participant to identify the educational problems most urgent in the region, and the conditions that have given rise to these problems. This is a necessary foundation for the development of problem-solving skills.

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 1 | Crisis in Education | Two selections that discuss the educational crisis in Southeast Asia and throughout the world, the background to this crisis, and some possible solutions. |
| 2 | The Need for Innovative Approaches to Education in Southeast Asia | Two essays discussing why Asia's educational problems are self-imposed, why traditional assumptions need to be questioned, and suggesting some methods of change. |
| 3 | SEMINAR: Educational Problems in SEAMEO Countries | Small-group workshops and oral presentation and discussions on outstanding educational problems in each of the SEAMEO countries. |

## II. INNOVATION AND "TECHNOLOGY"

In this portion of the course, the participant is exposed to a number of innovations that have occurred within and outside the region, with particular emphasis on innovations that have been effected to resolve educational problems similar to those facing the participant's own country. At this stage, the participant will begin to gain some innovative skills when he creates modifications to some of these innovations in a way that would make them applicable to his own country by minimizing its constraints and making maximum use of available resources.

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 4 | Instructional Technology and the Learning Process | An essay describing how learning takes place as well as their implications to instruction and the characteristics of various forms of instructional media and the various types of learning outcomes for which each form of instructional media is specially suited. |
| 5 | Innovations in the Delivery of Mass Primary Education in Southeast Asia - Project IMPACT | A "newspaper clipping" of the future describing a bold new concept in the delivery of mass primary education, and a report on the present reality - the progress of the tryouts of the IMPACT concept in two sites in Southeast Asia. |
| 6 | Innovations in the Delivery of Mass Primary Education in Southeast Asia - Project RIT | A report on another delivery system of mass primary education being developed and tried out by Innotech - Project RIT. Project RIT (short for Reduced Instructional Time) seeks to provide quality education at a lower cost within the traditional school setting. |

INNOVATION AND TECHNOLOGY ... (Cont'd)

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 7 | In-School Off-School Approach | A paper on an innovative, community-based approach to education being developed in the Philippines that is expected to provide quality education at a lower cost to a greater number of learners. |
| 8 | Programmed Teaching: Effective Teaching by "Unqualified" Teachers | A research paper describing the results of an experiment conducted in Malaysia that made use of programmed teaching conducted by community members to teach beginning reading. |
| 9 | Other Innovations in SEAMEO Countries | Descriptions of two more innovations that have occured in SEAMEO [illegible] countries, exercises on how information about an innovation may be structured so that the problem, and all pertinent information are adequately covered, and finally, the identification and reporting of similar educational innovations in the participant's own country. |
| 10 | Seminar on Innovations in SEAMEO Countries | Small-group workshops and oral presentation on how innovations from one country may be modified for use in another. |

## III. THE SYSTEMS APPROACH

This block introduces the participant to the Systems Approach. The participant is first exposed to situations that underscore the need for systematic thinking and analysis before arriving at any solution. He is then exposed to different systems models created by various educators. This is designed to enable the participant to judge for himself the components and the relationships that he thinks are essential in a systems model. Finally he demonstrates his skill in this aspect when he creates his own systems model and justifies the components and their relationships.

| MODULE | TITLE | BRIED DESCRIPTION |
|---|---|---|
| 11 | Why Systems Approach? | A series of anecdotes covering a variety of situations that point out some of the most important factors that have to be considered in decision-making and underscore the need for a systems approach. |
| 12 | The Systems Approach to Education | An article which clearly illustrates the sequence and relationships between the various components in the systems approach. |

THE SYSTEMS APPROACH ... (Cont'd)

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 13 | Applications of the Systems Approach to Educational Improvement | An essay describing another interpretation of the systems approach, with concrete examples provided. |
| 14 | Application of Systems Approach to Educational Development in Indonesia | An essay describing the systems approach to educational planning developed by the BPP in Indonesia. |
| 15 | Seminar on Systems Model-Building | Small-group workshops on the design and development of the participant's own interpretation of the systems approach, followed by individual and group presentations. |

## IV. APPLICATION OF THE SYSTEMS APPROACH

At this stage, the participant makes practical application of the systems approach to problems confronting him in his own job, as well as to the problems facing the educational system in his own country. This block is further divided into four sub-blocks representing major components of a system as follows:

### A. Identification of problems (Modules 16-17)

This sub-block provides useful exercises in identifying problems and stating them in a way that does not limit the number of possible solutions. Participants will apply the skills learned here by identifying and properly stating the most outstanding national and on the job problems.

### B. Formulating Objectives (Modules 18 and 24)

This is designed to enable the participant to gain the necessary skills in formulating objectives, the attainment of which can be measured. Work on the national and on-the-job problems started in the preceding sub-block will be continued as the participants formulate objectives base on the problems identified.

C. Identifying Resources and Constraints, Generation, Analysis and Selection of Alternatives (Modules 19-23).

The modules herein deal with skills in identifying the resources and constraints, with particular emphasis on those pertinent to the objectives. After this, the modules that follow will provide the participant with requisite skills in generating innovative solutions to achieve the objectives, analyzing them, and selecting the most promising alternative or combination of alternatives. As in the preceding sections, practical work will deal with their national and on-the-job problems.

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 16 | Formulating Educational Problems | A self-instructional mathetics program aimed at providing the requisite skills in properly formulating educational problems. |
| 17 | Seminar on Formulating Educational Problems | Oral presentation and practice exercises on how to formulate national and on-the-job problem statements. |

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 18 | Deriving General Objectives | A self-instructional mathetics program on how to formulate general objectives from problem statements. |
| 19 | Identifying Resources and Constraints | A selection and exercises on how to identify the factors that may militate for or against the solution of a particular problem. |
| 20 | "OPEN YOUR MIND TO GENERATING ALTERNATIVES" | A hilarious self-instructional program with exercises designed to release one's mind from restrictive assumptions that would limit the possible solutions to any problem. |
| 21 | "What Have Others Done About Things Like This"? | Individual and group research work to find out what has been done elsewhere to achieve similar objectives and to consider expert opinion. |
| 22 | Seminar on Generating Alternatives | Small-group brainstorming sessions to generate alternative solutions to national and on-the-job problems. |

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 23 | Analysis, Selection and Modification of Alternatives | Group and individual work on the analysis, synthesis, evaluation, selection and modification of solutions to national and on-the-job problems. |
| 24 | Specific Objectives | A self-instructional program on deriving specific objectives from a general objective, and practical work on formulating specific objectives to solve national and on-the-job problems. |
| 25 | Seminar on Alternative Solutions | Oral presentation and discussions on the alternative solutions selected and the modifications made. |

V. STRATEGIES FOR CHANGE (Modules 26-28)

The modules in this block give some helpful techniques and skills necessary for the change strategist. Useful pointers are given on how to identify the individual and social forces that may stand for or against a certain innovation and how to overcome resistance and gain support. Applying the principles and techniques learned in the modules, the participants will then map out their own strategy for change and acceptance of the solutions they have devised to solve the national and on-the-job problems.

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 26 | The Individual as an Educational Innovator and Change Agent | An essay describing three very practical strategies that would greatly help the educational innovator and change agent in attaining his proper role. |
| 27 | Strategies for Change | An analysis of the process of change, as they apply to innovations that have occured in SEAMEO countries, and techniques that the participant may apply as part of his own change strategies. |
| 28 | Seminar on Strategies for Change | Small-group workshops and oral presentations on strategies for change and acceptance of proposed solutions to national and on-the-job problems. |

## VI. WINDING UP

These last three modules will serve to wind up the course and are designed to make the participants as fully prepared as possible to apply the skills and concepts acquired upon their return to their respective countries.

| MODULE | TITLE | BRIEF DESCRIPTION |
|---|---|---|
| 29 | The Processes of Tryout, Evaluation and Revision | An essay describing the processes of tryout, evaluation and revision and their functions in the systems approach. Practical application on the application of the concepts and teachniques discussed in drawing up plans for tryout of selected solutions is included. |
| 30 | COUNTRY REPORT | Formal presentation by each country group of a complete report on the solutions worked out to their national problems, including the problem's background, the processes undertaken to evolve the innovative solution, and the strategies for change and acceptance. |
| 31 | Seminar on Review and Revision of Systems Model | After the experience of having gone through the systems approach to specific problems, participants may probably want to modify the models they have created earlier, the better to serve their particular needs. This seminar, which includes small-group workshops and large-group discussions, will be held for that purpose. |

MODULE 1

# CRISIS IN EDUCATION

INNOTECH

# MODULE 1

**PREVIEW**

Module 1 is designed to give you an overview of present educational problems in the world and in the SEAMEO Region. It contains ideas adapted from Philip H. Coombs' The World Educational Crisis, and from the SEAMEO Regional Educational Planning Seminar held in Bangkok in April 1971. The module provides you useful background information on educational problems before you go further into sharpening your problem-solving skills.

**OBJECTIVES**

Become sufficiently aware of the crisis in education as it exists in our world, its causes and some possible directions for its solution -- so that you can:

- describe the possible crisis as it exists in your own country;
- explain some of the probable causes for the crisis in your country; and
- name possible ways in which the crisis can be reduced.

**CORE INSTRUCTIONAL ACTIVITIES**

Read Module 1, and write answers to the SELF-EVALUATION questions. Do not look at the FEEDBACK (our suggested correct answer) until you have completed writing your answers. Then check your answers with the FEEDBACK. Note that FEEDBACK answers are only some suggested answers. The answers you give may be equally good, but judge this for yourself. If you need help with any portion of the module, ask at the Training Office.

At the end of Module 1 is an e
you to complete based upon wha
learned (or thought about) wh
the module. It is called a PO
PRACTICUM and will ask you to
short paper about the "crisis
as it may occur in your own co

*****

HAPPY LEARNING !

## CRISIS IN EDUCATION (PART I)

### Development and Crisis:

In the past 10 years, educational systems in the world have grown rapidly. Student enrolment has increased faster than ever before and costs have increased even more. Education has become the largest local industry.

From 1950 to 1960, world-wide primary school enrolments have increased by more than 50 percent, and secondary and higher education enrolments by more than 100 percent. Thus, by 1960, twice the number of the world's children were in formal schools (1).

In Asia, 17 percent of the school age population (5 to 24 year old) were in school in 1950. Enrolment grew to 31 percent in 1965 -- almost double.

These enrolment increases seem to promise continued educational progress. The figures, however, are silent about the difficulties. They do not show the high rate of dropout and failures. They hide the large number of costly "repeaters". They say nothing about the quality of education.

More and more students knock on education's door each year. In the developed countries, the demands are greatest beyond the secondary level. In the lesser developed countries, they are great at all levels.

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(1) P.H. Coombs. The World Educational Crisis, A Systems Analysis, Oxford University Press, New York, 1970.

Despite the large increase in school enrolment after 1950, the demand for more education has been even larger. For many years to come, this "demand-supply gap" will continue to be a problem.

In lesser developed countries, the present demand for education exceeds enrolment at the secondary and higher levels more than it does at the primary level. This difference is due partly to the earlier priority which was given to primary education. In the SEAMEO Region enrolment is much higher at the primary level than at the secondary. At the primary level the percentage of school age children in school differs from country to country, from a low of 47% to a high of 100%. At the secondary level, enrolments are much lower, from 4% to 55% (1).

The demand-supply gap will be even more of a problem because of population increases. In the SEAMEO Region, the most striking single factor that affects school enrolment is the size of the population. In 1975, the population of the SEAMEO countries will reach around 275 million. The age structure of the population in the SEAMEO countries shows a large and increasing proportion of the population in the school age group. The implications for education of this rapidly expanding school age population are evident. Grave political and social consequences can result if the social demand for education is not satisfied. The SEAMEO countries will have to devote an increasing share of their scarce resources to creating additional educational opportunities for the new population. At the same time, they must try to overcome existing illiteracy and inadequate schooling. They are now making every effort to solve this problem, but their inability to do so with present resources is a basic cause of the coming "Crisis in Education".

(1) SEAMES, Beyond the School wall, A Study of Non Formal Education in the SEAMEO Region 1973-1974; Bangkok, 1974.

This demand-supply gap is not the only problem of education in the SEAMEO Region. In 1969, the Regional INNOTECH Center conducted a series of national seminars in the Region which resulted in a listing of 73 "problems"*. The problems when classified and arranged in order of priority resulted in:

1. Lack of relevance between jobs and education. Examples: lack of relevance between the student's later needs and his present education, between a nation's goals and the products of its educational system.

2. Lack of qualified teachers. Examples: not enough well trained teachers, ineffective instructional methods.

3. Many students are not in school or not in the right school. Examples: Lack of space, lack of educational opportunities, student dropouts, need for adult education.

4. Lack of money for school buildings and facilities.

5. Lack of valid tests to measure student performance and evaluate educational systems.

6. Illiteracy.

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* Later in this course, we will be able to make finer distinctions between "problems" and "solutions". Some of the "problems" above are, in reality, solutions to more basic problems.

It is significant to note that these problems identified at the national seminars conducted by INNOTECH are very similar to those summarized from the papers received by SEAMES from the SEAMEO countries for the Regional Educational planning Seminar in Bangkok in April 1971 (1).

(1) SEAMES, "Present Educational Situation and Major Educational Problems in the SEAMEO countries" - SEAMEO Regional Educational Planning Seminar, Bangkok, 26 - 30 April 1971.

# CRISIS IN EDUCATION (PART I)

## SELF - EVALUATION

## AND

## FEEDBACK

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How to use:

Answer the questions on the SELF-EVALUATION sheets. You may refer back at any time to Part I of this module.

After you have written your answers, turn to the FEEDBACK sheet on the next page. Compare your answers with those on the FEEDBACK.

Change your answers if you want to, but if you feel that your answers are as good as those given as FEEDBACK, leave them. Remember that FEEDBACK answers are only suggestions.

## SELF-EVALUATION (PART I)

A. What is education's "demand-supply gap"?

_____
_____
_____
_____
_____

B. Does a "demand-supply gap" exist in your country? (Yes/No)

_____

(If yes) what are several reasons for the "demand-supply gap" in your country?

(1) _____
_____
_____
_____

(2) _____
_____
_____
_____

(3) _____
_____
_____
_____

Note: FEEDBACK answers are on the next page.

## FEEDBACK (A and B)

A. Education's "demand-supply gap" indicates that many persons want to attend school who cannot do so because there is no room for them. The "gap" is between the number who want to enrol and the ability of the educational system to find places for them.

B. Several reasons for the "demand-supply gap" are given below. (You may have other reasons in your own country).

- the growing social demand for education: more students try to enter school or try to stay in, and go further;

- the rapid population growth causing a rapidly expanding school age population;

- the scarcity of educational resources (money, manpower...).

## SELF-EVALUATION

C. What are some reasons why school enrolments are increasing, especially in lesser developed countries. (Give at least 2).

(1) _____

_____

_____

_____

_____

(2) _____

_____

_____

_____

_____

(3) _____

_____

_____

_____

_____

## FEEDBACK (C)

C. Some suggested reasons for increasing school enrolments (You may have given other reasons which are just as good):

- Parents and their children are convinced that more education means better living conditions, economically and humanistically. This reflects society's social demand for education.

- Public policy puts the stress on educational development as a precondition for over-all national development (manpower training).

- To increase educational participation rates - which means sending a higher proportion of each age group to school, and for more years -- appears everywhere to be a democratic imperative.

- The population explosion has acted as a quantitative multiplier of the social demand for education.

## SELF-EVALUATION

D. What are possible implications or problems for educational systems resulting from increased enrolments? (Give at least 3).

(1) _____

(2) _____

(3) _____

(4) _____

## FEEDBACK (D)

D. Possible implications and problems include the following (You may have given other implications that are equally good):

- More students
- Need for more schools, more classrooms and other facilities, more learning materials.
- Need for adequate curriculum and methods of teaching for mass education.
- Need for more teachers, supervisors and other non teaching personnel.
- Increased educational budget.
- Possible overcrowded schools of poor quality
- etc...

## CRISIS IN EDUCATION (PART II)

There are various ways of explaining the existence of today's crisis in education. Following is an article by Mr. Ly Chanh Duc, former INNOTECH director, presented at the SEAMEO Regional Educational Planning Seminar held in Bangkok in April 1971. The "three crises in the world today" it describes could in fact be the very causes of the world educational crisis.

### THREE CRISES IN THE WORLD TODAY

There are three situations in the world that I want to talk about today. I hope we can focus our attention on these three situations as we plan for SEAMEO in the '70s.

#### Situation 1. Population Growth

The first situation is rapid population growth. The most recent UN estimate indicates that the world's population will double by 1985. By 1980, the end of the decade we are planning for, the SEAMEO countries will have 89,000,000 more people than we do today. The problems of population growth are complex and vary from area to area, but the overall region can expect to have 30% more people in 1980 than we have today.

It is difficult to imagine the effect that this increase in population will have on us. A city with 40 schools would need to have 55 schools of the same size just to handle the increase in population. With this high growth rate, we will have to run very fast just to stay in place.

There is another factor of population growth which will probably be even more obvious to us in 1980. This is the growth in the size of our labor forces. Since our populations are young, most of the population increases will occur in school age and working age groups. As a whole, the labor force in the area will increase about 35% in the next decade. For Indonesia, this means ten million more men will be looking for jobs in 1980. In the Philippines, about four million more men will be seeking jobs. West Malaysia will need about nine hundred thousand more jobs for its male work force in 1980.

The effects of even highly successful population control programs are very slow. Nothing we do now will have had much effect by 1980. But what we do now will affect what the next generation does, and, by the second generation, the brakes we apply now will have begun to take effect.

It seems to me that, at a minimum, every child should know the number of children he should have in his future family, i.e., the family size that will stabilize the population in his country or region. This number may be the single most important fact that a school system can teach a child in the 1970s. And of course, this is only a beginning step in bringing population under control.

Fortunately, we have examples of successful family planning programs within the region. Fortunately, new methods of birth control are being tested; fortunately, we have recognized the importance of the problems. Now, it is time for the most difficult step in the entire development process: turning knowledge into action. Although education will be only a part of a total population control system, education must not be the missing link.

Situation 2. Knowledge Growth

If anything is increasing more rapidly than we humans are, it is our knowledge of the world we live in.

The traditional response to the knowledge explosion has been to cram more facts and theories into the school curriculum. It is time to consider a more realistic approach. We should realize that no one can hope to master the knowledge of the world today and no school can teach it. We should also realize that the facts and theories of today may be of little use tomorrow as new facts and theories are discovered.

The knowledge explosion is real. But it does not automatically follow that we should have a curriculum explosion or a school explosion. In fact, just the opposite view of education can be taken. Perhaps education should prepare students to learn on their own, rather than teach them current facts and theories. Perhaps we should discard most of the current curriculum and teach only reading and a few other process skills which will help people learn on their own.

An example may illustrate how the present schools do not prepare students to learn on their own later in life. When we are out of school and we want to learn something new, we must schedule our own time, find our own information, and process the information ourselves. How greatly this contrasts with learning in schools! In school, the teacher schedules our time, presents the information to us, tell us what pages to read, and processes the information for us in lectures. We have

nothing to do but memorize facts and theories that have been placed in the syllabus. Nothing could be as different as "learning in school" and "solving problems in life".

It may be maintained that children need the structure of a school and will not learn without it. But a child learns the most complex thing he ever learns before he enters school. This is his ability to think and talk in his nature language. This acquisition of language and thought processes is the greatest personal gain in knowledge that any of us ever make. And we make it without the aid of the school.

Situation 3. The Process of Relevant Education

And this leads me to the third situation. Not all education takes place in school. Indeed, most meaningful education does not. We learn on our own how to learn new things. We do not learn in school how to be happy, how to choose a wife or husband, or how to plan our careers. In fact, most of the really important human decisions -- marriage, birth, jobs, new knowledge, -- are seldom mentioned in schools.

Nor should they be.

There are other ways to educate a person. Every educational planner, it seems to me, should become familiar with the papers by Everett Reimer and Ivan Illich* of the Centro Intercultural de Documentaction in Chuernavaca, Mexico. I cannot summarize their arguments now, but their conclusions are striking. They believe that schools should be abolished because they increase social stratification and increase inequalities.

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* See Illich's "The Alternatives to Schooling" available as Elective Bal.

Illich and Reimer insist that we stop thinking of education as something that takes place in a school. They have described other means of educating a population as alternatives to expensive universal schooling. For example, "educational accounts" could be given each child at birth. These would allow him and his family to buy educational services. This alternative may not cost as much as the current costs of schools. The educational accounts could be spent over a life time as the individual continued his life-long education.

The important thing to keep in mind as we plan for the coming decade is that alternatives to the present school system do exist. The region which begins to investigate these alternatives seriously may find itself with an educational system which the developed countries will want to copy. Everywhere students are complaining about the lack of relevance between what they learn in school and what they see and do in the world. A nation which attempted to solve this problem by placing the responsibility and means for life-long education in the hands of the people who are to be educated might soon be a leader in world education.

We spend too much money on schools for the return they give us. We do this because people have come to equate schools with education, and length of staying in school with the quality of education. This attitude may be the largest obstacle standing in the way of useful reform. It would indeed be a brave statesman who would reduce the "time of schooling" and call this an improvement in the "quality of education".

But there is scattered evidence that this can be done. In one study, the entire first grade curriculum of the middle-class U.S. school was taught to American Indian children in one month's time. In addition, there is evidence that it takes primary children 10 times as long to learn to read as it takes adults to learn to read. Think how much a country could save by simply delaying the teaching of reading for a few years when reading could be taught much faster. We now aim at giving every child about 10 months of education per year for about 6 years. We cram these 60 months of education into childhood. For the same cost, we could give every human being one month of education per year for sixty years. Would this be a better use of our educational funds? Perhaps we should all go to school a month a year throughout our lives rather than continuously year after year when we are young.

I have mentioned this alternative to suggest that we have alternatives in education. One would hope that by 1980 SEAMEO has investigated these alternatives carefully.

# EDUCATION CRISIS (PART II)

## SELF - EVALUATION

## AND

## FEEDBACK

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How to use:

Answer the questions on the SELF-EVALUATION sheets. You may refer back at any time to Part II of this module.

After you have written your answers, turn to the FEEDBACK sheet on the next page. Compare your answers with those on the FEEDBACK.

Change your answers if you want to, but if you feel that your answers are as good as those given as FEEDBACK, leave them. Remember that FEEDBACK answers are only suggestions.

## SELF-EVALUATION (PART II)

A. What are some reasons why education systems should be concerned with rapid population growth? (Give at least 2 reasons).

(1) _____

(2) _____

(3) _____

## FEEDBACK (A)

A. - Rapid population growth means heavy enrolment pressures, and urgent needs for more educational resources.

- Rapid population growth means increased school enrolments, and need for adequate mass education (content, delivery system...).

- Rapid population growth means increased size of the labor forces: education will be expected to provide relevant training to an increased number of workers.

- By developing desired habits toward sound decisions concerning family size, population education could, in a long range, contribute to bringing population growth under control.

## SELF-EVALUATION

B. How does knowledge growth contribute to the educational crisis?

## FEEDBACK (B)

B. - The knowledge acquired at school becomes soon obsolete: education cannot keep up with new discoveries in actual life.

- Knowledge explosion has caused overloaded school curriculum: education focuses upon facts and theories and does not teach a person how to solve problems in life.

## SELF-EVALUATION

C. The article states that we have to develop alternatives to the formal school system in order to make better use of our educational money. Can you think of at least 2 very expensive components of the present formal school system in your own country?

(1) _____

(2) _____

(3) _____

## FEEDBACK (C)

C. - Teachers, even when they are underpaid, are the most expensive component of any formal educational system, because of their large number. In most SEAMEO countries, teachers' salaries represent more than 80% of education recurrent expenditures.

- Buildings and other physical facilities.

- Textbooks and learning materials (usually paid by students' parents, and therefore represent a hidden cost, but an important one anyway).

Is it possible to overcome the crisis in education? Following are some thoughts by P.H. Coombs for a suggested positive strategy.

"To do their part in meeting the crisis, educational systems will need help from every sector of domestic life, and in many cases, much more help also from sources beyond their national boundaries. They will need more money. But money will be harder to get since education's share of national incomes and budgets has already reached a point that restricts the possibilities for adding on further increments. They will need the real resources that money buys. They will especially need a fuller share of the nation's best manpower, not merely to carry on the present work of education, but to raise its quality, efficiency, and productivity. They will need buildings, equipment, and more and better learning materials. In many places, they will need food for hungry pupils, so that they will be in a condition to learn. Above all, they will need what money alone cannot buy - ideas and courage, determination, and a new will for self-appraisal, reinforced by a will for adventure and change. This is turn means that educational managers in particular must face up to the way the relevance of their systems is being challenged. No more than a grown man can suitably wear the clothes that fitted him as a child, can an educational system successfully resist the need to change itself when everything around it is changing.

"The main feature of strategy must be a heavy stress on <u>innovation</u> - innovation in virtually every aspect of every educational system: not change for its own sake, but changes carefully calculated to achieve needed improvements and adjustments".

## POST MODULE PRACTICUM

Module 1 has the educational crisis as it exists in our world. It has given some reasons why there is a crisis and why the crisis may become worse. However, the module also has presented some thoughts on how the crisis can be reduced.

Your PRACTICUM is to examine conditions in your own country and to write (no more than two pages) about your country. Try to cover the following:

> Critical educational problems, their probable causes and some suggested solutions of your own.

You may refer to this module or to any other reports or books that you wish. You may also discuss the topic with anyone you wish.

If some participants from the same country wish to prepare a joint PRACTICUM, that is very acceptable. If you do prepare a joint PRACTICUM, your report should naturally be more comprehensive.

Because we regretfully cannot provide secretarial services to the large number of participants attending the course, your practicum will have to be done in handwriting. The Training Office will provide you with carbon paper so that you may retain a copy.

**********

GOOD LUCK !

SERIES 5

MODULE 2

# NEED FOR INNOVATIVE APPROACHES TO EDUCATION IN SEA

INNOTECH

# MODULE 2

**PREVIEW**

Module 2 is designed to analyze and suggest alternative solutions to the serious educational problems confronting Southest Asia. The module contains:

1. A paper by Robert Jacobs

2. A paper on the Innotech Approach

Both provide useful background information for participants interested in sharpening their problem-solving skills.

**OBJECTIVES**

After reading these articles and completing the study questions, you should be able to:

1. explain the need for non-tradional approaches to education in SEA.

2. identify and discuss traditional assumptions about your national educational system.

**CORE INSTRUCTIONAL ACTIVITIES**

Read these two articles and write the answers to the SELF EVALUATION Question. Do not look at the FEEDBACK (our suggested correct answer) until you have completed writing your answers. Then, check your answers with the FEEDBACK. Note that FEEDBACK answers are only some suggested answers. The answers you give may be equally good, but judge this yourself. If you need help with any portion of the article, ask at the Training Office.

## INTRODUCTION

## THE PROBLEMS AND OPPORTUNITIES

A computerized guess estimates that it would take 181 years to educate all the children of Southeast Asia alive today using conventional approaches and existing facilities.

All the children of Southeast Asia can't wait that long. They are young men of the next century, growing up in a world of rapidly expanding knowledge. They are eager to learn. Can we help them?

We probably cannot help them if we continue to think about education in conventional terms. We cannot build enough schools, and train enough teachers to educate all the children of Southeast Asia. But even if we had money to build enough schools, and train enough conventional teachers to offer conventional education, would we want to do this?

Many educators in the world say no. We know much more about how children learn than we are using in conventional schools. We know much more about systems of communications than can be contained within the walls of the conventional classrooms. Three conditions converge to make change likely.

(1) The needs are great. Many children are not in school, and many of those who are in school are not learning things that will be relevant to them as adults in developing societies.

(2) The cost of conventional educational methods is much too high to extend conventional education to many more children. Already, some countries within the region are devoting up to 35% of their national budgets to education.

(3) The knowledge and technology are available to develop practical new approaches to education.

It is hoped that these three conditions -- the needs, the cost and the knowledge of new approaches -- can be combined with the appropriate organization and personnel.

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Here is a portion of Dr. Robert Jacobs' paper presented at the Innotech meeting, 1968. It provides specific background on educational problems in Southest Asia. In your reading you should discover some interesting suggestions and new ideas.

Good Reading!

# EDUCATIONAL DEVELOPMENT IN SOUTHEAST ASIA (PART I)

Robert Jacobs

## The Desperate Problem

In recent years the Asian countries have given high priority to the expansion of facilities for education and training. They have recognized that all other developments - in industry or agriculture, in politics or defence - depend on the skilled manpower and the informed citizenry that only an adequate educational establishment can provide. They have committed themselves to the attainment of sufficiency in education in the shortest possible time. But, despite their most earnest efforts, the demand has continued to eclipse the progress that has been achieved.

The limiting factor has been the enormity of the task. There have been no solutions to the quantitative problems of providing basic education to the large percentage of children to whom this opportunity now is denied; of balancing this investment with the equally urgent needs for higher education and for technical education at all levels; and of finding still further resources to cope with such special problems as literacy training for some 350 million adults. Nor have there been solutions to the qualitative problems of replacing the traditional aims of education with revised objectives attuned to present-day manpower needs and national development aims, and of maintaining high standards of education throughout the flux of expansion and change. Could they have been treated individually, any one of these problems would have posed a serious challenge. In the aggregate, they have proved overwhelming.

Looking ahead, the Ministries of Education have projected their needs and their resources, and have found that even long-range solutions are nowhere in sight. It is simply impossible to build the schools, train the teachers, print the textbooks, install the shops, equip the laboratories, and hire the administrators in the numbers required to meet the basic needs of all sectors of the educational effort. The unhappy alternatives have seemed to be (1) to concentrate the available resources in certain sectors, perforce slighting the rest; or (2) to dilute the effort with partial programs in all sectors, thereby doing justice to none. Either way, the established targets for national development cannot be acheved.

A New Hypothesis

As startling as it may be, as unacceptable as it may be initially, a strong case can be made for the hypotheses that most of the "insurmountable" problems of Asian education are in fact self-imposed and, to that extent, articicial. They are problems only because we have assumed that Asia must follow the traditional approaches to education that were developed in past centuries. We have assumed that each of the developing countries in Asia must retrace the steps that the advanced countries travelled decades before.

The problems are self-imposed simply because we have continued to insist on traditional classrooms with standard equipment, on the accepted ratio of a qualified teacher for each 35 students, on the bound textbooks that are costly to produce and difficult to keep up to date, on the instructional methods whereby one student performs while his classmates sit idle and passive, and on all the other outmoded features that the countries which are exporting educational expertise are trying to replace in their own educational programs.

Take away the constraints of history and tradition, and the problems begin to disappear. Remove the self-imposed assumptions and certainly the nature of the basic problems will change considerably.

A New Approach

The reality of today is that breakthroughs have been achieved in the technology of teaching and learning which demonstrate quite clearly that there are infinitely better, more efficient, and more economical means of achieving instructional objectives than were available even ten years ago. There is no reason why Asian education should be tied to approaches which have been made to norm only by history and tradition. Systems and methods consistent with Asian resources and directed specifically to Asian needs can, should, and inevitably will be developed.

What are the implications of these breakthroughs for educational development in Southeast Asia? What would be the effect of tossing aside these age-old assumptions? It is indeed necessary to have a teacher for every 30-35 pupils? Is it necessary to spend 6-8 years to achieve the instructional objectives which are set for the elementary cycle? Is it necessary to house the learning process in the expensive physical plants which are designed to serve the one teacher to every 30-35 pupils approach? These are not simple "just suppose" questions. They are questions which can be raised legitimately in view of the alternative approaches and solutions which are now above the horizon and which have never been tried seriously in Asia.

## A SHORT INNOTECH SUMMARY TO PART I

... National development depends on education to a large extent.

... The educational "demand-supply gap" (referred to in Module 1) continues to increase.

... Educational problems are far more than "demand-supply", they include setting priorities among many kinds of educational needs.

... It is impossible, with present resources, simply to expand the traditional system of education.

... Problems are <u>self-imposed</u> because we insist on traditional solutions.

... Non-traditional approaches and questioning of traditional assumptions may provide answers.

# MODULE 2 (PART I)

## SELF - EVALUATION

## AND

## FEEDBACK

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How to use:

Answer the self-evaluation questions before referring to the suggested answers on the feedback sheet. Compare your answers with those on the feedback sheet. Change your answers if you wish, or leave your answers if you feel that they are as good as those suggested on the feedback.

Remember that this is not a memory course, so you may look back through PART I as you prepare your answers.

## SELF-EVALUATION (PART I)

A. According to Dr. Jacobs, why are Asia's educational problems self-imposed?

B. Do you feel that the idea of problems being self-imposed apply to your own country? (Why/Why not?)

## FEEDBACK (A and B)

A. Your answer should make the point that Asia's problems are self-imposed because Asia continues to insist upon traditional approaches to education which were developed in past centuries.

B. Check (and discuss) with other participants from your country whether the idea that problems are self-imposed really apply to your own country.

You and your colleagues are the best judges on your answer to this question.

## SELF-EVALUATION

C. What are some assumptions about education that need to be questioned in your own country? (Give at least 3 assumptions. You may review Dr. Jacob's questions in the last paragraph of PART I).

1. _____

2. _____

3. _____

4. _____

## FEEDBACK (C)

C. Some assumptions that may need questioning:

- every classroom should be equipped with standard equipment
- accepted ratio of one qualified teacher for every 35 students
- bound textbooks
- instruction whereby one student performs while classmates remain passive
- to spend 6-8 years to achieve the instructional objectives set for the elementary cycle
- to house learning process in expensive physical plants
- to use textbooks as the primary mode of instruction
- to teach different subjects at different times
- to start school at 8.00 a.m. and end school at 3.00 p.m.
- to build more school buildings to handle increasing enrolments.

EDUCATIONAL DEVELOPMENT IN SOUTHEAST ASIA (PART II)
Robert Jacobs

With exercise of just a bit of imagination one can pass from questions about assumptions to a possible future where the objectives of basic education (literacy skills, basic computational skills, simple community living skills, and so on) are implemented and achieved right in the home and village by use of simple inexpensive, self-instructional packets of materials, co-ordinated with radio broadcast which come into either the home or perhaps a community centre. No school as we know that institution today may be required. A completely new kind of institution may emerge replacing both the physical facilities and the concepts which now separate education into elementary and secondary cycles.

These institutions of the future will possibly be community education centers for self-learning, where persons of all age groups will gather to utilize modern learning resources, largely self-instructional requiring a minimum of professional supervision, and achieving what the educational system is expected to achieve at a fraction of the cost at greater efficiency, and in considerably less time than the twelve year norm established by tradition for the elementary/ secondary cycles. Vocational education may be carried out in special learning centers where basic knowledge and techniques are mastered through multimedia instructional devices, at a bare fraction of the cost of vocational education as it operates today, leaving the development of special job skills based on this general background as the responsibility of the business, industrial, or governmental organization employing these skills.

One can try to set these imaginative wanderings aside as being the science fiction of educational technology, but it must be remembered that in the physical sciences we have been in our generation the leap from the science fiction of yesterday to the space exploits of today.

Methods of Change

I am not foolish enough to propose or to even imply that this kind of change can come quickly or easily. The roots of the educational establishment lie deep, and this is true in any culture within any national boundary. Educators are generally conservative and resistant to change. And there are vested interests lobbying for maintenance of the statusquo. One can see all of these forces at work in the countries now coming to grips with the newer educational technology. But in Asia the alternative to change is perpetuation of insurmountable problems, and eventually, quite possibly educational bankruptcy, for the cost of traditional approaches grows greater each year, and resources for the national investment in education, unfortunately, do not increase proportionately. There simply must be willingness to try new approaches, and there must be serious exploration of the newer educational technology to see what it may have to offer However difficult the achievement of change, a start has to be made.

It would be a mistake, and a serious mistake, to begin simply by importing teaching machines, programmed textbooks, educational TV, computers, and the other "gadgetry" developed for use elsewhere and attempting to impose them upon an existing system of education. There are two things wrong with this approach. First, innovation must be indigenous, suited to Asian problems and needs, if it is to be effective. Second, imposing "gadgetry" upon an existing system simply

adds the cost of the new to the old. Educational television, for example, used as a supplement to traditional classroom instruction is a luxury few, if any, Asian countries can afford. But when used to make the skill of the master teacher available to fifty classrooms at a single performance, educational television may become an instrument for change while affecting genuine economies in the cost of education.

It would also be a mistake to start innovation by importing specialists from other countries to do the job for the Asians. Such expertise must be tapped for purpose of training and for dealing with specific problems, but innovation is not a oneshot affair; it is a continuous process, and to insure its continuity Asians themselves must be the innovators, not simply passive onlookers while the job is done for them by outsiders.

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## A SHORT INNOTECH SUMMARY TO PART II

... Schools (as we now know them) may be replaced by entirely new institutions and procedures

... Community learning centers may evolve in which persons learn with a minimum of professional supervision

... The number of school years may be reduced

... Any number of possibilities are possible if we overcome our traditional outlook

... We must be willing to change and to try new approaches

... Change and innovation must come from Asian settings by Asians; successful changes can rarely be imported.

MODULE 2 (PART II)

SELF - EVALUATION

AND

FEEDBACK

## SELF-EVALUATION (PART II)

What do you think is wrong with simply adding TV, projector, programmed instruction and other innovations and technologies to the existing Asian education system?

## FEEDBACK (PART II)

Your answer can include these two reasons:

- Innovation must be suited to Asian problems and needs if it is to be effective.

- Imposing "gadgetry" upon the existing system may simply adds the cost of the new to the cost of the old.

MODULE 2 (PART [illegible])

THE INNOTECH APPROACH

INNOTECH stands for INNOvation and TECHnology. But it does not stand for innovation for the sake of change only. Nor does it stand for technology solely in terms of some sort of educational hardware or devices.

INNOTECH does stand for innovation, however, when changes are needed to solve educational problems. And the technology of INNOTECH refers to the techniques and approaches resulting from research into the appropriate methods for achieving learning.

Change for the sake of change cannot be justified any more than traditional approaches can be justified because "this is the way we have alwasy done it." The measure to be applied to any approach, whether it is innovative or not, is does it provide a feasible solution to an educational problem?

The most important concept at INNOTECH is that any activity be problem-oriented. The center cannot come up with innovative ideas and then seek problems for which they are suited. It is entirely the other way around: solutions are to be sought for problems which exist.

We cannot however, attempt to solve problems which are not defined specifically in clear terms. And most importantly we must be able to discriminate between problems and solutions. Participants in this course will probably tire of the training staff in its repeated insistance on distinguishing between problems and solutions*, but the concept is basic to both INNOTECH and to any process which attempts to come to grips with "real" educational problems in seeking solutions.

There is a need for innovation when it is clear that traditional approaches are failing. This three-month course will attempt, however, to provide a framework whereby a systematic search for appropriate approaches and solutions can be made.

In line with this, we bring you the first two items of INNOTECH operational philosophy-Innotech Concepts from the Five-Year Development Plan 1974:

1. Since the project title may tend to focus unduly on innovation, it is important to point out initially as one element in the INNOTECH operational philosophy that the stress is on effectiveness and workability in developing solutions to educational problems. In other words, as problems are identified, clearly defined, and actions are initiated to solve them, effectiveness and workability of solution, in terms of the specifications which are set for a satisfactory solution, will be the keynote regardless of whether it is a new and unconventional solution or simply a re-structuring of a long-practiced solution.

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* We will show later that a problem such as "there are not enough teachers" refers more to a solution rather than to a problem.

2. The work of the project is to be problem oriented. This is one of the most important elements in the INNOTECH working philosophy. Work with new educational approaches and technology will be in relation to identified problems and the possibilities presented by these alternative approaches in deciding the most effective solutions to these problems. For example, educational television, programmed textbooks, and self-instructional devices, or any other innovative approaches will <u>not</u> be developed as separate solutions after which there would be a search to find problems for which these solutions might fit. To repeat, the work of the project will be <u>problem oriented</u>.

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SUMMARY

Module 1 gave several viewpoints on the educational crisis that exists in our countries, some possible causes of those crises and some ideas for their solution. These ideas concerned the overcoming of traditional assumptions about education so that new solutions can be sought.

The present module has carried the idea even further with Dr. Jacob's assertion that many of the problems in this Region are "self-imposed" because we have not been able thus far to escape our traditional outlook. His advice to question traditional assumptions about education can provide us with a powerful tool in seeking alternative solutions to our problems.

The INNOTECH approach was included here primarily as a caution to all of us that we can get so "innovation conscious" that we are more concerned with the change itself than we are with the problems that we are seeking to solve.

From here on, let us all be very problem oriented in our attempts to break away from traditional systems in our search for solutions.

# MODULE 2 (PART III)

## SELF - EVALUATION

## AND

## FEEDBACK

### SELF-EVALUATION

Part III has presented an INNOTECH approach regarding innovation and change that has been described as "problem-oriented".

Give a short description about what is meant by being "problem-oriented" in the development of innovations.

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## FEEDBACK (PART III)

What is meant by being "problem-oriented" in the development of innovations includes ...

- Change or innovations are of no value unless they are directed toward the solution of problems.

- The process of innovation is not to develop innovations first and then seek for problems which they could solve; the process is first to identify problems and then to seek solutions. Solutions may be innovative or traditional depending upon their effectiveness and workability.

- When traditional approaches do not work, alternative and innovative solutions must be sought -- but they are sought in relation to a specific problem.

## POST MODULE PRACTICUM

Let us take here one "self-imposed" problem:

> Not enough youngsters are able to complete a secondary education.

Now list at least ten assumptions about traditional secondary schools which we could question in seeking an answer to the problem. Two assumptions are given to start you off.

1. It would cost more money to educate more students

2. Youngsters learn only at school

3. _____

4. _____

4.

5.

6.

7.

8.

9.

10.

Now, examine all the assumptions you have made and then describe one possible solution to the problem.

A possible solution may be to _____

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When all your colleagues from your country have finished this Module, meet with them along with a member of the training staff and repeat the above process. HHowever, this time

a) identify a critical problem in your own country

b) list assumptions related to that problem which should be questioned, and

c) write a short description of a possible solution to that problem.

GOOD LUCK!

SERIES 5

MODULE 3

# SEMINAR: EDUCATIONAL PROBLEMS IN SEAMEO COUNTRIES

INNOTECH

## MODULE 3

## SEMINAR: EDUCATIONAL PROBLEMS IN SEAMEO COUNTRIES.

**PREVIEW**

Module I gave you an overview of the educational crisis confronting most countries today and the causes for this crisis. Module 2 gives some reasons as to why conventional approaches will not be adequate to solve those problems and challenges some traditional assumptions upon which most of our conventional solutions have been based. It also suggests some alternative solutions to the serious educational problems confronting Southeast Asia.

The general purpose of Module 3 is to give all participants a clearer insight into the educational problems confronting the SEAMEO member countries and to sharpen their faculties for identifying traditional assumptions that have served as obstacles to working out more efficient solutions; assumptions that they think should be questioned.

OBJECTIVES

Each participant shall be able to

(1) identify three (3) critical educational problems in his country,

(2) name the traditional assumptions related to the problem which he thinks should be questioned

(3) describe one possible solution to each problem, and

(4) suggest assumptions related to problems given by fellow participants that ought to be questioned.

CORE INSTRUCTIONAL ACTIVITIES

1. Before the seminar, meet with your country group and, in addition to the critical problem you have identified during the Post-Module Practicum in Module 2, identify two other educational problems in your country, listing the assumptions related to each problem that should be questioned, and write a short description of a possible solution to each problem.

2. During the seminar each country group will describe the problems they have identified, the assumptions related thereto that should be questioned and the possible solutions. At the same time, they should be ready to entertain and answer questions that may be raised by fellow participants and take note of other assumptions that may be suggested. When other country groups are presenting their problems, the other participants will raise any question that they may want to raise for clarification, and suggest other assumptions related to the problem that may not have been mentioned.

3. After the seminar (and this is purely optional) you may want to make a consolidated list of all the problems presented and indicate those that are common to most, if not all of the SEAMEO member countries. This will help to give you an overall picture of the educational situation in Southeast Asia.

SERIES 5

MODULE 4

# EDUCATIONAL TECHNOLOGY AND THE LEARNING PROCESS

INNOTECH

For Internal Use Only

Adapted from
Original Material
by Robert M. Gagné
Florida State University

## MODULE 4

**PREVIEW**

In this module, Robert M. Gagné of Florida State University describes the processes of learning and their implications to instruction. It then discusses the characteristics of several forms of instructional media and the potentialities of each for various types of learning outcomes.

**OBJECTIVES**

After completing this module and writing answers to the self-evaluation questions, you should be able to explain the relationship of different kinds of media, different types of learning and different phases of learning.

**CORE INSTRUCTIONAL ACTIVITIES**

Read Dr. Gagné's article and write the answers to the self-evaluation questions. Then, check your answer with the feedback we have provided. If you need help with any portion of the article the Training Staff will be pleased to assist you.

# EDUCATIONAL TECHNOLOGY AND THE LEARNING PROCESS

The phrase "educational technology" carries different meanings to different people. Both of its major meanings were recognized by the Commission on Instructional Technology in its report entitled "To Improve Learning" (1970). I have always favored the second meaning identified in that report, namely, a body of technical knowledge about the systematic design and conduct of education, based upon scientific research (Gagne, 1968). Obviously, though, any such systematic approach to education, and more specifically to instruction, must include a consideration of the functions to be performed by media - that is, by what are called "the things of learning" (Armsey and Dahl, 1973).

One of the major questions of educational technology is, "How can the 'things of learning' best be employed to promote learning?" There must be some reasons why these "things have come to be viewed as having advantages for student learning. Why should a projected picture, a taped message, a television program, or a computer program, be of value in providing instruction to students? Are there reasons to suppose that they do, sometimes, have advantages for learning that are greater than those provided by the lecture, the book, and the chalkboard?

I want to examine how such questions can be answered. As a first step, I believe I must take a look at learning itself -- learning as it occurs in the setting of schools and colleges, including universities.

The procedure I intend to follow, then, is first to consider learning as it occurs in education. From this set of descriptive principles, I shall try to derive what seem to be some important points of decision about the use of hardware technology as an aid to instruction.

## LEARNING OUTCOMES

To begin the description of learning as it occurs in educational settings, it will be useful to distinguish some categories of learning outcomes. The outcomes of learning are sometimes considered simply as changes in behavior. However, this is only part of the story. The changes in student behavior that we gratefully observe imply that persisting states have been acquired. "What is learned" is something new that remains a part of the learner. Some would call these abilities, but I prefer to speak of them as capabilities, since they make students capable of accomplishing things they couldn't previously do. It is these capabilities that constitute the outcomes of learning.

What is learned by the student are customarily described as "subjects" and "topics". Thus, we often speak of a student as studying biology, or literature, or history, or sometimes more specifically topics such as "Newton's second law", or the "institution of the family". Obviously, though, these subjects and topcis merely imply what is being learned, rather than naming it. In studying "Newton's second law", for example, the student might be learning how Newton tested his second

law, or how to state Newton's second law, or how to measure the variables involved in this law -- or any or all of these. In studying the institution of the family, the student might be learning how to define a family, or how to describe cultural differences in families, or how to identify the functions of a family as a social institution -- or any or all of these. Naming the subjects or topics does not tell us what capabilities the student is acquiring. If we are to think systematically about student learning, we must think in terms of such capabilities.

Now, of course, the capabilities learned by the student can be identified in such specific terms that they include the content of the subject he is studying. If this is done, they become what are called instructional objectives. Any given course of study, such as introductory chemistry, would contain hundreds of such specific objectives. The magnitude of such a collection of objectives makes them very hard to deal with, for many purposes.

There is, I believe, a way out of this dilemma. The solution resides in the fact that there is a limited number of types of capabilities, which are found within any subject of the curriculum, and yet have quite distinct characteristics so far as learning is concerned. They differ from each other with respect to how they are learned, how they are retained, and how they behave in their generalization or learning transfer. These differences also imply that different external events -- provided by various media -- need to be arranged in instruction.

My suggestion is that there are five principal categories of learning outcomes -- of learned capabilities -- which can be identified in any subjects of the curriculum. The five are: (1) verbal information, or knowledge; (2) intellectual skills; (3) cognitive strategies; (4) attitudes; and (5) motor skills. I have described these in other writings (Gagné, 1971, 1973), but I need to define them here in brief terms.

Verbal information, or knowledge. This kind of capability is learned when the individual can state in propositional form the names, facts, and generalizations he has acquired. As several theorists have maintained, units of information often become subsumed or otherwise related to larger collections of information stored in longterms memory. Information may be of use to the invidual in his further learning; it may be of practical use in everyday life; and it may be of value as a vehicle for thought. Surely a great deal of what is learned by students, in various subject areas, can be classified as information.

Intellectual skills. Intellectual skills are the capabilities the student acquires that enable him to deal with his environment symbolically. Fundamentally, the symbols he uses are those of language and mathematics. It should be noted, however, that such skills are specifically embodied in every subject of the curriculum. For example, a student of chemistry learns the skill of finding the normality of solutions; a student of his native language learns the skill of constructing descrptive paragraphs; a student of social science learns the skill of tabulating data.

Cognitive strategies. A third class of learning outcome is called cognitive strategies. These are the skills of self-management that the learner acquires, presumably over a period of years, to govern his own processes of attending, learning, and thinking. By acquiring and refining such strategies, the student becomes an increasingly skillful independent learner and independent thinker. As goals of education, cognitive strategies are often accorded the highest priority by educational philosophers.

Attitudes. Attitudes and values are a fourth category of learning outcomes, sometimes referred to as the "affective domain" (Krathwohl, Bloom, and Masia, 1964). As learned dispositions, they modify the behavior of the individual towards classes of things, persons, or events, in doing so, they affect the choices he makes of his own personal actions toward these "objects". The modification of attitudes of students may occur, of course, in any subject of the curriculum.

Motor skills. The acquisition and perfection of motor skills is also a part of what is learned by the student. One thinks most immediately of the motor skills learned in sports and physical education. However, there are other instances which occur in academic subjects. Examples are the manipulation of instruments in science and engineering, and the pronunciation of sounds in foreign languages.

Five types of learning outcomes. Briefly, then, what is learned by the student, regardless of its specific content, may be classified into these five types of outcome -- information, intellectual skills, cognitive strategies, attitudes, motor skills. The reduction of an enormous number of specific learning objectives to these five classes is an important step, because it makes possible systematic thinking about learning. The five classes are significant because they are distinctive in their learning characteristics. In particular this means that instruction, for each of these classes of outcome, has readily distinguishable differences. One does not, example, design instruction for motor skills to be the same as instruction for attitudes; instruction for information is not the same as instruction for intellectual skills.

## A SHORT INNOTECH SUMMARY

... Educational technology is the systematic design of education ... based upon research.

... It is possible to design instruction and the use of different media for different types of learning.

... Dr. Gagné suggests five types of learning that should be considered regardless of the subject matter or topic.

... The five types of learning are:

(1) Verbal knowledge is the acquiring of information, facts and generalizations.

(2) Intellectual skills refer to the learned use of symbols, primarily language and numbers.

(3) Cognitive strategies refers to the ways a person learns to manage his learning and thinking.

(4) Attitudes determine the behavior of person's toward things, persons or events - and they affect the choices be makes.

(5) Motor skills refer to physical skills and manipulations.

... By reducing learning objectives to these five types of learning, one may design instruction (and the use of different media) which can be directed toward these types regardless of subject matter.

MODULE 4

# SELF-EVALUATION

# AND

# FEEDBACK

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How to use:

Refer back to Dr. Gagnés article if you wish.

Answer the self-evaluation questions. Compare your answers to those suggested on the FEEDBACK sheet. Note that your own answers may be as good as those suggested on the FEEDBACK. You will be the judge.

## SELF-EVALUATION (A)

4. Why are Dr. Gagné's suggested five types of learning important to the design of instruction and the use of different media?

## FEEDBACK (A)

... These probably are appropriate instructional methods or media for each type of learning.

... Having only five types of learning simplifies analysis of appropriate instructional methods or media.

... Instructional methods or media are more relevant to types of learning than to subject matter or topic.

... We do not need to examine each of the thousands of instructional objectives in determining appropriate instructional methods or media.

## SELF-EVALUATION (B)

B. The five types of learning suggested by Dr. Gagné are:

... verbal knowledge

... intellectual skills

... cognitive strategies

... attitudes

... motor skills

For each example below write the type of learning involved.

Example A: Learn how to adjust a microscope

Type of learning: _____

Example B: Learn to feel and act differently toward another person

Type of learning: _____

Example C: Learn a new language

Type of learning: _____

Example D: Learn to multiply numbers

Type of learning: _____

Example E: Learn the names of the eight SEAMEO countries

Type of learning: _____

Example F: Learn systematic ways to solve problems

Type of learning: _____

## FEEDBACK (B)

Example A: Learn how to adjust a microscope

Type of learning: motor skills

Example B: Learn to feel and act differently toward andther persons.

Type of learning: attitudes

Example C: Learn a new language

Type of learning: intellectual skills

Example D: Learn to multiply numbers

Type of learning: intellectual skills

Example E: Learn the names of the eight SEAMEO countries

Type of learning: verbal knowledge

Example F: Learn systematic ways to solve problems

Type of learning: cognitive strateties

## SELF-EVALUATION (C)

Do you think that the use of the five types of learning will allow us to determine exactly what instructional methods or media are appropriate for every case?

Yes _____

No _____

I don't know _____

Comment: _____

## FEEDBACK (C)

Any answer you give is alright, but it is unlikely that we can always make a perfect match between methods or media and types of learning. What the use of the five types of learning does do, however, is do allow us to classify and simplify our thinking so that we can make some good estimates about appropriate learning (methods) or media.

Without losing sight of these different learning outcomes, I turn attention now to another dimension of human learning. What is it that goes on inside the student's head when he learns? What is the process of learning like? To be sure, on some occasions the entire process may take place in a few seconds, or it may last a number of minutes. But some kinds of events take place, over some time period.

Contemporary theories conceive of learning as a matter of information-processing. Stimulation from the learner's environment affects his central nervous system by a series of processing stages. The transformed information is stored in memory, and a final transformation makes possible a performance that is evident to an external observer. A more-or-less standard model employed in these theories is illustrated in Figure 1. My point in depicting this model is not give a complete explanation of it, but rather to emphasize the kinds of processing that are supposed to be involved in a single act of learning. Notice that by following the "flow of information", one can detect the various transformations that are required. These may be considered as the "stages" of a single learning event. As illustrated in the figure, these states are as follows:

(1) From receptors to sensory register

(2) From sensory register to short-term memory

(3) From short-term memory to long-term memory

(4) From long-term memory back to short-term (working) memory

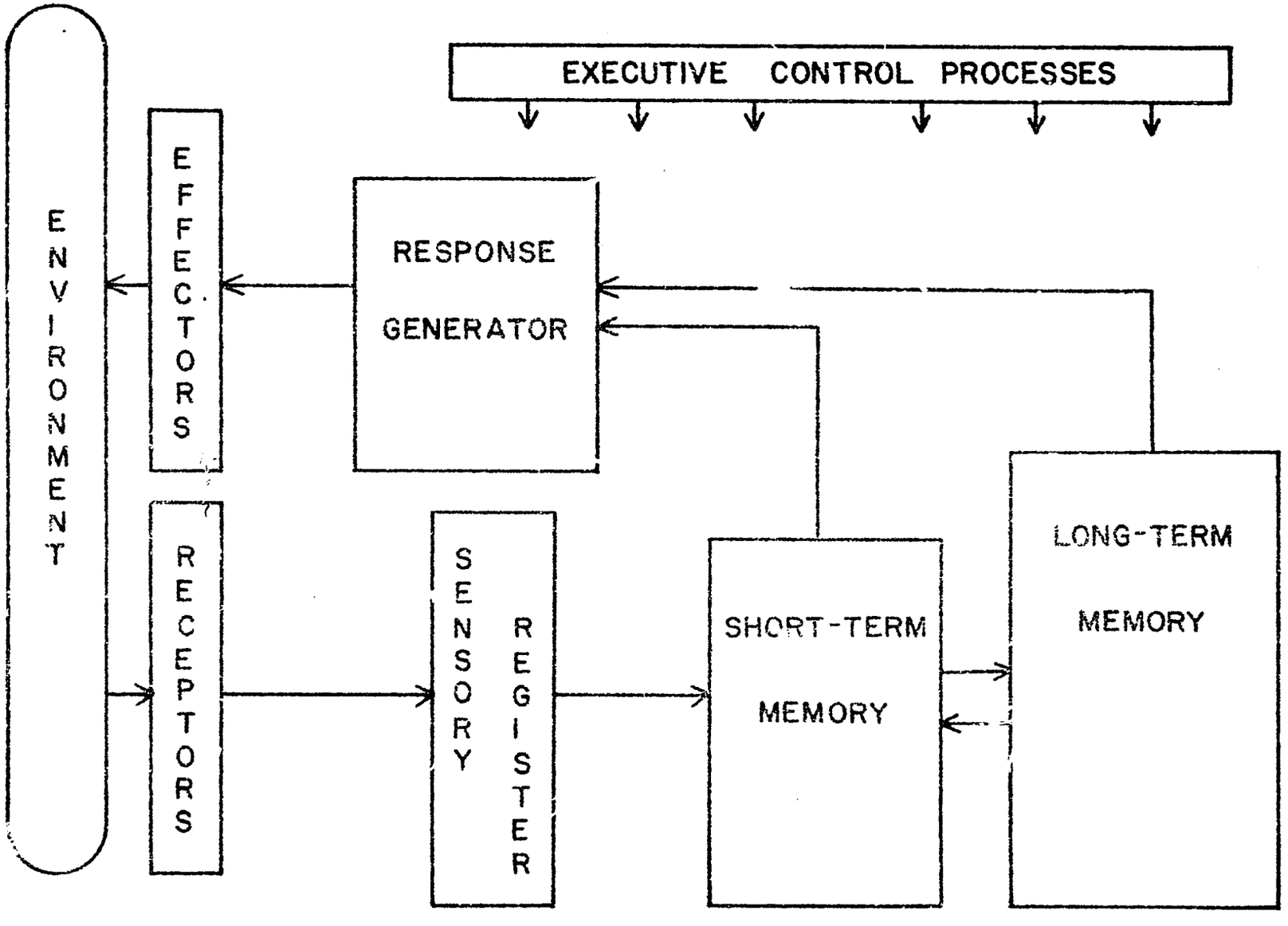


Fig. 1 A model used in information-processing theories of learning and memory.

(5) From short-term (working) memory to response generator

(6) From response generator to effectors

(7) From effectors to a performance.

Each of these processing stages is controlled by one or more "executive control" processes, which themselves are an important part of the learner's repertoire.

In the time available to me, it is not possible for me to describe these processes in detail, as has been done by a number of writers and theorists (Atkinson and Shiffrin, 1968; Lindsay and Norman, 1972; Greeno and Bjork, 1973). For present purposes, the important points to be noted are these:

1. An act of learning, from initial stimulation to response, consists of a series of transformations of "information".

2. Some of these transformations (or processes) are familiar because they have been investigated for many years; examples are attention, slective perception, retention, response generation. Others have been newly identified, and knowledge about them is now accumulating. Examples of these new processes are coding, rehearsal, and retrieval.

3. The various stages of processing of information during an act of learning are controlled and modified by executive control processes which are a part of the learer's "memory store". These processes of executive control may be considered as basically identical with the previously mentioned "cognitive strategies".

4. The various processes of an act of learning can be influenced by events external to the learner. Thus, as an example, the way in which information to be learned is "coded" to enter long-term memory may be influenced by a suggested coding, provided by a picture or diagram.

## IMPLICATIONS FOR INSTRUCTION

The conception of learning as a series of processes occurring in stages has some important implications regarding the nature of instruction, and what instruction can be expected to accomplish.

If we consider the student to be a young adult, we realize that he has learned many things by that time. He has a large store of information, he has formed many attitudes, and he has learned many intellectual skills. But most significantly of all, he has acquired many cognitive strategies which make it possible for him to arrange instruction for himself -- to conduct self-instruction. Assuming that an appropriate source of stimulation can be located(a book, a document, a picture), the student is capable of learning by activating the various executive control processes available to him. To a considerable extent, he can and does instruct himself.

If learning can be accomplished by means of self-instruction, why is any external instruction, designed and delivered by other persons, necessary? The answer to this question leads first of all to a definition of instruction. As I have pointed out, the internal processes which compose an act of learning can be influenced by events external to the learner. Instruction may be defined as the set of planned external events which influence the processes of learning and thus promote learning. It is of importance to note, however, that these external events take place in a context of internal control processes that are already on-going, and which make learning possible. The external events do not produce the learning -- instead, they potentially support processes which are occurring within the learner.

There is still another important implication of this conception of learning as a series of information-processing stages. When an act of learning, however buried it may be, is conceived in stages, it follows that instruction may have several different functions corresponding to these stages. Instruction may be supporting one stage of the total set of processes at one time, and still another stage at another time. In other words, the set of events called instruction does not have a unitary purpose -- it has a number of purposes. The external event which is appropriate for one stage of learning may be quite irrelevant or inappropriate for another stage. This point becomes obvious if one contrasts an instructional event used to arouse attention, for example, with the very different instructional event used to support retention.

The different functions served by instruction may be roughly grouped into four phases. I use these phases here for convenience, rather than for precise description. The relation between learning processes and the four phases of instruction I wish to emphasize is shown in Table 1. The phases named imply in general terms what instruction does to support learning.

TABLE 1

LEARNING PROCESSES AND PHASE OF INSTRUCTION

| LEARNING | INSTRUCTION |
|---|---|
| Motivation | |
| Attention | Introductory Phase |
| Selective Perception | |
| Coding | |
| Storage Entry | Initial Guidance Phase |
| Retention | |
| Retrieval | Application Phase |
| Transfer | |
| Performance | |
| Reinforcement | Feedback Phase |

1. Introductory phase. Instruction in this phase "sets the stage" for learning by appealing to student interest, arousing and directing attention.

2. Guidance for initial learning. In this phase, instruction supports the initial learning by giving directions, suggesting "coding" schemes, furnishing "prompts" and "hints".

3. Application phase. A third phase of instruction is concerned with schemes for retrieval, spaced reviews, and practice in generalizing, with the aim of promoting retention and transfer.

4. Performance and feedback. Finally, there is a phase of instruction which concerns itself with setting the occasions for student performance, and with providing feedback (reinforcement) relevant to that performance.

It is evident that these four different phases of instruction, supporting different stages of learning, are frequently delivered to the student as verbal communications by an instructor. Alternatively, they may be communicated by the printed pages of a textbook, by pictures on a television screen, or by a number of other means. Whatever phase of instruction is involved, one may speak of it as "communication". Calling instruction by the single name of "communication", however, solves no problems. The various unitary communications are different, because they support different internal learning processes -- different stages of a total act of learning.

## INSTRUCTION AND MEDIA

The characteristics of learning and instruction that have been reviewed are all relevant to the next question I want to address. This is the question, how can various media best be used for instruction?

Answering this question can best be done, I believe, within the framework of two propositions that set limits on the generality of the answers one seeks. These two propositions may be briefly stated as follows:

1. Decisions about instruction must be made in the context of the question: "instruction for what?" Instruction is different depending on what is to be learned -- on what kind of learning outcome is expected. The five kinds of outcomes -- information, intellectual skill, cognitive strategy, attitude, motor skill - have different implications for effective instruction. One does not expect instruction in motor skills to be the same as instruction designed to establish an intellectual skill. Instruction intended to establish or change an attitude is not the same as instruction for the learning of information. Answering the question, is this or that example of instruction "good"? cannot be done unless one includes the subordinate question, "good for what?"

2. Decisions about instruction must also take account of the fact that instruction has a set of phases which perform different functions. Instruction supports different learning processes, depending on the stage of learning to which it is directed. It may have the purpose of introducing learning, of guiding initial learning, of supporting one or another learning process.

Of course it is not possible for me to describe in any complete sense the implication of these ideas for the use of media in instruction. The "things of learning" are many, and all of them are useful in some ways and in some situations to support learning processes. The most I can hope to do on this occasion is to use a few examples in which I try to bring to bear the concepts of learning and instruction previously described.

## A SHORT INNOTECH SUMMARY

... In addition to the 5 types of learning, there are also 4 phases of instruction that should be considered in designing instruction. They are:

1. Introductory phase
2. Guidance for initial learning
3. Application phase
4. Performance and feedback

... In determining learning methods or media, we should considered the 5 types of learning <u>and</u> the 4 phases of instruction.

# MODULE 4

# SELF-EVALUATION

# AND

# FEEDBACK

## SELF-EVALUATION (D)

D. What are the two propositions suggested in this module for answering the question "How can various media best be used for instruction?"

1. _____

2. _____

## FEEDBACK (D)

These two propsotions are:

1. Decisions about instruction must be made in the context of the question: "Instruction for what?" (Types of learning)

2. Decisions about instruction must also take into account the fact that instruction has a set of phases which perform different functions. (Phases of instruction)

THE BOOK

Let me begin with one of the most familiar "things of learning" -- the book.

So far as types of learning out-comes are concerned, there are some that learning by reading a book cannot accomplish, without additional supplementary activity. Clearly, this is the case with motor skills. Reading the description of how to operate a typewriter, for example, may be of some initial aid, but can in no way be sufficient for the acquisition of the skill. Similarly, reading a book is often insufficient for the learning of an intellectual skill. The student who is learning to balance chemical equations, for instance, must supplement his reading with practice on a number of examples, before he can be said to have acquired such a skill. He must also be able to obtain feedback informing him about the correctness of his efforts. A book can contain directions for these activities, and also answers to problems from which the necessary feedback can be obtained. Note, however, that these activities are not themselves a part of the reading -- they are additional activities, for which the book simply sets the occasion. Yet it is these additional activities, rather than the reading itself, that supports learning of an intellectual skill in a critical fashion. This is, of course, the basic point of texts of "programmed instruction", they require the learner to undertake practice of examples, and provide the accompanying feedback.

The kind of learning outcome that the reading of books accomplished most successfully is the learning of information. To be sure, some self-instructional process must be brought to bear on such learning. Usually, the motivation to learn must already be present. In addition, the learner must in large part manage his own attentional processes and provide his own immediate feedback (usually, by a kind of internal rehearsal). But the information on the printed page is arranged in a convenient propositional form for retention, and is also presented in a larger meaningful context which is of immediate aid in both coding and later retrieval. For the truly skilled and highly motivated reader, the book is difficult to surpass as a medium for the learning of information. For this type of learning outcome, the need for other media, in fact, arises primarily from the recognition that learners are not always highly motivated and not always highly skilled as readers.

What about attitudes? Can they be established or modified by reading books? It is apparent that changes in attitudes do come about from reading, but only under certain circumstances. One does not expect, for example, the reading of a printed message such as "Avoid harmful drugs" to have any great effect upon a learner's attitude. But the reading of literature and biography can have quite a different effect, because people are portrayed. As the work of Bandura (1969) shows, attitudes can often be effectively changed when the learner becomes involved in learning situations that include "human models". Of course, he sometimes comes in direct contact with such persons. But he can also form identifications with human models by reading about them. The heroes of fiction and the distinguished men and women whose lives are recorded in biographies can become the human models whose decisions affect the learner. It has often been emphasized that courses in history and literature have the prominent aim of modifying the student's attitudes and values. In seeking this goal,such courses depend heavily upon books as their primary medium..

A SHORT INNOTECH SUMMARY

BOOKS

... are best for learning of information

... are helpful in learning attitudes if the student can identify with persons portrayed in the book

... are not sufficient, by themselves, for learning motor skills or for learning intellectual skills or for obtaining feedback

... always require (1) ability to read and (2) motivation to read

TELEVISION PROGRAMS

In terms of its characteristics as an instructional medium, including the ways used to support or enhance learning processes, the television program bears some resemblance to a book. Of course, it has the additional advantage of being an illustrated book -- a book with pictures. In addition, the viewer doesn't often have to read a printed page -- the communication is delivered by auditory means.

Despite these added features, a television shares with a book the limitation of being unable to support the performance-feedback portion of the learning act. The viewer may be responding appropriately to what he is viewing, and receiving feedback from his response, or he may not be. The program itself has no way of insuring that the learner's performance and its subsequent feedback will occur. A television program, like a book, can only set the occasion for such responding,, and can provide only a standard for performance, rather than direct and individual feedback. It is true that clever design, as in some parts of Sesame Street, can increase the probability of learner responding, but this does not mean that performance and feedback are assured.

The implication of this characteristic of televison programs is that the learning of skills -- motor and intellectual -- cannot be readily supported by this medium. In the case of a motor skill, some learning guidance can be provided with good effect, to be sure. But the smoothness and timing of a skilled motor performance must be attained by practice in the performance itself, and therefore must be acquired on

occasions which supplement the viewing. In the case of an intellectual skill, it is likewise the case that a television program can introduce and guide the learning. But again, the performance and feedback phase of learning must be supported by some supplementing activity, such as the completion of exercises in a workbook whose pages are keyed to the program. The learner must have a chance to apply the skill being learned to particular examples, by exhibiting the relevant performance and receiving feedback from it.

When attention is turned to the learning of information, some of the outstanding advantages of television programs can be perceived. First, scenes can be presented which introduce the learning by appealing to strong interests of the learner. Attention can be directed and maintained by a variety of means which are well known to designers of programs. The guidance of learning can be enhanced by contexts of rich variety, both verbal and pictorial. Even the performance and feedback phases of learning can be supported by the provision of questions and partially completed statements which require the learner to "answer back".

It is scarcely necessary to document the power of television programs in accomplishing these kinds of learning-support functions. In our daily lives we have become well aware of the tremendous effectiveness of television programs in bringing about the learning of information in viewers old and young. Much of the content of education would appear to be well suited for television presentation. This is particularly true for those portions of instruction concerned with the "transmission of the culture", and when the goal is one of "general education". This includes the learning of knowledge of the world and its peoples, of historical events and periods of developments, and trends in science, in the arts and in technology.

Turning now to the domain of attitudes, here again is an area in which television programs may be expected to have outstanding effects in the support of learning. The outstanding characteristic of such programs is their ability to present respected human models -- popular sports heroes, fictional characters, respected figures of history, and even "the guy next door". These people can be shown in realistic settings engaging in activities that exhibit the choices they are making, and being gratified or rewarded for choices of personal action. In crude form, the basic technique of attitude establishments is to be seen in the commercial messages of television broadcasting. Obviously these are effective, else they would not be continued. Yet we should not allow any misgivings we have about the aims of such programs -- sales and profits -- to diminish our appreciation of their effectiveness. Basically the same techniques, involving human modeling, can be employed to serve the aims of education. They can be used to establish and reinforce the socially desirable attitudes and values approved by the larger community.

## A SHORT INNOTECH SUMMARY

**Television**

... is best for learning of information, for providing motivation to learn; for giving initial guidance.

... can introduce and guide learning.

... is excellent for "transmission of culture".

... is excellent for learning of attitudes.

... cannot support the performance-feedback phase of instruction (need workbooks keyed to program).

... cannot readily support the learning of motor and intellectual skills, but can provide some guidance.

THE COMPUTER

As has frequently been pointed out, the computer itself is not a medium for instruction. Instead, it may be employed as the core of a system which combines several different media for instructional delivery. Specifically, the computer integrates the activities of a display component, a response component, and a feedback component of instruction.

The characteristics of the display portion of a computer system, insofar as they pertain to instructional effectiveness, would seem to be the same as those of the medium employed for display. If the learner is required to read messages in print, then he is receiving instruction similar to that of a book. If he looks at pictures or diagrams, their effects may be assumed to be entirely similar to pictures and diagrams imprinted on a page. If he is hearing an auditory message, it may be assumed to have effects similar to that of other types of sources of auditory messages.

The responding component of a computer system for instruction also has characteristics and limitations inherent to that component. Typing out answers to questions is a typical response made in computer systems. Since the responses to questions or examples for intellectual skills are usually symbols, this particular kind of responding is often well suited to the support of learning in this domain. In the case of information learning also, the typing of answers to questions about what has been learned appears to be an appropriate kind of responding. Obviously in contrast is the area of motor skills, in which practice of the motor performance itself is required.

The outstanding potential of the computer system in instructional support appears to lie in the feedback component. The responses made by the student in answers to questions may be assessed as correct, incorrect, incomplete, or wrong in particular ways. In its memory, the computer can store a number of alternative kinds of feedback information, designed to be appropriate to the response the learner has made. Virtually all designers of computer-aided instruction have recognized this possibility of differential feedback as the most promising characteristic for learning support. Note that it is this particular characteristic which makes the computer different from books or television programs. The computer can be programmed to "talk back" to the learner, and thus to serve this highly important function of providing feedback to the learner's performances. The feedback provided can be designed to "match" the response made by the learner; that is, it can be made appropriate to the correctness or incorrectness of his response.

At the same time that this significant potential of the computer system is revealed, its current limitations also become apparent. The kinds of differential reinforcement the computer can currently provide are limited to responses that can be simply coded. Of course, the computer can respond to the position of answers made by the learner, as in multiple-response questions. If the learner chooses alternative number one rather than alternative number three, the computer can provide appropriate feedback. Even more sophisticated transformations of the learner's responses, however, seem to be within the reach of modern technology. If the learner types the response "below" instead of the

approximate synonym "underneath", the computer may be able to provide feedback appropriately, as would be the case with a human teacher. Similarly, a suitably programmed computer may be able to recognize the identity of meaning in responses such as "the boy threw the rock" and "the rock was thrown by the boy".

Whatever technical limitations exist at present, it seems likely that future developments will make it possible for a computer system to provide differential feedback matched to the meanings of learner responses. When that happens, we shall truly be able to design a system which fulfills the most important area of promise exhibited by the computer system for the support of learning.

The Computer

... can integrate display component, response component and feedback.

... has one outstanding feature: the feedback component.

## MEDIA AND THE SUPPORT OF LEARNING

By these examples, what I have tried to show is that different media do indeed have different potentialities for instruction, when the latter is conceived as a set of events that support learning processes. First, media are differentially adapted for different kinds of learning outcomes. Some are particularly well suited for the learning of information; some have advantages for the establishment of attitudes; some have greatest relevance for the learning of intellectual skills. Whatever the medium, one needs to recognize that it is performing not one but several different functions. Instruction as a whole consists of a number of kinds of events, which have a number of different effects upon learning processes. These events may be (1) introducing the learning; (2) guiding the initial learning; (3) promoting retention and transfer; or (4) providing for performance and feedback. The various media accomplish these functions with differential effectiveness.

A single medium may often be extended in usefulness by supplementary things. Thus the printed text may be enhanced in usefulness by pictures and by workbook examples. The television program may similarly be extended in usefulness by supplementary materials which require learner responding.

I suggest that educational researchers need to adopt an analytic view towards the problems of appraising the effectiveness of the media of instruction. We need to ask the questions, what learning outcomes are being supported by particular kinds of media? And what kinds of support to learning processes are intended by the use of the "things of learning?" The basis for such an analytic approach is provided, I believe, by contemporary knowledge and theories of learning. From these sources it should be possible to derive an educational technology which is sophisticated enough to answer some important questions about how instruction can best be designed and delivered.

## A SHORT INNOTECH SUMMARY

The purpose of this article is not to be comprehensive; its purpose is to suggest that an educational technology may be developed which will allow us to consider (1) types of learning and (2) learning phases in the design of instruction and the use of different media.

## SELF-EVALUATION (3)

Discuss briefly the assets and liabilities of the following media in relationship to the five types of learning.

1. The Book

2. Television Programs

3. Computer

## FEEDBACK (E)

1. The Book:

The kind of learning outcome that the reading of books accomplished most successfully is the learning of information. Some self-instructional process must be brought to bear on such learning. Usually the motivation to learn must already be present. In addition, the learner must in large part manage his own attentional processes and provide hiw own immediate feedback.

It is apparent that changes in attitudes do come about from reading, but only under certain circumstances. So far as types of learning outcomes are concerned, there are some that learning by reading a book cannot accomplish, without additional supplementary activity. This is true in the case of motor skills. Similarly, reading a book is often insufficient for the learning of intellectual skills.

2. Television Programs

The learning of skills-motor and intellectual -- cannot be supported by this medium. But television programs are tremendously effective in bringing about the learning of information by the viewer. A television program, like a book, can only set the occasion for the viewer to respond appropriately to what he is viewing. He may receive feedback from his response, or he may not receive. A Television Program can provide only a standard for performance, rather than direct and individual feedback.

In the domain of attitudes, television programs provide outstanding effects in support of learning. The outstanding characteristic of such programs is their ability to present respected human models which can be employed to serve the aim of education. They can be use to establish and reinforce the socially desirable attitudes and values approved by the larger community.

3. The Computer

If the learner is required to read messages in print shown on display components, then he is receiving instruction similar to that of a book. Typing out answers to questions is a typical response made in a computer system for responding

component. Since the responses to questions or examples for intellectual skills are usually symbols, this particular kind of responding is often well-suited to the support of learning in this domain. Obviously, in contrast, is the area of motor skills, in which practice of the motor performance itself is required.

The responses made by the student in answers to questions through the feedback component may be assessed as correct, incorrect, incomplete, or wrong, in a particular way.

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POST MODULE PRACTICUM

| Types of Learning | Phases of Learning | | | |
|---|---|---|---|---|
| | Introductory Phase | Initial Guidance Phase | Application Phase | Feedback Phase |
| Verbal knowledges | | | | |
| Intellectual skills | | | | |
| Cognitive strategies | | | | |
| Attitudes | | | | |
| Motor skills | | | | |

Consider these methods of learning

B: Book
C: Computer
T: Television
R: Radio
I: Instructor
S: Self-Instructional modules

In the chart above place three "B's" where you think Books are good methods for learning; three "C's" where you think computers are good methods; theree "T's", "R's", "I's" and "S's". You may put more than one letter in a box.

When you finish, arrange a meeting with colleagues from your own country, discuss the similarities and differences of your individual papers, and prepare a new chart which will show your group's judgment.

As a group, prepare a second chart showing what each method does least well. Place three (-B)'s where you, as a group, think books are not very good methods of learning, three (-C)'s where you think computers are not very good, three (-T)'s, etc.

When you finish, make a single combined chart of all B's & (-B)'s, C's & (-C)'s, etc. Blank charts are available in the Training Office.

Now, as a group, consider just one of the five types of learning (verbal <u>or</u> intellectual or cognitive <u>or</u> attitudes <u>or</u> motor skills) and write a short paper discussing each of the above methods of learning in each of the four phases. A suggested format is given on the next page.

## SUGGESTED FORMAT

Country Report on Methods of Learning

Country _____

Type of Learning (check one)

- ◯ Verbal knowledge
- ◯ Intellectual skills
- ◯ Cognitive Strategies
- ◯ Attitudes
- ◯ Motor skills

### Introductory Phase

Books _____

_____

_____

_____

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Computers _____

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Television _____

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Radio _____

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Instructors _____

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Self-Instruction _____

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Initial Guidance Phase

Books

Computers

Television

Radio

Instructors _____

_____
_____
_____
_____
_____

Self-instruction _____

_____
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Application Phase

Books _____

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Computers _____

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_____
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Television _____

_____

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Radio _____

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Instructors _____

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_____

Self-instruction _____

_____

_____

_____

_____

_____

Feedback Phase

Books

Computers

Television

Radio

Instructors _____

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Self-instruction _____

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_____

_____

SERIES 5

MODULE 5

# INNOVATIONS IN THE DELIVERY OF MASS PRIMARY EDUCATION IN SOUTHEAST ASIA

PROJECT IMPACT

INNOTECH

JANUARY 1975

# MODULE 5

**PREVIEW**

Modules 5, 6 and 7 represent innovations which depart from our traditional systems of primary/elementary education. All three are now being tried in SEAMEO countries.

Only about one-half of the children in this Region are able to complete a primary education. Most SEAMEO countries do not have enough money to solve the problem by increasing the number of schools, teachers, text books, etc.... all of which are required by traditional educational systems. By far the highest cost of education is that of teachers; some 80-90 per cent of education costs can be considered teacher costs ... their training, housing, transportation, salaries, retirement, etc. All three innovations presented in Modules 5, 6 and 7, therefore, are directed toward making teachers responsible for the education of a much larger number of students than they presently are able to do. However, all three also are dedicated to providing a quality education.

**OBJECTIVES:**

You should understand the IMPACT system and give serious consideration to its use in your own country in order to be able to:

(1) Anticipate potential problems of IMPACT if it were to be used in your own country, and
(2) Suggest ways the system might be changed for use in your country <u>or</u> suggest ways that the potential problems could be overcome.

CORE INSTRUCTIONAL ACTIVITIES

Before beginning this module, it would be valuable for you to see the Project IMPACT slide-tape presentation. Sign up now for the presentation! You may have to wait a day or two to see it, but you may either continue studying this module or you may begin on Module 6 and come back to Module 5 after seeing the slide-tape presentation.

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Let us assume that you now have seen the slide-tape presentation on Project IMPACT. Remember, that the complete system has not been tried out yet, but that there are two field sites in which it is being conducted.

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As you read the description of the system, make notes to help you in your Post Module Practicum. Look now at what will be asked of you as part of your Practicum.

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There will be several sets of Self-Evaluation & Feedback in the module to help you to be sure that you understand the important points of the IMPACT system. Answer the Self-evaluation questions before looking at the feedback. Then compare your answers with those given as Feedback.

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Good Luck!

# A DESCRIPTION OF PROJECT IMPACT (PART I)

## RATIONALE

... approximately one-half of children in Southeast Asia do not complete 4-5 years of primary education,

... this condition is most prevalent in rural communities in which some 70% of the population lives,

... educational budgets are already strained, and the direction of INNOTECH research should not concern ways to increase funding,

... traditional means of education (teachers, classrooms, etc.) cannot simply be expanded because funds are not available,

... non-traditional alternatives must be found which are both effective and economical,

... mass media is expensive (TV) and limited (radio) as a means for delivery of rural primary education,

... 80 to 90% of educational costs are those associated with teachers,

... ways must be found to increase the student-teacher ratios (perhaps to as much as 200:1),

... with increased student-teacher ratios, classroom teaching is unlikely, and the role of the teacher may change to one of managing educational experiences,

... inexpensive community resources of all kinds (parents, skilled workers, older students, materials, buildings, etc.) should be utilized,

... students/parents may have to be responsible (self-directed) in taking advantage of educational opportunities,

... most learning may have to be self-instructional (or at least "non-teacher") under the management of the teacher, but under the direction and tutoring of parents, community members and older children,

... a means should be provided for individual learning rates and exit and reentry into the educational system at any time (as one means to avoid dropouts and wastage).

DESCRIPTION

The word IMPACT is an acronym for Instructional Management by Parents, Community and Teachers*. The title provides a fairly accurate description of the IMPACT system. "Management" is a key word because the professional teacher's role is drastically changed from one of being a classroom instructor to one of being a manager of learning experiences which are gained primarily through non-teacher sources (community volunteers including older students as tutors and adults with special skills, self-instructional learning modules, remedial classes conducted by older students, self-directed group interaction, possibly instructional radio, peer "buddy system" learning, monitoring of progress by parents, etc.).

IMPACT, in many ways, goes back in time before we had formal schools (and before parents delegated the responsibility for their children's education to professional teachers) when the responsibility

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* In Indonesia, the acronym is Proyek PAMONG: Pendidikan Anak oleh Masjarakat, Orang tua dan Guru which is translated as Primary Education by Community, Parents and Teachers.

for the transmission of knowledge and skills rested with the family and community. The IMPACT system once again insists that the basic responsibility for education resides in the community. What it does provide, however, is for relevant and quality learning experiences which are organized and managed professionally to provide for effective learning.

Since the inception of the IMPACT concept, the staff has been questioned numerous times as to whether the system represents formal or non-formal education. We consider it a marriage of the two concept It is primarily non-formal in the sense that there is little formal classroom teaching and that it is designed to make optimum utilization of community resources of all kinds. However, it is also formal in that it provides for systematic management of the learning process.

The staff prefers that the reader judge the above distinctions for himself from the following description of IMPACT which first appeared as a "newspaper clipping" in the April 1973 Planning Document[3]. Note, first, that the clipping is dated January 1980. Note also that the article gives a fairly fanciful description of a primary education system that undoubtedly will never come about in exactly the way it is described in the clipping. IMPACT is a concept involving the management of learning experiences; as we gain experience at the project sites with the various components of the system, however, there will be undoubted revisions which will change whatever is actually reported in a newspaper in January 1980.

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3. ibid

Newspaper Clipping

Sealand, January 1980

Primary schools throughout Sealand are closing! School bells no longer ring. On visits to three isolated villages during the past week this reporter did not see one class in session. In response to my questions about the cause of this calamity, I received tolerant smiles from villagers and was told time and again that "our concern is not with schools, it is with the education of our children."

What has happened in Sealand and in other countries in Southeast Asia is a revolution in education. Seven years ago, budgets of these countries were strained simply to provide education for one-half of primary age children; today, even in remote villages, essentially all children are receiving primary education. The concept that has brought about this revolution is the one voiced in my recent visits to SEALAND villages -- "our concern is not with schools, it is with the education of our children." A totally new system of primary education has been based upon this concept, and it represents a dramatic departure from the familiar and traditional primary school classes of my own youth.

How did this new system come about? It started with the Southeast Asian Ministers of Education Organization (SEAMEO), a cooperative effort on the part of eight countries in Southeast Asia to pool their resources in

an attempt to solve pressing educational problems common among the countries of the region- The organization, in planning for the future, documented its planning under the title of "Educational Development Programmes for the 1970's", and a high priority was assigned to the development of an effective and economical delivery system for mass primary education. The 1970's have passed, and the IMPACT education system which I recently saw in Sealand villages is the outcome of SEAMEO's far-sighted planning for the 1970's.

MOA LIA GOES TO "NO SCHOOL"

Moa Lia is the 12-year old son of a farmer in a small Sealand village. In questioning him, his parents, the district education inspector and others in the village I was able to piece together the following picture of the educational revolution through the eyes of those who are taking part.

Q: Moa Lia, what grade are you in?

Moa Lia: I don't know.

Father: We don't have grades or classes any more. Moa Lia, tell him what modules you have completed.

Moa Lia: In Language I have completed module 23, in Science module 17, in Mathematics 15, in Social Studies 12, and in Applied Projects 28.

Q: I don't quite understand. What is a module?

Moa Lia: It is a learning unit that usually takes me about a week to finish.

Q: Is it a chapter in a textbook?

Moa Lia: No, I don't have any textbooks. A module can be lots of things. Most times it is a self-instructional booklet of about twenty pages that I can do by myself. Of course, I do have to ask somebody to help me sometimes. Other times a module might ask me to work with a shopkeeper, or a carpenter or even the village headman. Once a bunch of us helped the district health officer on a project to drain water from some areas to get rid of mosquitos.

Q: Why don't you use textbooks?

District Inspector: We found that it would be a lot cheaper to have modules because we don't need so many. For example, once Moa Lia finishes a module he turns it in and somebody else can use it. Having a textbook is like carrying around twenty or thirty modules, even though a child can only read in one chapter at a time. Moa Lia, let him see your Science module 18.

(Science Module 18, as I examined it, most certainly was not a textbook. In the first place, the pages were fairly thick -- probably some kind of plastic. I was told that much money was saved because the plastic pages allowed the module to be reused many times without deterioration. It could even be cleaned up after being dropped in a puddle of water -- boys will be boys in any country. The content of the module was in the language of Sealand and I couldn't read it, but it clearly was a lesson on the human heart, and it included a number of three-color pictures. There wasn't much of the usual textbook about it. Obviously, it was some form of programmed instruction with places for Moa Lia to answer and to check his own answers. Pretty sophisticated stuff for a ten-year old.)

Q: Moa Lia, isn't a module like this difficult for you to do?

Moa Lia: I have to work hard, but I know what to do and I can ask for help if I need to. I had to learn to read first and then I had to

"learn how to learn", that is, I had to learn how to use each module.

Father: I never went to school, but I know what Moa Lia should be doing at any time. Even though I don't always know what it is he is learning, I know the steps he is supposed to follow. All the parents in this village, thus, can help their children on how to learn. We also can keep track of what they are doing and, because they are our own children, we are responsible because we both know that both he and our country will benefit from his learning.

Q: Moa Lia, you said that you have "learned how to learn." What do you mean?

Moa Lia: Everytime I pick up a new module, I listen to a cassette tape while previewing the module. I can listen to it as many times as I want until I am sure of what to do.

Q: Aren't cassette tapes expensive?

District Inspector: There are two inexpensive cassette players in the village and each module has only one cassette. The two cassettes are necessary in case one breaks down and has to be repaired. They are a lot cheaper than a teacher.

Q: Moa Lia, you also said that you had to learn to read first. How did you do that? You couldn't have learned from a module like this one on the human heart.

Moa Lia: Even before learning to read, I had to learn to speak.

Q: I don't quite understand.

Moa Lia: Most of the kids here grow up speaking a local dialect. We only know a few words of the national language when we start primary education.

Q: How did you learn to speak?

Moa Lia: When I was about six years old, I started listening to some radio programmes which taught kids how to understand the national language.

Father: We have four or five transistor radios in the village. Much of the time they are used by younger children in language learning but there are also adult programmes which we listen to. I have made several changes on the farm after listening to agriculture programmes.

Q: Moa Lia, so you learned to speak only by listening to the radio?

Moa Lia: No, but the radio helped me get started. Some 8 to 10 of us had a class in the main house of the village where we listened to special cassette tapes. Some of the kids parents who spoke the national language also helped us out.

Q: Did you have a teacher?

Moa Lia: Not really. The same parents helped out; some of the older kids also helped us.

Q: Then you learned to read?

Moa Lia: Yes, but we had to pass a listening test first to make sure that we knew enough to learn to read.

Q: Who gave the test?

Moa Lia: The Instructional Supervisor was here one day and gave it. Sometimes parents or older kids give it.

District Inspector: The Instructional Supervisor (IS) is the professional who manages the whole primary system here. The IS for this village also is responsible for two other villages in the district and makes regular rounds of the villages.

Q: I would like to find out more about the IS. But first, Moa Lia what happens if you don't pass the listening test?

Moa Lia: They find out what we do and don't know, and parents and older kids coach us.

Q: How long did it take you to learn to speak and understand the national language?

Moa Lia: About four months; it was fairly easy. Some kids take one or two years because they weren't able to learn it full time; they had to help their fathers.

Q: O.K., once you learned to speak, how did you learn to read?

Moa Lia: By programmed teaching and by modules which I could take home.

Q: What is programmed teaching? Is it a special method that your teacher uses?

Hoa Lia: The person who taught us wasn't really a teacher; it was a parent who had graduated from primary school and could read.

Q: Not a teacher?

District Inspector: Hoa Lia is right. The people who act as teachers here are not graduates of a TTC, and they only have a primary education. In this village, for example, three members of the community have volunteered to work part-time in the programmed teaching programme for reading. They are paid by the hour at a rate of about one-third of what it would cost for a teacher who had graduated from the TTC. We give them two weeks of specialized training in very specific techniques for teaching reading. Two older children who are in approximately their last year of primary education also have become programmed teachers. All older children are required to spend time in helping younger ones learn different subjects, quite often by individual tutoring. This scheme has been very successful.

Not only do the younger children learn quite effectively, but the older students also report that they themselves have learned a lot by teaching others. Because these villages have very little money, the free time given by older students in the teaching of the younger ones represents real savings. Before we had the new system, any teaching had to be done by a qualified teacher who was paid a regular salary, and there was no way that this village could afford to pay a full-time teacher. In several places in my district military servicemen fulfill some of the teaching aide functions.

Q: During all the time that we have been talking today, I have yet to find out what the school teachers do.

Moa Lia: We don't have any -- just some of the parents and older kids.

District Inspector: Moa Lia is right. Under the new system we don't have teachers and classes and textbooks in the same way that we used to. We simply cannot afford it.

Q: But I have seen some fairly sophisticated instructional materials -- learning modules, transistor radios and cassette recorders. How can you afford these things?

District Inspector: For the simple reason that we do not have teachers. Traditionally, more than 80 per cent of education costs have been teacher costs -- salaries, retirement, training, etc. The most revolutionary change made by the Project IMPACT was to eliminate the use of professional teachers who were tied to the classroom and to retrain them to become Instructional Supervisors. The usual student-teacher ratio in the past was 35:1. Our present student -- Instructional Supervisor ratio is 200:1. The IS's make a much better salary than they did as teachers, but we still have realized at least a four-fold savings in teacher costs. The money we have saved in this way is used for instructional materials of various kinds and to pay modest stipends to local instructional aides (community members with special skills).

One other benefit of this new scheme has been our ability to retain good IS's in the rural

communities. We had a very difficult time in the past in attracting and keeping good teachers in the villages. The increased responsibility, prestige and income of IS's seems to have played a big part in making rural education more attractive to top people.

Q: I now have a fairly clear idea of the kinds of learning experiences which children such as Moa Lia have under the new system. I also understand to some extent how the community draws upon its own resources to assist in primary education. But, I am not clear exactly what part the Instructional Supervisor plays in all this.

District Inspector: Throughout my district, each IS has the responsibility for about 200 primary children. In some of the larger towns there are two or three IS's. For small villages such as this one, however, there is only one -- and he is responsible for two other villages as well.

In larger towns, an IS will have an office in a permanent learning centre. Here, however, the learning centre is mobile. The IS travels in a small van which is his mobile learning centre.

The learning centre is the hub of the primary education system. It contains the appropriate learning modules, the cassette instructions for each module, tests for each module, instructional materials for use by programmed teachers and by other kinds of teaching aides, and progress records of each student.

Q: Moa Lia earlier mentioned that he had to take a test on understanding the national language when it is spoken before he could begin to learn to read. Does each module have such a test?

District Inspector: Yes, each module has several kinds of tests. First, when a child selects a new module he takes a readiness test to insure that he has all the necessary prerequisites to benefit from the module. The results of a readiness test may, at times, indicate that a child needs to take another module first -- or it may indicate that he should complete a review module, especially if he hasn't been able to take any modules for a long time because of illness or work on the farm.

Most modules of the self-instructional types also have quite a bit of built-in self evaluation to help a child monitor his own progress and be ready for the post-test when he finishes the module. Successful completion of the post-test itself indicates that a student has achieved the objective of the module and his achievement is entered on his record, one copy of which is kept by the Instructional Supervisor and the other copy is kept by the student so that he can keep track of his own progress.

The system is very flexible since it allows a student to take a post-test even if he hasn't studied the module -- if he feels confident that he can achieve the objectives of the module.

Q: What about adults, can they take the post-tests?

District Inspector: Of course, anyone in this village can take any of the modules or any of the tests. Primary education is no respecter of age. We used to worry about the dropout and wastage problems a lot more than we do now, and one reason for that worry was that if a child didn't finish

primary school by the time he was about 14 years old we felt that the education system had failed. We even designed non-formal systems to upgrade the competencies of "over age" persons -- and non-formal education was kept fairly separate from primary school. What SEAMEO has done in Project IMPACT is to incorporate much of what was called either "non-formal" or "community" education into a single system of achieving the educational objectives of primary education.

A person can progress through primary education at his own pace. A number of children now start school at a later age. (We have found students who begin at an older age actually progress faster -- providing some additional savings in our educational resources.) Many students are working, usually on their parents' farms. At certain periods during the year they do not have time to keep up their studies. However, they usually don't drop out as they used to when they would have been forced to repeat a grade on

returning to school. Now they can come back and pick up where they left off, perhaps starting out with a review module to cover previous work.

Q: What form are the tests in?

District Inspector: There are all kinds, depending on the objectives of the module. Sometimes there are performance tests on some practical skill, quite often there are knowledge questions, but the most usual form concerns the application of what has been learned.

Q: Does the Instructional Supervisor give all these tests?

District Inspector: It is not possible. On the average some 100 students complete a module eack week, perhaps 30 in each village. It takes about 15 hours each week in each village for testing alone. Volunteer aides give the tests. They have been trained by the supervisor to do so.

Q: Isn't there a chance for aides to score a child a little more favorably than he really deserves because of village pride?

District Inspector: We suspect that, when we first started and people didn't fully understand the system, some favoritism was shown. But,

villagers soon learned that the tests were for a student's own good -- to show his strengths and weaknesses as a basis for improvement. Since most persons now finish primary education there is no particular need for any examinations other than the tests associated with the modules. After all, the amount of education a child receives is up to himself and his family -- and they have come to realize that what they are learning is relevant to their lives as community members and as productive members of society.

Children who desire to go on to higher levels of education must pass readiness tests before going on. These examinations are conducted periodically by the central government.

Q: We have been talking all afternoon about modules, but I have no idea how many modules constitute primary education.

District Inspector: The number varies in each subject, but the average number is about fifty.

Q: Getting back to the Instructional Supervisor -- it appears that he is more a manager than a teacher.

District Inspector: That's very close to the truth. Let me list some of the duties of the IS:

... Select and train teaching aides from the community in specific duties,

... assign tutorial responsibilities to older students and train them in these functions,

... conduct PTA meetings to orient and train parents for the self-management of their children's studies,

... survey community resources and enlist persons with specific skills to assist students to "learn by doing" for some of the applied modules,

... monitor all instructional and evaluation activities,

... maintain student records of progress, giving particular attention to those who are progressing unusually slowly as a basis for counseling with students and parents,

... maintain a complete inventory of the learning centre, including instructional modules, equipment and tests, repairing or replacing as needed,

... provide feedback to the central government on the assets and liabilities of given instructional modules as a basis for improvement,

... serve as an advisor to the communities on educational matters.

Q: I'm still confused. It was a lot more understandable when there was the school, the teacher and textbooks. It seems that everybody in the village is somehow involved with the new system.

Father: That's about right. Students are helping students, parents are helping their children and specialists in the community as acting as part time aides. We couldn't to this on our own, though. We need the structure that is provided by the learning modules, and we need the organization, management and counsel of the Instructional Supervisor.

Q: I can guess your answer to this last question: How is the system working?

Father: If you mean if there are problems, the answer is yes. There is often some kind of mixup, but it is getting sorted out fairly well.

If you mean if children are getting a primary education, the answer is a definite yes. No matter how fast they are progressing, there has yet to be a student in this village who has given up and stopped.

> If you mean if children are in school, the answer is no. This is a Project IMPACT village. OUR CONCERN IS NOT WITH SCHOOLS, IT IS WITH THE EDUCATION OF OUR CHILDREN!

The above "newspaper clipping" appeared in the May 1973 issue of the INNOTECH Newsletter. A few readers at that time got the impression either (1) that the IMPACT system already was operable or (2) that INNOTECH was going to develop a system exactly as described. Neither impression was correct; the project is only in an early research stage and the staff expects that it will need to make many changes to the IMPACT system as it gains experience and experimental data. The key concept of the management of a variety of learning experiences by a trained professional (the Instructional Supervisor) is what is being developed and tested. The various components and methods of learning may be altered without changing the management concept of the IMPACT system.

To some, Project IMPACT may seem revolutionary because the traditional classroom is replaced by a community learning center which provides educational experiences outside the classroom*. However, if the reader will examine the various components of the system, he will find that all have been used in a variety of educational settings in the past. Self-instruction, older student tutoring, ungraded self-pacing, community volunteers, programmed teaching by older students, parental guidance, radio, cassettes, etc... no single component has

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* Grades I and II probably will receive much more classroom instruction than the later grades until children learn basic reading skills and are able to undertake self-directed instruction.

not been tried successfully at one time or other. What is revolutionary (new) is the IMPACT system of managing these various learning components, and it is this concept that is being tested experimentally at the field sites.

SUMMARY

1. An Instructional Supervisor represents the only institutionally trained professional educator. The traditional teacher's role is eliminated, and the Instructional Supervisor acts as a manager of instruction providing the needed direction and organization in the use of a variety of learning resources. One Instructional Supervisor manages the instruction of as many as 200 primary students.

2. Community members with particular skills (carpentry, home-making, agriculture, health, religion, etc.) are enlisted to provide specialized instruction. They are unpaid volunteers who have been recruited by the Instructional Supervisor on the basis of a survey of community resources in relation to educational needs.

3. Other community volunteers and older students, who are primary school graduates, are trained by the Instructional Supervisor to conduct specific courses, i.e. beginning reading on a part-time basis. Their training is very specific to the course they teach, and they probably function as programmed teachers. Some assist in the operation of the community

learning center, including record keeping and evaluating student progress.

4. Older students are expected to assist younger students through tutorials and remedial instruction. They are unpaid.

5. Parents are trained to monitor the instructional activities of their own children and are expected to take responsibility for their children's progress. Students and parents jointly are self-directed in terms of student progress, age of beginning formal education and age of completion.

6. There are no particular age limits. Except for learning reading skills, students need not be encouraged to begin at an early age.

7. Education is modular, each learning module covering the amount of instruction that normally takes one to two weeks. Each module is designed for the learning of specific educational objectives and contains both a readiness test and a post-test.

8. Many modules are in the form of individualized instructional packages. Students typically seek tutorial help from assigned older students whenever they experience difficulty.

9. Some learning modules are in the form of small -roup instruction under the direction of teacher's aides from the community. Others are tied to

instructional radio programmes, small group exercises, etc.

10. Printed modular materials are reusable by other students as soon as they are completed by those who progress more rapidly.

11. There are very few set class periods. Students are able to drop out and reenter at any time.

12. Primary education is ungraded; progress is indicated by learning modules satisfactorily completed rather than by school levels (grades).

13. All materials and records are maintained in the community learning center.

# MODULE 5 (PART I)

# SELF-EVALUATION

# AND

# FEEDBACK

SELF-EVALUATION (PART I ... A, B, C)

The questions below are to insure that you understand some of the basic concepts of IMPACT as presented in the preceding article.

A. Is IMPACT being tried out now?

Yes _____

No _____

If yes, where is it being tried out?

_____

B. Why didn't Moa Lia know what grade he was in?

_____

_____

_____

_____

_____

_____

C. If the problem of providing primary education is a problem of money how will IMPACT be able to afford quality instructional modules, tape recorders and radios?

_____

_____

_____

_____

_____

_____

## FEEDBACK (PART I .. A, B, C)

A. IMPACT is being tried out now in Solo, Indonesia and in Naga, Philippines.

B. Moa Lia didn't know what grade he was in because there are no grades in IMPACT. Students study modules at there own speed. School is self-paced, ungraded, and with a system of continuous progression. No one is held back because he/she has to wait for slower students. No one is pushed through faster than he is able to go.

C. Money will be available because far less money will be spent for teacher training, teacher salaries, teacher retirement, etc.

SELF-EVALUATION (PART I ... D, E, F)

D. How may IMPACT help solve the problem of drop outs?

_____

_____

_____

_____

_____

_____

E. Are all learning modules self-instructional?

Yes ____

No ____

Explain _____

_____

_____

_____

_____

F. How has the role of the teacher been changed?

_____

_____

_____

_____

## FEEDBACK (PART I ... D, E, F)

D. Students who drop out may return at any time and begin again, perhaps taking a review module. Students who have to help out at home can study modules at home, and they come to the Learning Center to take post-tests, get help on what they don't understand and pick up new modules.

E. Some learning modules are self-instructional, but many are not. Community members may instruct, older students may instruct a tutor, students can learn together, etc.

F. The teacher no longer stands before a class and gives lectures. The job becomes one of <u>managing</u> a variety of learning experiences for students.

A DESCRIPTION of Project IMPACT (PART II)

A Working Paper on "Learning How to Learn"

Those who are familiar with some of the original Project IMPACT concepts will remember the story of Moa Lia (a hypothetical newspaper report made in 1980 describing the experiences of a student, Moa Lia, in the IMPACT educational system). Moa Lia told the reporter that before beginning an instructional module he had to "learn how to learn;" he had to learn the procedures to follow for any given module. The report also said that the prime means for learning how to learn was a cassette player which was used in conjunction with the module simply to explain what process he was to follow, and he could replay the cassette until he was sure what he was supposed to do.

It is not a bad idea to use some form of standardized instructions which can be understood by all children (as shown by the difficulties students are having in tryouts in both Project IMPACT and Project RIT -- because they have to learn an instructional process entirely new to them). Instructions are printed in each module and staff members ("teachers") take time to explain the process, but kids often end up confused.

However, the use of a cassette for each module in Project IMPACT is mathematically/economically impossible. We have projected one cassette player (plus one spare) per 200 children. The player would, on the average, be available to a given student less than two minutes each day (360 min. + 200 students). We also have considered the use of the player for other instructional purposes (e.g. spoken language).

We propose to combine two possible solutions.

First, add one more player ($25 - $35) per 200 students.

Second (and more important) standardize formats of modules. This suggestion by no means should be interpreted as one which would do away with the variety of learning experiences which is necessary both to maintain a high interest level ("learning is fun rather than boring") and to allow the development of what we consider to be the most effective instructional process for a given set of educational objectives.

What is recommended, however, is that the format for each given kind of learning process be standardized. For example;

... All small-step linear programs should have the same general format. The sequence through the programmed text should be the same, feedback is always found in the same relation to frames, etc.

... Short paragraphs followed by questions/feedback should always follow the same format.

... Pictorials and accompanying response/feedback sequences should follow the same format.

... The procedures in the use of flip-cards or flash-cards should be the same for all.

... Following instructions as a means for applied skill training (usually involving a community member as "teacher") should be as standardized as possible.

... Small-group or buddy-system learning should follow similar procedural rules.

... Use of cassette players and workbooks should have great process similarity.

... etc., etc.

There can be perhaps 20 or 30 such module types -- not the 1200 or so modules needed for the complete primary curriculum. Students, thus could learn the module types and not be confuse- when they meet the same type again.

How to "learn how to learn" the different module types? Our suggestion is to prepare a practice module which is very simple while containing all the elements of the full-blown module. Use as content some fun (and funny) topics with an easily identifiable character. The character for each practice module should be different so that one type can be identified as a "Charlie Brown", another as "Felix the Cat", another as "Popeye", another as "Gordo", etc. Once learned, a "Gordo" type will be remembered as a "Gordo" and each full-blown module of this type should be thus identifed (perhaps with a small picture plus name of the character in a corner of the cover).

Each child will have access to all practice modules and be able to review them at any time.

Original learning of practice module procedures probably still should be assisted by a cassette which the children follow while going through the module. They should also be encouraged to ask anyone in the learning center (including classmates) if they are unsure how to proceed. At the time of module post-test and remediation (by tutors), the tutors should be instructed to make sure that each child has "learned how to learn."

# MODULE 5 (PART II)

## SELF-EVALUATION

## AND

## FEEDBACK

## SELF-EVALUATION (PART II ... A, B, C)

A. What does "Learning how to Learn" mean?

_____

_____

B. The first suggestion for improving children understanding of instruction for use of modules was to add one more cassette player for each 200 students. What was the second suggestion?

_____

_____

C. Why were practice modules suggested?

_____

_____

_____

## FEEDBACK (PART II ... A, B, C)

A. "Learning how to Learn" means the learning of students how to use IMPACT modules for learning. Module instruction is new and students need to know how best to use modules.

The second suggestion was to standardize formats of modules and to have only 20 - 30 types of modules.

C. Practice modules were suggested so that students would have practice with the format of the instructional module before using it. It was also suggested that practice modules be identified with pictures and that the same pictures would appear on every instructional module of the same type.

# A DESCRIPTION OF PROJECT IMPACT (PART III)

## A Working Paper on "Evaluation and Remediation for 100 per cent Mastery"

A key concept of Project IMPACT learning is that all children will reach 100 per cent achievement. Learning is modular, ungraded and self-paced, and each child will achieve all the objectives of a given module before going on to another module. This level of achievement may seem unnecessarily severe on the surface, but since much learning is sequential the effects of less than 100 per cent achievement can be magnified over time because a child may not have the prerequisite knowledge necessary to successfully learn later modules.

Traditional methods of teaching are not so demanding on achievement levels because of the flexibility provided by the teacher. A child who is unprepared for a given lesson (does not have the prerequisite knowledge) can usually be given individual help by the teacher at any time during a class. The IMPACT system, however, typically does not allow the flexibility provided by a classroom teacher, and children should possess prerequisite knowledge and skills before they undertake a given module.

Although severe, this insistance on 100 per cent mastery is a blessing in disguise because overall achievement levels of IMPACT students, almost by definition, should exceed those of students in a traditional school system. The topic of this paper, "Evaluation and Remediation", describes the process by which mastery is to be achieved.

There are three evaluation and remediation processes: (1) Self-Evaluation and Self-Remediation, (2) Tutorial-Evaluation and Tutorial-Remediation and (3) Teacher-Evaluation and Teacher-Remediation.

1. Self-Evaluation and Self-Remediation

Self-Instructional modules can take many forms, e.g.

... programmed texts

... work books

... flash cards

... instructions for group activities

... instructions for applied skills learning

... etc.

But, whatever forms modules may take, they have common characteristics:

a. Requires at least three hours to complete*.

b. Contains "chunks" or units of learning, each of which requires no more than 30 minutes to one hour to complete.

c. Gives the purpose (reason for learning) for the overall module and for each "chunk" within the module.

d. Gives explicit instructions (how to learn) for both the overall module and the chunks.

e. Presents explicit objectives (what is to be learned) at both modular and chunk levels.

f. Intersperses the learning experience with frequent opportunities for student response and feedback.

g. Summarizes (at both chunk and module levels) the most important things that have been learned -- insuring that these are consistent with the stated objectives.

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* A necessary requirement of the instructional management system for high student-teacher ratios.

h. At both chunk and module levels, gives a very comprehensive post-test, followed by a presentation of correct responses, followed by instructions by which a student can improve his understanding/skills which were shown inadequate in the post-test. It is this portion of the module that is described as Self-Evaluation and Self-Remediation.

The forms that self-remediation can take may vary.

(1) A student may be referred to specific pages in a module for relearning.

(2) An explanation of why a given response is more appropriate may be given with the response.

(3) A student may be told to ask a peer's or older student's help.

(4) A student may be directed to go to the learning center and ask one of the tutors (older students who devote one hour each day to tutorial activities). Tutors, however, usually are only available in after-school hours and may not be assessible at the time a student requires help.

(5) Rarely, the student may be told to go to the teacher ("Instructional Supervisor") who is in the learning center throughout the day.

The above possible types of remediation are at both the chunk and module levels of instruction and probably will come close to insuring mastery. A more-formal evaluation and remediation is given by the tutor at the module level (below).

2. Tutorial-Evaluation and Tutorial-Remediation

Tutors are older students who have been trained to administer formal modular post-tests, to score them and to remediate as necessary. In addition to being trained and to being supervised by the Instructional Supervisor, the tutors are provided with explicit instructions (guides) on how to score post-test exercises and how to assist a student in the remediation of those things inadequately learned.

Three notes:

(1) We anticipate a student-tutor ratio of some 5:1. Since each student will be available only one hour each day, the average daily contact (on a one-to-one basis) with a student is only 12 minutes. This limited time is the primary reason why the tutor works at the module level and why each module is at least three hours in length. Thus, a student would be expected to complete a module per day and to go to his tutor daily. (Students who progress at a faster pace will be encouraged to do so; they will be given a module in a different subject matter which they can work on while waiting for his scheduled tutorial time for taking the post-test on the module previously completed.

(2) The basic IMPACT concept of children studying on their own (possibly at home) and going to the house of his tutor (a neighboring older student) remains a possibility, but more likely students will study at the learning center (one big study hall) unless required to be home or away, and tutors all will report for one hour after school hours to the learning center where they can share tutorial and learning center responsibilities, insuring that a tutor is always available when a student is ready for module-level evaluation and remediation.

(At this juncture, we have only referred to tutors who are in post-primary school. At another time we will consider older primary school students as tutors or programmed teachers for younger children. In this case the one-hour-after-school rule need not apply; they could be scheduled throughout the day.)

Centralizing all activities at the Learning Centre should help the management system as run by the Instructional Supervisor a good deal.

(3) This paper is concerned with means for achieving mastery. The self-instructional process described earlier will, in itself, come close to insuring mastery. In addition, modules will be evaluated and revised throughout the IMPACT experiment so that they will eventually provide even more effective instruction. In the early going, students may go to tutors unprepared to take post-tests because they have hurried through their modules. The tutorial remediation process described below should, by its demands on students, tend to encourage them to be sure of their own mastery before going to their tutors.

Tutors will have three general avenues for remediation, depending upon the level of mastery a child exhibits on his module post-test. Although we should expect that students will have no less than 80 per cent mastery once they have been through the self-instructional process, tutorial procedures for less than that level will be made explicit. In general:

If post-test mastery <u>exceeds 70 per cent</u>, the tutor (following his guide for the module under consideration) remediates on a one-to-one tutorial basis helping his student relearn those

instructional portions for which his knowledge/skill was shown to be inadequate on the post-test. Typically his guide would instruct him to go over and explain those specific portions of the module not well understood. Once he is convinced that the student understands a remediated portion, he would present the student with a supplementary post-test exercise (often asking a verbal question) to insure himself that mastery is achieved. By remediating, portion by portion, a 100 per cent level of mastery would thus be achieved. (Module mastery would then be reported to the learning center so that the student can undertake a subsequent module.)

If post-test mastery falls between 50 and 70 per cent, the tutor (following his guide for the module under consideration) would not remediate on a one-to-one tutorial basis because it would be to time-consuming. Rather, he would assign specific portions of the module to be thoroughly reviewed by the student by himself. However, the tutor would explain how to do each of the assigned portions because we now suspect that many errors will arise from improperly understood procedural instructions. The student would return to the tutor (probably the next day), would take the same post-test again and would be remediated on specific items as above.

If post-test mastery falls below 50 per cent, the tutor would require the student to repeat the complete module. He would, however, explain how to do the module, ask the student about difficulties and try to overcome them. On repeating the complete module, the student would be required to repeat the post-test and to follow the remediation procedures outlined above.
In the same way that "chunks" are combined into modules, modules are put together as "blocks". A block contains approximately five modules of instruction plus a short review module of all

essential learning within the block. We feel that periodic review of this nature is highly important for retention. The review module is treated like the other modules in that the tutor administers a post test followed by appropriate remediation.

A further post test for the complete block is given under the direct supervision of the Instructional Supervisor in the Learning Center. This block post test is comprehensive, covering all essential learning contained in the modules making up the block. It represents some one to two months of learning of a given subject under the traditional system. And it is here that the final evaluation and remediation takes place which insures 100 per cent mastery. Because it is administered under the direct supervision of the Instructional Supervisor, we are calling it for convenience: Teacher-evaluation and Teacher-remediation.

3. Teacher-Evaluation and Teacher-Remediation

The Instructional Supervisor is responsible for some 200 students. Assuming that she works 360 minutes (6 hours) per day and that one-third her time is given over to supervision and management rather than to instruction/remediation, she will have 2/3 time x $\frac{360 \text{ min. x 5 days}}{200 \text{ students}}$ minutes available per student per week:

some 6 minutes per student. (Not much time for instruction).

We should also assume that each student will complete one block per week and that the Instructional Supervisors will be responsible for block post-test (evaluation) and re-instruction (remediation) for the block. If we further assume that older students are assigned to the Learning Center as both tutors and aides, many of the block post-test duties can be carried out by them: Administration and scoring of block post-tests and giving remediation as directed by the Instructional Supervisor.

Note: The block post-test is the "final examination." It is the main means provided the Instructional Supervisor to monitor the progress of students (and the effectiveness of particular tutors). When we get some sort of contingency management system operating for tutors, it also will be the main criteria for tutor evaluation/reward.

We would expect that after the earlier instruction, review and evaluation/remediation at the many levels that there would be little call for remediation at the block level. Some children undoubtedly will require no remediation at all, and the Instructional Supervisor need only allow a small portion of her "six minutes" to giving congratulations and social rewards (such as making the child's progress to all in the Learning Center). Thus, more time will be available for students in more need of remediation.

Having checked post-test results and (again following an explicit guide provided her) the Instructional Supervisor will have a number of remediation avenues open to her. Should a child fail on very few exercises, she should take her time to help them (again giving alternative post-test exercises to insure that mastery has been achieved). If a greater level of failure is evidenced, she would turn the student over to one of the Center Aides for one-to-one remediation (using an explicit guide), but once the aide is convinced that mastery is achieved, it would be the Instructional Supervisor's responsibility to verify mastery.

WE ARE CONVINCED THAT 100 PER CENT MASTERY CAN BE ACHIEVED BY ALL STUDENTS IN PROJECT IMPACT.

# MODULE 5 (PART III)

## SELF-EVALUATION

## AND

## FEEDBACK

## SELF-EVALUATION (PART III ... A, B)

A. Why is 100 per cent mastery so important to the IMPACT system?

_____

_____

_____

B. What are the three processes of evaluation and remediation and how are they done?

1. _____

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_____

2. _____

_____

_____

3. _____

_____

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FEEDBACK (PART III ... A, B)

A. IMPACT does not have the flexibility that the traditional classroom teacher has to help children in the class who have not understand the previous lesson. A teacher can take time out to explain something to individual children.

IMPACT must make sure that each child can achieve the objectives of each module before going on to the next module.

B. The three processes of evaluation and remediation are:

1. Self-evaluation and self-remediation, It is done by the student himself as part of the module. He answers questions or performs other exercises and then checks his answers against a feedback (much as you are doing here). The feedback also explains the correct answers and directs the student to particular parts of the module in case he needs to study those parts again.

2. Tutorial-evaluation and tutorial-remediation. It is done by an older student acting as a tutor. The older student gives the module post-test, checks the answers and helps the student understand those parts of the module with which he had difficulty.

3. Teacher-evaluation and teacher-remediation. It is done by the teacher (or by aides and older students under the direction of the teacher). (Remember that the "teacher" is now called an "Instructional Supervisor".) This evaluation/remediation is done after a student has completed 4-5 modules (plus a review module) that make up a "Block". A comprehensive post test is given which covers all the modules in a block. Children are then helped (remediated) with those parts of the Block that they have had difficulty with.

POST MODULE PRACTICUM

IMPACT is a very innovative approach to mass primary education that is only now being tried out in rural villages of two SEAMEO countries. It will be some 3-5 years before the complete system can be developed and tried out.

The Research Staff of INNOTECH requests your help. The Staff is attempting to look ahead and anticipate possible problems with the system ... and to plan ways to overcome these problems in advance.

We request each country group to give serious consideration to specific problems that might arise should the system be introduced into your country. We would like you, therefore, to meet with the colleagues from your own country and to prepare a short (2-4 pages) report on "Potential Problems and Suggested Solutions for the Adaptation of IMPACT to (your country)." Limit yourselves to the 4 or 5 most serious problems. Solutions may be ways to change the present system or the thinking of your countrymen, on ways to change some aspects of IMPACT so that it will work better in your country, etc.

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Good Luck and Thank You!

SERIES 5

MODULE 6

# INNOVATIONS IN THE DELIVERY OF MASS PRIMARY EDUCATION IN SOUTHEAST ASIA

- PROJECT RIT -

INNOTECH

## MODULE 6

**PREVIEW**

Modules 5, 6 and 7 represent innovations which depart from our traditional systems of primary/elementary education. All three are now being tried in SEAMEO countries.

Only about one-half of the children in this Region are able to complete a primary education. Most SEAMEO countries do not have enough money to solve the problem by increasing the number of schools, teachers, text books, etc... all of which are required by traditional educational systems. By far the highest cost of education is that of teachers; some 80-90 percent of education costs can be considered teacher costs ... their training, housing, transportation, salaries, retirement, etc. All three innovations represented in Modules 5, 6 and 7 therefore, are directed toward making teachers responsible for the education of a much larger number of students than they presently are able to do. However, all three also are dedicated to providing a quality education

OBJECTIVES

You should understand the RIT system and give serious consideration to its use in your own country in order to be able to:

(1) Anticipate potential problems of RIT if it were to be used in your own country, and

(2) suggested ways the system might be changed for use in your country or suggest ways that the potential problems could be overcome.

CORE INSTRUCTIONAL ACTIVITIES

As you read the description of the system, make notes to help you in your POST MODULE PRACTICUM. Look now at what will be asked of you as part of your PRACTICUM.

There will be several sets of SELF-EVALUATION & FEEDBACK in the module to help you to be sure that you understand the important points of the RIT system. Answer the SELF-EVALUATION questions before looking at the FEEDBACK. Then compare your answers with those given as FEEDBACK.

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GOOD LUCK !

## A DESCRIPTION OF PROJECT RIT (PART I)

Traditional methods of instruction are notoriously inefficient in every country. Teachers and students spend an inordinate amount of time on unessential activities. There are several different types of inefficient practices which can be seen in most schools. One of the most obvious and probably the easiest to deal with, is to spend time in clearly non-instructional activities, such as record keeping, announcements and discipline. The performance of many of these tasks by trained teachers is as inefficient as trained doctors making the beds of their patients in hospitals. Another type of inefficiency exists in those instances in which the teachers spoon feed the students information which they could be obtaining by themselves. There are many learning tasks which could be performed by the students without the ever present guidance of the teachers. In many instances it would be better for the students to perform these tasks with as little guidance from the teachers as possible in order for the students to develop their independent learning skills as much as possible. There are many practice, memorization, and application activities which do not require the constant presence and guidance of the teachers. In addition to the inefficient practices of having teachers perform non-instructional activities and teacher directed instruction tasks which would be better performed by the students as self-instructional tasks, there is the use of instructional approaches in which many of the youngsters do not learn the material being taught, and those who do take longer

than is necessary. Teaching which does not result in learning is perhaps the greatest inefficiency of all. When students take longer to learn what they need to, a good deal of the instruction they are receiving is also not resulting in learning. This instruction can be made more efficient, (and more effective) through appropriate design of the instructional programme.

Project RIT (meaning Reduced Instructional Time) is trying to help the present schools and teachers increase the efficiency of their instruction. The research is being conducted in Vietnam and devoted to trying to find ways of (1) decreasing the amount of time students take to learn and (2) decreasing the amount of time that teachers need to spend with their students. All of this research is being conducted in the existing school settings. It is not being extended to non-school learning (mobilization of community resources, cross age-tutors, programmed teachers, etc.). Project IMPACT is currently developing these approaches. Project IMPACT is exploring a number of non-school approaches and is moving away from traditional school schedules, approaches and traditions. Project RIT, however is concentrating more directly on means for improving the instructional processes in traditional school settings in an effort to enable more children to benefit from present school facilities and personnel.

A Summary of RIT

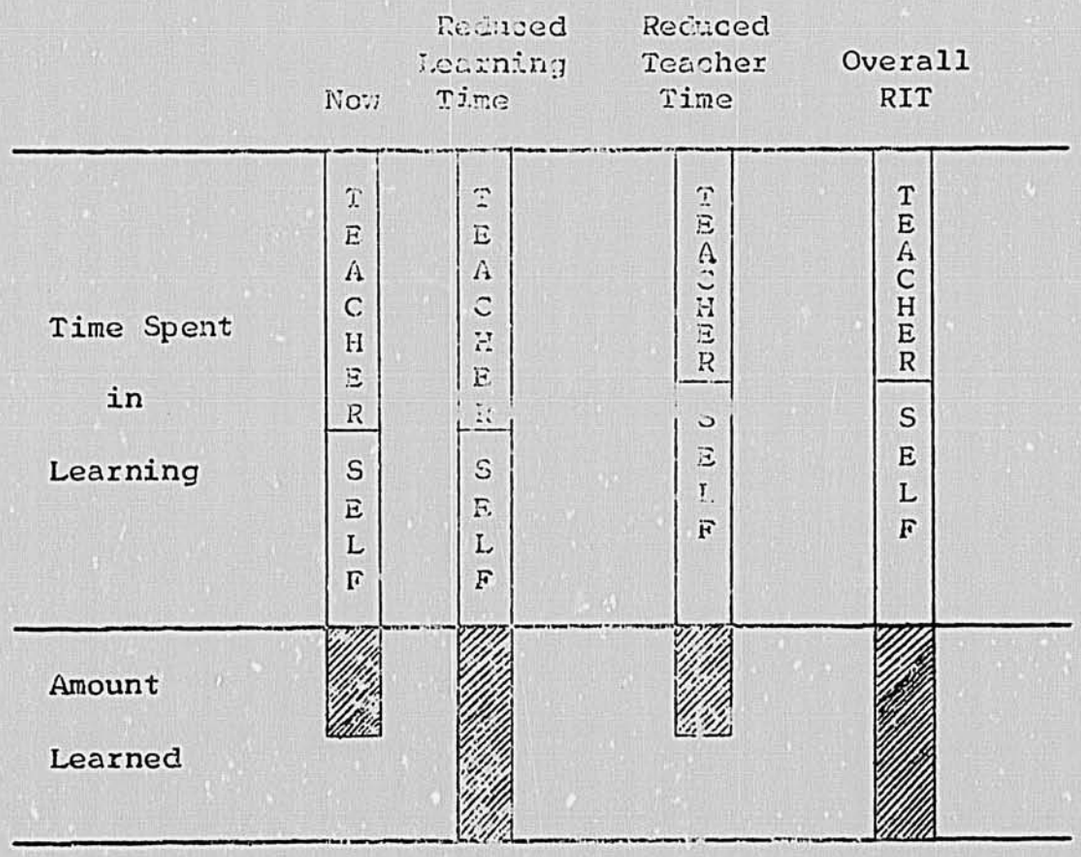
The overall purpose of RIT is to increase the efficiency of present school personnel and facilities so that an increased number of children can make use of them. In order to accomplish this we are using principles of effective learning to increase student learning rates and achievement and modify the instructional process in order to reduce student/teacher interaction time.

... Increase student learning rates. Students will acquire skills and knowledge in less time than they are now taking. This may mean that a student who now takes 30 minutes to memorize a set of history facts may increase his learning rate so that he is able to do the same thing in only 15 minutes or a student taking five hours to learn how to use an addition algorithm may be able to decrease this time to three or four hours.

... Reduce the amount of time that students and teachers interact. At the present time teachers spend approximately four hours per day with their students. We intend to reduce this time as much as possible without increasing the total number of hours that a student spends in learning (in school plus out-of-school time). In other words the total learning time a student is now using will not increase but the amount of time that he spends with a teacher will decrease.

We believe that it will be possible in the near future to decrease both the time that a student takes to learn a given amount of material and the amount of time needed to be spent with a teacher.

In a traditional setting, the amount of time which a student spend learning a lesson is a combination of the time he spends in class with his teacher plus the amount of time which he spends doing his homework. The student/teacher interaction is the amount of time that a teacher spends in class with her students. RIT is trying to reduce both the teacher time and the student learning time, as illustrated below:



Some explanations:

... suppose that learning now requires 30 minutes in class (teacher time) and 15 minutes of home work (self time) in order to learn one unit (amount learned), and

... suppose that through reduced learning time, the same amounts of time can be used to double the amount learned (i.e. 30 minutes in class and 15 minutes of home work allows students to learn two units rather than the present one unit), and

... suppose that learning, through reduced teacher time, will require only 15 minutes in class (teacher time) and 30 minutes of self study in order to learn one unit.

... suppose that overall RIT procedures can be developed that would both reduce student-teacher interaction and increase learning rate.

These examples are intended as illustrations only. In actual practice we may find some subjects in which we are able to save more than 50% of the time while in other subjects we may find that we can save less than 50%. The actual savings which we will be able to make can only be determined after we try out the new instructional materials and approaches.

# MODULE 6 (PART I)

## SELF - EVALUATION

## AND

## FEEDBACK

## SELF-EVALUATION (PART I)

A. Why is Project RIT trying to reduce <u>per pupil cost?</u>

B. Project RIT is trying to reduce two kinds of instructional time. What are the two kinds of instructional time?

1.

2.

C. What is the main difference between IMPACT and RIT?

## FEEDBACK (PART I)

A. RIT is trying to reduce per pupil cost because

... one-half the children in our Region cannot complete a primary education

... there is not enough money available to simply expand the traditional system (more schools, teachers, etc.).

B. The two kinds of instructional time that Project RIT is trying to reduce are:

1. reduced learning time of students

2. reduced teacher time spent with students.

C. The main difference between IMPACT and RIT is that

... RIT is trying to make present school facilities and personnel (teachers) able to educate a larger number of children, whereas,

... IMPACT uses a Community Learning Center rather than a school and uses many learning resources such as parents, community members, older students, etc.

RIT is trying to make traditional schools more efficient, and IMPACT has taken learning out of the schools.

# A DESCRIPTION OF PROJECT RIT (PART II)

## Effective learning is necessary for efficient learning

In developing instructional procedures to reduce learning time, it is first necessary to be sure that the children will indeed learn, that is they will achieve the appropriate learning objectives. Achieving the objectives alone however, is not a guarantee of efficiency. But it is necessary for efficiency and in many cases, it leads directly to more efficient learning. The INNOTECH staff, therefore, has compiled a set of learning principles which are being applied in the development of RIT learning materials and procedures. (NOTE: YOU DO NOT NEED TO MEMORIZE THESE PRINCIPLES).

## PRINCIPLES OF EFFECTIVE LEARNING

... CLEAR STATEMENT OF OBJECTIVES. Before trying to teach anyone anything it is necessary to state the objectives of the instruction. The objectives should be stated in a way which allows them to be measured. They should deal with tangible, observable behaviors or products of the learners.

... CLEAR DIRECTIONS ABOUT HOW TO LEARN. Information should be given to the student which tells him how to acquire the skills or information that he is trying to learn. These may give him directions about the best way to memorize some materials, practice an arithmetic skill, apply an algorithm, or any of the many other behaviors which will be expected of him. Instead of simply giving the student materials and telling him to 'learn' them he should be told some of the ways to study or practice the materials.

... WHAT PERFORMANCE IS EXPECTED OF THE STUDENTS. The students should be told what behaviors or products will be expected of them as a result of going through the lessons. This may be presented to the students in the form of questions which they will be expected to answer, problems they will have to solve, discriminations or generalizations they will have to make, etc. The point is that the sutdents should know what will be expected of them after they complete the lessons.

... AN OVERVIEW OF WHAT IS TO BE LEARNED. Let the students know what the general content of the lesson will be. This allows the students to see the forest before they begin to examine each of the different kinds of trees. Telling the students what performance will be expected of them is like telling someone the destination of a trip. Telling the students the overview is like telling someone how they are going to get to the destination and what they can expect to see along the way.

... OPTIMUM SIZED LEARNING TASKS. The tasks which the students are asked to perform should be designed in small enough steps for them to progress from one behavior to another as smoothly as possible. If the steps are too large many of the students will not gain the skills, whereas they could have had the steps been smaller.

... PERIODIC REVIEW, SELF-EVALUATION, CORRECTION, AND REMEDIATION. At various points in the lessons the students should be given some review of what they have been doing. Without this it becomes very easy to lose whatever skills or information have been learned. They should be allowed to evaluate what they have been learning. It is important for an individual to see the progress he is making. In order to self-evaluate,feedback must be provided to the students which allows them to see the correct performances or products they are working on and then compare what they have done with the feedback. Once this is done the students should correct any errors they may have made. It has

been shown that students who correct their errors perform significantly better than students who see the correct answers but do not correct their errors. If a student is not making progress he will need some additional help. Provisions should be made for some types of remedial help from tutors, review of the same materials or the use of alternative approaches.

... ACTIVE LEARNING. The students should be doing something which is necessary for the learning. This is different from the passive role which is assigned to many students now. Instead of spending a lot of time listening to or watching the teacher doing something, the students should be directly involved in learning activities themselves. What is important is what the student does rather than what is done to the student.

... STATEMENT OF WHY THE STUDENTS ARE LEARNING THE SKILLS OR INFORMATION. The students should know the purposes of their efforts. These should be related to the possible applications of what they are learning, to further learning and to real life situations.

... APPLICATION OR USE OF WHAT IS LEARNED. The students should be given the opportunity to practice what they have learned. It is the practice which allows the students to both develop and maintain the skill they have learned.

... INTRINSIC OR EXTRINSIC MOTIVATION (INCENTIVES) TIED TO SPECIFIC ACCOMPLISHMENTS OF THE LEARNER. Desirable consequences should be provided for performed learning tasks. These can be information given to the student on the success of his behaviors or incentives which the students can earn by correct performance. For some students the intrinsic rewards produce a great deal of motivation. Many other students however may require extrinsic rewards or incentives in order to become motivated. As long as the incentives used are in no way harmful to the students, both intrinsic and extrinsic incentives should be used.

... TEACH OTHERS WHAT HAS BEEN LEARNED. One of the best ways to learn something is to teach it. Students should be given the opportunity of teaching other students some of the things which they have learned. The other students can be younger or of the same age.

... TRANSLATION OF WHAT HAS BEEN LEARNED INTO A NEW CONTEXT. This allows the students to generalize what they have learned. There is a danger that the students will only be able to use a skill in a limited number of situations if they are not given a chance to use it in a variety of contexts.

... USE OF CLEAR, SIMPLE LANGUAGE. When instructions are given to the students the writers should not try to impress the students with their erudition but should make sure that the language is simple and clear enough for the students to follow the directions. If the students cannot follow them the directions should be rewritten before accusing the students of being dummies.

... USE OF VARIETY WITH BOTH THE LEARNING TASKS AND THE INCENTIVES. Variety will generate both enthusiasm and motivation just as surely as a lack of it will create boredom and disinterest. The perfect teaching procedures do not exist any more than the perfect incentives exist. It is therefore a good and safe idea to introduce a variety of teaching procedures as well as a variety of incentives.

... INTERACTION WITH OTHER STUDENTS. Students should interact with each other in both small and large groups. The interaction can be through games, exchange of ideas, helping sessions, critique sessions, joint projects, etc.

... ACCOMMODATION OF INDIVIDUAL DIFFERENCES. This can be accomplished most effectively through the use of self-instructional materials which are used on an individual basis. If students are not allowed to progress at their own rates the slower ones will not master the skills and the fast ones will get bored.

... USE WELL ORGANIZED LESSONS. The lesson plans which are used should describe both student and teacher activities rather than just indicating the content which is to be covered.

... USE OF THE PRINCIPLE OF "LEAN PROGRAMMING". We should not take the time to teach things that the students have already learned. If they know the information or have mastered, and maintained the skill, don't teach it again. The fairly obvious way to accomplish "lean programming" is to test the students before you teach the materials. If they demonstrate their knowledge or skills -- don't teach the lessons again.

This list is not all inclusive but we feel that it does represent most of the key elements of effective teaching and learning.

How are there principles being used in RIT? First, any given segment of the curriculum is examined carefully in terms of how it might be improved by applying the above principles. Second, once ideas for such improvement are derived, the staff determines how they might be best applied to speed up the time it takes a child to learn. Finally, the staff examiner the procedures as closely as possible to identify ways in which the necessary learning can take place with a minimum of teacher involvement.

## RIT CAN RESULT IN NEW SCHEDULES TO PERMIT MORE CHILDREN TO ATTEND SCHOOL

The possible outcomes of more effective/efficient learning lie in the rescheduling of classes. There are, of course, many different schedules which may be able to take advantage of more efficient learning. Students may go to school for three years instead of five years; they may attend school for two hours per day instead of four; they may attend school three days a week instead of six; or go to school six months instead of ten; or any number of other combinations which may result once we are able to reduce the amount of time needed to educate younsters. The particular schedules which may be used will depend largely upon the particular circumstances, traditions and cultures (both national and local) in which the new instructional programs are to be accepted.

On the following pages is a make-believe "newspaper clipping" about only one of possible RIT schedules ... the reduction of school time to two hours per day.

When you read this article remember that RIT is not yet in the schools. Also please remember that there are many different kinds of school schedules which may be possible under RIT.

Newspaper Clipping

Dateline: Today

This reporter had a dream same time ago about a new system of primary education called Project IMPACT. Many of my readers will recall my reported conversations with a youngster named Moa Lia and with his parents, community members and educators. That report, dated January 1980, may become more than a dream because Project IMPACT is now being implemented in two rural settings in SEAMEO countries.

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Last night I had another dream ... rather two dreams ... about Moa Lia's sister and brother. Again the date was January 1980, but this time each of the children I talked to was taking part a different kind of primary education.

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MY FIRST DREAM (Project RIT)
Sealand, January 1980

Her name was Oum Sam. She was the bright-eyed sister of Moa Lia, the young boy I had interviewed before about Project IMPACT. Oum Sam was ten years old and obviously was exited to have the chance to tell me about her education.

Q: Oum Sam, just last year your village changed from traditional primary schooling to a new way to learn called Project RIT. By looking at your bright eyes, I can tell that you like the new way. Can you tell me something about it?

OUM SAM: Well, for one thing I don't have to sit in class all the time and listen to a teacher explain things I already know.

TEACHER: Oum Sam is one of our brightest students. I could tell that she was terribly bored with class when I had to take time to explain things to some of the less-able students.

Q: Don't you have classes any more?

OUM SAM: Yes, we still have classes, but I now go to class only two hours a day instead of four.

TEACHER: Project RIT stands for Reduced Instructional Time. We have been able to reduce the amount of classroom time to one-half of what it used to be.

Q: What is the advantage of cutting classroom time in half?

TEACHER: The main advantage is that I now am able to teach twice as many children. Before, only half the children in this village could go to primary school because we could not find places for everyone. Now, all the children can have a chance for a primary education.

Q: Certainly with only one-half as much time spent in class, the children cannot learn as much.

TEACHER: The beauty of RIT is that the children actually are learning more. At first I was ashamed, as a teacher, to admit that the quality of education was actually better in RIT. I now realize that I am now a much better teacher because I can concentrate more on the things a teacher does best.

Q: What are the things that a teacher does best?

TEACHER: Teachers are most necessary to provide students with

... guidance, support and encouragement

... management of educational experiences

... enrichment

... evaluation

... remediation

... reporting and rewarding progress

... interaction with parents and community.

Under RIT, we actually have more time to give this kind of support.

OUM SAM: And I don't have to sit in class all day copying down things from the blackboard.

Q: Perhaps I am too old fashioned, but I can't understand how Oum Sam and her schoolmates learn their lessons.

TEACHER: Most of the learning takes place in my absence. The Community has built a large shelter with chairs, tables, blackboards and moveable wall dividers. Much of the learning takes place in this Study Hall with children taking part in a variety of learning activities which we call "non-teacher instruction".

Q: Doesn't there have to be an adult in charge?

MOTHER: I am Oum Sam's mother. There is always one teacher in charge of the study hall, but we mothers also volunteer to help out when we can.

Q: Back to what you called "non-teacher instruction", do you mean self-instruction.

OUM SAM: Some of our lessons are self-instructional programs that we usually work on by ourselves. Sometimes, however, three or four of us will work on a program together ... helping each other to make sure everybody understands. We also have groups puzzles and problems in mathematics, and sometimes one of us is chosen as "student leader". A leader is given a printed set of instructions by the teacher which tell him exactly what to do. Sometimes two of us use a buddy-system*, usually using flip-cards, so that we can ask each other questions and correct each others answers.

Q: RIT certainly sounds like a more exciting way to learn, but it would seem that a teacher could lose control of what is going on.

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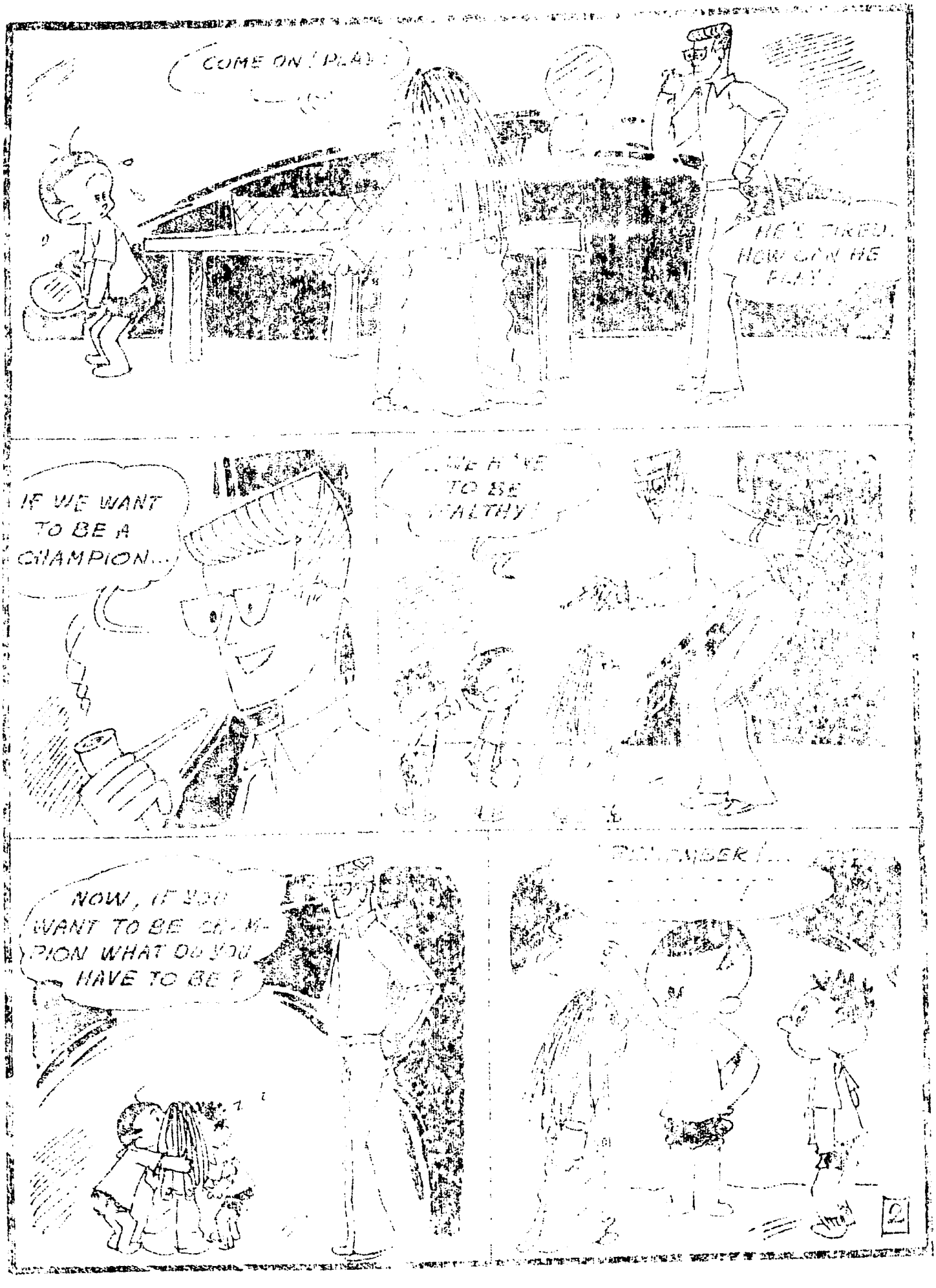
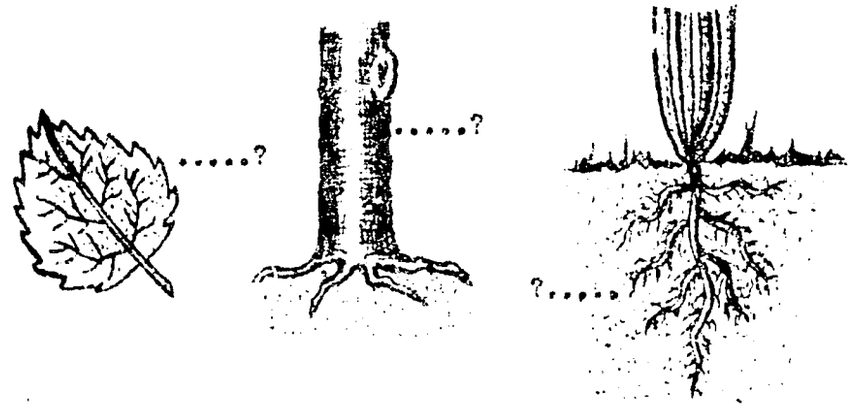
*Editors note: One example of a RIT self-instructional cartoon is given on the next page. The following page is an example of "buddy-system flip-cards.


COME ON! PLAY!
HE'S TIRED. HOW CAN HE PLAY?
IF WE WANT TO BE A CHAMPION...
...WE HAVE TO BE HEALTHY!
NOW, IF YOU WANT TO BE CHAMPION WHAT DO YOU HAVE TO BE?
REMEMBER!...
2

What are the three parts of a plant below?




FRONT OF CARD

Answers:

Leaf

stem (or trunk)

roots

BACK OF CARD

TEACHER: At first, there was a lot of confusion on both my part and on the part of the children, but what may now look to you like confusion ... with different children of different ages in the study hall doing different things ... it is really more controlled than before. I now can do some of the things that gives order and meaning to learning.

For example, when Oum Sam told you that she only attended class two hours a day, she was right. But she still spends four hours at school. One-half of her time is spent in the study hall.

Her four-hour school day is broken down into 30 minute units. She spends 30 minutes in class, then 30 minutes in the study hall, then 30 minutes back in class ... alternating class time and study hall time throughout the day.

In class, I am able to evaluate what has been learned by way of RIT post-test of each lesson. I can then give special remedial help for those parts not learned very well. This regular evaluation not only gives me much control over learning; it also gives me a chance to give the praise and support ... which we feel is so important to learning. Once the previous lesson is out of the way, I then give the new assignments, explaining every step so that all the children will know what to do.

Q: What do you do while Cum Sam's class is in the study hall?

TEACHER: I conduct in-class sessions with other students. It is in this way that RIT has enabled this village to double its primary school enrollment.

PARENT: We in the community are very grateful to SEAMEO and to Project RIT. Now all of our children are able to complete a primary education.

OUM SAM: It's a fun way to learn. I hope that RIT will be in secondary school if I get a chance to go.

Editors Note: The above represents the end of our reporter's first dream. His second dream in Module 7, concerns Project ISOSA.

Participants who wish to know more about Project RIT may ask to read a copy of the latest progress report in the library.

You will also have an opportunity later to talk with staff members of both RIT and IMPACT.

MODULE 6 (PART II)

SELF-EVALUATION

AND

FEEDBACK

## SELF-EVALUATION (PART II)

A. How can the use of the principles of <u>effective</u> learning help in RIT?

B. Why can the concepts of RIT be important to the SEAMEO Region?

C. What do you consider to be the three main things that an RIT teacher does in class?

1.

2.

3.

D. Write a short description of another kind of school rescheduling that might be possible under RIT.

## FEEDBACK (PART II)

A. Effective learning is considered necessary for efficient learning. (One of the greatest inefficiencies occurs when students cannot learn because the materials or procedures are not designed to be effective).

B. RIT can be important to the Region if it is truly successful in reducing instructional time because it would then permit the rescheduling of primary schools to permit many more students to enroll.

It can also be important because it saves per pupil costs by allowing present schools and teachers to educate more children.

C. The teacher

1. Evaluates (tests) how well the children are learning.

2. Gives remedial help on those parts of a lesson not well-learned.

3. Gives clear instructions on how to learn the next lesson.

D. You could describe a three-day school week, a five-month school year, a three-year primary school ... or whatever schedule <u>you</u> think would be both possible and workable.

## POST MODULE PRACTICUM

RIT is an innovative approach to mass primary education that is only now being developed in Vietnam. It will be some 3-5 years before a complete system can be developed and tried out.

The Research Staff of INNOTECH requests your help. The Staff is attempting to look ahead and anticipate possible problems with the system ... and to plan ways to overcome these problems in advance.

We request each country group to give serious consideration to specific problems that might arise should the system be introduced into your country. We would like you, therefore, to meet with the colleagues from your own country and to prepare a short (2-4 pages) report on "Potential Problems and Suggested Solutions for the Adaptation of RIT to (your country)". Limit yourselves to the 4 or 5 most serious problems. Solutions may be ways to change the present system or the thinking of your countrymen, on ways to change some aspects of RIT so that it will work better in your country, etc. (Note: Select only one type of rescheduling for your paper).

**********

GOOD LUCK AND THANK YOU !

SERIES 5

# MODULE 7

# IN-SCHOOL OFF-SCHOOL APPROACH

INNOTECH

Adapted from Original Material
by
Dr. Liceria Brilliantes Soriano
Director of Public Schools
Philippines

## MODULE 7

**PREVIEW**

Modules 5, 6 and 7 represent innovations which depart from our traditional systems of primary/elementary education. All three are now being tried in SEAMEO countries.

Only about one-half of the children in this Region are able to complete a primary education. Most SEAMEO countries do not have enough money to solve the problem by increasing the number of schools, teachers, text books, etc... all of which are required by traditional educational systems. By far the highest cost of education is that of teachers; some 80-90 percent of education costs can be considered teacher costs ... their training, housing, transportation, salaries, retirement, etc. All three innovations represented in Modules 5, 6 and 7 therefore, are directed toward making teachers responsible for the education of a much larger number of students than they presently are able to do. However, all three also are dedicated to providing a quality education.

OBJECTIVES

You should understand the ISCSA system and give serious consideration to its use in your own country in order to be able to:

(1) Anticipate potential problems of ISOSA if it were to be used in your own country, and

(2) suggest ways the system might be changed for use in your country or suggest ways that the potential problems could be overcome.

CORE INSTRUCTIONAL ACTIVITIES

As you read the description of the system, make notes to help you in your POST MODULE PRACTICUM. Look now at what will be asked of you as part of your PRACTICUM.

There will be several sets of SELF-EVALUATION & FEEDBACK in the module to help you to be sure that you understand the important points of the ISCSA system. Answer the SELF-EVALUATION questions before looking at the FEEDBACK. Then compare your answers with those given as FEEDBACK.

**********

GOOD LUCK !

MODULE 7

In recent years the community has emerged as the most vibrant educative laboratory within the reach of every learner. It is the most promising medium for spanning the gap between what the learner knows and what he does.

Optimum use of its resources offers a potent approach to cutting down costs for primary education in developing countries, where funds for education are scarce, and to making education more relevant.

A community-based education broadens the concept of the classroom to include the entire world of the learner. Such an expanded notion of the classroom erases the line which has been drawn between schooling and education and makes possible delivery of the kind of education demanded in a world under-going rapid change.

Full exploitation of community resources in education requires the deinstitutionalization of the school to some extent. This process starts from the "breaking down of the school's walls" as the people in the community are drawn into the educational process. As the community is drawn to the school, the learners are drawn out into the community. As a consequence, formal educational patterns begin to become more informal, and the institutionalized system soon gives way to a deinstitutionalized one. The school becomes more community centered, loses its rigid structures.

Such a manner of partially deschooling educational forestalls the dislocation of the school and assures ready acceptance of the change by the community. The integration of the school and the community thus becomes a painless process, which should insure its success.

A partially deinstitutionalized school makes it much more feasible to adapt individualized instruction and to maximize the utilization of community resources, thereby assuring the best learning.

Maximum use of human and material community resources may be both the goal and the result of a restructured curriculum. It demands more relevant materials of instruction than ordinarily required. The restructured curriculum should reflect the relationship between in-school and out-of-school reality and consider individual growth in the context of the values cherished by the society -- values which equip the learner not only for coping with the norms of society but also for altering them when there is necessity for it.

The expansion of the classroom to include the community and its resources has certain implications for the teacher. Her role changes as she embraces a community-based education. Her behaviors as a teacher must change.

Since there are few textbooks which adequately treat all aspects of the community, the teacher must develop competence in exploiting the community resources as a given of knowledge and as a springboard for meaningful experience for the development of life skills. This means that she should be a perceptive and competent curriculum developer. She should also be a skillful diagnostician of student's needs, a rational decision-maker in determining the direction and focus of study, and a precise evaluator of the instructional process and the growth of the learners. The new role of the teacher demands a great measure of versatility which only appropriate training can give her.

The administrator should likewise sharpen the tools of his trade. He needs to strengthen his ability to spot breakdowns in the newly installed system to provide supervision so that he will be capable of guiding and helping the teacher achieve desirable outcomes vis-a-vis specified objectives.

The foregoing conceptual framework undergirds the approach proposed here for providing low-cost but effective primary education through the optimum use of community resources.

The "in-school"portion of its name includes all the educative activities that are undertaken in the school;the "off-school" part involves those that are deinstitutionalized and thus non-formal. The

approach is partly deinstitutionalized and partly institutionalized since all non-formal activities of learners in the home or community are contiguous with in-school learning.

Organization. Fifty pupils are assigned to each teacher; 25 (Group A) report to her for in-school or formal instruction for one week while the other 25 (Group B) undertake off-school work. The following week, Group B reports for in-school instruction while Group A does off-school work.

Throughout the year, this alternate in-school-off-school pattern is adopted. Thus, where schoolrooms and teachers are not adequate, a teacher may be assigned even between more than 50 and 80 pupils a year, since she meets only half of the number at one time.

When children enter school for the first time, and at the beginning of each school year, they go through a series of evaluative activities to determine at what level to start in the different subject areas of the curriculum, namely, communication skills, computational skills, social studies, health and science, work education, music, arts and physical education.

Beginning learners who have been taught by their parents or elders at home are expected to start at a level higher than those who have never received the benefits of home training.

As in modularization, the scheme exemplified in INNOTECH 's Project IMPACT, the learners are not classified or paced according to grade levels but in terms of the learning tasks they have successfully performed. For example, in computational skills, a beginning learner may begin with Learning Task$^{10}$ while his peers may begin with Learning Task$^{1}$ simply because they have had absolutely no earlier training in numeracy.

The Curriculum Materials. Before ISCSA classes are organized, self-learning kits for the learning tasks in each subject area should be prepared. A complex learning task will rate more than one Self-Learning Kit (SLK) since it has to be divided into its component tasks. For instance, for a difficult computational skill, there may be four SLK's, one for each subtask, to assure reasonable mastery of the task. The fast learner need not go through all the SLK's. He may skip one or two to get to the final one, depending upon his capacity and needs.

An SLK consists of sequenced materials for learning specified skills or information and corresponding source materials, a list of community resources that may be utilized, as well as reinforcement exercises, which allow each learner to work at a rate, style, and level suited to his capacities and learning mode. To be effective, it must be brief and easy to understand, stimulating and challenging, involve activities that require use of varied media or resources available in the community, and easy to follow. It must be community-oriented but at the same time also oriented to the learners' increasingly expanding world.

To make the SLK's last longer, they should be made of material which can stand long and careless handling. Plastic-covered pages amount to a high initial cost, but are economical in the long run.

It will take considerable time, money and expert effort to prepare SLK's for all the areas of the curriculum. Such SLK's may be developed in curriculum workshops during the summer vacation. To provide adequate incentives for the participation of the most competent teachers in the workshops, service credits, live-in allowances, and credits for promotion purposes may be offered. An important goal is to organize a corps of the best teachers and supervisors available whose task would be the development and continuous revision of SLK's.

Techniques Used. The first in-school meetings of the year are devoted to diagnosis of learners' needs as well as training in the independent use of SLK's which should be highly individualized. Fast learners may assist in training poor learners in the effective use of an SLK.

At the end of each in-school week, learners pick up SLK's for different subjects, ticking off on an individual check list the respective numbers of SLK's they take out for off-school work. They are expected to take out only as many as they believe they can accomplish within the week, with the teacher helping each learner determine how many he should tackle during the week.

While half of the teacher's class is on off-school work, the other half is with her learning in the ordinary classroom structure. The focus of the instruction is on sharpening the learners' tools for learning to learn so that they can be more effective independent learners during off-school hours. Thus, emphasis is placed on reading, writing, speaking, listening, computational, and process skills.

Since the number that meets at one time is small, intensive training in the skills is feasible, especially if mastery learning strategies are employed.

The off-school time of the learner is devoted to individualized learning through SLK's, which may require listening to the radio and viewing TV(where available) lessons, observation and participation in community activities under the guidance of volunteer parents or other individuals, peer learning activities, listening to tapes or viewing educational films, slides and film strips at the community center or in a mobile resource center (if available), apprentice work with community workers or in centers of work.

Since the SLK's are community-based they will invariably require the learner to seek varied specific resources in the community. For instance, for a lesson on community helpers, he will need to

visit different workers or places of work and interview and observe people in order to answer question in the SLK. Or to prepare a brief and acceptable report on changes needed to improve his community, he may need to take a study trip around it in and listen to a tape at the community resource center or mobile resource center (if there is one) or tune in the radio at a specified hour for the educational program that deals with the lesson. The schedule of educational programs on TV and radio for a specific period must be in the hands of the learners so that they will have a ready guide. A radio in the community or village center can easily be made available to learners during the hours scheduled for educational broadcasts since it is inexpensive.

The subjects that lend themselves best to purely off-school treatment are social studies, work education, and arts, music and physical education. The other subjects of the curriculum are better taught using a combination of in-school and off-school treatments. However, they may also be effectively taught using purely off-school techniques provided that well-developed SLK's are available. For effectiveness and economy in teaching-learning, the integration of several subjects in one SLK should be a goal.

Especially in work education, use of community resources can be easily maximized and costs for providing systematic and effective training in work skills brought down. In fact, the only in-school activity that may need to be undertaken with regard to work education and, possibly social studies, is checking SLK's turned in by learners and evaluation of their progress, which must be a teacher-learner endeavor. All the other learning activities in these subject areas are undertaken in the community, using appropriate resources to the optimum.

In work education, where all the work skills have been identified and systematically arranged, the learner, with the guidance of his teacher and parent, identifies the community resources from which he may acquire each skill and seeks to learn it from the specific resource. For instance, a child may get training in handling certain implements on the farm from his father, who also guides him in the application of his skills in planting an area with vegetables. The teacher, with the help of the farmer, evaluates his performance and advances him to the next higher learning task if he is ready for it.

Since individual capacities and modes of learning differ, learners will progress at different rates. They pace their own learning and need not experience the humiliation that stems from failure to cope with their peers since evaluation of learner-progress is criterion-referenced rather than norm-oriented.

## A SHORT INNOTECH SUMMARY

... One-half of students are off-school (out of school) while the other half are in-school.

... Students are in-school for one week and then off-school for one week.

... While in-school, students are (1) given post tests on their off-school activities, (2) given remedial help, (3) given enrichment, (4) taught how to use the off-school SLK's (Student Learning Kits), (5) taught skills needed for off-school learning (for example, skills in observation, interviewing, how to use newspapers and radio, etc.), (6) given readiness tests to insure that they are capable of benefiting from given SLK's.

... While off-school, students (1) learn via SLK's (some of which are self-instructural, (2) follow instructions in SLK's on using community resources and persons for learning, (3) come to the school, as needed, to use the library or consult with the teacher.

The following clipping is not from our reporters dream. It is an actual article from a a Philippine newspaper on the In-School Off-School Appraoch.

In-School-Off-School Approach

A new teaching method to bring down the cost and upgrade the standard of primary (Grades I to IV) education will be launched in three pilot areas next school year by the bureau of public schools, Public Schools Director Liceria B. Soriano said that this new method called the "In-School-Off-School Approach" -- involves the assignment of 80 pupils to one teacher, 40 to do in-school work of formal instruction and the other 40 to undertake off-school work for one week alternately. Dr. Soriano said the new method will be adopted in selected schools in Manila, Bulacan, and Iloilo throughout the year. She added that a teacher may be assigned even more than 80 pupils a year since she meets only half of the students at one time.

To assure satisfactory results from this method, which fully uses community resources, Soriano said that it would be necessary -- at the start of school term to: (1) Redesign the curriculum and revise the instructional materials; (2) restructure class organization; (3) adopt

imaginative and effective ways of meeting individual needs; (4) redefine the roles of the teacher and the administrator and train them for efficient performance of their roles.

Why a community - based approach to education? Soriano pointed out that optimum use of community resources reduces costs for primary education. She added that a community based education broadens the concept of the classroom to include the entire world of the learner. Before "In-School-Off-School Approach" classes are organized, however, self-learning kits for the instructional work in each subject area should be prepared, Soriano stressed. According to her, a self-learning kit (SLK) consists of "systematically sequenced material for learning specified skills or information and a list of community resources that may be utilized".

Community resources may be grouped into human, material, institutional and cultural.

Human resources include parents, older students, youth leaders, professionals and groups that may be able to assist the school in educating the young. Material resources include buildings, parks and playgrounds, machinery, and newspapers that may serve as educational objects or laboratories.

Institutional resources refer to organizations, associations, churches, clubs and industrial establishments. Cultural resources are the libraries, museums, dramatic guilds, glee clubs, reading centers, bands, etc.

Dr. Soriano also emphasized that "to be effective, the SLK must be brief and easy to understand, stimulating and challenging, involving activities that require varied resources available in the community and easy to follow. It must be community-oriented but at the same time, also oriented to the learners' increasing expanded world".

Editors note: ISCSA is presently being tried out in seven sites in the Philippines. Next year, the system will be tried out at the secondary level.

MODULE 7

# SELF-EVALUATION

# AND

# FEEDBACK

## SELF-EVALUATION

A. Name some possible advantages of ISCSA compared to:

1. RIT: _____

2. IMPACT: _____

B. Name some possible disadvantages of ISOSA compared to:

1. RIT: _____

2. IMPACT: _____

## FEEDBACK

A. 1. One distinct advantage of ISOSA compared to RIT is the greater involvement of community resources and persons. Another is the flexibility provided by having a teacher before a class for a full week to give remedial help and enrichment. (We are sure that you have named other advantages).

2. One advantage over IMPACT is the greater amount of contact that a teacher has with children. (We are sure that you can name others).

B. 1. One disadvantage of ISOSA compared to RIT is the long time between student/teacher contact (although children can see the teacher whenever they need help). Another possible disadvantage in the preparation of materials is the care taken by RIT to insure effective learning in the absence of teachers. (You may think of others).

2. A disadvantage of ISOSA compared to IMPACT is the need to keep most children progressing at the same rate rather than at their own pace. Dropouts cannot enter back into school so easily with ISOSA. (You may think of others).

## POST MODULE PRACTICUM (MODULE 7)

In the past two modules you have been asked to identify potential problems of the innovation for your own country and to suggest possible changes so that the innovation could be adapted to your country. In this module, your practicum is the same, but the training staff has prepared a way to give more structure to your thinking. You are provided with a form on the next several pages which asks questions about a large number of aspects of an innovation in relation to its acceptance and adaptation to a new country.

This form is called the IEI (Instrument for Evaluating Innovations), and it has been adapted from an original instrument developed in 1971 by the Office of Educational Development in Indonesia. In its initial design it was used to evaluate the potential of various innovations for adaptation to Indonesia. The INNOTECH revision is intended to make it applicable for the use of any of our countries; ... and particularly for your use in evaluating innovations and suggesting changes to make them applicable to your country.

Instructions for use of the IEI are included with it. They will not be given here.

Your post module practicum is:

(1) Complete the IEI in reference to the In-School-Off-School Approach, and

(2) <u>After</u> finishing the IEI, write a short (one or two page) paper on "Some Adaptations of the In-School-Off-School Approach for possible use in (name of your country)".

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GOOD LUCK !

SERIES 5

MODULE 8

# PROGRAMMED TEACHING:
# EFFECTIVE TEACHING BY "UNQUALIFIED TEACHERS"

INNOTECH

Adapted from an Original Paper
by
Dr. Douglas Ellson
Regional INNOTECH Center

MODULE 8

**PREVIEW**

The report which follow is one of INNOTECH's success stories. Not too long ago, in July 1972, SEAMEO assigned this Center the responsibility of pursuing all avenues to find an "economical and effective delivery system for mass primary education." The research reported herein is in direct response to that assignment.

At the present time, budgets in most SEAMEO countries are strained simply to provide a minimum primary education to about one-half of the children of primary school age. Since monies cannot be significantly increased, it is evident that we must endeavor to find means for providing effective primary education at drastically reduced costs.

Some savings can be through less expensive textbooks or more effective use of existing schools, but major savings lie in the cost of teachers. This cost represents 80 to 90 per cent of total expenditures for education. If we can save on the cost of teachers, much can be done to reduce the cost of total primary education.

One approach to reducing these costs is represented by the content of this report. Dr. Ellson and his staff attempted to use community members who had only a 6th grade education to teach beginning reading to Malaysian boys and girls. The fact that they were extremely

successful in doing so speaks well for the concept of "programmed teaching" as described in this report, and it portends well for the possibility of actually reducing the costs of effective primary education.

**OBJECTIVES**

Upon completing this module, you should be able to:

(1) Use the Instrument for Evaluating Innovations as a basis for analyzing the appropriateness of an innovation for use in your country.

(2) Discuss the feasibility of using programmed teaching in your own country.

**CORE INSTRUCTIONAL ACTIVITIES**

Read Dr. Ellson's study. As you read, pay particular attention to the feasibility of programmed teaching for your own country. Do not spend time on research design. Concentrate on the content.

If you need help, see any member of the training staff for tutorial assistance.

ABSTRACT

Approximately 100 first-grade children in 10 rural schools in Malaysia were given 1/3 of their beginning reading instruction by elementary school graduates briefly trained in the technique of programmed teaching. Their performance on a reading achievement test was compared with that of a matched control group consisting of children from the same classrooms who were given all of their reading instruction by their regular teachers using conventional methods. After 55 days of instruction, reading vocabulary and comprehension scores were significantly higher for the experimental group. These findings contradict the widely held assumptions that good teaching requires professionally trained teachers and that improvement in teaching can be achieved only through increased teacher training of the conventional kind. Practically, they suggest the feasibility of using local personnel with minimal qualifications for effective teaching, with resultant improvement in the cost-effectiveness of instruction.

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Programmed teaching is different than programmed instruction. In programmed instruction, the materials used by students are prepared so that students can learn effectively by themselves. In programmed teaching, it is the teachers that are programmed rather than the materials.

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Programmed teaching is an adaptation of an innovation from a wertern country. Originally it was called "programmed tutoring" with an adult tutoring a child. It has been changed so that are adult is programmed" to teach 10 children.

Programmed Teaching (Part I)

AIM

Broadly speaking, the aim of this study was to evaluate the feasibility of programed teaching at the primary level by "unqualified" Asian teachers.

Programed teaching is a recently-developed form of educational technology in which subject matter, materials, and teaching technique are integrated in carefully designed and tested procedures. Elsewhere it has been shown that the use of this technology makes it possible for persons with no more than elementary schooling to teach as well as fully trained professional teachers, and in some cases better. The potential value is clear, especially in developing countries where both trained teachers and the funds to pay more of them are in short supply. Thus the question arises: can this technology be used effectively under Asian conditions?

This question is too broad to be answered in a single experimental study. Asian conditions, i.e., Asian culture, Asian teaching practices, Asian children, etc., are not homogeneous, and school curricula include a wide range of subject matter and levels. In one investigation, an innovation can be evaluated under only one or at best a few of the possible combinations of the many conditions which affect its feasibility. Consequently, it was necessary to narrow the aim of this study drastically and to select a set of conditions for initial test which would provide a maximum of useful information. The actual aim, therefore, was more specific, namely, to evaluate the feasibility of programed teaching of beginning reading by elementary school graduates in a rural community in Malaysia.

THE PROBLEM

In all developing countries that attempt to achieve universal education at the primary level--and all Southeast Asian countries have stated this aim--a cluster of problems arises. The aim itself immediately poses the problem of numbers, the "quantitative problem". The conventional solutions to this problem--more teachers, more schools, more teaching materials, etc., produce corresponding shortages. If expansion is pushed rapidly, the shortage of trained teachers is most crucial. As several economists concerned with educational development have pointed out, this shortage typically results in the "quantitative problem", an actual decline in the average quality of primary education. Such a decline in average quality frequently occurs when enrollment is abruptly increased.

To solve this problem in the obvious way--by providing more trained teachers--may well be impossible. Training is expensive, but the cost of paying adequate salaries to professional teachers once they are trained is far greater. Some developing countries which have followed this solution are now closing teacher-training colleges because they can not afford to employ all of the teachers they have trained. Thus, the conventional solution has not worked. It is necessary to devise effective delivery systems for primary education which do not depend exclusively on professional teachers used in the ratio of one teacher to 35 pupils. One alternative is to make greater use of parents,members of the local community, older students and others who do not have professional teacher training. But in the past, most attempts to use such untrained persons as teachers, whether they were in full charge of a classroom or used simply as teacher's aides, have failed. Except for the all-too-rare "born teachers", training in the form of a good secondary education followed by three or four years

of professional training appeared to be the only way to produce good teachers. This is no longer the case. Recent research indicates that properly "programmed" non-professionals with a primary school education or even less, can teach in some areas, including beginning reading, as well as or better than the average fully trained professional teacher.

As Harbison and Myers (Education, Manpower and Economic Growth, p. 98) have written: "the basic problem ... is to find new technologies of primary education which can be utilized effectively by low-paid, poorly educated, and unqualified teachers". Programed teaching is one such technology.

MODULE 8 (PART I)

# SELF EVALUATION

# AND

# FEEDBACK

## SELF EVALUATION (PART I)

A. Dr. Ellson refers to the use of "unqualified teachers" for programmed teaching. Who are these "unqualified teachers?"

B. Why does he think that money could be saved using programmed teachers?

## FEEDBACK (PART)

A. Dr. Ellson's meaning of "unqualified teachers" refers to persons who have not had formal teacher training. They can be parents, community members, members of the military, older students, religions leaders, etc. There "unqualified teachers" can be "programmed" to be effective teachers.

B. The main cost savings would be in the salaries of teachers. Programmed teachers could either by low-paid aides or unpaid volunteers.

There could be other savings in the cost of training teachers.

PROGRAMED TEACHING (PART II)

As its name implies, programed teaching is teaching in which the instructor follows a pre-arranged plan or program in detail. The program prescribes not only what is to be taught -- as syllabi and lesson plans do--but also specific procedures for teaching it.

Typically, the program is planned in detail by a team that includes subject matter experts, programming specialists and master teachers. The design is repeatedly tested and revised in tryouts with representative samples of the pupils and teachers for which it was planned. It is the transfer of responsibility for overall and detailed planning of teaching procedures from the teacher to an empirically validated program which makes it possible to utilize non-professionals successfully in the teaching role.

> IMPORTANT NOTE: The concept of programmed teaching is that the very best professionals can be used to plan and develop procedures and materials, but that much less "qualified persons" could then be trained to teach using the procedures and materials.

In a sense, programed teaching represents the culmination of a trend toward increasing the support provided for the classroom teacher. First general books, then textbooks were introduced into the educational process to supplement the teacher's knowledge of subject matter. Later syllabi and reading lists specified the material to be covered and in some cases the order in which it was presented. Teacher's guides, developed still later, specified content, sequence and presentation in greater detail and sometimes indicated the type of response required from the pupils. Ordinarily the teacher was

free to accept or reject the assistance provided by these guides, but if the teacher followed the guide in detail, as many who were inexperienced or inadequately trained did, the result was an early but incomplete form of programed teaching. It differed from present forms chiefly in the degree to which details of teaching procedures were prescribed. Teacher's guides typically specify content and the presentation of it in great detail but leave teaching technique especially feedback (testing and differential treatment of correct and incorrect responses) to be improvised by the teacher. Programed teaching fills this gap. Once the three basic elements of learning - presentation, response, and feedback - are prescribed in detail and built into an integrated program, many of the reasons for the failures of non-professionals are removed. Programed teaching provides sufficient support that it becomes possible for those with no teacher training and often with little general education to teach effectively.

MODULE 8 (PART II)

# SELF EVALUATION

# AND

# FEEDBACK

## SELF EVALUATION (PART II)

C. How does programmed teaching procedures improve on the usual teachers' guides?

_____

_____

_____

_____

_____

_____

## FEEDBACK (PART II)

C. Teachers guides usually give content and presentation, but they do not detail technique --- particularly the use of feedback. Feedback here includes evaluation (testing) and different teacher activities for different student responses.

# PROGRAMMED TEACHING (PART III)

## The Experiment

Schools in 10 rural communities in Southern Malaysia took part in the study. First Grade classes in each school were divided into two groups, one control and one experimental. The two groups in each class were made comparable on the basis of (1) tests of reading ability and (2) rankings of their teachers.

The control groups were given 30 minutes extra classroom teaching each day. The experimental groups spent this 30 extra minutes with a programmed teacher. Both groups were being taught the same materials in beginning reading (of Bahasa Malaysia).

The teachers of the control groups were the regular (professional) classroom teachers. Programmed teachers were selected from among community members with only a primary education.

There were 98 students (from the 10 schools) in the control groups and 98 in the experimental. The experiment lasted for 55 days.

## The Teaching Program

The experimental teaching program had two parts: (1) the Content program and (2) the Operational program.

The Content program included the syllabus and lesson plans. The Operational program specified in detail how the teaching was to be done.

## Content Program

The content program was planned on the assumption that the pupils spoke and understood Malay at a level appropriate for beginning first-graders and had no reading skills. The material to be learned is presented in 64 lessons in 8 cycles. In each cycle except the first, the pupils are first taught the names and sounds of a set of 6 to 12 letters; these are combined (by sounding-out procedures) to form words and the words are combined to form sentences, after which meaning is emphasized. Letters are introduced roughly in order of their frequency in the Malay language, but those in the first few sets are also selected for their usefulness in forming short common words which can be combined into sentences that are meaningful to young children. Lower case letters are introduced first; upper case letters are introduced at a slower rate, beginning with those such as S and U which closely resemble their lower case forms. To facilitate the formation of sentences which are meaningful to beginning readers, a few proper names are taught by the whole-word (look-say) method before all of their component letters have been taught. In addition, the numerals 1-12 are taught by the same method that is used to teach whole words or the names of letters.

The cycles included in the 64 lessons designed for the experiment are listed below.

| Cycles: | Letters | Words* |
|---|---|---|
| I | - | Awak, Abu, Bapa, Ali, Ibu, Fatimah |
| II | a,b,d,i,n,s,u,y,I,S,U,Y | ada, ibu, buku, nasi, Saya |
| III | e,k,p,w,K,P,W | saya, awak, bapa, adek, kakak, suka |
| IV | c,g,h,m,t,C | nama, siapa, baik, che'gu, abang, tak |
| V | f,j,l,o,r,J,O | foto, kapor, buku nota, meja, di atas, di tepi, kerusi, bangku, beg sekolah |
| VI | d,e,l,p,s,t,D,E,L,P,S,T Numerals 1-12 | Satu, Dua, Tiga, Empat, Lima, Enam, Tujoh, Lapan, Sembilan, Sa-puloh, Sa-belas, Dua-belas, Pukol (each with lower case also) |
| VII | A, B,C, F, I, K, M, W | Adek, Buku, Itu, Foto, Cuti, Meja, Wayang |
| VIII | G, H, J, N, O, R, U, Y | Guru, Hitam, Jalan, Nasi, Orang, Rumah, Udang, Yang |

Letters Q, X and Z are omitted because of difficulty in finding common Malay words that include them. Considering the "same" words beginning with capital and small letters to be two different words, 66 words are included in the content program. At the end of the program, insofar as it is successful in teaching the sounding-out skill, the pupils should,

---

* Each cycle except I and VI also included sentences constructed from words previously learned- Cycle I made use of pictures and cycle VI added numerals.

of course, be able to read (at least pronounce) any words or sequence of letters that is pronounceable according to the phonetic rules of the Malay Language.

## Operational Programs

The operational programs specify the procedures necessary to teach the content described above. The instructions for these programs are sufficiently explicit and detailed that they can be carried out by non-professionals after a few hours or days of training. There are five types of programs used for teaching new materials and skills plus a review game to provide motivation.

The five types of operational programs are:

(1) Identification Program: The task is to point to (identify) a letter, word or picture by responding to a question or instruction such as, "Which is the letter "A?" or "Point to your name on the blackboard."

(2) Oral Answer Program: The task is to give the name or sound of a letter or to read a word which the pupil is not prepared to sound out. Typical question are, "What is the sound of this letter?" (pointed to on the blackboard) or "What is this word?"

(3) Word-Sounding Program: The task is to read a word when the pupil knows the sounds of all of the letters in the word. A typical question is, "What is this word?" If the child can not read the word he is taught to sound it out.

(4) Sentence-Reading Program: The task is to read a sentence when the pupil knows the sounds of all of the letters used in the words of the sentence. A typical question is, "Can you read this sentence?" If the child can not do so he is taught the words he can not read by a procedure similar to that of the Word-sounding Program.

All of the above four programs have a common pattern consisting of two steps. In Step 1 the teacher presents the task and calls on a child to answer. If he does so correctly, he is praised and the teacher goes to the next step. If not, he is taught an acceptable answer, in the first two item programs by simple demonstration, in the others by following the sounding-out procedure. In Step 2, the teacher calls on the entire class to perform the same task in unison. If they do so she praises them; if not, she demonstrates, requires them to imitate her, and then repeats the two-step procedure with another item. The Sentence-Reading Program has a third step: When both the first child called on and the group read the sentence correctly without prompting, the first child is called on again to answer a question which calls attention to the meaning of the sentence which has just been read.

(5) Teaching Program: One of the above four Programs is applied to an appropriate set of items (letters, words, sentences, etc.) in the context provided by the Teaching Program. The chief function of this program is to specify the order in which children are called on for recitation. The procedure is designed to give the most practice to children who need it, i.e., those who have not yet learned to perform the required task. In a given "round" the teacher calls only on children who have not yet given a correct response.

Once a child responds correctly he is given a "reward card" an is not called on again until all children have responded correctly. The reward cards are then collected and a new round is begun. This procedure replaces the common custom of calling on children who hold up their hands to recite. This procedure results in providing the most practice for children who do not need it.

The rules of the Review Game can be applied to any of above five programs. The motivation program is used several times in each content cycle to give further practice on material taught in previous lessons and to review material to be used in lessons which follow. The game program incidentally provides breaks in which the children can leave their seats and move around.

## Teaching Context

Teaching began on January 30, 1973, approximately one month after the opening of the school year, and continued for 55 school days, until May 3.

Children in the experimental group left their classrooms for daily half-hour sessions of programed teaching given in addition to the customary daily one-hour periods devoted to Bahasa Malaysia in the classrooms. All other children in the class, including those in the control group, remained in the classroom for a corresponding half-hour session of additional instruction in Bahasa Malaysia by their regular teachers.

No textbooks were used in programed teaching. A specially constructed board was used which combined the features of a flannel board and a blackboard. Material was displayed on flash cards or printed by hand. Each teacher was supplied with the necessary cards, chalk, eraser, etc.

Training of Programed Teachers

Each teacher and the supervisor were supplied with a copy of the Teachers' Guide (available in English from the INNOTECH library) for use during training and the teaching which followed. They were given 16 hours of group training, eight hours during the three days immediately before teaching began and an additional eight hours during the first week of teaching. Changes in the program made it necessary to give an additional four hours of re-training during the third week of teaching. In the formal training sessions, procedures were described and then demonstrated by two Malay-speaking members of the research staff, after which the teachers practiced the programed procedures, with the other teachers and the research staff in the role of pupils.

Formal programmed teaching was supplemented by on-the-job training. Throughout the teaching period, the teachers were visited approximately twice weekly by the non-professional supervisor who observed the teaching, corrected errors, and made suggestions for improvement, filled out a 35-item checklist on teaching procedures, and summarized necessary records. Research personnel observed each teacher approximately once a week, more often during the first three weeks, less often toward the end of the program.

Post-Test

At the end of the teaching phase of the experiment, all children in the participating classrooms were given a reading achievement test designed to measure the children's ability to read and comprehend words and

sentences. The test consisted of (a) a group test given during the week after the termination of experimental teaching and (b) an individual test given during the first three days of the following week. The tests were administered by Malay-speaking members of the research staff and the special teachers. Teachers tested only in schools in which they had not taught and precautions were taken to prevent testers from knowing the groups (experimental or control) to which the children they were testing had been assigned.

In order to make possible some analysis of what had been learned the 64 word-items included in the group and individual tests were constructed from four types of words:

(a) Text Words: Words included in those pages of the classroom textbook which the classroom teacher expected to cover before the end of the teaching phase of the experiment, but not included in the program content.

(b) Programed Words: Words included in the program content but not in the pages of the textbook which the classroom teacher expected to cover.

(c) Both: Words included in the pages of the textbook which the classroom teacher expected to cover and also included in the program content.

(d) Neither: Words not included in the part of the textbook to be covered or in the program content.

A SHORT INNOTECH SUMMARY

..

... In the experiment 10 rural schools were used.

... In each school, 1st Grade students were divided into two comparable groups on the basis of reading readiness tests and teachers' rankings.

... One group of 98 students made up the experimental group, and the other group of 98 students made up the control group.

... The control group was given 1/2 hour of extra normal classroom teaching each day for 55 days.

... The experimental group was given 1/2 hour of programmed teaching each day for 55 days.

... Teachers of the control group were the normal classroom teachers.

... Teachers of the experimental group were community members with only a primary education.

... Experimental group teachers were "programmed teachers."

... Programmed teachers were given about 15 hours of training using a Teachers Guide (ask the INNOTECH library for a copy)

... Programmed teaching included (1) a content program and (2) operational programs.

... The content program is similar to a syllabus and teachers guide.

... The operational programs gave specific instructions on how to teach specific items, how to evaluate each student, and how to handle the different kinds of student response.

... After the 55 days of the experiment, a post-test was given all students. The post-test was designed to favor neither the experimental or control groups.

Before going on, review the five types of operational programs given on pages 18-19. Write the names of the five types here:

1. _____

2. _____

3. _____

4. _____

5. _____

MODULE 8 (PART III)

# SELF EVALUATION

# AND

# FEEDBACK

## SELF EVALUATION (PART III)

D. What type of material was in the content program?

E. The essence of programmed teaching is in the operational programs. Why do we consider the operational programs different from the usual teachers' guides?

And, why are they so important to the use of "unqualified teachers?"

## FEEDBACK (PART III)

D. The content program contained the material to be taught --- much like a present syllabus. It also contained the way that it was to be presented --- the sequence.

E. The operational programs are different from the usual teachers' guides because they contain exact instructions on how to each each lesson, what to say to the children, how to question the children and (most important) what to do in the case of different responses from children.

The operational programs are important to the use of "unqualified teachers" because non-professionals can be taught the exact procedures to follow in a very short time.

## Programmed Teaching (Part IV)

### Results

The results of the experiment are presented in terms of a) the performance of the experimental teachers as observed in the classroom and training sessions and b) performance of the pupils as measured by an objective test of reading achievement.

### Teacher Performance

The first question to be asked in determining the feasibility of programed teaching is: Can and will the experimental teachers follow the prescribed program? Although there were differences in personal style and momentary deviations from the program, all of the teachers were able to follow the program with precision. Two of the five teachers achieved an acceptable standard after the initial 8 hours of training (obviously supplemented by careful home study of the Teachers' Guide); the teaching of two others was satisfactory by the end of the first week in the classroom; and all were performing satisfactorily by the end of the second week of teaching. The major problem appeared to be a matter of attitude; some of the teachers apparently assumed that they could improvise, or were expected to improvise their own teaching procedures or to imitate conventional procedures they had observed or experienced elsewhere. It was necessary to convince them through on-the-job training that one general rule stated in the Teachers' Guide, "FOLLOW THE PROGRAMS EXACTLY," should be taken literally.

The performance of the supervisor was equally satisfactory, although a similar problem arose initially. It was apparently not initially made clear that her primary task was to make certain that the teachers

followed the programs in detail -- i.e., that her task was training and quality control, rather than administration.

In summary, the overall performance of both teachers and supervisor was unquestionably equal to that of programed teachers observed elsewhere, even though most of the teachers observed elsewhere were secondary school graduates and had more prior education.

## Pupil Performance

The more critical question to be asked in examining the feasibility of programed teaching must be answered in terms of final output, the performance of the children. HOW WELL DID THE CHILDREN LEARN? This question is answered primarily by comparisons of objective test scores obtained by children in the experimental and control groups.

First, table one below shows that the experimental and control groups were comparable before the experiment was started. That is, both groups scored about the same on the reading readiness pre-test.

Table 1

Scores on Pre-test

| | Groups | |
|---|---|---|
| | Experimental | Control |
| N | 98 | 98 |
| Mean | 39.3 | 39.9 |
| σ | 8.8 | 9.5 |

Table 2, on the next page, summarizes data obtained on the post-test. In every category analyzed, the performance of the experimental group exceeded that of the control group. For the test as a whole and for most sub-tests the differences were statistically significant.

Table 2

Detailed Post-test Data

Comparisons of Total test and Sub-test Means for Experimental and Control Groups

| Measure | Possible Score | Chance Score | Exper. Group Mean | Control Group Mean | Diff | $\sigma_D$ | t | p |
|---|---|---|---|---|---|---|---|---|
| Total Score | 80 | 10 | 41.6 | 36.6 | 5.0 | 2.31 | 2.18 | .05 |
| Group Test | 40 | 10 | 24.7 | 21.4 | 3.3 | 1.14 | 2.88 | .01 |
| Individual Test | 40 | - | 16.7 | 15.0 | 1.7 | 1.29 | 1.31 | N.S. |
| Word Items | 64 | 6 | 32.7 | 28.8 | 3.9 | 1.90 | 2.06 | .05 |
| Program Words | 16 | 1.5 | 8.6 | 6.8 | 1.8 | 0.51 | 3.51 | .001 |
| Text Words | 16 | 1.5 | 9.2 | 8.9 | 0.3 | 0.54 | 0.50 | N.S. |
| Both | 16 | 1.5 | 9.2 | 7.9 | 1.3 | 0.53 | 2.44 | .05 |
| Neither | 16 | 1.5 | 5.8 | 5.5 | 0.3 | 0.50 | 0.58 | N.S. |
| Sentence Items | 16 | 4 | 8.7 | 7.3 | 1.3 | 0.52 | 2.57 | .05 |
| Comprehension | 20 | 5 | 12.1 | 10.8 | 1.3 | 0.65 | 2.05 | .05 |
| Word Comp | 12 | 3 | 7.7 | 7.1 | 0.6 | 0.45 | 1.41 | N.S. |
| Sentence Comp | 8 | 2 | 4.4 | 3.8 | 0.7 | 0.26 | 2.60 | .05 |

An important question concerns the magnitude of the differences in performance of the experimental and control groups. If it is assumed that the children could not read at the beginning of the experiment, the test scores can be considered as absolute measures of what was learned and differences can be converted to percentages. In these terms, the experimental group, which received approximately one-third of its reading instruction in the form of programed teaching, answered 14% more items correctly than did the control group, which received all of its instruction from the classroom teachers. When corrected for guessing, which is necessary because of the inclusion of multiple choice items in the test, the increment attributable to programed teaching is 19%. Increments in sub-test scores corrected for guessing range from 4% (Text Words) to 39% (Sentence Items and Sentence Comprehension).

Another indication of the magnitude of the effect of the programed teaching can be derived from a comparison of the data in Tables 1 and 3 (below). On the pre-test, the performance of the experimental and control groups were effectively equal and significantly lower than that of the not-selected group. On the post-test, the performance of the experimental group was approximately midway between that of the control (low) group and the not-selected (high) group.

Table 3

Total Test Scores on Post-test

| | Groups | |
|---|---|---|
| | Experimental | Control |
| N | 29 | 89 |
| Mean | 41.6 | 36.6 |
| σ | 21.0 | 18.9 |

In summary, these findings indicate that the form of programed teaching used in this study resulted in significantly more learning than was produced by an equal period of conventional teaching. Significant increments were produced in reading vocabulary, sentence reading and sentence comprehension. No evidence was found for improvement in word comprehension or sounding out skills.

## Discussion

The answer which this study provides to the question: "Is programed teaching feasible under Asian conditions?" is clearly affirmative. Elementary school graduates in a rural Asian community, given a few days of training in the technique or programmed teaching had no serious difficulties in learning and applying the program with the require precision. Their ability to do so was indistinguishable from that of similar non-professionals elsewhere who had the benefit of considerably more education before they were trained as programed teachers. More important, the pupils they taught learned significantly more than a matched group of children taught by their regular classroom teachers.

These results contradict two widely held assumptions: a) That good teaching can be accomplished only by professionally trained teachers and b) That the quality of teaching can be improved only by increased teacher training of the conventional kind. It does not follow, however, that professional teaching and conventional teacher training should (or could) be supplanted by programed teaching. These results were obtained in only one study which evaluated the effectiveness of a single program under one set of conditions which can not necessarily be duplicated throughout a working school system. The program evaluated was designed to teach only reading and, in fact, only a part of the reading curriculum for a single grade. This study alone simply opens the door to the possibility that an educational delivery system more economical and effective than the present one can be developed by making

extensive use of programed teaching. The nature of such a system and its practicality depends upon the answers to many questions. An initial set of such questions concerning the educational scope and effectiveness of programed teaching can be answered only by a series of studies similar to the present one but designed to determine the feasibility and effectiveness of the technique when it is applied to other subject matter, geographical areas, and levels. Existing evidence, chiefly from outside Asia, suggests that there are few limits to the scope of the method. Although the number of experimental evaluations is small, they indicate that programed teaching can be effective from the elementary to the university level, with a few obvious limits on the subject matter that can be taught.

Assuming positive answers to questions concerning the educational effectiveness of programed teaching, a second set of questions concerns the most effective way of using it. There are basically three ways to use programed teaching in educational systems - as a replacement for conventional teaching, as a supplement to it, and as a part of it, i.e., as one of the techniques used by professional teachers. It can also function as a research technique for evaluating programs considered as teaching methods to be incorporated, strictly or loosely, into conventional teaching procedures.

A third set of questions concerns the nature of delivery systems within which programed teaching might be used. If programed teaching in the hands of "unqualified" teachers proves to be effective in many areas of teaching, it will be possible to make far greater use of local human resources than is the case in present educational systems, and its use will very likely reduce costs. The use of local personnel as programed teachers will almost certainly up-grade the role of the professional teacher by eliminating routine teaching tasks, emphasizing the more demanding kinds of teaching, and requiring special supervisory skills. With more efficient and less costly teaching, the

two major educational objectives, academic preparation and life skill training, which are often considered to be incompatible alternatives, may both be attainable.

A fourth set of questions is concerned with costs and cost-effectiveness. However programed teaching may be used, whether as a teaching device or as a research tool, the cost of developing the teaching program will be a major consideration. In fields other than education, high costs of development, incurred in order to achieve low costs in production, are taken for granted. Educators, on the other hand, are unaccustomed to high development costs and perhaps as a consequence, take high production (teaching) costs for granted. The development of a new system or technique of teaching typically consists of the publication of an article or book giving a general description of an idea or technique and a plausible theoretical justification for it, sometimes supported by a model textbook or set of teaching materials. Cost is largely limited to writing and publication costs. Writing cost is ordinarily included in the salary of the system's inventor, which is typically absorbed by the institution which employs him as a teacher; and the publication cost is absorbed by the parents of the pupils. The cost of properly developing a teaching program is far greater and it cannot be hidden. The process is comparable to the engineering of a physical product. Few teachers have the necessary "engineering" skills. Typically, the writing of a program requires the collaboration of a team of experts, including specialists in the areas of program development, subject matter, and good teaching. But writing is only the first step. Once the program is drafted by the team, it is repeatedly tested and revised, first in small scale tryouts, then in the field on a larger scale. Only after satisfactory output is achieved, as measured in terms of pupil performance, is the program ready for release.

There are other costs to be considered. More teaching materials may well be required for non-professional than for professional teachers. While programed teachers require less training than professionals, the cost of training will ordinarily appear as a new item in local budgets. Administrative costs may be increased; programed teachers require more rigorous supervision and administrative support than professionals. For success, it may be necessary to raise existing minimum standards of administration.

The major cost of education, however, is not development of programs, materials, or administration. It is teachers' salaries, which typically represent 70-80% of education budgets, The effective use of non-professionals, local personnel, even students and other volunteers, which is made possible by programed teaching, can presumably result in large savings in this budget item. If, as evidence seems to indicate, programed teaching by non-professionals is at least as effective as current professional teaching, its cost-effectiveness is thus determined primarily by costs. If the savings in teaching costs exceed the increased costs in other items, programed teaching will be cost-effective.

MODULE 8 (PART IV)

# SELF EVALUATION

# AND

# FEEDBACK

## SELF EVALUATION (PART IV)

E. Check the appropriate box for each question below.

| | Conventional Teaching | Programmed Teaching |
|---|---|---|
| 1. Which has the higher development cost? | ☐ | ☐ |
| 2. Which has the higher administrative cost? | ☐ | ☐ |
| 3. Which has the higher cost for teacher's salaries? | ☐ | ☐ |
| 4. Which will require more bound textbooks? | ☐ | ☐ |
| 5. Which will require greater cost for formal training of teachers? | ☐ | ☐ |

## FEEDBACK (PART IV)

E.

| | Conventional Teaching | Programmed Teaching |
|---|---|---|
| 1. ... higher development cost? | ☐ | ☑ |
| 2. .... higher administrative cost? | ☐ | ☑ |
| 3. ... higher cost for teachers' salaries? | ☑ | ☐ |
| 4. ... more bound textbooks? | ☑ | ☐ |
| 5. ... greater cost for found training of teachers? | ☑ | ☐ |

POST TEST PRACTICUM (Module 8)

Programmed teaching looks like one possible innovation that may help us relieve some of our educational problems. However, there is a need to evaluate the possibility of its use in other contexts and countries than the study of Dr. Ellson and his group.

For this practicum, therefore, we are asking that you (together with your colleagues from your country)...

... 1. Complete a new IEI on Programmed Teaching (You may obtain a new IEI Questionnaire from the Training Office).

... 2. Write a short (one or two page) paper on "Some Adaptations of Programmed Teaching for Possible Use in (Name of your country)."

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Good Luck!

SERIES 5

MODULE 9

# OTHER INNOVATIONS IN SEAMEO COUNTRIES

INNOTECH

MODULE 9

**BACKGROUND**

You have now studied four different innovations in Southeast Asia (IMPACT, RIT, ISOSA and Programmed Teaching). You also have been examining each innovation in terms of how it might be used in one's own country. In the last two modules (7 and 8) you have been able to structure your evaluations of innovations using the IEI.

One of the main reason that a number of innovations are being presented early in this course is to enable you to examine the details of a variety of alternative approaches in the solution of a single problem... the problem of providing low-cost mass primary education.

Later in the course you also will be asked to develop some alternative solutions to educational problems. You will also be asked to evaluate, select and modify the alternatives ... much as you have been doing in the past four Post Module Practica. What you have been doing, therefore, is in preparation for your later work on other educational problems using the systems approach.

Because the last four modules have all been on a single problem, however, we have been unable to present you with a bread range of innovative solutions to a variety of problems. This module, therefore, is designed to give greater exposure to different kinds of innovations in Southeast Asia*.

**PREVIEW**

In this module you will be given an opportunity to describe an innovation from your own country and to evaluate and modify an innovation described by a fellow participant from a different country.

**OBJECTIVES**

After completing this module you should be able to:

(1) give a clear description of an innovative approach to solve an educational problem, and

(2) evaluate and modify a different innovation for possible use in your own country.

---

* There are also a number of innovations available to you in the electives.

| | |
|---|---|
| CORE INSTRUCTIONAL ACTIVITIES | Read the module and complete the Self-Evaluation/Feedback of Parts I and II. |
| | As a country group, perform the Post Module Practicum. (It is suggested that you look at the Practicum before starting the module so that you will know what will be required). |

## OTHER INNOVATIONS IN SEAMEO COUNTRIES
## (PART I)

### What is an innovation?

... Innovation is one type of change. This means that not all changes are innovative.

... Innovation is the use of new ideas. But not any innovation is completely new. "New", in this case, means "new in certain situations".

... Innovation is a realistic approach. It should be based on the existing situation, the resources and constraints.

... The Innovative approach is a systematic process. The steps in this approach should follow logically and systematically.

Innovation can be a simple way of thought and application. Anyone can make some innovation. It may happen institutionally, but it can happen at the classroom level, too. We are making a mistake when we think that innovation can only be undertaken if there is a specific institution for innovation, if there are some experts, and a large sum of money. A single teacher in a rural area can make an

innovation, without thinking about the existance of institutions for innovation in his area, or experts, or money. He can think it out, and undertake it, based on the real situation. He can make such an innovation to improve his instructional approach. But it should be remembered that not all activities are innovations.

Why innovate?

When things are not working the way we want them to, we often change (innovate) what we are doing. When problems exist because our traditional methods are unable to solve them, we look for new (innovative) solutions to them. We innovate in an attempt to solve problems.

Why do we have IMPACT, RIT, ISOSA and Programmed teaching? The answer is simple: the traditional system of education was unable to cope with the problem of providing education for all our younsters. Typically, therefore, educational innovations are problem oriented. If they are not problem oriented, we think of them as being simply "change for the sake of change". At INNOTECH and in SEAMEO we cannot afford the luxury of innovation except as a way to solve a pressing educational problem.

## SELF-EVALUATION (PART I)

A. Why should we innovate?

## FEEDBACK (PART I)

A. We should innovate only in an attempt to <u>solve problems</u>.

PART II

Why disseminate innovations?

One of the important functions of INNOTECH is to find out about innovations which may be useful in the Southeast Asian region and to distribute this information to the SEAMEO countries. INNOTECH does this for one reason: to help member countries know of successful innovations that may be adapted for the solution of their own educational problems.

In the same way, we would like participants in this course to exchange innovative ideas. It would be a real waste if you, the participants from the eight SEAMEO countries, were not able to know of important innovations in other countries of our region. Perhaps some of the problems in your own country can be solved by adapting innovations from other member countries.

How to exchange innovative ideas among participants from SEAMEO countries?

We could talk to each other on an informal basis, asking questions about innovations and discussing ways that you might be able to use one another's

innovations. A good idea! And one which you could well pursue with each other on an informal basis.

However, if you are to get the greatest benefit from your time it is best to read about an innovation of an to think about it ... before discussing it. It is also better if the information you receive about an innovation is structured and clear so that all the essential information is available to you.

This module has two further parts:

(1) Writing a description of an innovation in your own country, and

(2) Evaluating (as part of the Post Module Practicum) an innovation from another country in terms of its usefulness for your own country.

The module which follows (Module 10) will give you an opportunity to discuss the innovations in an open seminar.

## DESCRIBING INNOVATIVE PROJECTS

Below is a description of an innovation in Thailand.

### Mobile Trade Training Schools

Adults and out-of-school youth living in Thailand's rural areas with only 4 years of primary education now have an opportunity to learn basic trade skills which was not available to them before. Mobile Trade Training Schools (MTTS) have been established in 54 provinces to provide training in the skills necessary for jobs in industry and agriculture. The schools are mobile in the sense that teachers and equipment can be moved to new districts of a given province when enrollment at the initial location has dropped.

The programmes are designed to provide training in the basic trade skills with minimum expense and time. They offer the following courses: metal work, automechanics, electricity, radio and TV, welding, woodworking, cooking, food preparation, sewing, bookkeeping. Courses can be completed in five months (300 hours). MTTS programmes typically operate 3 three-hour shifts each day. This multiple use of facilities permits the programme countrywide to train 43,000 people a year.

The MTTS programme is growing rapidly, creating a number of problems: recruitment of teachers and other staff members for the schools, exchange of teachers and other staff members among the various schools; transportation of materials to the schools; communication, etc. To minimise or eliminate these problems, a coordinating unit, the Vocational Promotion Division, was established to help the schools set up follow-up programmes, supervise and introduce appropriate methods of teaching, introduce new materials to improve the training, and to see that supplies, personnel, and facilities are being utilised to capacity.

Earlier this module emphasized of structuring the information about a project so that all important points are covered. The need to make an innovation problem-oriented also was stressed. INNOTECH, therefore, has designed a simple outline for reporting innovations. It includes:

A. Title
B. Problem
C. Main Idea
D. Description

(1) Objectives

(2) Methods and Content

E. Progress/Status

Below is the same innovation from Thailand following the above outline:

| | |
|---|---|
| A. TITLE | Mobile Trade Training Schools (Thailand) |
| B. PROBLEM | In Thailand, there are a large number of adults and out-of-school youth who are unable to get jobs because they have no chance to get training in marketable skills, many live in remote areas having no permanently-equipped training schools. |
| C. MAIN IDEA | A mobile van and teachers, (with equipment for metal work, automechanics, electricity, radio and TV, welding, wood-working, cooking, food preparation, sewing, bookkeeping) moves from one district to another district to train adults and out of schools youth in basic trade skills. |

| | |
|---|---|
| D. DESCRIPTION<br><br>(1) Objectives | a) To increase the number of trained people in rural areas, where there are no permanent facilities for training.<br><br>b) To train adults and out-of-school youth in certain skills: metalwork, automechanics, electricity, radio and TV, welding, woodworking, cooking, food preparation sewing and bookkeeping. |
| (2) Methods and Content (include people, equipment, materials, etc). | a) A mobile van and a group of teachers with training equipment as a unit come to a rural district, where there are no permanent facilities for training, to train adults and out-of-school youth in certain basic skills.<br><br>b) The training offers the following courses: metal work, automechanics, electricity, radio and TV, welding, woodworking, cooking, food preparation, sewing and bookkeeping. |

| | |
|---|---|
| | c) These courses can be completed in five months.<br><br>d) The programme operates three shifts each day.<br><br>e) Once the training in these trade-skills in one district has reached the saturation point, the unit will move to another district, and start offering the training to other groups of people.<br><br>f) This unit is equipped with facilities to teach the trade-skills mentioned above. |
| E. PROGRESS/STATUS | a) 43,000 people are trained each year.<br><br>b) The MTTS programme is growing rapidly, creating a number of problems: recruitment of teachers and other staff members for the schools, exchange of teachers and other staff members among the various schools; transportation of materials to the schools; communication, etc. To minimise or |

| | |
|---|---|
| | eliminate these problems, a coordinating unit, the Vocational Promotion Division, was established to help the schools set up follow-up programmes, supervise and introduce appropriate methods of teaching, introduce new materials to improve the training, and to see that supplies, personnel, and facilities are being utilised to capacity. |

Shortly you will be asked to write a brief description of an innovation using the format above. It is outlined below. Please refer to this outline when preparing your description.

| | |
|---|---|
| A. <u>TITLE</u> | The title of the project should reflect the main components of the innovation. e.g.: MOBILE TRADE TRAINING SCHOOLS. |

| | |
|---|---|
| B. PROBLEM | What is the real problem that the innovation is intended to solve? Is it illiteracy? Is it the need for better planning? Make it very clear! State the problem ... not the purpose. |
| C. MAIN IDEA | Write 20-30 words describing the main characteristics of the innovation. |
| D. DESCRIPTION | (1) State the objectives of the innovation ... what outcomes it is designed to achieve. Make these objectives as specific as possible.<br><br>(2) Describe in detail the methods and content being used. Describe organization, management, equipment, training, what population is involved, etc. etc. |
| E. PROGRESS/STATUS | How long has the program been running?<br><br>What problems have been encountered?<br>What changes have been made?<br>What are the plans for the future?<br>What success has been achieved? |

## SELF-EVALUATION (PART II)

B. On the next page is the description of an innovative project. Read the description carefully and rewrite it in standardized format just described in this module.

Following the description are several blank format pages on which you should rewrite the description.

Community Education Rural Center (CERC) - LAOS

Community Education Rural Centers (CERC's) were initiated by the Ministry of Education in 1962 with a view to facing budgetary limitations and enrolling as many children as possible. They serve simultaneously as lower primary schools, youth centers and adult education centers. A CERC may be any of the following:

- a temple school, founded in any village where a temple is in existence; or.
- a public primary school, or.
- where there is no temple or public primary school, a rural school built on the villagers' own initiative with a teacher (sometimes working part-time) selected and maintained by the community.

Under pressure from the people's ever rising expectations for the education of their children, most CERC's have gradually turned into elementary schools with a single class divided into three grades. The only difference between them and the public schools is that their teachers are not civil servants. The Government pays them monthly allowances which range from 3,000 kip (1US$ = 600 kip at the official rate) for beginners to 6,000 kip for those who have participated in at least four upgrading seminars. The allowance is supplemented as needed by parents' contribution in money or in kind.

Although in 1962, the government envisaged the establishment of 1,500 CERC's within three years, the insecurity prevailing in some rural regions, the difficulty of communications and the scarcity of national resources, have permitted the opening of only 891 so far. Their work is supplemented by that of the monks and the military (especially in remote areas and dangerous operation zones). In order that isolated communities may benefit from education, the rule that a minimum of 35 children aged from 6 to 9 is necessary for an elementary school to be created has been waived in the case of CERC where there are 960 teachers for 23,448 pupils' or a pupil-teacher ratio of slightly less than 25:1.

- CERC teachers are recruited from among the young people of the villages who have completed 6 years of primary school.

In conclusion, considering the restriction of the actual budget and the lack of teachers, in order to extend education, even primary, to all the people, Laos will be obliged--not without justification--to call on the communities to contributed usefully and effectively to the expansion of education. The villagers are responsible for the support of CERC teachers and for construction of certain buildings.

Please rewrite the above description on the format provided on the next page. After you have completed the format, compare your work with the Feedback sheet. Remember that your work will probably be different (and perhaps better) from that done by INNOTECH ... simply make sure that you have put the essential information under appropriate headings. Again, since innovations should be problem-oriented, spend some time in deciding what the problem was that the CERC's were designed to solve.

PROJECT DESCRIPTION

| | |
|---|---|
| A. TITLE | |
| B. PROBLEM | |

| | |
|---|---|
| C. <u>MAIN IDEA</u> | _____<br>_____<br>_____<br>_____<br>_____<br>_____<br>_____<br>_____<br>_____<br>_____<br>_____<br>_____ |

| | |
|---|---|
| D. DESCRIPTION | (1) Objective(s): |
| | (2) Methods and Content: |

| | |
|---|---|
| | |
| E. PROGRESS/STATUS | |

| | |
|---|---|
| | |

## FEEDBACK (PART II)

The rewritten description below probably is different from the one you wrote. The important thing is that you have described the innovation under the appropriate headings.

### PROJECT DESCRIPTION

| | |
|---|---|
| A. TITLE | Community Rural Education Center (CERC) - LAOS |
| B. PROBLEM | Too few children in Laos are able to receive a primary education because budgets do not allow a sufficient increase in the number of traditional schools. Budgets also do not permit separate primary schools, youth centers and adult education centers. |
| C. MAIN IDEA | CERC are community operated schools in rural villages. Teachers for CERC's have completed only 6 years of primary school, and they are recruited from the village. They are trained through a series of |

| | |
|---|---|
| | of government run upgrading seminars. The village is responsible for buildings and for most of the salaries (either money or in kind) of the teachers. |
| D. DESCRIPTION | (1) Main Objective:<br><br>Provide primary educational opportunities to rural villages at low cost.<br><br>(2) Methods and Content:<br><br>(a) Teachers are recruited locally from 6th grade graduates.<br><br>(b) Teachers are trained through a series of upgrading seminars.<br><br>(c) Teachers receive a small stipend from the government of $5(US) per month. This amount is increased to $10(US) for those who have attended at least four upgrading seminars. |

| | |
|---|---|
| D. DESCRIPTION (Continued) | (d) The village communities are responsible for additional teacher payments. Parent/community contributions are either in money or in kind.<br><br>(e) Teachers are not civil servants.<br><br>(f) Teachers are supplemented by monks and the military, particularly in remote areas and dangerous operation zones.<br><br>(g) School buildings are provided by the village community. They may be located in a temple (temple school), in existing school buildings or constructed by the villages.<br><br>(h) Schools are maintained by the community.<br><br>(i) The government rule that 35 children aged 6-9 must be in a village before a school can be established has been relaxed for the CERC's. The average pupil-teacher ratio is slightly less than 25:1.<br><br>(j) CERC's also serve as youth centers and adult education centers. |

| | |
|---|---|
| E. PROGRESS/STATUS | (1) CERC's were began in 1962 with the aim of establishing 1500 schools in three years. However, insecurity in some remote areas, difficulties in communication and lack of resources have permitted the establishment of only 891 to date.<br><br>(2) There are now 960 teachers and 24,448 pupils.<br><br>(3) Expansion is planned. The Lao Government will be obliged to call on additional communities to contribute. |

POST MODULE PRACTICUM

STEP 1 You and your colleagues from your own country should meet and decide upon one educational innovation in your country that may be of value to other countries in the region. Your innovation may be any aspect of education (educational management, a curriculum development unit, technical education, non-formal education, etc. etc.).

Once your group has decided upon the innovation, write as complete a description of it as you can (only one report for the total country team). Give it immediately to the Training Office so that it can be typed and reproduced.

STEP 2 The Training Office will distribute two descriptions from other countries to each country group as indicated below:

Indonesia will receive description from Laos and Philippines.

Khmer will receive descriptions from Singapore and Vietnam.

Laos will receive descriptions from Khmer and Malaysia.

Malaysia will receive description from Thailand and Vietnam.

Philippines will receive description from Khmer and Singapore.

Singapore will receive description from Indonesia and Thailand.

Thailand will receive description from Malaysia and Philippines.

Vietnam will receive description from Indonesia and Laos.

When you receive the description from the two countries, please

... apply the IBI, noting suggested changes for adaptation to your own country, and ...

... write a short (1-2 pages) report on "Some Adaptations to the (name of innovation) for Possible use in (name of your country).

---

AGAIN, GOOD LUCK !

SERIES 5

MODULE 10

# SEMINAR ON INNOVATIONS IN SEAMEO COUNTRIES

INNOTECH

# MODULE 10

## SEMINAR ON INNOVATIONS IN SEAMEO COUNTRIES

**PREVIEW**

The last five modules has provided you with a wide variety of innovations in Southeast Asian countries which have been devised to solve certain educational problems. You also have had some exercise in identifying the supportive and delimiting factors of each innovation (in the light of conditions in your own country) and making modifications to make maximum use of resources and minimize the constraints. This seminar will give you the opportunity to exchange views and ideas with fellow-participants from other SEAMEO countries on how innovations brought about in their countries may be modified and applied to your own educational problems.

**OBJECTIVES**

The participant shall be able to

(1) describe how one innovation from each of two SEAMEO countries may be modified and applied in their own country and

(2) Explain the reasons for each modification you have made, stating the conditions in your country that have necessitated such modifications.

**CORE INSTRUCTIONAL ACTIVITIES**

1. Before the Seminar, meet with your colleagues from your own country and study the group report (Adaptations to some innovations) that you prepared in the Post-Module Practicum of Module 9. Prepare to present the report during the Seminar.

2. The presentation of reports will be as follows:

| COUNTRY REPORTING | TO REPORT ON ADAPTATIONS TO INNOVATIONS FROM - |
|---|---|
| 1. Indonesia | Laos, Philippines |
| 2. Khmer | Singapore, Vietnam |
| 3. Laos | Khmer, Malaysia |
| 4. Malaysia | Thailand, Vietnam |
| 5. Philippines | Khmer, Singapore |
| 6. Singapore | Indonesia, Thailand |
| 7. Thailand | Malaysia, Philippines |
| 8. Vietnam | Indonesia, Laos |

3. There will be a brief question-and answer session after each report during which you may raise questions to clarify some points on the innovation or its adaptation. Suggestions on other adaptations that you think will increase the effectiveness of the innovation may also be made.

SERIES 5

MODULE 11

# WHY SYSTEMS APPROACH?

INNOTECH

## MODULE 11

**PREVIEW**

At INNOTECH, we use what is called a "Systems Approach" as a basic method for educational planning. To give the method a title such as "System Approach" does not give the method any special magic. What the title does do is to indicate that we are using a systematic way to arrive at decisions about education. Module 11 describes how a number of persons might have made better decision had they been more systematic in their approach.

**OBJECTIVE**

After reading through the articles and writing answers to the self-evaluation questions, you should be able to name the most important factors one should consider systematically in making a decision.

**CORE INSTRUCTIONAL ACTIVITIES**

Read the articles and write the answers to the Self-Evaluation questions. Then, check your answer with the Feedback. If you need help with any portion of the article, consult any member of the Training Staff.

## WHY SYSTEMS APPROACH? (PART I)
## HOW TO BE A BETTER MINISTER

A Minister of Education, on a trip to Europe, saw a very exciting school in which secondary students were studying academic subjects and at the same time, learning practical skills. It was called a comprehensive school. He said to himself that a comprehensive school looked like a good thing for his country, and he should start the construction of comprehensive schools when he returned home.

If you were that Minister, you should tell yourself to think again, because you had not used a systematic approach in arriving at your decision.

You had not asked yourself whether this new comprehensive school met the needs of your country, or provided a solution to your country's problems.

You, obviously, had not established very clearly what the objectives of your educational system were --- what the system should try to achieve.

You probably did not have a very clear idea whether this new idea was possible in terms of the constraints and resources within which you have to work. For example, you might not have given adequate consideration to costs, to the availability of trained teachers, or to the possible reaction of parents.

It is also not very likely that you considered all other alternative ways by which you might meet your country's needs --- ways which could be more effective or ways which were less expensive and more acceptable.

One of your greatest faults, however, was your decision to start the construction of a number of comprehensive schools immediately, rather than trying out the idea in a single location and evaluating the results of this tryout --- before you constructed others.

If you did not do these things in arriving at your decision, you were not a good Minister. If you had done them very thoroughly, you would have been a better Minister because you would have applied a systematic approach in arriving at your decision.

MODULE 11 (PART I)

SELF-EVALUATION

AND

FEEDBACK

## _____ SELF-EVALUATION (PART I) _____

A. The Minister probably would have made a better decision if he had considered five factors. The factors were:

1. his country's problems

2. the _____ of the educational system

3. his country's constraints and resources

4. all other _____ ways to meet the country's needs

5. making a firm decision before trying out the idea

(Please fill in the blanks of items 2 and 4 above.)

## FEEDBACK (PART I)

A. The Minister probably would have made a better decision if he had considered five factors:

1. his country's problems

2. the objectives of his educational system

3. his country's constraints and resources

4. all other alternative ways to meet the country's needs

5. making a firm decision before trying out the idea.

## WHY SYSTEMS APPROACH? (PART II)
## HOW TO BE A BETTER HOUSEWIFE TO DO MARKETING

A housewife went to the morning market. She bought fresh eggs, chicken, beef, pork, vegetables and fresh fruits. She bought everything until her basket was full and her arms were full too. She took a taxi home. That evening she was going to have birthday party for her beloved husband. She planned to make a very delicious birthday cake for him and a few friends.

She began to mix flour with butter, eggs and ---
"Where is my baking powder?", she asked herself.
She began to search for a small can of baking powder. She took everything out of the basket; she unpacked every bag. She couldn't find it. Suddenly she realized that she had not bought it.

She stopped mixing cake and began to make spaghetti sauce. But she had to stop again after putting ground beef in the pan because she remembered that she could not find tomato sauce in the market that day.

We can apply a systematic approach in our daily life too. If you were the housewife, before you went to the market, you would have determined what your needs were. You were going to have birthday party for your beloved husband.

Then you would have established your objectives - to make spaghetti and cake for that party. Next you would have considered the resources and constraints - what ingredients for those things you already had, what you need to buy, and list them. Then you would have considered the time that you might spend at the market, the time

that you would spend for cooking; and also you would have considered the budget that you could provide for the party.

In case you could not buy all ingredients that you need for making spaghetti and cake, what are the other alternatives? You might change from cake to fruit or another kind of sweet, like pie, etc. You might change from spaghetti to another kind of dish whose ingredients are easy to find.

The try-out of the dishes that you were going to cook for the party is also important. You should have cooked those dishes at least once before the party. Then you should evaluate the results - was the taste good or not? How much of each ingredient did you have to buy?

If you had done these things before, everything for the party for your beloved husband would have been absolutely perfect, and you would have been a better housewife doing the marketing.

---

There is no Self-evaluation or feedback on Part II.

## WHY SYSTEMS APPROACH? (PART III)
## HOW TO BE A BETTER DIRECTOR

The Director of the Teacher Training Department read a report about the severe teacher shortage in the rural areas of his country

"That's our job," the Director cried, jumping to his feet. "We must double, perhaps triple, our output of qualified teachers". With his usual energy, he worked hard to get the money, and he got it. He then put up additional rooms to the existing teacher training colleges, hired more professors, and accepted more students. In four years, the number of graduates rose by three hundred percent. To his surprise he found out that the problem of teacher shortage in the rural areas was still there, plus one another problem -- an oversupply of teachers, fighting for positions in the urban areas.

What do you think was the greatest fault in the Director's decision-making? We believe that he jumped at a solution before he had considered carefully the real problem or need, when he had learned that there was a severe teacher shortage in the rural areas of his country. The real problem was that children in rural areas were not receiving an adequate education.... not simply that there was a shortage of teachers.... perhaps the problem could be solved without teachers. The solution to his problem became a problem -- "We must double, perhaps triple, our output of qualified teachers". And of course he could not formulate the right objective since he did not identify the real problem.

And also he had not given adequate consideration to the constraints within which he had to work --- the limited budget of the existing

teacher training colleges. He didn't think of ways to use existing buildings, materials and personnel .... he didn't consider existing resources that he could use.

It seemed that he had not considered all possible alternatives that might provide the needed services in the rural areas. Nor did he evaluate the several alternatives. If he had done so he could probably have come up with solutions that were effective.

He also didn't think of ways to tryout or receive feedback before going ahead on a large scale program. Because he did not arrive at his decision systematically -- the problem remained and, in addition, a new problem arose which became the real problem for some fellow in some other department to solve - The Director of the Labor Department.

Had he done all the things suggested above, he would have been a better Director of Teacher Training.

MODULE 11

_____ SELF-EVALUATION (PART III) _____

He would have been a better Director of Teacher Training if he had

1. ... more carefully considered the problem of rural education rather than simply jumping to the conclusion that shortage of teachers was the problem.

2. ... established his _____ in relation to the real problem rather than simply assuming that he wanted to increase the number of teachers.

3. ... considered money constraints and considered the existence of a number of _____ such as present buildings, materials and personnel.

4. ... considered then alternatives for achieving the objective of educating more rural children (perhaps IMPACT or ISOSA) rather than thinking only of more teachers. He should also set up some procedures for _____ the alternatives.

5. ... set up a way to tryout his alternative ideas before implementing a large-scale program.

6..... and obtained _____ information from his tryouts so he could modify his approaches.

(Please fill in the blanks of items 2, 3, 4 and 6.)

## FEEDBACK (PART III)

1. ... consider the real problem

2. ... established his objectives in relation to the real problem

3. ... considered constraints and resources

4. ... considered other alternatives and set up procedures for evaluating alternatives

5. ... set up tryout procedures

6. ... obtained feedback.

## WHY SYSTEMS APPROACH? (PART IV)
## HOW TO BE A BETTER PRINCIPAL

The principal of a primary school was sorry for the students in his school. There were very few things for them to play with during recess. Only a few at any one time could use the swings and other playground equipment. The other children could only stand around until it was their turn to use the equipment.

Because he wanted all his children to be able to enjoy the playground, he ordered some new equipment.

After the new equipment was put up on the playground, he sadly observed that much of it was not used by the children. He also found later that he did not have enough money for needed textbooks because he had used so much for the new playground equipment.

If you were that principal, you should tell yourself to think again because you had not used a systematic approach in arriving at your decision.

You did recognize the problem of all children not being able to play at the same time. Good for you!

However, your objective of ordering new equipment was an error for several reasons:

... You did not consider your resources and constraints because your limited amount of money would not cover both playground equipment and new textbooks.

... You did not think of alternatives ... different ways that the children could enjoy themselves on the playground. You could have organized games. You could have had inexpensive equipment built in your own community rather than ordering expensive playground equipment. You could have rescheduled classes so that a much smaller number of children would be on the playground at one time.

... You didn't evaluate the possible alternatives by checking what the children wanted to play with.

... You went ahead and ordered all the equipment rather than putting up only a few pieces to tryout whether the children wanted to play with them.

... And you didn't use the results of the tryout (or the results of an evaluation of alternatives) to provide you with feedback so that you could modify your objective or your alternatives.

Had you done all these things you would have been a better principal.

MODULE 11 (PART IV)

# SELF EVALUATION

# AND

# FEEDBACK

## _____ SELF EVALUATION (PART IV) _____

The principal probably would have made a better decision if he had:

1. ... considered his resources and _____.

2. ... considered other alternatives.

3. ... checked with the children in order to evaluate the other _____.

4. ... put up only a few pieces of equipment to tryout whether the children wanted to play with them.

5. ... used the results of the tryout to provide _____ so that he could modify his objective or his alternatives.

(Please fill in the blanks in items 1, 3 and 5 above.)

## FEEDBACK (PART IV)

The principal would have made a better decision if he had:

1. ... considered his resources and constraints.

2. ... considered other alternatives.

3. ... checked with the children in order to evaluate the other alternatives.

4. ... put up only a few pieces of equipment to tryout whether the children wanted to play with them.

5. ... used the results of the tryout to provide feedback so that he could modify his objective or his alternatives.

## WHY SYSTEMS APPROACH (PART V)
## HOW TO BE A BETTER ADVICE-TAKER

The new Minister of Education was pleased. There were many international donors willing to help improve the country's educational system. Each promised assistance for projects that they thought the country should have. One advocated comprehensive schools. Another pressed for Teacher education. Another proposed a literacy program. There were proposals for English language, Technical Education, Educational Television, Nonformal Education and many others. All promised assistance for the projects if the government would provide counterpart funds.

"Ours is a poor country," said the Minister, "and we must make use of all assistance offered." And he accepted them all. There was much activity and the many projects started. "Now we are really doing something," thought the Minister to himself.

But in a short while, the heads of the various programs were having difficulty getting their needed portion of the limited counterpart funds available. Some projects had to stop because there were no more funds to go on. Others that were able to get funds were not well received because they were not directed to solving the country's real problems.

Despite the huge sums expended, more than half of the children failed to finish the elementary course. Very few finished high school, and those that did could not find any employment. "I wonder what went wrong", said the Minister. "The projects were all good. We received a lot of aid. Why then, did they not do any good?".

If you were that Minister, you should tell yourself to think again, because you had not used a systematic approach in arriving at your decision to go ahead with all the projects at once.

You had not asked yourself whether each project was directed toward the problems of your country.

You had not established clear-cut objectives in response to these problems.

You had not considered other alternatives to achieve your objectives.

You had not thought about the resources and constraints within your country that must be considered in doing all these projects. You should have asked such questions as! "Do I have enough counterpart funds?" "Do we have enough trained people to carry the programs out?" "Does a given project fit into the culture and does it take advantage of our own usual ways of doing things?"

You didn't set up any criteria to evaluate the possible alternatives.

And you didn't tryout the projects on a small scale or use the feedback from the tryouts to modify your objectives or your alternative programs.

Had you done all of these things, you would have been a better advice-taker.

MODULE 11 (PART V)

# SELF-EVALUATION

# AND

# FEEDBACK

## _____ SELF-EVALUATION (PART V) _____

The Minister would have been a better advice-taker if he had:

1. ... made sure that the programs were directed toward solving his country's real _____.

2. ... examined the proposed programs in view of the objectives of education in his country.

3. ... questioned the availability of counterpart funds, the availability of trained persons to run the programs, the ways in which the programs could take advantage of the countries cultural habits, etc.
   ... In other words, considered both _____ and constraints.

4. ... considered other alternatives for achieving the country's educational objectives.

5. ... established ways to _____ alternatives so that he could decide among them.

6. ... set up small-scale _____ of the projects, using the results as feedback to modify objectives or the alternative programs.

(Please fill in the blanks of items 1, 3, 5 and 6.)

## FEEDBACK (PART V)

The Minister would have been a better advice-taker if he had:

1. made sure that all programs were directed toward solving his country's real problems.

2. examined the proposed programs in view of the objectives of education in his country.

3. considered both resources and constraints.

4. considered other alternatives for achieving the country's educational objectives.

5. established ways to evaluate alternatives so that he could decide among them.

6. set up small-scale tryouts of the projects, using the results as feedback to modify objectives or the alternative programs.

## MODULE 11

## POST MODULE PRACTICUM

The Director of a Technical Training school has been directed by his Minister to "redesign his curriculum to make it more relevant." What things should the Director consider in his redesign of the curriculum?

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

SERIES 5

MODULE 12

# THE SYSTEMS APPROACH TO EDUCATION

INNOTECH

Original Material
Developed by
Dr. Henry Lehman
Chairman
Task Group on Systems
Approach to Education
Project ARISTOTLE

## MODULE 12

**PREVIEW**

Module 11 was designed to focus attention upon some of the important considerations in educational decision making. In that module the following concepts were repeated:

... problems

... objectives

... resources and constraints

... alternatives

... evaluation of alternatives

... tryout

... feedback

The next three modules will attempt to establish a systematic relationship among these components. (Different words will be used, but you should recognize that the concepts are the same).

The reason that we are presenting three different modules to outline the systems approach is because there is no single "systems approach". However, all three approaches have much in common.

When you finish the next three modules, you and your colleagues will be asked to develop your own systems approach in Module 15. (You will have a chance to modify your approach at the end of the course). Remember that there is no single approach that is best, what you develop in Module 15 undoubtedly will be as good as those given in Modules 12, 13 and 14.

In the next three modules we will not give very extensive details about the components in the systems approach ... only the relationship among components. Following this series of Modules, we will explore each component in greater detail.

Module 12 was created to familiarize you with one educator's interpretation of the systems approach to education - Professor Henry Lehman. Previous groups of participants at INNOTECH have found Lehman's article very clear, well-organized, and extremely systematic.

OBJECTIVES

After reading the article and completing the study questions you should be able to:

(1) discuss at least three reasons why one should use a systems approach to solve educational problems.

(2) describe the relationship between different steps of the systems approach as described by Lehman.

(3) modify the diagram of Lehman's systems approach in a way that you think would make it more useful to you and give reasons for the changes you breake.

**CORE INSTRUCTIONAL ACTIVITIES**

Read Lehman's article and write the answers to Self-Evaluation questions. Do not look at the suggested answer until after you have written your answer. Then, check your answer with the Feedback. If you need help, consult any member of the training staff.

# THE SYSTEMS APPROACH TO EDUCATION

HENRY LEHMAN

Whenever one is faced with a complex problem these days, someone is bound to suggest that the systems approach should be used, as if this were to guarantee an immediate optinum solution. I wish that there were such a magical panacea to the solution of the complex problems facing our society, whether they relate to the Middle East, revitalization of American inner cities, public transportation, or the national education system. The systems approach does not provide the ultimate answer by only adding water and shaking vigorously. The systems approach does (1) provide an orderly process for developing a solution, a process which is (2) structured to minimize prejudicial preconceived notions and maximizes the objectivity required to arrive at a scientifically correct answer.

Throughout 1967 a group representing government, the educational community, and industry has been meeting to encourage continuing communication of new ideas, developments, and techniques and thereby contribute to the advancement of quality and efficiency of the nation's education and training. To assure that this activity would continue to stimulate an interchange of communication among the governmental-educational-industrial elements of our society, the activity was named Project ARISTOTLE - Annual Review and Information Symposium on the Technology of Training, Learning and Education.

Of the 10 task groups which were active during 1967, one was devoted exclusively to the application of the systems approach to educational problems. The task group devoted the first year to describing the systems approach. The material below is a summary of the approach developed by the entire task group and represents the material presented by the Systems Approach to Education paned at the first ARISTOTLE Symposium held in Washington, D.C., on December 6 and 7, 1967.

The systems approach is nothing new. It is what we have called in the past "the scientific method" and (3) is a logical step-by-step approach to problem solving which we use continually, even though we perform many of the steps unconsciously. Yet it is surprising how often major problems are solved -- or are attempted to be solved -- by finding politically attractive solutions which are not based on a systematic analysis of the problem and alternate solutions, and therefore end up making the problem worse, rather than solving it.

As developed by Project ARISTOTLE, the systems approach to education consists of eight steps:

1. Need -- the education/training problem;

2. Objectives -- measurable learning goals;

3. Constraints -- restrictions or limitations;

4. Alternatives -- candidate solutions;

5. Selection -- choice of best alternative;

6. Implementation -- pilot operation of the chosen solution;

7. Evaluation -- measurement of results obtained against originally stated objectives; and

8. Modification -- the change of the system to correct for the deficiencies noted.

Briefly this list can be restated as:

(1) Define the real problem you are trying to solve.

(2) Examine many potential solutions and select the one for which an objective analysis has the greatest promise.

(3) Measure the results obtained and modify the approach until the problem really is solved.

This may appear to be so self-evident that it is not worthy of discussion. Yet, as in the case with many self-evident "truths", these steps are not always followed properly, resulting in additional confusion rather than solution. The real intent of each step and the manner of application are discussed in the following sections.

## SELF-EVALUATION (1)

Discuss at least three reasons why Lehman believes that a systematic approach should be used when solving educational problems.

(1) _____

(2) _____

(3) _____

(4) _____

## FEEDBACK (1)

Your answer should mention that a systems approach provides:

(1) a systematic way of problem solving

(2) an orderly process for developing a solution

(3) a process which is structured to minimize prejudicial preconceived notions and to maximize the objectivity required to arrive at a scientifically correct answer

(4) a logical step-by-step approach to problem solving.

## NEED

The first step is to state the need -- the real need of the group under consideration. The real need should address the overall problem to be solved, and not only the educational problem; for the first thing we must recognize is that education, in itself, is only one solution to the problem. A statement of the need should be, for example, "We must provide better medical care", and not, "We need a programed instruction booklet series for nursing training".

The second statement not only assumes that more nurses will provide better medical care -- an action which at best will give only a partial solution to the problem -- but also includes the solution; namely, programed instruction in the need statement. This is in complete violation of the systems approach.

The proper way to implement the need step, as well as some common pitfalls to be avoided, are shown in Figure 1.

### FIGURE 1

NEED

| | |
|---|---|
| DEFINITION | A statement of the real problem being faced by the society under consideration -- that statement of a problem which initiates consideration of an education/training system as a potential solution. |

PROCEDURE

1. Start with an expression of the generalized need; e.g., "we need better medical care".

2. Determine whether education/training constitutes at least a partical satisfaction of the need.

3. Determine in the light of the present state-of-the-art what type of manpower and what skills are needed; e.g., more knowledge technologists in the medical and allied sciences.

4. Define more specifically and in greater depth the group of people and skill areas required to satisfy the need.

5. Verify the need and the delineation of the group concerned through the judgment of knowledgeable people in the real world involved.

PITFALLS

1. Have you defined the real need or are you addressing a synthetic subproblem which may presuppose the answer? (Have you considered the need for updated equipment, rather than more personnel?)

2. Have you based the need too much on assumptions and too little on verified facts?

## OBJECTIVES

Once the need is properly stated, we can determine what learning objectives must be attained to satisfy the need. In this step we decide what the student should be able to do after having completed the learning experience.

This is the most important step of the systems approach, because all subsequent steps are designed to cause the learning system to meet these objectives. Hence, if the objectives are stated improperly, the system approach will not lead to the proper solution.

To be useable in the systems approach, the objectives must be stated in terms which can be measured, for otherwise we will never know whether the system as

implemented meets the stated objectives. It is this requirement for measurable objectives which makes this step the most difficult in the process.

Most of us can see readily how to write measurable objectives for skill training and for education in mathematics and the physical sciences. For example, it is easy to describe precisely the type of mathematical problems which a fifth-grade student should be able to solve, or which parts of a flower he should be able to identify correctly. The problem becomes more difficult in the language arts, social sciences, and fine arts; yet even there many behavioral changes expected in the student can be stated in measurable terms. Instead of saying that we expect the fifth-grader to have an understanding of the problems faced by the founders of our country and be able to relate how they affect our current problems, this objective can be stated in more measurable terms as follows: "The student should read the editorial page of the newspaper at least three times a week and should be able to write a 200-word essay on how a similar problem was handled by the fathers of our country".

It is often said that stating educational objectives in measurable terms overemphasizes skills as opposed to education, that, it would force the stating of objectives in terms of "The student should be able to list the names of all the Presidents in proper sequential order". As seen from the foregoing example, this need not be the case, but subtle abilities and attitudes can also be stated in measurable terms. This is the greatest challenge to the educational systems designer.

Some guidelines on the preparation of objectives are shown in Figure 2.

FIGURE 2

OBJECTIVE

DEFINITION

The determination and specification of the terminal capability desired of students after having successfully completed a learning experience.

PROCEDURE

1. Define that portion of the need which can be satisfied by the education/training system.

2. Describe in measurable terms the observable act(s) which will be accepted as evidence of the learner having achieved the objective.

3. Describe the environmental conditions (stress, etc.) under which the desired end behavior must be demonstrated.

4. Define the minimum acceptable criteria for demonstrating terminal behavior objectives.

PITFALLS

1. Are you sure that your objective contributes significantly to satisfying the real need?

2. Are your objectives stated in specific measurable terms (must be able to identify themes from Beethoven and Mozart piano concerti) as opposed to qualitative statements (he must develop an understanding and appreciation of romantic music)?

3. Is your definition of the test conditions realistic and valid in light of the true need)?

4. Have you confined your statement of objectives to "should be able to do", or have you mixed in references as to how the student will in fact acquire these capabilities?

## CONSTRAINTS

The universe in which we live does not permit the implementation of just any solution. We are surrounded by constraints. Some of those are permanently inviolate because they represent laws of nature; some are temporarily inviolate because they represent current laws of fiscal limitations, and hence are changeable with time; and others appear to be constraints, but are only the reflection of years of tradition and the status quo.

It is imperative that a comprehensive list of constraints be prepared to guide the selection of alternatives. These constraints should be examined carefully to segregate the inviolate constraints from the assumptions. Too often mediocrity has been perpetuated by an attitude of, "We can't change that, we have always done it that way". Much of the technological progress which has occurred during the current century results from an attitude of scientists and engineers that "there must be a better way" and "unless you can prove that it can't work, I will continue to treat it as a potential solution".

Some guides to the preparation of constraints are listed in Figure 3.

FIGURE 3

CONSTRAINTS

DEFINITION

Those real-world limiting conditions which must be satisfied by any acceptable system designed to attain the educational objectives.

PROCEDURE

1. Identify the applicable families (initial student behavior, facilities, financial, timing, staff limitations, administrative, political, etc.)

2. List specific constraints within each family and establish source of constraints.

3. Label the constraints by severity (physical law short term but inviolate, financial or political psychological or political, subject to change.

4. Rank constraints in order of effect upon the system design.

PITFALLS

1. Have you separated:

   ... facts from assumptions?

   ... constraints from variables?

   ... intuition from bias?

   ... need from pressures?

2. Have "pet solutions" introduced unwarranted constraints?

3. Have you "built in the answer" by seeing non-existing constraints?

4. Have you carefully validated the inviolate constraints?

5. Have you defined the prerequisite or presupposed student entry capability sufficiently accurately to permit the design of a system to bring about the required change in capability?

## ALTERNATIVES

You are now ready to generate a list of potential or candidate solutions. This is the step in the process where the much advocated "brainstorm" approach is useful. Since this is not the time to discard or evaluate any solution, and since this is the time to generate all possible solutions so as not to miss the really good one, the development of alternatives should be done in an atmosphere of complete intellectual freedom, with participation from as many different groups of people as possible, as shown in Figure 4.

### FIGURE 4

ALTERNATIVES

| | |
|---|---|
| DEFINITION | The generation of candidate systems which could achieve the objectives. |
| PROCEDURE | 1. Gather data based on current and expected state-of-the-art with respect to potential means toward the specified ends. |
| | 2. Solicit ideas from a wide spectrum of sources. |

3. Keep written list of all suggested ideas -- even if they appear to be impractical or to violate constraints.

4. Gather more data if the ideas are insufficient in quantity or scope.

PITFALLS

1. Are you soliciting ideas only from the "in-group"?

2. Are you rejecting ideas as being impractical or inappropriate?

3. Do you have enough knowledge of new possibilities to include such solutions?

4. Are you inhibiting individuals from proposing radical solutions?

5. Have you considered selection rather than training as one of your alternatives?

## SELF-EVALUATION (2)

During the third step, Alternatives, which of the following activities does Lehman consider to be important?

(1) generate as many solutions as possible

(2) create an atmosphere of intellectual freedom

(3) participation by every member in the generation of alternatives

(4) do not criticize or evaluate alternatives.

## FEEDBACK (2)

Lehman considers all of the above to be important.

## SELECTION

The time has now come in the systems approach to be critical. This is the step in which we have to select the best candidate solution. This step must also be performed scientifically, otherwise the introduction of bias at this time can make a mockery of the entire systems approach.

The selection criteria must be listed first. By selection criteria we mean those characteristics which a candidate solution possesses which have an impact on the selection. These would include such classical factors as the cost of implementing the solution, the time within which it could be implemented, the degree of risk involved, the impact on other portions of the system, etc.

The next step is to quantify these selection criteria. Professional operations analysis have developed very sophisticated computerized mathematical models to evaluate various alternatives and select the optimum one. Too often, however, the model is much more accurate than the data which can be assembled for a candidate solution. For our purposes, it is probably sufficient to rate each candidate solution against the selection criteria on a +, o, - basis.

After this semi-quantitative evaluation has been completed, look at the picture it presents and apply critical thinking to the answer it appears to give. Don't just add up the pluses and minuses and pick the one with the highest score, because all of the selection criteria should not carry the greatest weight. This is the step in the process where horse sense, experience, and good calm judgment should be introduced. The question to be answered is, "Is this really the best approach"? Many billions of dollars have been wasted by taking the output of a complex mathematical model as the gospel truth because it came out of a computer: there may have been nothing wrong with the computer, only with the data fed into it. On the other hand, numerous executives have wrecked their companies because they failed to rely on objective analyses and made all decisions by "the seat of their pants". A healthy mixture of rigorous analysis (supplying objectivity) and judgment (supplying intangible experience) is necessary to select the best candidate, as described in Figure 5.

FIGURE 5

SELECTION

| | |
|---|---|
| DEFINITION | The systematic evaluation of all alternatives in terms of objectives and constraints to select the one which is considered the most desirable. |

PROCEDURE

1. Define the criteria which will be used to select the most promising system.

2. Establish a quantitative method for rating each alternative against the selection criteria.

3. Evaluate the relative importance of the selection criteria.

4. Utilize analytical methods (anything from logical thinking to mathematical models) to select the best alternatives.

5. Review the results of the analysis against mature judgment.

6. Make final selection of alternative(s) for testing.

PITFALLS

1. Have you considered all of the vital selection criteria?

2. Is your scoring system biasing the answer?

3. Do you employ a reasonable balance of analysis and judgment?

4. Are you unintentionally penalizing radical solutions because they will cause you problems?

5. Have you rationalized a predetermined conclusion?

6. Have you objective evidence that the means you are selecting are actually effective?

## IMPLEMENTATION

Once the alternative has been selected -- go do it! Nothing will happen until you try it out, and try it in sufficient depth, for a sufficient time, and with sufficient dedication to obtain valuable and accurate results. Se Figure 6.

FIGURE 6

IMPLEMENTATION

DEFINITION

The first adoption of the selected alternative to meet the specified objective.

PROCEDURE

1. Delineate the activity elements, schedule of events, and resource requirements.

2. Plan a program to evaluate the selected alternative(s) in utilizing a pilot program (as a test phase if possible, to minimize the risk).

3. Establish a controlled experiment.

4. Establish machinery to collect data (performance, financial, etc.) to use for evaluation.

5. Implement the program with conviction.

**PITFALLS**

1. Are you implementing the system in sufficient depth to give it a good chance?

2. Are you prepared to carry on the experiment for a sufficient length of time to gain valid results?

3. Are you considering altering the original plan without sufficient justification?

4. Are you ready to resist those who want you to stop after one of the early faltering steps?

5. Are you able to collect the type of data to prove your numerical rankings of the selection process?

6. Are you prepared to follow through if success is proven or repeat earlier steps if results are unsatisfactory?

7. Above all -- do you have enough courage to try something new?

## EVALUATION

Now that the new educational activity has been implemented the results must be evaluated. Measures must be set up which measure exactly the parameters specified in the original statement of objectives. By measuring the behavioral change which the educational experience was designed to bring about we can obtain an objective evaluation of the experience and move away from such subjective values as "the students liked it", "the students appeared happy and inspired".

A list of guides for performing the evaluation is given in Figure 7.

FIGURE 7

EVALUATION

| | |
|---|---|
| DEFINITION | The determination of the conformance or discrepancy between all of the objectives initially specified and the performance that was actually obtained. |

PROCEDURE

1. Re-examine the original statement of objectives and collect therefrom the specific measurable and capability statements.

2. Re-examine the original statement of objectives and collect therefrom the statements of the environment within which the capability must be demonstrated.

3. Develop as many relibable and valid tests as may be required to establish whether all the objectives are being met.

4. Incorporate in the tests diagnostic features that provide guides for corrective action.

5. Administer the tests to the experimental system.

6. Interpret the results of the tests both quantitatively and qualitatively.

7. At specified intervals, re-examine and evaluate the need and all elements of the system.

PITFALLS

1. Are you testing for the capability originally specified?

2. Are the quantitative measures validated and do they measure the same parameters specified in the objectives?

3. Are the tests reliable (repeatable)?

4. Have you avoided dependence on subjective ("I liked it!") responses?

5. Are you testing for retention of changed behavior?

6. Are the assumptions made during the analysis explicit and tenable?

## MODIFICATION

You have just completed one interation of the systems approach. The job is by no means done. It is most unlikely that the evaluation reveals that all objectives were met fully. The nature of the nonsatisfaction of objectives must now be studied, changes must be made in the solution, these changes must be implemented and evaluated. This iterative process must be continued until the objectives are met to the extent desired.

Since the objectives also change with time due to pressures and changes in the external universe, this iterative process probably never ceases; this is not disturbing -- man continues to strive for perfection and most probably will never reach it.

Guides for this step are given in Figure 8.

FIGURE 8

MODIFICATION

| | |
|---|---|
| DEFINITION | The process of modifying the designed learning system based on deficiencies in meeting the objectives as determined through evaluation. |

PROCEDURE

1. Examine discrepancies between specified (objectives) and obtained (evaluation) system performance to determine probable cause for deficiencies.

2. Analyze the entire system to ascertain where the correction can best be made.

3. Develop a specific plan for correction.

4. Make the correction during the next system cycle.

5. Conduct a new evaluation and continue this cycle until the specified performance is attained.

PITFALLS

1. Areyou willing to admit that you had discrepancies which need corrective action or are you blaming it on "start up" problems which will go away?

2. Are you sure the system is actually implemented the way you thought?

3. Don't be fooled by initial success, but keep up the evaluation to detect time degradation of system performance, and to evaluate quality of education/training under real-world conditions.

These are the simple steps of the systems approach. This approach is not the answer to the problem, but it does represent an orderly scientific way of finding the answer. As was stated at the outset, this process is not new, it is merely the standard logical scientific approach to problem sovling. The important thing is that it works.

We probably use it all the time without realizing it. When we buy a new car, select a new job, or make vacation plans we go through this same process. Or at least we should. When we ignore this process and make our decisions on emotional biases or on inadequate alternatives, we often regret the consequences.

This is the basis of the decision-making process used by industry and government in areas where the penalty of a wrong approach is too costly to conceive. We cannot afford to use less of an approach in structuring our educational systems.

One cannot help but wonder whether the use of such an objective systematic analysis of the educational problems over the last century would have given us our current system of a small school with a teacher for every 25-30 students presenting material in a manner almost identical to thousands of other teachers in similar small schools all across the land.

Is there a better way? I do not know. But we must aggressively search for one, otherwise we cease being creative human beings. And the systems approach will help us find a better way.

## SELF-EVALUATION (3)

Describe the relationship which Lehman proposes between Implementation (Step 6), Evaluation (Step 7), and Modification (Step 8).

## FEEDBACK (3)

Your answer should include the following points:

(1) You implement the selected alternative

(2) Based upon the results of the implementation, you evaluate the alternative to determine whether the behavioral change specified by the objective was accomplished.

(3) Based upon the results of the objective evaluation, you modify the alternative as needed.

## SELF-EVALUATION (4)

(A) Put the following five systems approach steps in the correct order:

(1) Implementation (1) _____

(2) Need (2) _____

(3) Constraints (3) _____

(4) Selection (4) _____

(5) Modification (5) _____

(B) Complete Lehman's model by adding the three missing steps in the correct order

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(6) _____

(7) _____

(8) _____

FEEDBACK (4)

(A) (1) Need

(2) Constraints

(3) Selection

(4) Implementation

(5) Modification

(B) (1) Need

(2) Objectives

(3) Constraints

(4) Alternatives

(5) Selection

(6) Implementation

(7) Evaluation

(8) Modification.

SERIES 5

MODULE 13

# APPLICATIONS OF A SYSTEMS APPROACH TO EDUCATIONAL IMPROVEMENT

INNOTECH

Original Material
Developed by
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# MODULE 13

**PREVIEW**

Module 13 focuses upon an article by Dr. David Klaus "Applications of a Systems Approach to Educational Improvement". In this article, Dr. David Klaus stresses that for educational planning in any country to be effective, a systems approach must be used. The first section discusses in general terms what a systems approach is and why we need it. Then Dr. Klaus proceeds to delineate six major steps that broadly make up his interpretation of the systems approach. Finally he offers an example of how the systems approach can be applied. This module is important for you to read because it stresses the value of using a systems approach in educational planning and offers a concrete example in support.

**OBJECTIVES**

After reading the article and going through the self-evaluation questions, you should be able to: (1) list and give educational examples from your own country of each of the six major steps of the systems approach as described by Klaus. (2) modify the diagram of the systems model by Klaus in a way that you think would make it more useful to you and give reasons for the changes you make.

| | |
|---|---|
| CORE INSTRUCTIONAL ACTIVITIES | Read Dr. Klaus article and write the answers to the self-evaluations. Do not look at the suggested answer until after you have written your answer. Then, check your answer with the Feedback provided. If you need help consult any member of the Training Staff. |

# APPLICATIONS OF A SYSTEMS APPROACH TO EDUCATIONAL IMPROVEMENT

David J. Klaus

## Need for a Systems Approach

Education is only one of the many fields in which the availability of potentially useful technology is considerably ahead of the development of practical applications of the technology. Not only has a vast variety of devices and media been devised to support and supplement classroom teaching, but far more sophisticated concepts of curriculum planning, student evaluation, teaching methodology, career guidance and school administration have appeared as well. The growing gap between what is done and what might be done in providing effective education, then, is not due to any shortage of promising techniques but to their diversity and lack of familiarity. No one person today can acquire the expertise necessary to be an authority in each and all of these technologies.

As a result, the efforts of many individuals each working in his own range of specialized competency must be combined if educational planning is to make use of all relevant technology in achieving its purposes. This, in turn, requires a systems approach, a methodology for integrating the various components needed to implement an innovation into

a smoothly functioning system. A systems approach is not a substitute for the skilled efforts necessary to design, develop and produce each separate part which may be required. Instead, it is a methodology for insuring that every required component is identified, that each component contributes effectively to the overall outcome and that no component represents expenditures of time, money or resources disproportionate to its unique contribution within the system.

Endless examples can be cited where a failure to focus on the system as a whole rather than on one of its more evident components has led to unhappy results. For instance, perhaps millions of dollars worth of language laboratory equipment sits unused in many American schools because the lesson materials needed to accompany this equipment are unavailable or unsatisfactory. In other schools, large amounts of money spent on overhead projectors have been wasted because no one determined in advance whether teachers could or would prepare the necessary visuals. Sometimes years have been spent developing courses for educational television only to have changes in the curriculum render the course obsolete before it could be used.

Emphasize the Product, not the Process

These kinds of errors can be avoided by approaching the system of education as a whole, and by insisting that attention be focused on the product instead of the process of education. This means it is not twelve years of free instruction, nor educational television, nor ample budgets, nor even bright teachers that will insure the success of education. Improved textbooks, newer buildings, better guidance and smaller classes all seem desirable but they are no more than a few of the choices of means by which education might be improved. They are not ends in themselves. Focus on the product is stressed by the systems approach, and the methodology associated with the approach has evolved from efforts to devise a framework which will yield a product that, with respect to the state of the art, is the most effective, efficient and economical which can be achieved.

## SELF-EVALUATION (1)

The systems approach emphasizes the product, not the process of education. The product is what the system will produce. The process is how it will produce the product. Check which of these is a process and which is product.

a. Fewer pupils per teacher

[ ] process [ ] product

b. 90% of students at age 7 can add any two numbers between 1 and 100

[ ] process [ ] product

c. Use more educational TV to present science lessons

[ ] process [ ] product

d. Students can build a battery operated electric motor

[ ] process [ ] product

FEEDBACK (1)

(a) process

(b) product

(c) process

(d) product

## Steps 1 and 2: Problem and Outcome

The first steps in applying a systems approach are (1) the recognition and definition of the problem, and (2) deciding what is to be the outcome of the system. Determining goals is not always easy, particularly to someone experienced in system development, because many of the more obvious goals seem somewhat elementary under close examination. There are many alternate ways of producing more graduates, for example, although some of them, such as lowering standards drastically, are not considered desirable by most educators. Similarly recognition that skill in carpentry may be more important than knowledge of Latin or that mastery of mathematics may be far different than exposure to arithmetic must be established early in the design of a system of education to make certain that those who will work on its various segments will have a common goal.

## Step 3: Measures of Success

The third step in a systems approach is to establish measures of success, not only for the system as a whole but also for each of its component functions. How much should every child learn in school, and how is this to be measured? What is the limit on how much can be spent, and are there any limits on how this money is to be allocated? When is the

system to be operational, and what constitutes sufficient reasons for delay? The most convenient way of expressing these questions is in terms of the cost, in time, money and resources, for each measurable increment in the level of student accomplishment or the number of students to be educated. Insistence on stating measurable outcomes, however, differentiates between a systems approach and many other approaches to educational betterment. Change based upon no firmer a justification than hopelessness over existing practices easily could be a change for the worse. That educational progress is difficult to measure makes it no less imperative.

Step 4: Potential Solutions

It is only after adequate measures have been established that serious work can begin on the fourth step, that of identifying potential solutions. Each solution must itself be an entire system although it need not be directed at all desirable goals at once. One solution might be proposed for advancing adult literacy, for example, while others might be proposed for vocational training, textbook printing or school building design. Alternative solutions frequently will be suggested for each goal. During this step two important findings are bound to emerge. First, it will become evident that no one technology or innovation in education alone will

be capable of achieving any goal. Content, facilities, talent and many other factors must be combined into a workable system. Second, it will become apparent that no single technology of innovation, even when arranged into a workable system, will be supported by acceptable evidence to demonstrate that the system, if applied, will achieve the criteria established for it. This is a rather strong statement, but it would be foolish to conclude that any existing system provides the quantity and quality of education which is both needed and regarded as attainable or that the changes needed to make any innovation fit into a new environment will not have a major effect.

Step 5: Tryout and Revision

This does not mean that some one or even several, potential solutions could not be made to work and work well. But it does require a fifth step in the systems approach, a period of tryout and revision, of feasibility testing and improvement, which attempts to isolate and overcome weak components in suggested solutions. One system might be more effective, for example, if it could be adapted to permit each student to learn at his own pace. Another might prove to have an acceptable cost but only if the films to be used could be adapted with different sound tracks for other language areas. Still other systems might be more

acceptable if the necessary textbooks could be reproduced in sufficient quantity, if there were modest improvements in the curriculum or if slight revisions were made in teacher training.

Step 6: Implementation and Improvement

The sixth and final step in a systems approach is making provisions for continued efforts to improve whatever system is finally adopted. Educational technology is growing at an ever rapid rate and new innovations are bound to appear. Any system may be quickly outdated unless diligent efforts are made to recognize deficiencies and improve upon them. This capacity for change should itself be built into the system as procedures for continuous evaluation and feedback. It is not very likely that a system which was carefully built would have to be completely replaced, but this possibility always exists. For this reason, care should be taken to distinguish between innovations which represent major developments. There is no point in copying the errors made by others simply because they also have found some way in which they diminish the significance of these errors.

Innovate by Trying Things Out.

One last point is that any system should be designed to encourage and not discourage innovation. Most

systems, particularly educational systems, contain a surprising amount of redundancy. One or two errors or deviations are not likely to lead to seriously negative consequences. On the other hand, the opportunity to explore new method and techniques may produce useful discoveries. How to achieve the best possible education is not a matter to be decided by discussions among groups of experts; at best, experts can propose potential solutions which should be investigated.

Real innovations may come from anywhere. All that is required is openness towards trying them out. But it also must be remembered that innovation is itself a product of technological gains and not a process. Meaningful innovations must be distinguished from opportunistic fads that lead to neither lasting nor demonstrable improvements in education. Good solutions to important problems do not have to be elaborate, encompassing or expensive. Sufficient technology is available to overcome many of the present shortcomings in education if it is brought to bear in an orderly manner by conscientious individuals, each willing to contribute his talents as part of a goal directed team.

DISCUSSION OF KLAUS ARTICLE
QUESTION

I think we might give a little more insight into the systems approach if we could get Dr. Klaus to stretch his imagination a little further and assume a situation where a country is starting from scratch with no educational system and wants to build one. How would you apply the approach in developing an adequate national educational system? Then, after that, perhaps take a specific problem in this system that can be easily identified and apply it to that.

This is not as far fetched as it would seem. In our time this has happened, for example, in Ethiopia. After World War II, when the Italians left there was absolutely no institutional base for an educational system. There was not educational leadership and the indigenous educational system such as it was had been destroyed. The problem the Emperor faced was building an educational system from scratch. Swaziland was another case in point. How would you apply the systems if you were starting in these places from scratch?

REPLY

The first thing you would do is suggest that the country has to identify the national goals for education. This is extremely important, and it is much more difficult than it sounds. We tend to say we want our children to be well educated so that they will lead happy and productive lives. This is a terribly uncertain definition. The goals must be specifically stated in terms of their own national development needs; e.g. each child should learn: (1) an employable skills, (2) to read and write, (3) manage own money. Each child should leave the educational system with an employable skill. Whether he uses it or not is another problem, but you have to leave an educational system with a skill that somebody is willing to pay for. We feel every child should leave the system with the ability to read and write. Every person who leaves the system should have the ability to manage his own financial affairs.

The system should have an opportunity within it to progress to the point of attending the university. Well, these are some of the objectives that are specific. Once the purposes are determined, we have to decide on criteria for determining their achievement. For example, when is a student prepared to enter the university? Does he have to pass the British entrance examinations, or does he have to pass American entrance examinations, or does he have to pass what kind of entrance examinations? What kind of college are we trying to prepare him to go to?

We also have to establish costs principles for the system. The country has only so much resources, even anticipated in the future, that can be devoted to education. It may be necessary to drop out of some content or even drop out some children to meet the resource limitation, and these priorities must be determined by the people who live there.

Then, the next step would be to forecast potential solutions for achieving the outcome. Here we would potentially suggest a wide range of possibilities and then consider each one in greater detail. For instance, educational television might not be a very efficient way of bringing instruction because of the cost, or the transmission difficulty or something else like that.

We might well examine approaches which would use learner centered instruction instead of teacher centered instruction. That is, auto-instruction, programmed instruction, instruction completely in the absence of a teacher. This has been done and is not an unreasonable proposition. It is not easy as an established system, unfortunately, but in a new system, this is very plausible.

We would certainly want to investigate the possibilities of making better use of people's time than we do now. For some reason 12 years seems to be the rule for public school education. The US Air Force now gives 8 hours of instruction

a day. They consider that the most effective time span, but during the Korean conflict they went to 12 hours a day and they shortened courses by 1/3 and everybody learned just as much. There seems to be no real reason why people can't learn effectively 12 to 14 hours a day with enough time to eat and sleep, if you really have a lot to teach them.

We would probably like to look at systems that would minimize eventual problems such as the cost of the teacher. In the long run, the cost of the teacher is probably the biggest cost in any school system. We want to avoid building in an impossible expenditure of this kind in the beginning.

It is not possible to apply the remainder of the systems approach to this hypothetical case, because at this point we would be trying out various solutions and attempting to develop an interworking system. After you have developed the system, certain innovations would probably have to occur, and certain solutions would probably have to be dropped as being ineffective.

## SELF-EVALUATION (2)

The author describes six steps in the systems approach. List each step and give examples from your experiences in your own country. Steps 1 and 2 are done for you.

| STEPS | EXAMPLE FROM OWN COUNTRY |
|---|---|
| (1) problem and | (1) Not enough children in rural villages are learning to read; we must therefore, |
| (2) outcome | (2) increase the percentage of children who can read |
| (3) _____ | (3) _____ |
| (4) _____ | (4) _____ |
| (5) _____ | (5) (not necessary to complete) |
| (6) _____ | (6) (not necessary to complete) |

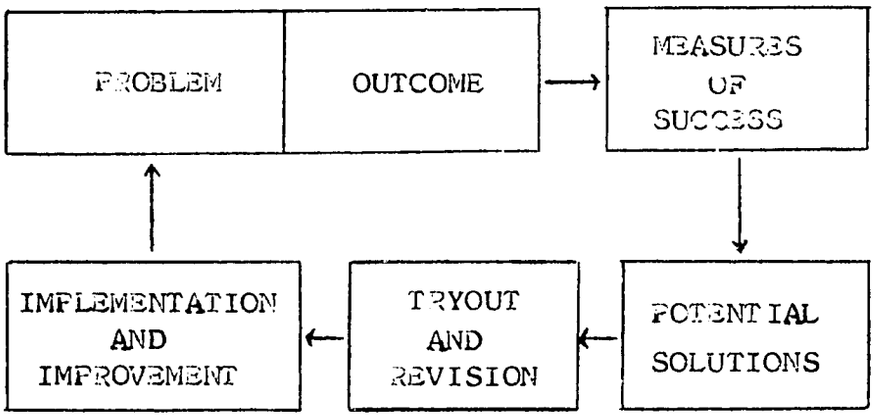
## FEEDBACK (2)

| STEPS | EXAMPLE FROM OUR COUNTRY |
|---|---|
| (1) Problem and | (1) Not enough children in rural villages are learning to read; |
| (2) Outcome | (2) we must, therefore, increase the percentage who can read |
| (3) Measures of success | (3) demonstrated ability to read newspapers, public notices, and signs - or performance on National Reading Examination |
| (4) Potential solutions | (4) Programmed Tutoring; Self-instructional Learning, ETV, Radio, Team Teaching, etc. |
| (5) Tryout and Revision | (5) not necessary. |
| (6) Implementation and Improvement | (6) not necessary. |

NOTE: Your answers, of course, vary depending upon your country. Check with a member of the training staff if your answers are markedly different from the ones above.

## POST MODULE PRACTICUM

Below is a diagram of the systems model by Klaus as drawn by INNOTECH.




STEP 1: On the diagram, make any changes that you think would make the model clearer and more useful to you. Use red pencil or ball pen and number the changes you make.

STEP 2: Give your reasons for each change you have made, numbering them correspondingly.

SERIES 5

MODULE 14

# APPLICATION OF SYSTEMS APPROACH TO EDUCATIONAL DEVELOPMENT IN INDONESIA

INNOTECH

# MODULE 14

**PREVIEW**

Module 14 illustrates the application of the systems approach to educational development in Indonesia (as developed originally for the BPP... Office of Educational Development in that country.)

This essay differs from the two previous interpretations of the systems approach (Klaus - Module 13 and Lehman - Module 12) in emphasizing the relationships between system components.

**OBJECTIVE**

After reading the essay and completing the study questions, you should be able to:

(1) describe the relationships between each of the system components in the Indonesian BPP Model.

(2) Make any changes in the BPP model that you think would make the model more useful to you and justify the changes you make.

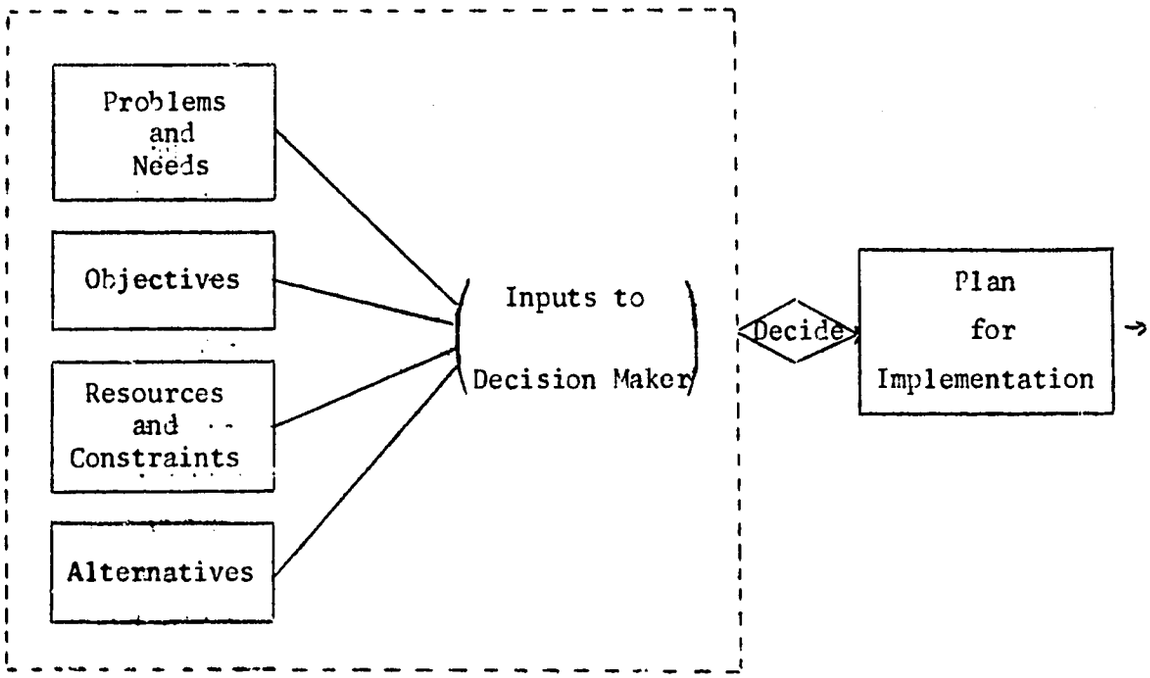
**CORE INSTRUCTIONAL ACTIVITIES**

Read the essay and write the answers to the self-evaluation questions. Do not look at the suggested answer until after you have written your answer. Then, check your answer with the feedback provided. If you need help, sign up for a staff tutorial in the Training Office.

## INTRODUCTION

Any large-scale human endeavor represents an attempt to achieve some goal. Goals may concern the creation of a faster airplane or the achievement of international peace. Whatever the goal, however, there are usually constraints which must be overcome, resource limitations which cannot be exceeded, and alternative means and consequences which should be considered. In Indonesia, the Pantjasila provides admirable principles toward which societal goals are directed. They cannot, however, all be attained at the same time, nor can they be achieved immediately. Resources are limited and must be allocated in a planned fashion to achieve priority objectives. Systematic planning is of value in any society, but it is crucial in a society with limited resources.

The formulation of plans consists, in effect, of a series of specific action decisions. The process of making decisions is fundamentally complex, as indicated by the flow chart shown below:



In the context of educational planning, the various elements of the chart may be interpreted as follows:

Problems and Needs can subsume deficiencies in a wide variety of societal areas such as literacy, population growth, industrialization, agriculture, transportation, communications, foreign relations, etc.

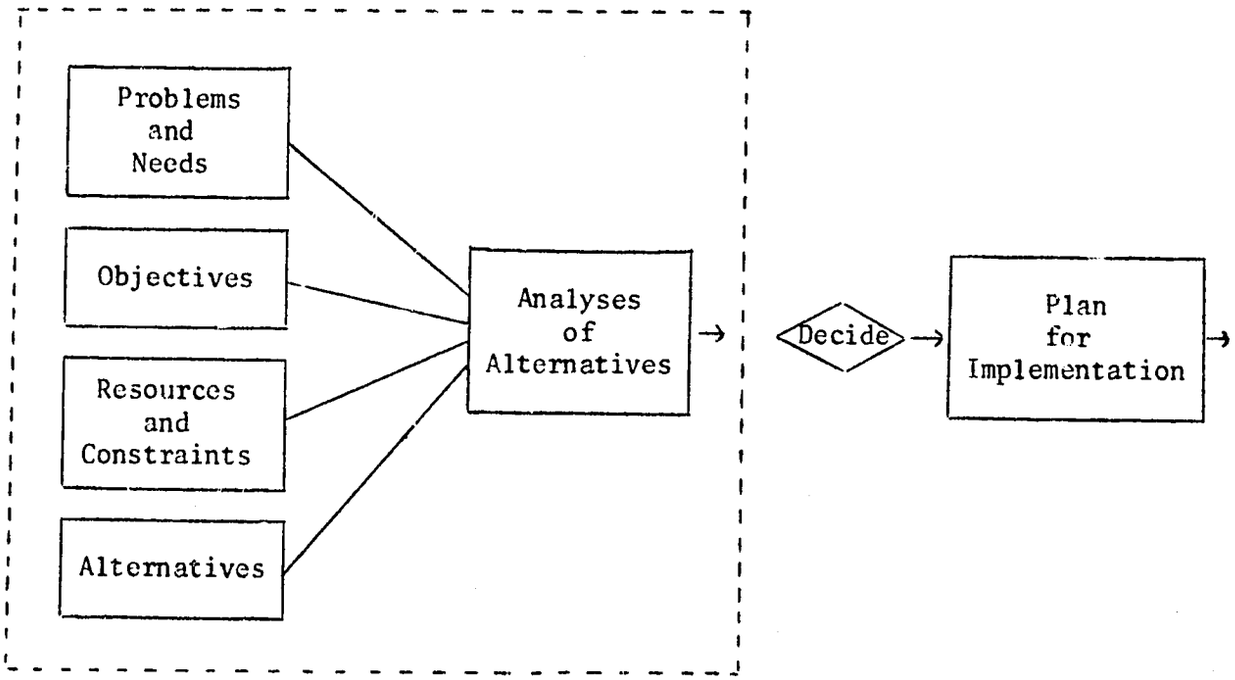
Objectives can refer to the purposes of educational programs designed to fulfill societal needs, e.g., increasing skills and capabilities within the population with reference to reading, family planning, health, trades, agriculture, etc.

Resources and Constraints can include supportive or restrictive factors such as money, policies and customs, availability of trained educators, physical assets and restrictions, timing or sequencing, etc.

Alternatives refer to specific educational programs and innovations which may have value in attaining educational objectives.

Obviously, all of these inputs at their many possible levels of specificity cannot be processed simultaneously by the individual who has to decide which educational programs to fund. What is needed is some process whereby this complexity of inputs can be systematically organized and presented to the decision maker in a meaningful way.

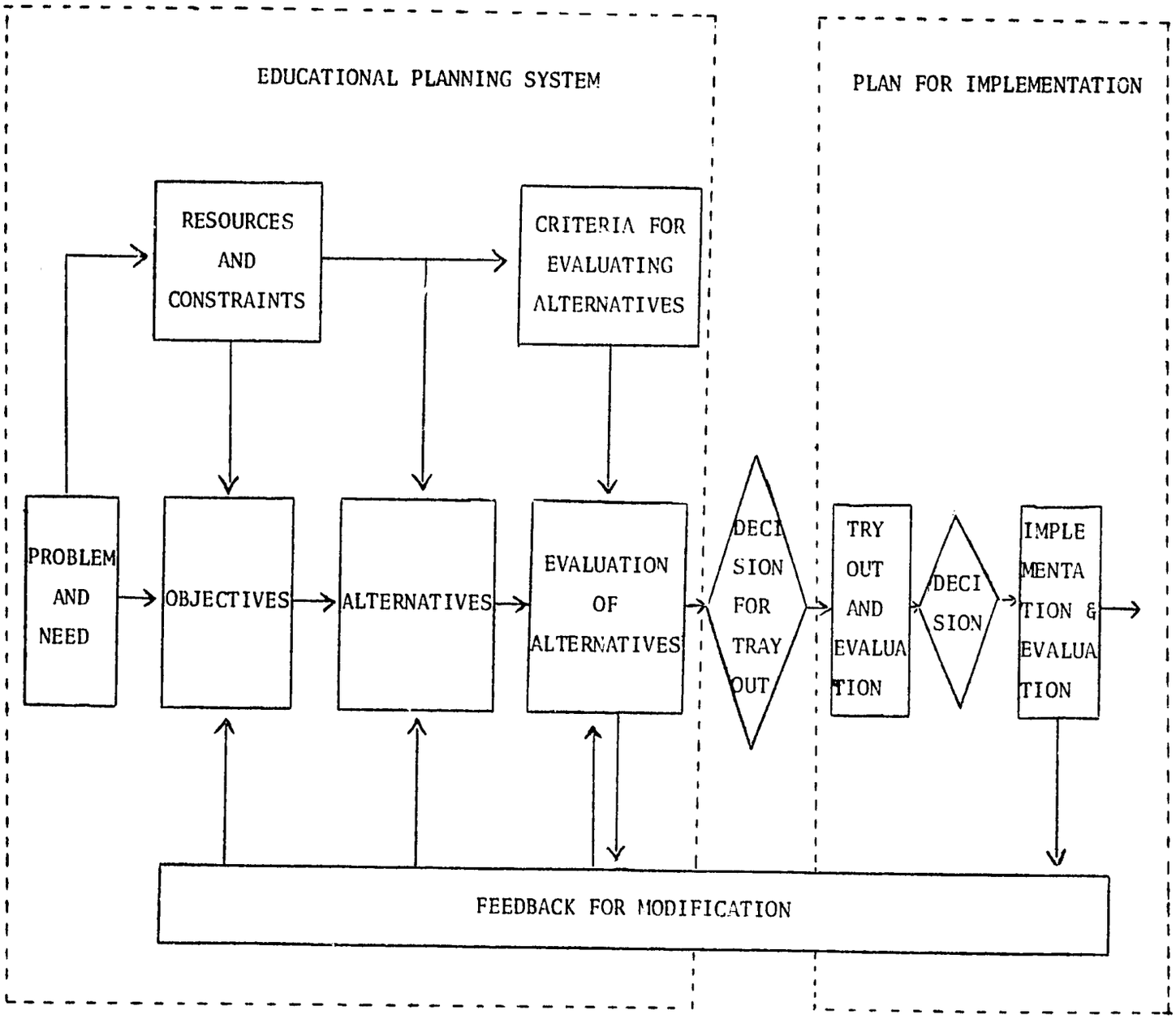
The following diagram shows an idealized "black box" which would process the inputs and provide the decision makers with the results of systematic analyses:



Although no such magical "black box" exists, the systems approach can help to perform these processing functions by providing systematic routines for handling data, as shown in the diagram below. The diagram indicates the major components of a proposed plan of action that must be considered before implementation; it also shows the sequence of analytic procedures to be applied as well as the output to the decision-maker. Each of the boxes represents an essential sub-process for which systematic routines must be devised. The sharper the methodology developed for carrying out these routines, the less demanding will be the process and the more precise will be the results.

The role of evaluation and feedback in this system should explicitly be noted. Effective planning machinery depends on a combination of analysis and empirical data; as the lessons learned from the results of one planning cycle are applied to the next, the entire process is steadily upgraded.

BPP MODEL


EDUCATIONAL PLANNING SYSTEM
PLAN FOR IMPLEMENTATION
RESOURCES AND CONSTRAINTS
CRITERIA FOR EVALUATING ALTERNATIVES
PROBLEM AND NEED
OBJECTIVES
ALTERNATIVES
EVALUATION OF ALTERNATIVES
DECI SION FOR TRAY OUT
TRY OUT AND EVALUA TION
DECI SION
IMPLE MENTA TION & EVALUA TION
FEEDBACK FOR MODIFICATION

In conclusion, it should be pointed out that even the most sophisticated application of the systems approach will not establish the goals -- people will have to continue to set their own goals. Nor can systems approach methods decide how to allocate resources to achieve these goals -- people will have to continue to make resource decisions. However, planning systems are extremely helpful in providing distilled, pertinent information.

MODULE 14

# SELF-EVALUATION

# AND

# FEEDBACK

## SELF-EVALUATION

Refer to the final Educational Planning System BPP Model.

(A) 1. To formulate objectives, one should consider both _____ and _____.

2. To modify objectives one should consider _____.

(B) According to the diagram, the main basis upon which analyses of alternatives is made is

_____
_____
_____
_____
_____
_____

(C) According to the diagram, how is feedback used in the system? Your answer should describe the relationship between feedback and three other components of the system.

_____
_____
_____
_____
_____
_____

## FEEDBACK

(A) 1. Problems/Needs and Resources and Constraints.

2. Feedback

(B) A set of alternatives is initially generated based upon Objectives and Resources and Constraints. Then, using specific criteria for evaluating alternatives, the alternatives are analyzed. Based upon the analysis, a decision is reached regarding which alternative or combination of alternatives should be implemented.

(C) Based upon the results of an evaluation feedback is used:

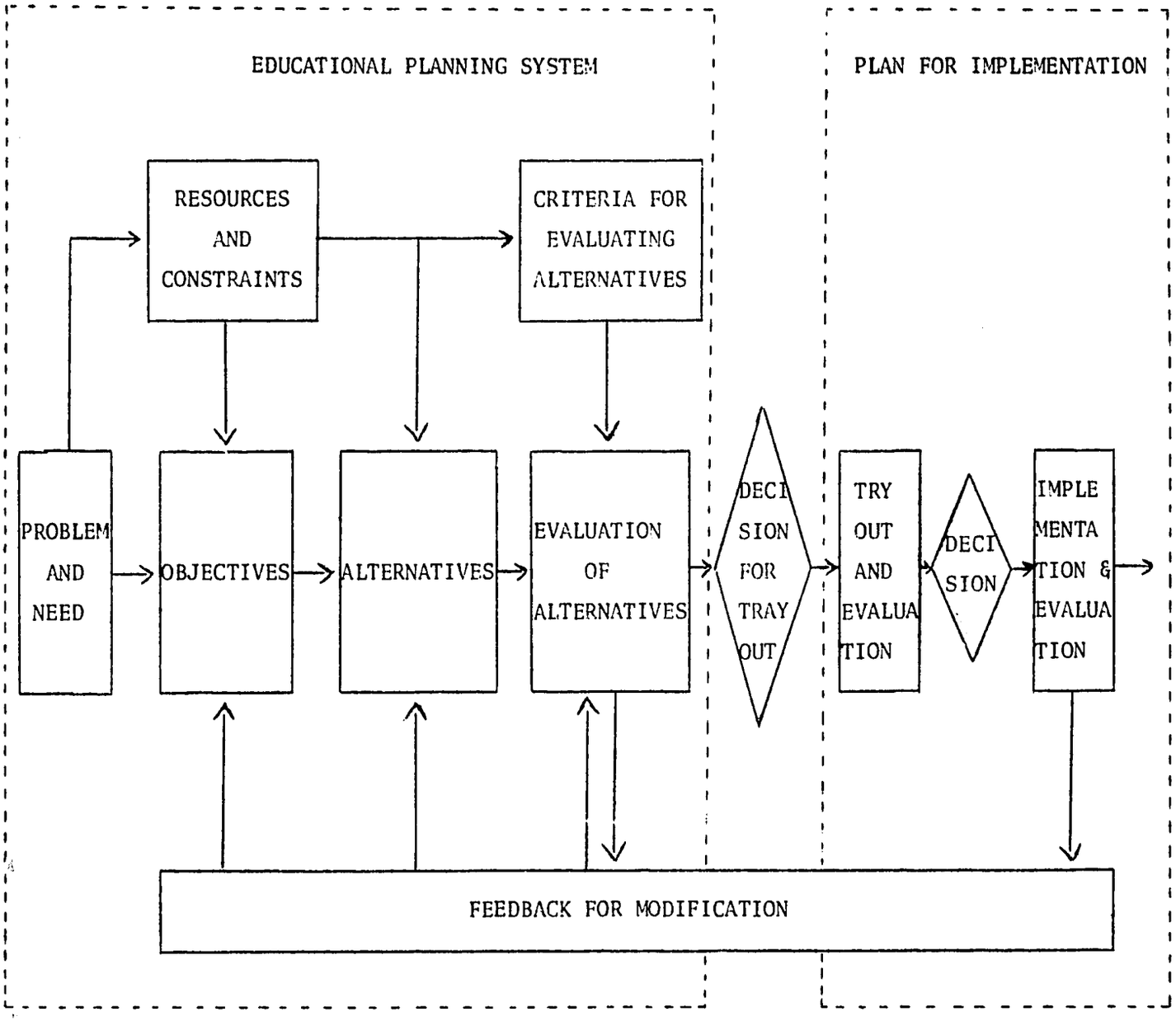
1. to analyze the first set of alternative again or

2. to generate a new set of alternatives or

3. to formulate a new set of objectives.

POST MODULE PRACTICUM

Below is the BPP model.



Step 1. On the diagram make any changes that you think would make the model clearer and more useful to you. Use red pencil or ball pen and number the changes you make.

Step 2. Give your reasons for each change you have made, numbering them correspondingly.

SERIES 5

MODULE 15

# MODEL BUILDING SEMINAR

INNOTECH

## MODULE 15

**PREVIEW**

Up to this point, you have demonstrated your understanding of a very important INNOTECH concept -- the systems approach to educational problem solving. You have also become familiar with at least three interpretations of the systems approach, namely, the interpretations of Lehman, Klaus, and the BPT model. We believe that you now have the necessary skills to create your own model of the systems approach, a model that you may be expected to use and apply in your problem-solving activities, not only in the course of this training programme but also upon your return to your home country.

**OBJECTIVES**

After participating in the model building seminar, you should be able to:

(1) design your own model of the systems approach, illustrating the components and their relationships in a simple flow chart,

(2) participate in a small-group model building activity, and justify the components and their relationships of the group model during a large-group discussion.

CORE INSTRUCTIONAL ACTIVITIES

To prepare for the Module 15 Model Building Seminar, review the different interpretations of the systems approach in Modules 12, 13 and 14. You may also study the different systems models inclosed in this module. Note that no two interpretations are exactly the same, although the most essential components in a systems approach are present in all. This is because there is no one systems model; each systems designer, designs his model to best meet .. needs and conditions of that particular society. This is an important point to consider when you design your own systems model.

EVALUATION

You are expected to evaluate your own performance. If you feel that you have not mastered the objectives of this module, consult any member of the Training Staff.

PRESENTATION NOTES:

MODEL BUILDING SEMINAR

## Models

A model is a representation of the "real thing". It is usually a greatly simplified version of some part of the real world which is too complex to handle directly. Models thus eliminate much of the complexity of reality. A model can be very useful if it includes the key factors in their proper relationship. In fact, complexity in a model is a drawback. The more complex a model, the harder it is to represent the components and the relationships that it is supposed to represent. Such models cannot be very useful if the persons who view it, especially the decision makers, fail to grasp its significance. The most ingenious and useful models are those which avoid the complex formulations and instead merely show the essential relationships between key variables.

There is nothing new in the use of models to represent the real world. Each of us uses models constantly. Every person in his private life and in his business life unconsciously, perhaps, uses models for decision making. The mental image of the world around you which you carry in your head is a model. One does not have

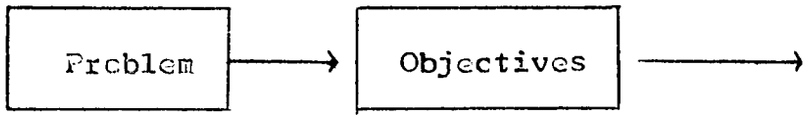
a city or a government or a country in his head. He has only selected concepts and relationships which he uses to represent the real system. A mental image is a model. All our decisions are taken on the basis of models. All of our laws are passed on the basis of models. All executive actions are taken on the basis of models. The question is not to use or ignore models. The question is only a choice among alternative models.

## SOME HINTS ON SYSTEMS MODEL BUILDING

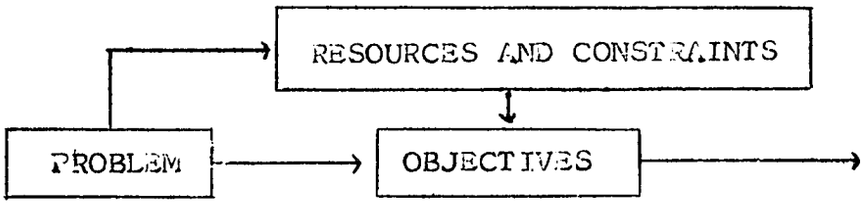
In this module, you will of course be creating your own systems model and illustrating it by means of a simple flow chart. We can give no hard and fast rule to follow in drawing up such a flow chart since most charts depend on the preferences of the individual designer; the main criteria being this: the sequence and relationships of the components must be clearly understood by those for whom the chart is intended. Thus, in some charts the components are reflected as squares or oblong boxes, others as circles, etc. Similarly, the sequence may be represented in a straight line, in the form of a closed quadrangle, or in the form of a circle. There are, however, certain symbols that are almost universally used and we present them here to insure the correct interpretation of your flow chart.

a. The use of the arrow

An arrow pointing from one component to another (say, from Component A to Component B) indicates that the latter component or activity immediately follows, and is based upon, the former. Thus, this portion of a diagram:




indicates that you first identify the problem, and based upon the problem, you formulate your objectives. Similarly, this:




indicates that you first identify the problem, then based upon the problem, you identify the resources and constraints (or identify the resources and constraints that are pertinent to the problem) and third, you formulate your objectives <u>based upon the problem</u> and <u>considering your resources and constraints</u>.

b. The solid line _____ or _____→

Solid lines generally indicate emphasis, i.e. the steps indicated by Solid lines have to be followed,

c. The broken line - - - - - - - - - - -

Generally, broken lines are used as "modification" or "feedback" lines, indicating that the components those lines lead to may be modified based upon feedback.

d. If the designer feels that any symbol be used may not convey the desired meaning, a legend will always be helpful.

## SOME INTERPRETATIONS OF THE SYSTEMS APPROACH

**KLAUS**
(Module 12)

1. Problem
2. Outcome
3. Measures of Success
4. Potential Solutions
5. Tryout and Revision
6. Implementation and Improvement

**LEHMAN**
(Module 13)

1. Need
2. Objectives
3. Constraints
4. Alternatives
5. Selection
6. Implementation
7. Evaluation
8. Modification

BPP
(Module 14)

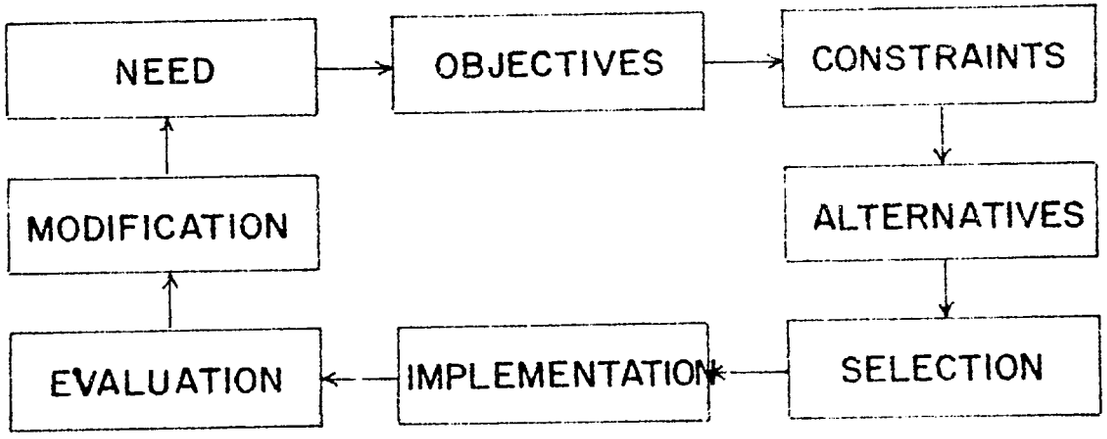
1. Need and Problem
2. Objectives
3. Resources and Constraints
4. Alternatives
5. Criteria for Evaluating Alternatives
6. Evaluation of Alternatives
7. Decision
8. Tryout and Evaluation
9. Decision
10. Implementation and Evaluation
11. Feedback for modification

## COMMON SYSTEMS APPROACH COMPONENTS REFLECTED IN SOME SYSTEMS MODELS

| COMPONENT | Systems Model by | | |
|---|---|---|---|
| | KLAUS | LEHMAN | BPP |
| 1. Need/Problem | ✓ | ✓ | ✓ |
| 2. Goals/Objectives/Outcome | ✓ | ✓ | ✓ |
| 3. Measures of Success | ✓ | | |
| 4. Resources/Constraints | | ✓ | ✓ |
| 5. Alternatives/Potential Solutions | ✓ | ✓ | ✓ |
| 6. Criteria for Evaluating Alternatives | | | ✓ |
| 7. Evaluation/Selection of Alternatives | | ✓ | ✓ |
| 8. Decision | | | ✓ |
| 9. Implementation | | ✓ | ✓ |
| 10. Evaluation/Tryout | ✓ | ✓ | ✓ |
| 11. Feedback/Revision/Modification | ✓ | ✓ | ✓ |

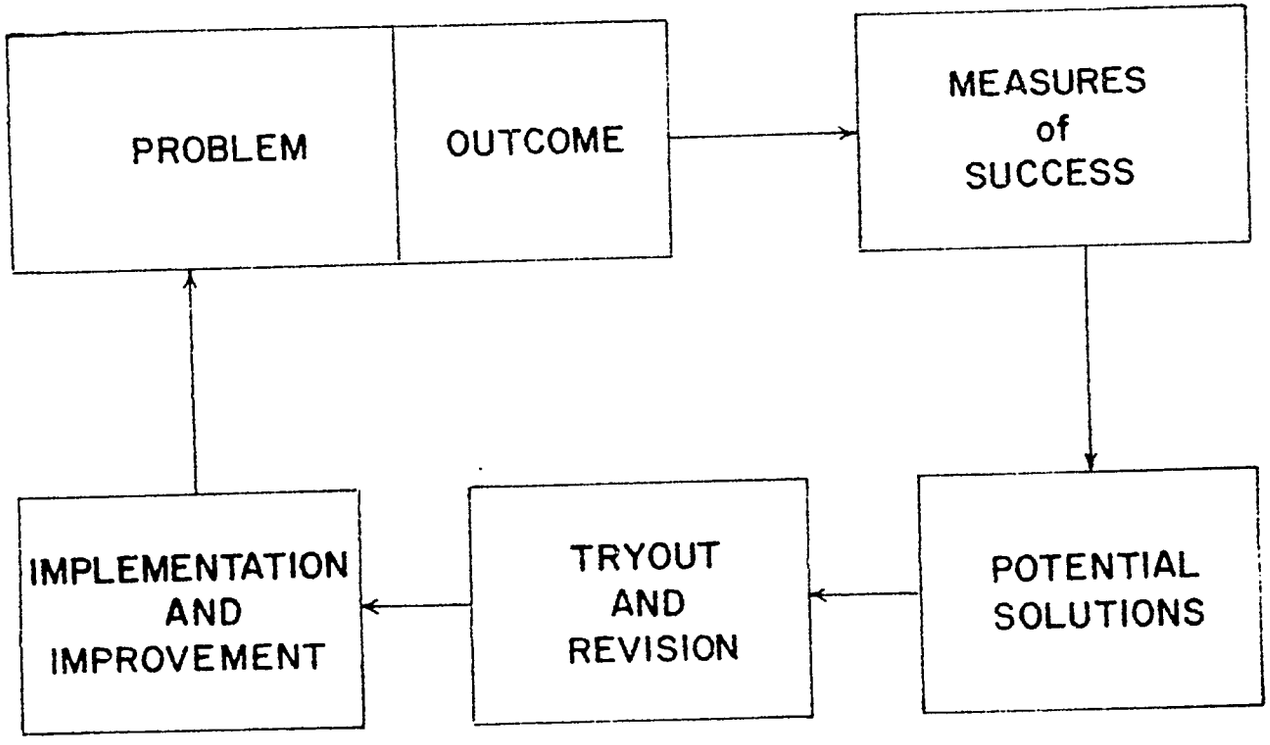
# SYSTEMS APPROACH TO EDUCATION

*( LEHMAN'S MODEL AS DRAWN BY INNOTECH )*



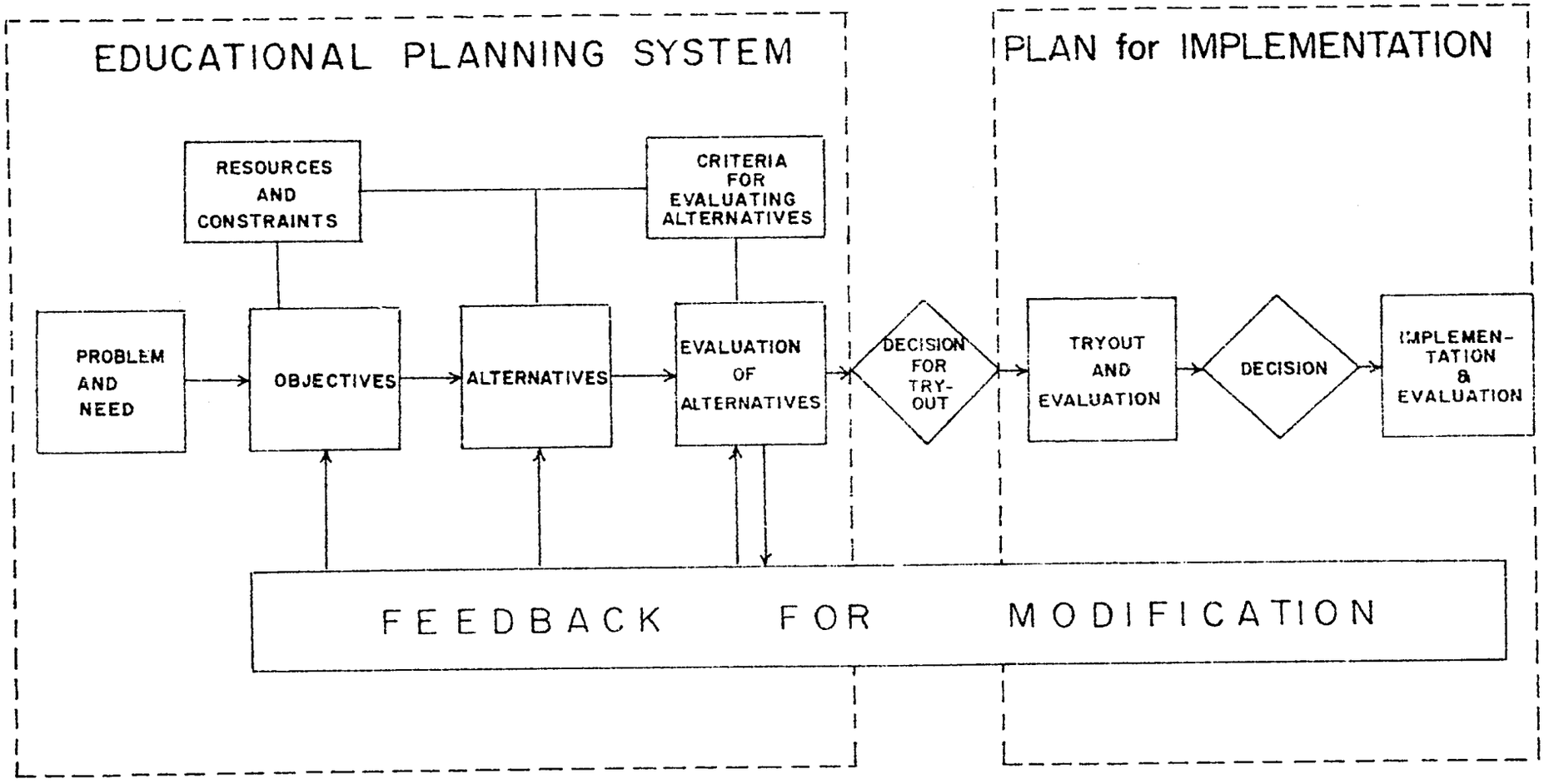
# SYSTEMS MODEL BY KLAUS

*( AS DRAWN BY INNOTECH )*

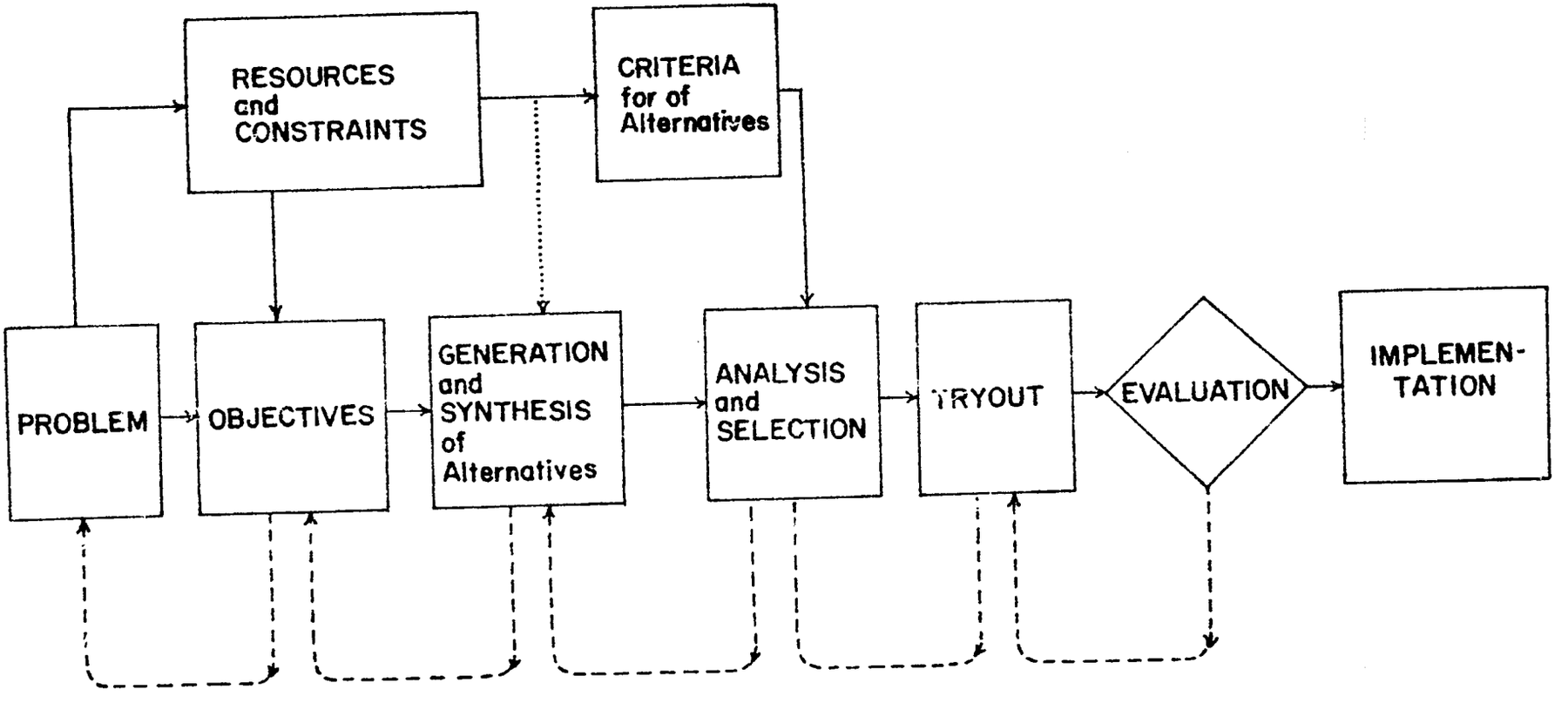


# AN EDUCATIONAL PLANNING SYSTEM

( DEVELOPED FROM THE BPP INDONESIAN MODEL )



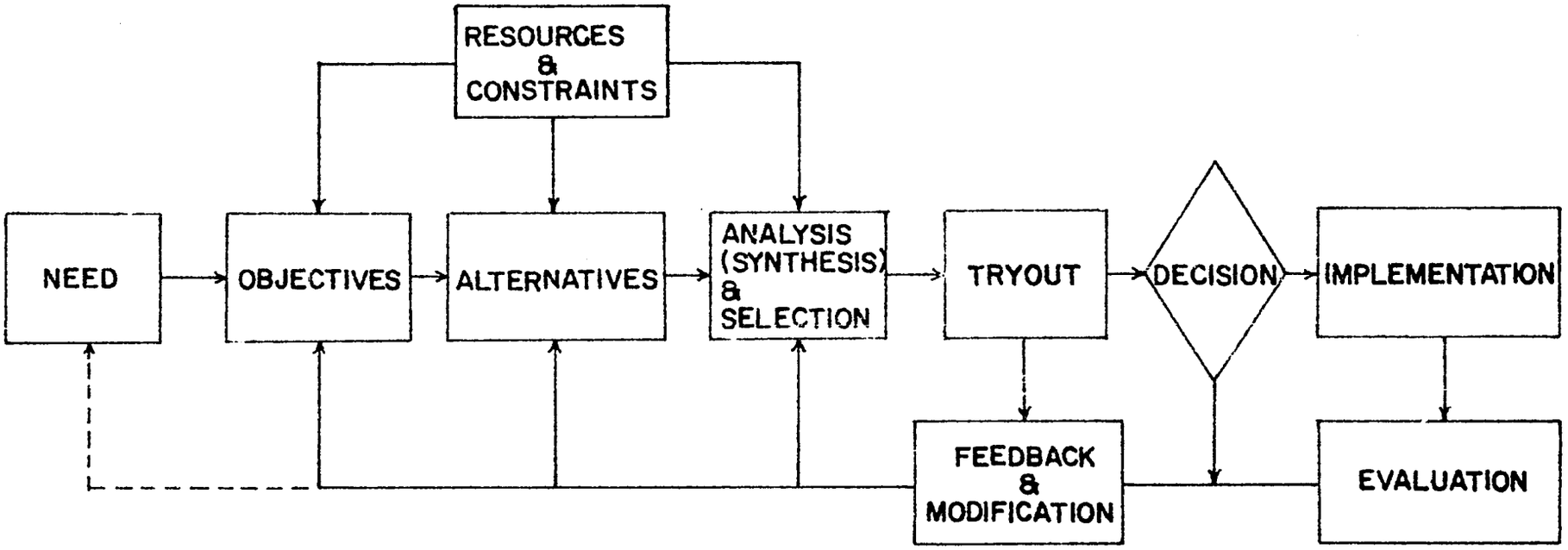
# SYSTEMS APPROACH TO EDUCATIONAL PLANNING



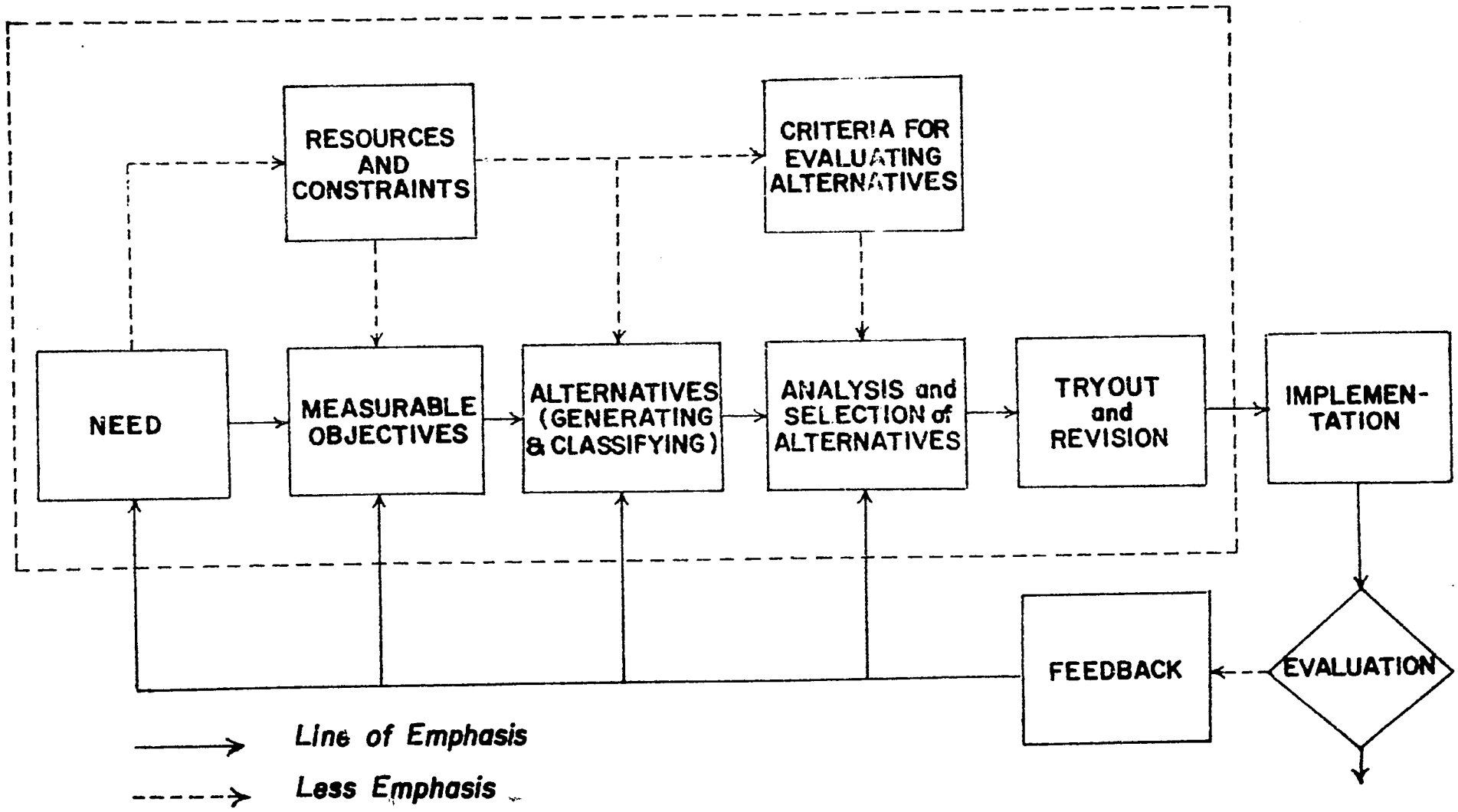

**LEGEND:**

- ⟶ LINE OF EMPHASIS
- - - → MODIFICATION SYSTEM BASED ON FEEDBACK INFORMATION
- ····· → LESS EMPHASIS

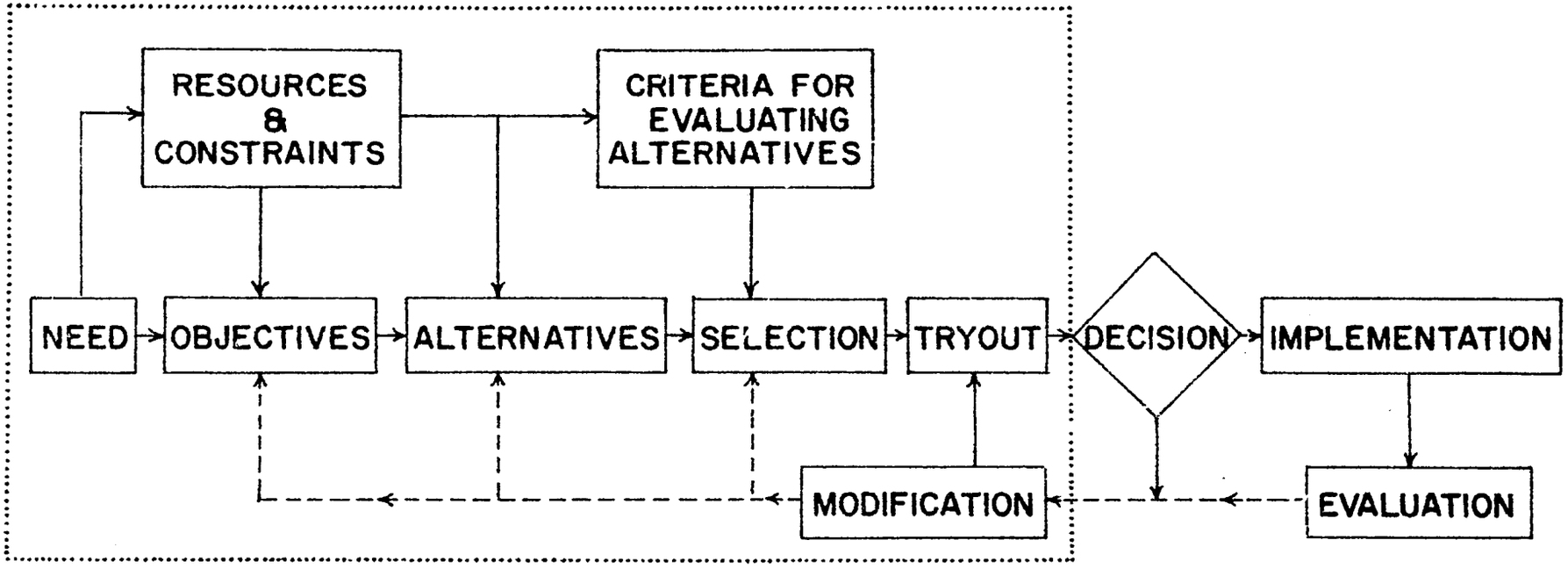
# EDUCATIONAL PLANNING PROCESS



# A SYSTEMS APPROACH TO EDUCATIONAL PLANNING



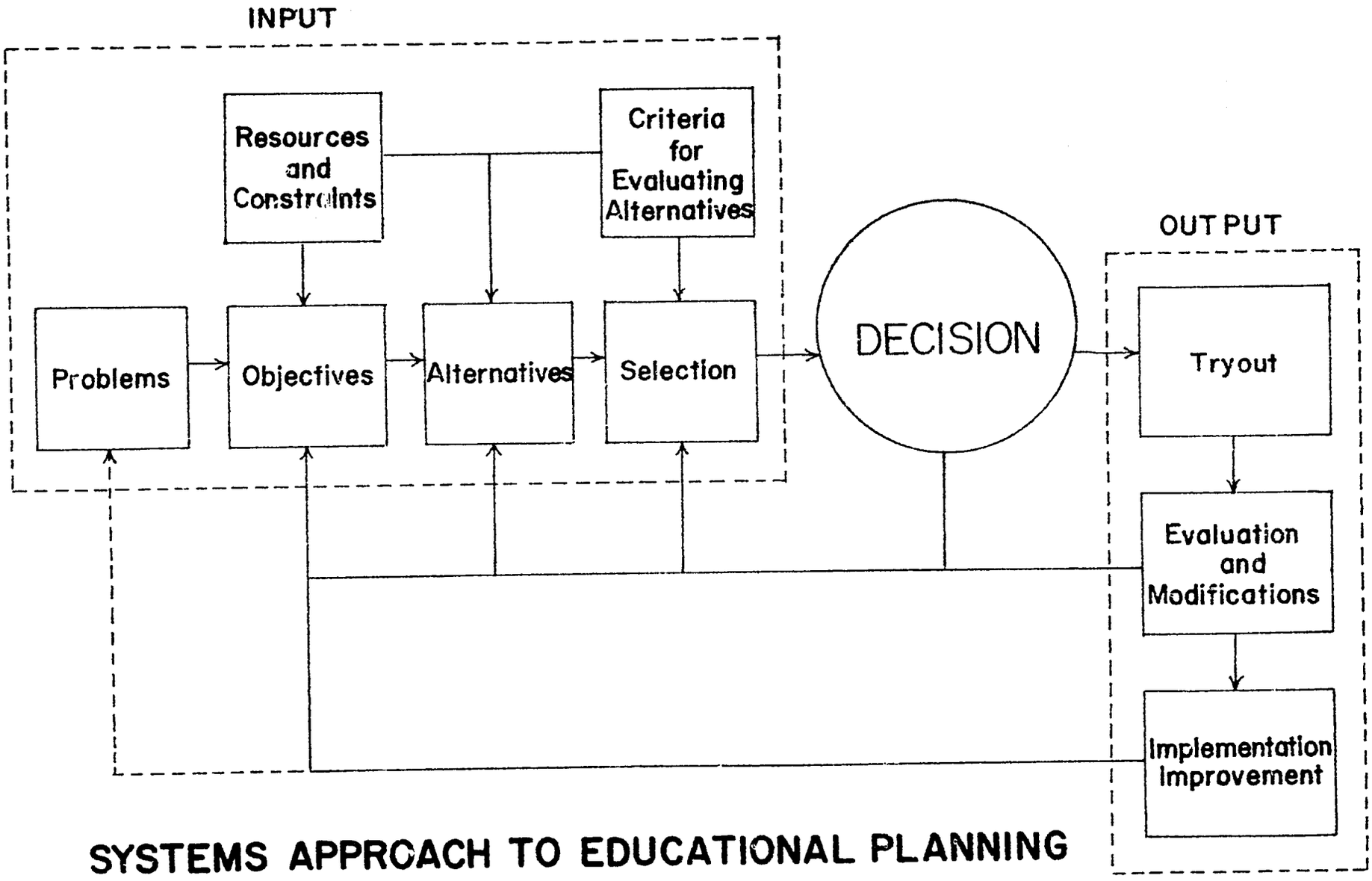
# EDUCATIONAL PLANNING SYSTEM



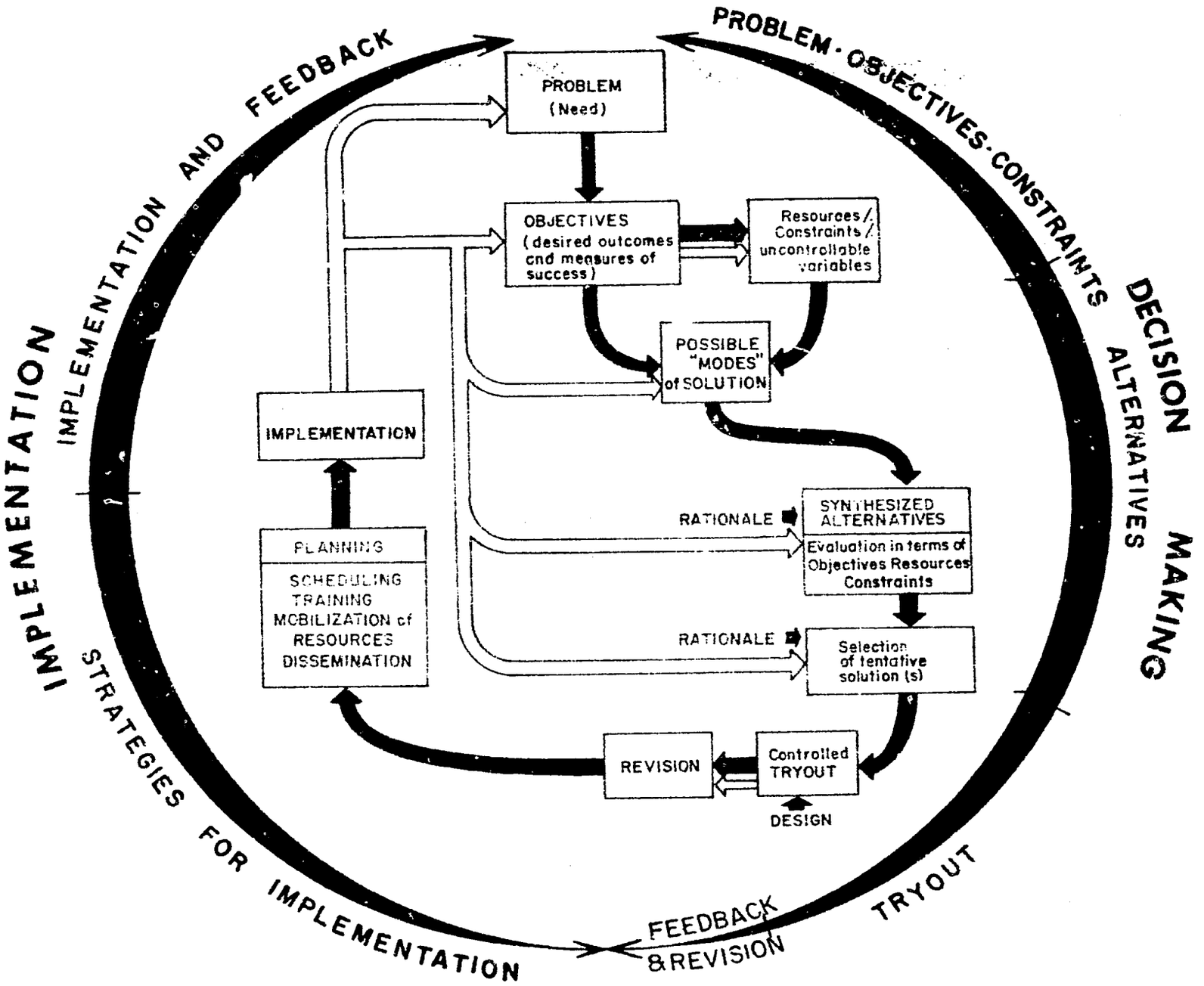

***LEGEND***

*Education planning stage*

*Feedback line*



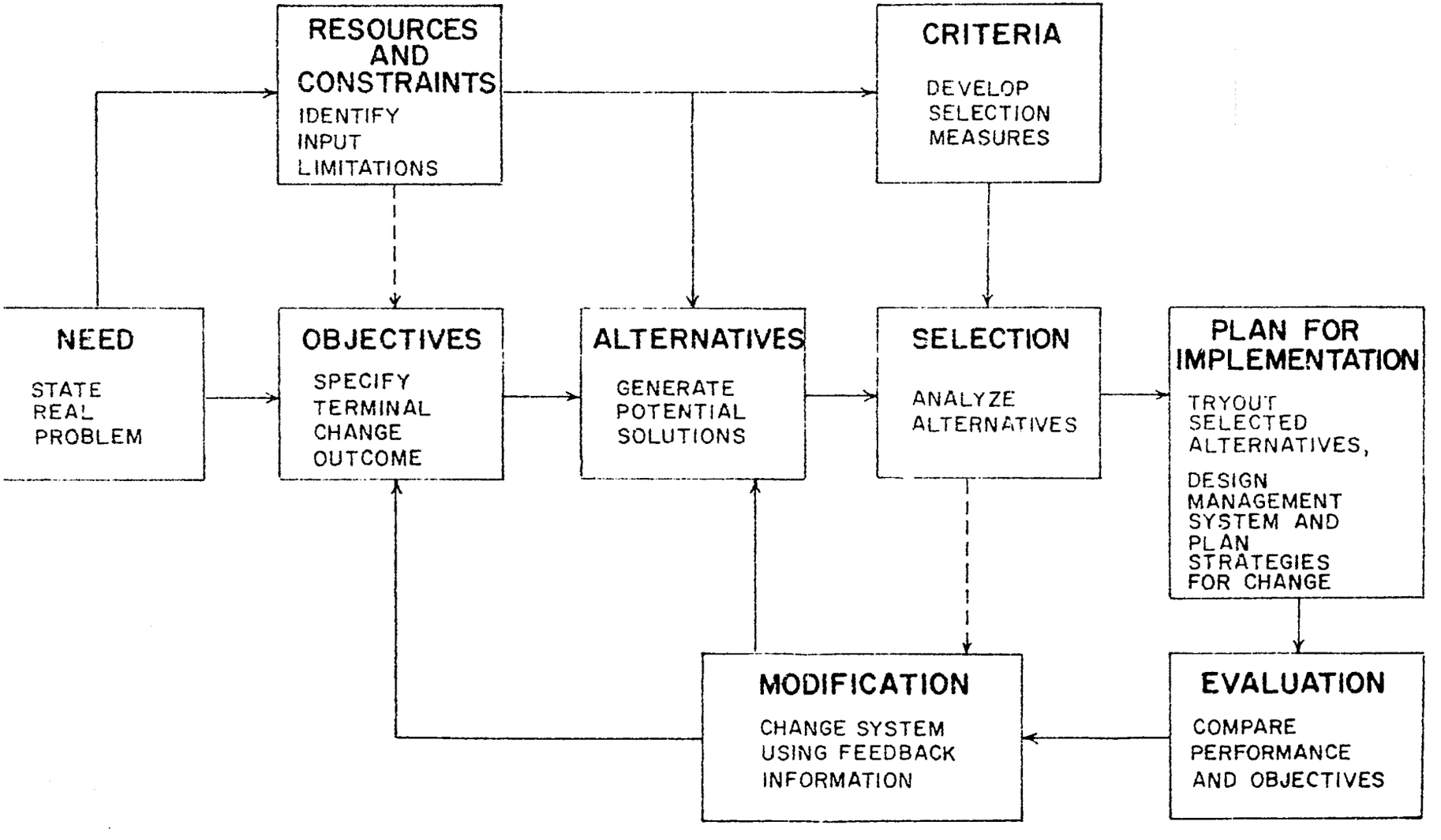
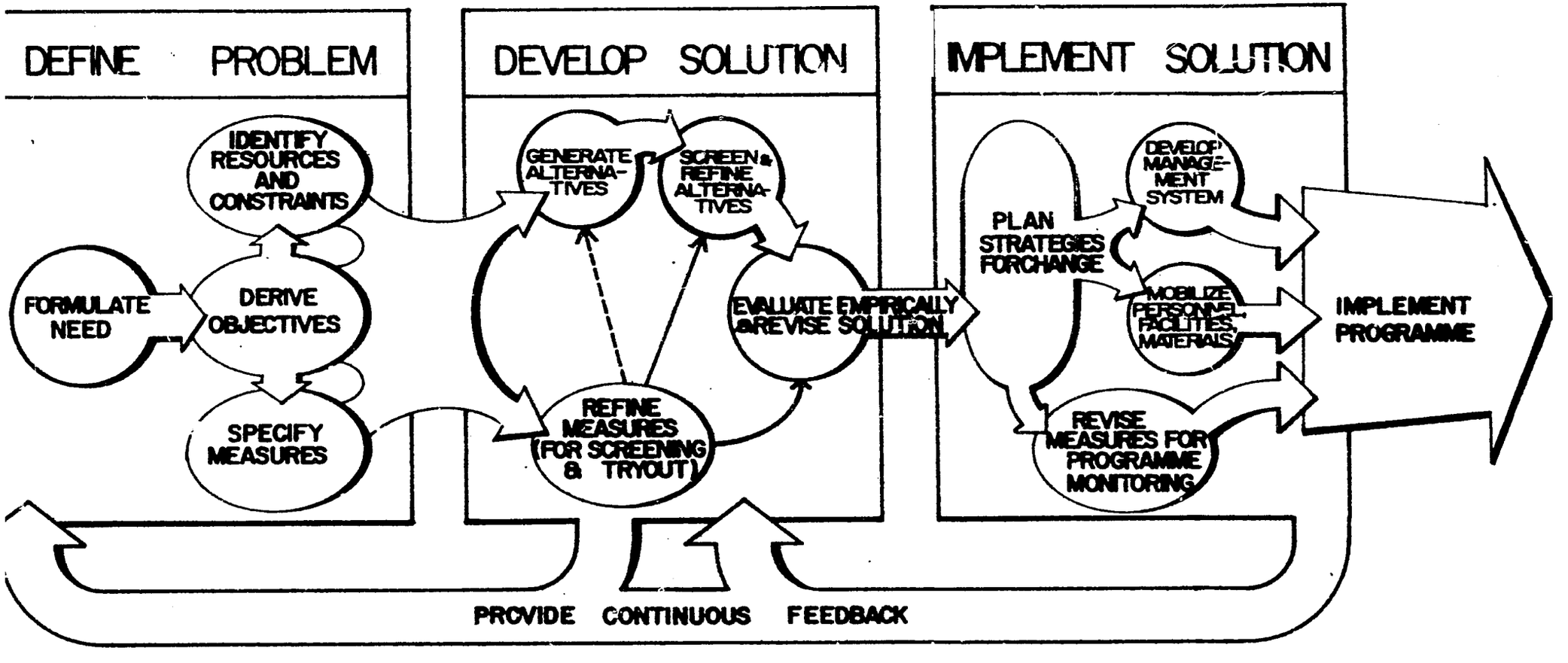

SYSTEMS APPROACH TO EDUCATIONAL PLANNING




A MODEL FOR THE SYSTEMS APPROACH TO PROBLEM SOLVING

# SYSTEMS APPROACH TO EDUCATIONAL PLANNING

## A REPRESENTATIVE MODEL



# SYSTEM APPROACH TO EDUCATIONAL PLANNING
## ( A REPRESENTATIVE MODEL )