California State University, Northridge

PLAN FOR EVALUATION OF
A SELECTED HEALTH EDUCATION PROGRAM IN THAILAND

A graduate project submitted in partial satisfaction of
The requirements for the degree of
Master of Public Health

by

Vichit Saithai

June, 1974
The graduate project of Vichit Saithai is approved:

__________________________________________
Committee Chairman

California State University, Northridge
June, 1974
ACKNOWLEDGEMENT

The writer wishes to express his appreciation and gratitude to Dr. Allan B. Steckler and Dr. G. B. Krishnamurty for their valuable guidance in writing this graduate project and for their approval of the study. The mutual interest in the problems of the planning for the evaluation of a health education program resulted in many discussions with Dr. Krishnamurty during which he advanced novel ideas and suggestions for this graduate project.

Finally, the writer wishes to thank Gayle Pokras for her continuous help in preparing this graduate project.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>iii</td>
<td></td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>vi</td>
<td></td>
</tr>
<tr>
<td><strong>CHAPTER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 INTRODUCTION</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>The Purpose of the Study</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Limitation of the Study</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>II BACKGROUND AND GENERAL DESCRIPTION</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>The Village Health and Sanitation Project (VHSP)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Current Health Education Methods Used in VHSP</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Evaluation of VHSP</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>III REVIEW OF LITERATURE</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Definitions</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Some Concepts, Models, and Methods</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Evaluation in the Planning and Implementation Process</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Methods of Evaluation</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Model of the Evaluation Mechanism</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Problems of Evaluation</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Feeding Back the Evaluation Result into the System</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>IV DESIGN OF INSTRUMENT</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Observation Index</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>CHAPTER</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>IV Construction of an Observation Index</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Testing Procedures</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>V PLAN OF IMPLEMENTATION</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>VI SUMMARY, CONCLUSION AND RECOMMENDATIONS</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BIBLIOGRAPHY</td>
<td>51</td>
</tr>
<tr>
<td>APPENDIX</td>
<td>54</td>
</tr>
</tbody>
</table>
ABSTRACT

PLAN FOR EVALUATION OF
A SELECTED HEALTH EDUCATION PROGRAM IN THAILAND

by

Vichit Saithai
Master of Public Health
June, 1974

The objective of this graduate project is to plan for evaluation of a health education program in the village Health and Sanitation Project in Thailand (VHSP). The evaluation design that was suggested in this graduate project in evaluating the effectiveness of health education methods would, in turn, help planners or health educators in developing the educational components in VHSP.

The presently employed health education methods emphasize working through community committees; other methods such as one to one, large group meeting, and mass communication, are less frequently employed in the project. These methods are sometimes even used in combination with each other. Using the community committee is a theoretical method of developing the community but not always the most pragmatic one particularly in rural Thai
society where primary relationships predominate and people are not used to work through committees or group process. Accordingly, the evaluative design in this thesis will be helpful in selecting the appropriate methods for approaching the rural Thai people.

The evaluative design was developed on the basis of theoretical concepts and the past experience of the investigator. The effectiveness of health education methods was measured by the technique of scoring the observed behavioral changes of the rural people in using sanitary latrines, drinking safe water, and keeping the house and yard clean. The preceding were the main criteria in determining the goal-achievement of the project. The design uses analysis of variance and Scheffe' test to test for significant difference of actual behavioral changes among the different observations and to make a comparison of each pair of educational methods.

The Village Health and Sanitation Project is still an important one among the intensive health programs in operation to reduce the prevalence of intestinal disease, the major cause of illness and death among the rural Thai people. The new educational methods which are evaluated and selected by using the suggested design will be useful to develop the Village Health and Sanitation Project in achieving the final goal, that of reducing the morbidity and mortality rate caused by intestinal
disease.
CHAPTER I
INTRODUCTION

In the year 1960, the Village Health and Sanitation Project was launched in Thailand to provide assistance to the public on a nationwide scale. The project deals with diseases associated with poor sanitation such as dysentery, typhoid fever, diarrhea and enteritis which are the leading causes of sickness and death in the country. The problem is of greatest magnitude in the nation's 46,573 villages where about eighty-five percent of the Thai people live. The main factors which make such disease endemic to this area are: (1) the villagers are not interested in cleanliness and personal hygiene; the premises are kept unsanitary, used water collects in pools under the house presenting an ideal breeding place for flies and mosquitos, (2) the water supply for the village comes from unprotected sources such as ponds and improperly constructed wells, and (3) the villagers lack knowledge and understanding of the relationship between unhygienic conditions and disease.

The objectives of VHSP, to raise the level of sanitation and personal hygiene in the villages, are being met by organized community action resulting in (a) privy installation and use by each household, (b)
protection of drinking water supplies, and (c) improvement of each premise’s sanitation. Several health education methods have been used in VHSP since its inception. From 1960 to 1972, the accomplishment of VHSP is as follows: (8:41)

<table>
<thead>
<tr>
<th>Country</th>
<th>VHSP</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Villages</td>
<td>46,573</td>
<td>22,559</td>
</tr>
<tr>
<td>Total Houses</td>
<td>4,914,943</td>
<td>2,637,498</td>
</tr>
<tr>
<td>Privy Installation</td>
<td>1,256,085</td>
<td>47.62</td>
</tr>
</tbody>
</table>

According to the figures given above, the project is still far from achieving the objective of acceptable sanitation levels for the villages. Moreover in the villages included in the project there have been no means for assessing the behavior change of the rural people such as in their use of latrines. Furthermore, most of the families do not even allow their children to use the latrine. These facts indicate certain health education components of the project have to be improved and carefully studied. The use of health education methods is one of the important factors in developing an effective approach to changing the behavior of the people.

The Purpose of the Study

The present study is an attempt to propose a plan for evaluation of a health education program in the Village Health and Sanitation Project. Such a plan will aid
in determining the effectiveness of the health education methods currently used in VHSP.

Limitation of the Study

The study is limited to the planning phase of the assessment of the effectiveness of the various health education methods employed in VHSP at the provincial level within one year.

Definition of Terms

**Appropriateness**: "The relevancy of the method toward achieving the goal with respect to the ecologic environment of the health consumer" (24:12).

**Adequacy**: "The expression of how much of a given health problem can be solved at various levels of program coverage, effort, and expenditure" (24:12).

**Community**: A defined population but (not necessarily at the municipal level) with a shared interest, need, or condition, whether defined politically, geographically, culturally by a problem or problem set, or by the provision of services (4:55).

**Criterion**: "A measurable component or test of a standard used to determine whether and to what extent the standard has been achieving" (4:55).
Effectiveness: The extent to which an activity achieves the goal.

Efficiency: "The amount of resources used to attain the goal. Factors to be considered in efficiency are man power, time, materials, and money" (25:12).

Feedback: The flow of information from a later phase of a process to an earlier phase; e.g., information about output quality channeled to inform planners, manager of production processes (4:55), information about the selection of experimental areas, program personnel trained to inform chief medical officer or similar staff of provincial health personnel, etc.

Instruments: "The resource cluster (service terms, facilities, equipment) used to carry out program activities" (4:55).

Objectives: The end state that a program seeks to attain.

Program: An organized set of interventions involving defined resources and undertaken to reach an objective within a given time period (4:55).

Project: A subunit or discrete phase of a program (sometimes the design phase) (4:55).

Reliability: The accuracy or precision of a
measuring instrument (21:442).

**System:** "A set of elements so interacting that a change in the state of any one element induces changes in the states of other elements" (4:55).

**Valid:** Asks the question: Are we measuring what we think we are measuring? (21:456).
CHAPTER II
BACKGROUND AND GENERAL DESCRIPTION

The Village Health and Sanitation Project (VHSP)

More than eighty percent of the Thai people live in rural areas. The leading causes of sickness and death of these people are a group of diseases associated with poor sanitation; in an attempt to reduce the high morbidity and mortality rates the Department of Health with the assistance of the United States Operation Mission (USOM) launched the Village Health and Sanitation Project in 1960. Emphasis has been on the principle of "self-help" i.e., maximum public participation through community organization, and intensive health education with the joint effort of the Ministry of Public Health.

To promote improved sanitation and good health for the rural inhabitants, the following community actions were instituted in the project:

1. Protection of drinking water supplies.
2. Privy installation and use by each household.
3. Improvement of premise’s sanitation through a continuing clean up and refuse disposal program.

The patterns of operation were:

1. Conduct conferences and hold in-service and
supervisory training for sanitarians and health workers.

2. Provide advisory technical assistance to provincial and district sanitarians.

3. Provide technical assistance in advisory techniques and advanced skills in environmental sanitation.

In 1970, a Parasitic Control Program was added as a subprogram to operate in a selected area of each province, particularly in the villages where sanitary privies were used by more than seventy five percent of the people.

In 1971, another subprogram was added to this project, e.g., a number of Mobile Health Education Units which began operation in the Northeast, Central plain, Northern, and Southern parts of the country. The purpose of these Mobile Units has been to assist and support provincial health workers, especially in sanitation, at all levels through the use of health education techniques.

Future plans include instituting the Environmental Health and Sanitation Project in all villages and the broadening of village health activities in every province. These activities will be incorporated into the comprehensive rural health services which will encompass the activities of different divisions in the
Current Health Education Methods Used in VHSP

Several health education methods are used in this project but emphasis is placed on the method of community organization. Junior health workers at the provincial level work as health education specialists and use the following health education methods in developing selected villages:

Step 1. One to one method: Home visits made for general observation and a survey of socio-economic and health conditions. A health worker meets with the head of about 10-15 households a day.

Step 2. Large group meeting: The health worker calls a meeting of all the villagers, especially the heads of the families, to tell them about the results of the previous survey and program operation in the village. The community committee is usually formed during the meeting by voting. At the meeting, the health worker also tries to relay a small amount of health knowledge related to the problems in the village and ask for the participation of the villagers in solving the problem.

Step 3. Small group meeting: A meeting is called by the community committee that was established in Step 2. This health education method is always included in the project. The health worker spends usually only one day (4-6 hours) on training committee members as to
how the group will work in solving the health problems of their own community. All committee members are also given a handbook on how the community committee functions and other pamphlets which cover basic knowledge of disease, how to build a sanitary latrine, a sanitary well, how to collect rain water from the roof and housing sanitation. Also presented are demonstrations of the role of chairman, recorder, and observer, and, group decision making procedures. Guidelines include how to call meetings of committee members, what the agenda and/or problems of discussion at the meeting should be, how to make a decision, how to contact the people and get their participation, and how to obtain the services of the health officer.

Step 4. Community organization: At the provincial and district level the community does not have a committee formed of members of different agencies. However, at the village level the community committee is composed of the following officials and lay leaders who work together: the school principal, the priests or religious heads of each denomination in the village, the heads of the family, the head of the village (Puyai Ban; he is the government representative of each village), the head of the commune or Tambol (Kamman; he is the government representative of each commune), the educated or skilled person (he/she always surrounded by a group of
people who consult him/her on most of their activities), a respected leader (he/she is responsible for organizing ceremonies in connection with marriages and deaths). This committee acts as a liaison between the government and the people. In Thailand, at the village level there are usually no private agencies, or groups of volunteers which serve the people as is the case in the United States.

Step 5. Mass communication: This health education method is not utilized in every province. Occasionally, there are programs on radio or TV or articles in newspapers and magazines which serve to provide the public with information, an understanding of the program, stimulate their interest in the principle of good health, and to motivate people to face health problems intelligently. The problem is, however, that every province does not have a radio or TV station, and where there are, few villagers have receivers.

To accomplish the above task and provide the support and assistance of health education techniques and materials, Mobile Health Education Units are provided to the provinces. This Unit does not have a full team; there is only one health educator or health education specialist, and a driver. Their policy is to integrate the role of health education at the provincial level with regular services so as to allow the province to carry on
health education activities by themselves in the future. Thus this unit not only serves the villagers but serves the province in training health workers in the health education aspects of this project and other health programs.

Evaluation of VHSP

There are two phases of evaluation currently employed in VHSP.

1. Every three months each province involved with VHSP sends a report containing information on the number of villages being developed, privies installed, school water supplies, and sanitary wells constructed during that time period, to the Department of Health in Bangkok.

2. Every month, a follow-up health worker is sent out from the region to each province where he assumes the task of observing and providing support for provincial health workers. This follow-up health worker evaluates health personnel on how closely the project design is being followed and provides technical assistance in the implementation of the project. His report is collected at the regional center and it is sent to the Department of Health every three months.

The reports both from regional offices and
provinces received tri-monthly by the Department of Health are reviewed each year and an analysis made to determine the progress of the program for that year and any changes which must be included in program methodology.
CHAPTER III
REVIEW OF LITERATURE

The literature review focuses on: (1) definition of "evaluation," (2) some concepts, (3) evaluation in the planning and implementation process, (4) methods of evaluation, (5) model of the evaluation mechanism, (6) problem of evaluation, (7) feeding back the evaluation result into the system.

Definitions

The American Public Health Association (1960) defined "evaluation" as a process of determining the value or amount of success in achieving a predetermined objective. Evaluation includes at least the following steps: formulation of the objective, identification of the proper criteria to be used in measuring success, determination and explanation of the degree of success, recommendation for further program activities (2:225).

The World Health Organization (First Report) defined program evaluation as the systematic accumulation and assessment of facts and opinions for the purpose of planning and making decisions about every phase of the program.

Evaluation has many definitions, purposes and meanings. Getting describes it as "an attempt to
determine the value of a public health program or a part of the program. Conversely, evaluation reveals the lack of value of some portions of the program. Its purpose is to measure and separate the valuable from the valueless. It may also compare the valuable with the less valuable. In the final analysis, evaluation measures the relative values of programs, sections of programs, services and activities" (34:66).

Getting has also provided an excellent differentiation between the terms: prospective evaluation, evaluation standards, objective evaluation, retrospective evaluation standards, retrospective evaluation, and terminal evaluation. He also stresses the fact that evaluative measurement may be quantitative, qualitative, or a combination of the two (34:66).

Some Concepts, Models, and Methods

"A related document spells out in considerable detail procedures for evaluating program effectiveness" (33:66). This is essentially a description of a goal-oriented approach to evaluation applied by program personnel themselves to previously specified program objectives (not to problems of efficiency, morale, manpower, needs, etc.). Characteristics of the approach are described and the situation to which the method is applicable are identified. Seven steps are proposed and these are applied illustratively in two different types of
public health programs. The paper contains a good discussion of why a program should be evaluated and of five kinds of evaluation commonly performed, viz: evaluation of performance, efficiency, morale and organizational continuity, effort, and needs. The problem of selecting a specific evaluation method is also included.

James conceptualizes the evaluation process as a circular one, stemming from and returning to our value system (20:1145). Steps in the process are: The valuation goal setting, determining a measure of the goal, measuring the goal, identifying the goal-attaining activity in operation, and appraising the effect of the goal. The establishment of objectives is conditioned by needs, resources, and community attitudes. James describes different levels of objectives, which form a hierarchy and which are affected by the value and validity assumptions underlying them. He illustrates the relevance of these assumptions in a discussion of a program of tuberculosis control. James, like Getting, supports a preference for prospective and on-going evaluation rather than for retrospective methods.

"A three-step approach to evaluating the effectiveness of a public health program is presented by Krauss" (34:67). This is a goal model with the following steps:

1. determination of the organization's stated
purpose, as well as identification of the goals with which it attempts to achieve this purpose;

2. examination of the organization's day-to-day activities;

3. comparison of the organization's purpose and behavior, and if deviation exists, determining the extent of this deviation.

Young states that "Roemer proposes a five-stage model of the evaluation process:

1. a survey of needs;
2. a determination of results in terms of the services provided by the program (before-and-after comparisons as well as simultaneous comparisons);
3. results in terms of health attitudes and practices (before and after comparison, as well as simultaneous comparisons);
4. results in terms of health status and survival (before-and-after comparisons as well as simultaneous comparisons);
5. the drawing of conclusions and generalizations" (34:67).

Roemer applies this typology in an analysis of nineteen projects carried out by local health departments in California. He distinguishes between demonstration projects and full-fledged evaluation studies (34:67).
Roberts has presented an excellent overview of concepts and methods of evaluation in health education (26:52). She states: "We evaluate primarily to study the effects of practice so that we can turn our findings back into practice and improve it, and at the same time, strengthen the scientific basis of practice in health education." The article included the many perspectives of evaluation (as a process, as a program, as performance, et al.) and identified some basic problems (the lack of basic standards in health education practice, the need for opposite base line data, the large number of variables, the lack of agreement on the types of change to be measured).

The goal model is applied by Hochbaum in his definition and description of evaluation in the field of health education (17:141). To him program evaluation is an assessment of a program made in the direction of predetermined goals which are clearly defined. The precise definition of objectives prescribes the kinds of evaluation criteria that should be utilized. A distinction is made between the objectives of a health program and those of a health education program and emphasis is placed on evaluating change in people's behavior.

Hochbaum concludes that evaluation should not be considered as a measure of success but rather as a diagnostic procedure that assists in the identification of:
effective and ineffective aspects of a program, reason for success or failure, and facilitator and inhibitors to the achievement of health education objectives (17:141).

Evaluation in the Planning and Implementation Process

Evaluation is for the purpose of better planning, and improved implementation. Getting explains that periodic evaluation is designed to find any weakness during a program implementation. If evaluation were left to the end, the program's effectiveness could be measured but it would be too late to make corrections which could have improved its value (13:520).

Thus, methods of ongoing evaluation must be built into the plan itself from the beginning. There must be agreement in the detailing of predetermined objectives, qualitative, quantitative, and they must be capable of measurement and comparison.

Ongoing evaluation, then, is the periodic analysis of data reflecting the results of the program from time to time, and the interpretation of these data to determine if qualitative, quantitative objectives have been attained as originally scheduled in the plan(s).

"Results, rather than activities, should be measured" (13:520). Evaluation may measure costs, resources utilized, number of actions attained (as persons
immunized) and quality of performance (as the degree of improvement of physical fitness among high school students).

Evaluation based on reductions in morbidity may give false value if the reductions are assumed to be due entirely to the program, as for using sanitary latrine, drinking safe water and keeping the house and yard clean against hookworm actually may not be the sole reason for the disappearance of the disease from a community. Undoubtedly many other factors have played a role in its reduction. The administrator must be careful in any evaluation that he does not assume credit for the program where multiple outside variables may have participated in bringing about the observed result (13:521).

The evaluation must also look for unexpected consequences which may not have been foreseen in the original plan. Finally, in the zeal for evaluation, one must not forget that evaluation is not an end in itself, but a tool whose purpose is to measure the success of a program, and thereby enable the administrator to do a better job (13:521).

Methods of Evaluation

Methods of evaluation vary with the area, resources, the people and the part of the program to be assessed; sometimes it is appropriate to "plant"
investigators in audiences watching a film or listening to comments. In other circumstances it may be advantageous to use ordinary teaching techniques of observation, verbal or written questions and answers, or group participation or discussion, to learn what is necessary. Much can be learned, too, from those workers who have the ear and the confidence of the group. In that event, the choice of suitable means and methods of evaluation must be worked out locally (17:23).

Evaluation of the people. The first essential action is to establish a baseline from which to measure improvement in the condition toward which the program is aimed. It is not always realized, however, that a similar baseline must be established in respect to the people. This can be called a "diagnosis of the educational and cultural condition" of the people. Socio-economic investigation should be aimed at revealing their visual and general levels of understanding, their attitudes to the problem, and the cultural, religious and other influences which may affect their reaction to the proposed program. The aims, goals, and difficulties of the people themselves should be learned and the best channels of entry into their confidence sought (18:23).

If this assessment is not carried out at the beginning of the program it will seriously hinder later evaluation and it will be difficult to assess what
progress has been made (18:23).

Evaluation of the plan. The program should then be planned in the light of what has been learned about the people; it is necessary, too, that the aims and objectives of the program should be clear in the minds of the planners. The program should be measured against standards of effectiveness in order to ensure that, as far as possible, every opportunity of promoting success has been used and every known resistance met (18:23).

Measurement of effectiveness. It should be determined whether the program will reach the whole population or whether there are places in the selected area that will not be reached, or any members of the group who will not hear about it. This implies the planning of adequate and well-organized managements for dissemination of information. Moreover, the program should reach the people intellectually and emotionally and be calculated to appeal to the minds and feelings of the group. In other words, the corrected type of approach should be made for the group or community to which it is addressed, and made in such a way that it is likely to attract and hold the interest of the group, rather than provoke them to shut their minds and ears to the idea. The content and the purposes of the plan should be such that it is likely to be understood, and the means of communication chosen should be those best suited to the people's educational
level. Aids should always be appropriate to the problem and suited to the levels of understanding and perception of the group. The idea contained in the program should be considered valuable by the group, and physically and economically feasible. They must be capable of performing the required action after they have learned how to do so. The plan should disturb custom as little as possible, and be consistent with the aims of the scheme. The authorities for their part, should plan to carry out their share of any proposed action so that the required changes may be made with a minimum of effort by the people (18:23).

Methods, techniques, and visual and other aids should always be tested before being used in a program. If one can not communicate, one can not educate. A turn of a phase, an association or analogy which is not recognized hinders and confuses. For example, if, when a picture of an eye is used in a trachoma campaign, the people believe it to be a picture of the sun, or leaf or baby's feeding bottle, as often happens, it will be of little value (18:23).

Though this early assessment will not necessarily ensure the success of a program, it will at least reveal ineffective methods and media before their use confuses the people and reduces the impact of the program; and at least will more likely (18:23).
The process of evaluating program effectiveness is divided into three steps (28:226-238).

Step 1. Describing the Program

The program description consists of naming the program to be evaluated and specifying project objectives or objectives, sub-objectives, activities and resources.

Step 2. Measurement

In general, valid and reliable measures of program accomplishment are needed. The scores do not always measure consistently what they are intended to measure. It is never completely safe to accept a test score at face value. In selecting a measure of accomplishment, the evaluator needs to design valid and reliable measures.

When to measure; the program objective and sub-objectives state the time period in with the measures are to be applied.

How to measure; There are two major problems in deciding how to make the needed measurement.

1. How to avoid bias.
2. The problem of sampling.

The possibility of bias is great if one evaluates his own work. This bias can be reduced by having more than one person judge. Sampling procedures are often used in evaluating a program. A probability sample which accurately represent the total population must be
Step 3. Determining Effectiveness

Analysis of program effectiveness can be simplified by using a set of ratio involving the three program variables: objectives, resources, and activities. The ratio of these can be determined in three situations:

1. The ratio of actual resources and plan use of resource $AP/PR$
2. The ratio of actual program activities and performed to plan activities. $AA/PA$
3. The ratio of net attainment of objectives attributable of program activities and the attainment desire less the status that would have existed in the absence of the program. $AO/PO$

Evaluation during the program. Program should be kept as flexible as possible to a change in method or media if required. Constant checks should be carried out along the lines in the preceding paragraph to ensure that communication is proving effective, that authority is playing its part, and that the required modification or change of habit is made as easy as possible. Any methods found to be ineffective should be changed and any aids do not help communication of the idea should be resigned or scraped (18:24).
Evaluation of follow-up. Finally, just as it is usual for the doctor to follow up his treatment to evaluate its effect, so is it necessary for the educator. Assessment in this instance consists of returning to the group after a suitable interval to evaluate the extent of the change induced by the program, and to consider the need for further "treatment," or to ensure that the satisfactory condition of the "patient" is being maintained (18:24).

Model of the Evaluation Mechanism

"To characterize evaluation as a form of research is to identify it as an information processing activity. How this process can be structurally conceived as applied to three different practical situations is depicted in Figure 1" (4:13).

The lower part of the diagram is an elaboration of the basic model, providing somewhat more detail on the structure of the evaluation process. In the upper part under the heading "System Being Evaluated" are shown three types of situations to which evaluation is frequently applied, including a program already in operation, a program in the planning stages, and the perception of a need or demand. (These situations might be evaluated separately or in combination.) As shown, the types of information serve to: (a) collect relevant information;
Figure 1. The Evaluation Mechanism in Relation to the System Being Evaluated.
(b) convert this information into terms permitting analysis and comparison; (c) make meaningful comparisons; (d) arrive at conclusions based on the comparisons; (e) suggest alternative courses of action as an "input" to decision making.

As with any cyclical process, one may have to run through the operation a number of times on the basis of improved information and further experience.

The critical element of evaluation is the normative component, the basis on which comparisons are made. Whether this component consists of stated objectives, technical standards, or economic values it will dictate the content and structure of the information brought into the evaluation process, i.e., what information is relevant and how it is to be expressed.

The evaluation mechanism model resembles the general model of rational problem solving in relation to decision making. The content, the degree of formality, the procedural explicitness and the final factors may differ, but the process is basically the same as in any controlled system, whether the objective is to maintain the temperature of a building, to select food from a menu, to determine the most effective means of reducing the incidents of schistosomiasis, to foster conformity of staff performance with technical and administrative standards or to dispose of wastes (4:13).
The evaluation process is used at all stages of program implementation. Although it normally implies the use of data during implementation, evaluation can also be carried out in the early stages to assist in the planning process, if sufficient information is already available. It, thus, helps in choosing between alternative activities and methods and in all allocating resources. Indeed, evaluation and planning are complementary and cannot be regarded as entirely separate or consecutive operations. The "feed-back" from evaluation makes possible continual adjustment of plans of action to meet changing conditions and unforeseen developments and to correct any errors that come to light (32:46).

Problems of Evaluation

There are two basic problems in the evaluation of any public health program. The old difficulty that the effectiveness of preventive medicine is rarely demonstrable, remains; it is indeed difficult to demonstrate to the individual that smallpox vaccination, or boiling water before drinking it, does, in fact, help to prevent disease. To this problem is added the difficulty of effective communication with uneducated groups and of measuring the effectiveness of methods, techniques and media used to promote the idea. Selling ideas is often more difficult than selling products. For instance it is
often possible to measure the value of advertising methods against a sales chart or the effectiveness of medical treatment against the progress of the patient. But it is not so easy to determine the effectiveness or otherwise of the various methods and techniques used in health education unless thorough and painstaking investigation is made (18:23).

Feeding Back the Evaluation Result into the System

The feedback from evaluation make possible continual adjustments or even reorganization of the system. The purposes that evaluation can serve in an organizational or community system, can be summarized as follows:

a. Scientific and technical base: identifying program premises; testing program premises; theory-building, suggesting hypotheses for research and development; providing a basis of dissemination of knowledge and technology; devising or modifying program technology.

b. Planning: clarifying objective, comparing alternative strategies and methods; measuring accomplishment over time; determining effectiveness, strong and weak points; reasons for strength or weakness; determining adequacy; identifying and checking side effects; re-planning, modifying programs; providing technical, social, political, and economic justification of programs;
establishing priorities for resource allocations and program activities.

c. Program direction: improving efficiency, performance, quality; determining and controlling costs; assessing accountability; gaining support for program modifications; clarifying expectation to staff.

d. Job performance: developing critical attitudes in staff; increasing interest in the job; fostering personal and organizational development; enhancing intellectual and emotional satisfaction (32:14).
CHAPTER IV
DESIGN OF INSTRUMENT

The purpose of this study is to propose an evaluative design of the effectiveness of various health education methods used in the Village Health and Sanitation Project. While the design presented here is appropriate for the VHSP setting, it is probably of limited use for those working in other health programs. This fact, however, does not preclude the application of this design even in other settings.

This chapter consists of (1) an observation index, (2) construction of an observation form, (3) testing procedure for the finalization of the observation form (i.e. instrument).

Observation Index

The following criteria derived from the goals of the program, are included in the design as indices of actual behavior change of the people in each household/family in VHSP:

1. Use of a sanitary latrine.
2. Drinking of safe water.
3. Keeping the house and yard clean.

These criteria are broken down into smaller
observable units in order to observe individual behavior changes in different stages.

Construction of an Observation Form

In order to observe the actual behavior changes of the people following the above criteria, a form was constructed to assist the observer in clarifying and recording his observations and to keep observations uniform for each village. Table 1 presents the untested version of the form.

Testing Procedures

Developmental testing of the form: The following steps would ensure the clarity of the form and form's conformity with the thinking of fellow professionals:

1. Submit the form to professionals for comments
2. Modify according to the feedback from professionals
3. Let observer try the form in actual situation on the villages; one observer at a time
4. Modify forms after feedback from each observer
5. Present modified form to another observer and so on (see Figure 2).
**TABLE 1**

Observation of Health Behavior Change Through VHSP

<table>
<thead>
<tr>
<th>House No.</th>
<th>No. of Persons in Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>05</td>
<td>06</td>
</tr>
</tbody>
</table>

*Field observations at different time intervals.*

**Items**

**Use of Sanitary Latrine**

1. Have latrine
2. Have sanitary latrine
3. Latrine is a permanent construct
4. Have proper toilet equipment
5. Cleanliness of latrine
6. Latrine was used (in the recent past)
7. Occasionally used
8. Habitually used

* 1. Each one of the observations will be recorded on a different form—so the previous scores will not be available to the observer.

2. Educational sessions intervene between some of the observations (See design, page for details).
Items

Drinking Safe Water

9. Have rain water storage tank
10. Have sanitary well
11. Use boiled water
12. Have water container in the kitchen
13. Have drinking utensils
14. Container, utensils are clean
15. Use public water supply

Keeping the House and Yard Clean

16. Have yard area around the house
17. Yard is clean
18. Yard is uncluttered
19. No waste water collected
20. Have refuse container
21. Floors, ceilings, walls are clean
22. Home interior is neat

* Field observations at different time intervals.
<table>
<thead>
<tr>
<th>Items</th>
<th>$o_1$</th>
<th>$o_2$</th>
<th>$o_3$</th>
<th>$o_4$</th>
<th>$o_5$</th>
<th>$o_6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Have refuse container in house</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Have garbage container in kitchen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Clothing and other household are clean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Have soap supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Have a cupboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Utensils are clean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. Lighting is adequate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Good ventilation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Field observations at different time intervals.

**Total Score**
Testing for reliability: The reliability of the observation can be tested by the following steps:

1. One VHSP developed village is selected from the province.
2. Twenty percent of the houses are randomly selected for observation by using the observation form.
3. Three to five health workers are chosen to be observers; an orientation is held on the use of observation forms.
4. The observers use the given form and observe the selected homes separately.
5. Total score from each observer are compared and tested for a significant difference by using analysis of variance.

The form is reliable if the test shows no significant difference between observers.
CHAPTER V

PLAN OF IMPLEMENTATION

At the provincial level the VHSP health education program evaluation will be implemented as follows:

1. Meeting Held to Consider Program

The meetings are held at the provincial office. The meeting members are a chief medical officer, a senior sanitarian, district health officers, health educator, and public health nurse. The objectives, methods, and advantage of the program will be explained at the meeting by the program planner.

2. Decision Made to Apply for Government Grant

3. Program Application Approval by Chief Medical Officer

By this point, the application for funding will have been made and written into the existing program. The program having been approved by the Chief Medical Officer is then sent to the Department of Health in Bangkok for approval.

4. The Department of Health Approval Secured

The program which has been sent to the Department of Health will be accepted and sent back to the province with promises of support for certain aspects of the program.

5. Meeting Held for Programming and Scheduling
The meeting is again held at the provincial health office to consider the approved program. Personnel, time, materials, equipments, money, and area are provided consistently. The steps of the program must be set. Each step is scheduled and clear cut. For example, instructors, time-table, and subjects are already formed in program personnel trained, etc.

6. **Selection of Health Workers**

Five health workers would be selected to work in the program. The purpose of this selection would be to eliminate or minimize problems related to the comprehension of how the program is to be carried out.

7. **Program Personnel Trained**

The selected health workers are trained at the provincial health office. The instruction should be conducted by the program planner or health educator. Small group discussion would be held to aid understanding according to the following outline.

1. **Health Education Methods:**
   - One to one
   - Small group meeting
   - Large group meeting
   - Mass communication
   - Community organization

2. **Observation, Instrument, and Procedure:**
   - Observation form in detail
Observation techniques
Score
Collecting data.

Upon the completion of program training, these health workers will be able to implement each of health education methods to the village and will be able to use the observation form by observing the same population relatively uniform from worker to worker.

8. Experimental Area Selected

Ten villages in the province are collected. Each health worker can select two villages independently in light of the following considerations:

1. The village is not part of the VHSP.
2. The villages are reasonably far from each other, and must be outside of municipal area.
3. Residents of the village live relatively close together.
4. Transportation is convenient for the responsible health worker.

In each village twenty percent of the residents or about 30 houses are randomly chosen for continued observation.

The selected areas must be tested for similarity by using the observation form for observing and scoring
each selected residentce. The observations are made by a different health worker in each of two villages. The purpose of this testing would be to minimize the bias which may be occurred in comparing between the different health education methods in the different villages.

The test will yield two possible results:

1. If the result is that there is no significant difference among the ten villages, then the evaluator can select five of them to be the experimental areas and one to be a control area.

2. If the result shows that there is a significant difference among the ten villages, then the evaluator can select six of them which the mean scores are more closer to be five experimental areas and one control area.

In both cases above, five experimental areas and one control area are selected for next step of experiment. Transportation should again consider to be convenient for the responsible health worker as much as possible (See Figure 3, page 41).

9. **Observation Form Reproduced**

Observation form is needed for each household chosen in the six villages. The amount of forms needed is about 250 according to the program.

10. **Educational Material Prepared**

The educational material will provided by the
Figure 3: Choosing the Experimental and Control Villages and Families

Thailand

One province of the whole country is selected.

*One of the whole VHSP village is selected for testing the observation form, and ten villages of the whole province are selected for selection experimental areas.

The residences in each village for observation are randomly selected.

* See design page 36 for detail.
Department of Health. Some will be produced by the Provincial Health Office. The educational material must be available for use in the program; specially trained health workers will utilize the material to aid in understanding during educational programs.

11. **Mass Media Support Obtained**

Mass media must be prepared for mass communication to inform the villagers, it is also used as a health education tool in educating the people. A Mobile Health Education Unit in VHSP can also support the province in the program.

13. **Home Visit Organized**

Each of health worker's has to observe and educate in a certain village through the year. Also each selected health education method is employed by designated personnel (See Figure 4).

**Figure 4: Design of Health Education Methods Approach in Five Villages.**

<table>
<thead>
<tr>
<th>Personnel</th>
<th>Method</th>
<th>Village No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>6</td>
</tr>
</tbody>
</table>

A. One to one
Each health worker has an equal chance to select each method. Village number six is the control village to be observed by the program planner.

The list of the residents is checked to make sure that the same families still live there throughout the year. Home visits are made to observe every two months in both the pre and post educational input, so that through the program each village is observed six times. Health workers have to change with each other during the educating period, in other words, after the educational input each health worker should not observe in his own village (See Figure 5).

Figure 5: Observation Schedule

\[
\begin{align*}
V_1 & : 01 & 02 & 03 & M_A & 04 & 05 & 06 \\
V_2 & : 01 & 02 & 03 & M_B & 04 & 05 & 06 \\
V_3 & : 01 & 02 & 03 & M_C & 04 & 05 & 06 \\
V_4 & : 01 & 02 & 03 & M_D & 04 & 05 & 06 \\
V_5 & : 01 & 02 & 03 & M_E & 04 & 05 & 06 \\
V_6 & : 01 & 02 & 03 & - & 04 & 05 & 06 \\
\end{align*}
\]
The column labeled design in Figure 5 refers to the experimental design. \( V_{1-5} \)'s represent the experimental area. \( M_{A-E} \)'s represent five health education methods input, while the \( O_{1-6} \)'s represent observation collected before (to the left of \( M \)) or after (to the right of \( M \)). The subscripts between \( 0 \) from left to right indicate two months period of time, \( V_6 \)'s represent the control area where there is only information to be informed the villager throughout the program.

The head of the village (Puyai Ban) must be contacted before taking action in the village. The purposes, methods and schedule of the program must be made clear to him.

14. Collecting Data

Before the educational approach is attempted in a village the VHSP services are explained to the villagers three times during the first six month period as to what is going on in their village, what kind of services are being provided for them, how they can receive these services in order to improve their health in the form of a letter from the provincial health office to the village head and/or by public speaking. The villagers' responses are recorded at two month intervals.

In the second six month period the different health education methods are implemented in the chosen
village (one method in each village) three times. In other words, every two months the same method is implemented again and observation are made at the end of each two months period.

Data are also collected from one control village for the entire experimental period.

The data are collected at the provincial health office by the program planner or health educator for statistical analysis.

15. Statistical Analysis

The scores should be rearranged and recorded in Table 2, page 55, which make a statistical analysis of data easier to carry out.

In the design, the observation are made in three phase; (1) before informing the villagers, (2) after informing or pre-education period, and (3) after educational approach.

Phase 1. Before Informing the Villagers

The purpose of this phase is to test the similarity of the villages as previously mentioned. The score of each village will be rearranged and put into the table of score recording (See Table 3, page 57). A significant difference between villages can be tested by the use of analysis of variance (See Table 3.1, page 59) five percent level of significance will be utilized for testing.
Phase 2. **After Informing the Villagers**

In this phase the average score at different time points are computed and recorded in Table 4, page 60. However, if there are significant differences between observations at different time points it indicates that results are occurring already. So obtaining a mean will not be appropriate.

Phase 3. **After the Educational Approach**

The average scores are again computed and recorded in Table 4. Then, the scores in Table 4 are tested for significant difference between the pre and post educational approach in each village by the use of t-test.

Should the result be that there is no significant difference between the pre and post education input of any of the educational methods, then such methods should not be included in further statistical analysis.

If the results show a significant difference between the pre and post educational input of any villagers, then the significant difference among the several health education methods used in the different villages and control group can be tested with a one way analysis of variance. The score arrangement and computation should follow Table 5, page 61 and Table 5.1, page 62. The Scheffe' test (21:240-241) is then used to determine the difference of each pair, so that the most effective
method will be selected.

The scores are illustrated through a graph (See Figure 6) and this will be the first step in the analysis.

Figure 6: Hypothetical Graph Showing Hypothetical Result of Treatment Methods

Scores

The most effective education method, according to the graph given above, would be method A (One to One).
CHAPTER VI
SUMMARY, CONCLUSION AND RECOMMENDATIONS

The design of the instruments and the implementation suggested above have been developed on the basis of the theoretical concepts of evaluation in health education and the past experience of the investigator in the Village Health and Sanitation Project (VHSP).

The health education methods presently utilized in VHSP have never been evaluated in terms of effectiveness, efficiency, adequacy or appropriateness to the Thai setting. There is no clear indication as to which method is the most appropriate one for the VHSP.

A suggested design in this thesis will be helpful in answering the above question. The change of actual health behavior in using the sanitary latrines, drinking safe water, and keeping the house and yard clean, resulting from the health education program in VHSP, can be more closely observed by well trained health personnel with the aid of a structured checklist. Use of competent personnel make the results valid. However there are many factors which affect the results of this experimental design: the reliability of the observation form, the quality of the observer's orientation, the duration of an individual response to a health education approach, how
often the people are exposed to each health education method, the differences in ability of each responsible health worker in the health education activities. These factor should be controlled as closely as possible so that they will have uniform effect on the results of the evaluative design.

The experimental design in this project is limited to assessing the effectiveness of various health education methods but the criteria for selecting the educational method should include also efficiency, adequacy and appropriateness (24:12). It is recommended that for further research the other three criteria mentioned above be considered in assessing health education methods.

The health education program used in the VHSP has many components which may be improved upon or better organized. Some of the main factors which should be studied if the program is to be further developed are:

1. Studies of the health personnel engaged in health education and the influence on the people of the health workers' beliefs, attitudes, motives, aspiration and values.

2. Studies of the effectiveness of various health education methods, and communication channels and media.

3. Studies of the health education program itself regarding the appropriateness and the
adequacy of the written component in respect to quality of writing, their relationship to each other and the overall direction of the program.

4. Studies dealing with the measuring of change in people's health knowledge and attitudes in terms of "general change" (change of the whole target population) versus "individual change" (change of each individual in the target population).

5. Studies of the factors in social support with respect to the continuation of community committee's activities.


**TABLE 2**

Score Recording Table for Observation in Experimental and Control Villages

<table>
<thead>
<tr>
<th>Form No.</th>
<th>( V_1 )</th>
<th>( V_2 )</th>
<th>( V_3 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01 02 03 04 05 06</td>
<td>01 02 03 04 05 06</td>
<td>01 02 03 04 05 06</td>
</tr>
</tbody>
</table>

\( V_{1-5} = \) Experimental Village  
\( V_6 = \) Control Village  
\( 0_{1-6} = \) Observation at Different Point of Times


<table>
<thead>
<tr>
<th>Form No.</th>
<th>( V_4 )</th>
<th>( V_5 )</th>
<th>( V_6 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 0_{1-6} )</td>
<td>01 02 03 04 05 06</td>
<td>01 02 03 04 05 06</td>
<td>01 02 03 04 05 06</td>
</tr>
</tbody>
</table>

\( V_{1-5} = \text{Experimental Village} \)

\( V_6 = \text{Control Village} \)

\( 0_{1-6} = \text{Observation at Different Point of Times} \)
## TABLE 3
Score Recording Table Used in Selecting Experimental Area

<table>
<thead>
<tr>
<th>Number of Families</th>
<th>Observer 1</th>
<th>Observer 2</th>
<th>Observer 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$x_{ij}$</td>
<td>$x_{ij}$</td>
<td>$x_{ij}$</td>
</tr>
<tr>
<td>1</td>
<td>$x_{1,1}$</td>
<td>$x_{1,2}$</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$x_{2,1}$</td>
<td>$x_{2,2}$</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$x_{3,1}$</td>
<td>$x_{3,2}$</td>
<td></td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>30 = n</td>
<td>$x_{30,1}$</td>
<td>$x_{30,2}$</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$x_{.1}$</td>
<td>$x_{.2}$</td>
<td>$x_{.3}$</td>
</tr>
</tbody>
</table>

$x = \text{Score}$

$i = \text{Row}; i = 1 \ldots 30$

$j = \text{Column}; j = 1 \ldots 10$
<table>
<thead>
<tr>
<th>Number of Families</th>
<th>Observer 4</th>
<th>Observer 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$v_7$</td>
<td>$v_8$</td>
<td></td>
</tr>
<tr>
<td>$x_{ij}$</td>
<td>$x_{ij}$</td>
<td>$x_{ij}$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$v_9$</td>
<td>$v_{10}$</td>
<td></td>
</tr>
<tr>
<td>$x_{ij}$</td>
<td>$x_{ij}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$x.7$</td>
<td>$x.8$</td>
<td>$x.9$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$x.10$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$x..$</td>
</tr>
</tbody>
</table>

$x = \text{Score}$

$i = \text{Row}; \ i = 1 \ldots 30$

$j = \text{Column}; \ j = 1 \ldots 10$
TABLE 3.1
Analysis of Variance Table Use for Table 3

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Square (s.s)</th>
<th>Degree of Freedom (df)</th>
<th>Mean of Square (m.s.)</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Village (B)</td>
<td>$n = 30 \frac{x_{ij}^2 - (x..)^2}{\frac{i=1}{n}\frac{N}{n}}$</td>
<td>$k - 1 = 10-1 = 9$</td>
<td>$\frac{S.S.B}{9}$</td>
<td></td>
</tr>
<tr>
<td>Within Villages (W)</td>
<td>$SST - SSB$</td>
<td>$N-k = 300-10 = 290$</td>
<td>$S.S.W$</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$n = 30 \frac{x_{ij}^2 - (x..)^2}{\frac{i=1}{n}\frac{N}{n}}$</td>
<td>299</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$k = \text{Number of villages or observation groups}; j \ldots k$

$n = \text{Number of families to be observed}; i \ldots n$
<table>
<thead>
<tr>
<th>Family No.</th>
<th>V_1</th>
<th>V_2</th>
<th>V_3</th>
<th>V_4</th>
<th>V_5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M_o</td>
<td>M_A</td>
<td>M_o</td>
<td>M_C</td>
<td>M_o</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>\bar{x}_o</td>
<td>\bar{x}_a</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V = Village

M_o = Average Score from the pre educational approach in each village.

M_{A-E} = Average Score from the post method A approach.
# TABLE 5

Score Recordings Table for Testing the Significant Difference Between Experiment Villages and Control Villages

<table>
<thead>
<tr>
<th>Family No.</th>
<th>Experimental Villages</th>
<th>Control Village</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$x_{ij}^{M_A}$</td>
<td>$x_{ij}^{M_B}$</td>
<td>$x_{ij}^{M_C}$</td>
</tr>
<tr>
<td>1</td>
<td>$x_{1,1}$</td>
<td>$x_{1,2}$</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$x_{2,1}$</td>
<td>$x_{2,2}$</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$x_{3,1}$</td>
<td>$x_{3,2}$</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>n = 30</td>
<td>$x_{30,1}$</td>
<td>$x_{30,2}$</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$x_{.1}$</td>
<td>$x_{.2}$</td>
<td>$x_{.3}$</td>
</tr>
</tbody>
</table>

i = row; i = 1 . . . n = 30  
j = column; j = 1 . . . 6  
$M_O$ = no education approach approach
### TABLE 5.1

Analysis of Variance Table Use for Table 5

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Square</th>
<th>Degree of Freedom</th>
<th>Mean of Square</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between method</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$ij$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$n = 30$</td>
<td>$k-1 = 6-1=4$</td>
<td>SSB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\frac{1}{n} \sum_{i=1}^{n} (x_{ij} - (x.)^2)$</td>
<td></td>
<td>$\frac{SSB}{4}$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\frac{1}{N} \sum_{i=1}^{N} (x_{ij} - (x.)^2)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within method</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$SST - SSB$</td>
<td>$n-k = 150-6$</td>
<td>SSW</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$= 145$</td>
<td>$\frac{SSW}{145}$</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$n = 30$</td>
<td>$k = 5$</td>
<td>149</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\frac{1}{n} \sum_{i=1}^{n} (x_{ij} - (x.)^2)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\frac{1}{N} \sum_{i=1}^{N} (x_{ij} - (x.)^2)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$k = j \ldots k (6)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$n = i \ldots n (30)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$N = ij \ldots nk (150)$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>