

**EDUCATIONAL POLICY ANALYSIS
TRAINING WORKSHOP**

Facilitator's Manual

January 1988

IEES

Improving the
Efficiency of
Educational
Systems

The Florida State University
Howard University
Institute for International Research
State University of New York at Albany
United States Agency for International Development
Bureau for Science and Technology
Office of Education
Contract No. DPE-5823-C-00-4013-00

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Facilitator's Manual

INTRODUCTION

Overview

The Educational Policy Analysis Training Workshop has as its primary purpose to provide training and experience in quick response analysis to typical policy issues encountered in developing countries. There are emphases on the skills of working in small groups, approaching problems from a variety of analytic standpoints, and presenting conclusions in ways that will be understandable and persuasive to busy policy makers who are not fully familiar with quantitative techniques. The workshop is directed towards civil servants concerned with education, but policy analysts in areas other than education will benefit from it as well.

The workshop consists of three components, which are modularized. That is, facilitators may choose to use any or all components, depending on the needs of the participants:

Group Dynamics Training

The goal of this set of exercises is to learn techniques of small group work. Skills such as brainstorming, buzz sessions, and reaching consensus are included in this section. Since the case study and exercise portions of the workshop emphasize group decision making, participants will find the group training section extremely useful for the successful completion of subsequent phases of the workshop.

Exercises for Skill Development

The goal of this set of exercises is to learn the analytical and technical skills necessary to conduct the educational policy analyses which are contained in the case studies.

There are nine sets of exercises, each with subsections. The exercises are framed around a case study which deals with the question of improving the "quality" of primary school teachers in a particular developing country. The format is the same for each exercise:

- The lead facilitator introduces the exercise.
- Break up into smaller groups of 4 to 8 persons, with a facilitator for each group.
- Read and discuss among the group the explanatory materials at the beginning of each sub-exercise.
- Read and discuss among the group the example for each subexercise.
- Read and discuss among the group the task for each subexercise.
- Complete the task for each subexercise.
- Present the product to the facilitator for evaluation and discussion.
- After the subsections of an exercise are completed, subgroups come back together for review, discussion, and introduction to the next exercise.

When all nine exercises are completed, your product will be a written solution to the case study, which is a memorandum written to the Minister responding to his policy analysis request. You will also prepare an oral presentation to the Minister.

Overview

Group Dynamics Training

Exercises for Skill Development

Unstructured Case Study Analysis

With all members present, you will present your oral report at a plenary session. Other participants and facilitators will critique and evaluate each group's report.

Unstructured Case Study Analysis

The goal of this section is to provide the experience of working through a realistic educational policy analysis problem as a group, utilizing the analytical skills you have acquired through the exercises.

A topic for this case study is provided, as well as a considerable amount of quantitative and qualitative data derived from an actual country, Botswana, in southern Africa. Most of the data are drawn from the sector assessment conducted by the Improving the Efficiency of Educational Systems project, funded by the United States Agency for International Development. Some data have been "invented" in order to facilitate the case study analysis.

Alternatively, a case study topic and data from the country in which the workshop is being held may be used. The problem-solving methodology presented in the exercises is universally applicable. The advantages to solving an indigenously produced case study are relevance, currency, and realism.

Materials

Materials

There are two volumes which comprise the Educational Policy Analysis Training Workshop:

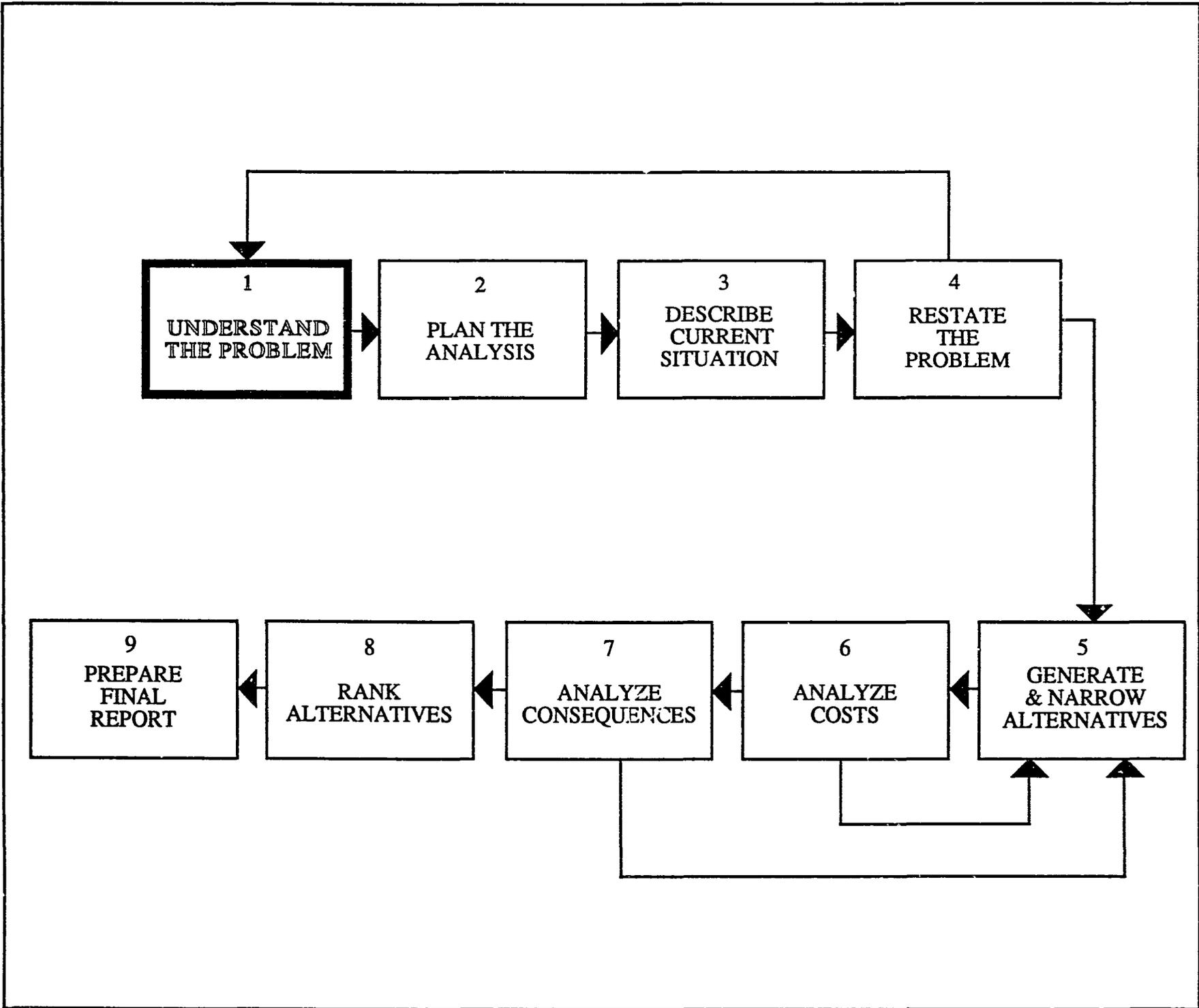
The Exercise Manual, which includes the following sections:

- Introduction
- Exercises 1-9

The Case Study Data Volume, which includes the second case study statement and qualitative and quantitative data for solving the second case study.

1

**UNDERSTAND
THE PROBLEM**



STEP 1

UNDERSTAND THE PROBLEM

OBJECTIVE 1.1

**Identify and State the Main Points
of the Passage**

OBJECTIVE 1.2

Identify Stated and Unstated Assumptions

OBJECTIVE 1.3

**Separate Verifiable Assumptions From
Unverifiable Assumptions**

OBJECTIVE 1.1

TIME LIMIT: 30 MINUTES

Identify and State Main Points of the Passage**To IDENTIFY AND STATE THE MAIN POINTS OF THE PASSAGE****Facilitator Activities**

- Lead facilitator introduces exercise and explains objective 1.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 30 minutes maximum to complete the exercise.
- Tell the group that the output is a short paragraph stating the main points of the Minister's memo.

Facilitator Activities**Trainee Activities**

- Group discussion.
- Reaching consensus.
- Note-taking.
- Writing drafts.

Trainee Activities**TASK****Task**

Read the Case Study statement on the page 11, and write a short paragraph stating the main points of the Minister's memo.

This is an extremely important step in the case study, as the trainees determine the precise nature of the problem which they are to address, and what they are expected to produce at the end of the analysis. Furthermore, the paragraph which the trainees produce should be used as the first paragraph of their final report to the Minister.

Solution**Solution**

The paragraph should include at least the following major points:

- They should conduct an analysis to determine whether there is reason to believe that the high proportion of untrained primary teachers is the major reason for the poor results on the competency examination.
- They are to write a proposal which would lead to an increase in teacher quality in their country, as measured by teacher competency examination scores.

- The constraint on their proposal is that it must not cost more than twenty percent over the current budget for teacher training.
- They should entertain other possible causes for the low performance of teachers on the competency examination.

Notes

Notes

- Topic sentences may appear anywhere in the paragraph. When the topic sentence is difficult to find or is nonexistent, one may find the main idea in other ways:
- Decide the person, place, or thing which is the subject of the reading passage. The subject can be something abstract, such as an idea or a process. This person, place, thing, idea or process then becomes the subject of the topic sentence.
- Decide the most important thing that is being said about the subject. Either the subject is doing something, or something is being done to it. This action becomes the verb of the topic sentence.
- Look for statements in support of the main point of the passage, in order to identify essential ideas. If mentally eliminating a given passage does not seem to detract from the main point, the passage or idea is incidental. It should be noted that many ideas which are "correct" may nevertheless be incidental in context.

Case Study One: Problem Description

MEMORANDUM

TO: Educational Planning Division

FROM: Minister of Education

RE: Reform of Primary Teacher Training

There has been growing concern in developing nations concerning the quality of teaching at the primary school level, since primary education is the most important ingredient for national development. Recently, an international agency has developed a primary teacher competency examination which has been administered in seven countries in our region. The exam consists of two sections: the first is a written portion which covers "professional knowledge," including pedagogical theories and practice, subject matter expertise, and child development. In the second part of the examination, teachers are rated by observers on their classroom performance. Teachers are scored on such behaviors as interaction with students, giving positive feedback for correct answers, use of the blackboard, clarity of presentation, and so on.

The results of the exam have just been released, and our country compares unfavorably with the others: it had the second lowest score. These results, compounded with growing dissatisfaction expressed by individual parents, by primary school headteachers, by secondary school teachers and headteachers, and by organizations of parents, have prompted me to launch a reform program to improve teacher quality. Representatives of the primary school teachers, while not wishing to accept full responsibility for this problem, do concede that there is a possibility that the average quality of primary school teachers is lower than desirable because of the high proportion of untrained teachers in the primary schools. This is crucial, since it is teachers who hold the major burden for educating our youth.

I am meeting next week with a delegation that includes parents, secondary school teachers, primary school headteachers, and members of the National Assembly. The delegation and the meeting has been organized by a member of the National Assembly who takes a keen interest in education matters and who is known to be a critic of the quality of the primary school teaching force (he himself had been a primary school teacher before independence). You will be accompanying me to the meeting and have been informed that after the initial formalities, you will make a presentation of the Ministry's position.

Your task now is to prepare a report for me that addresses the following issues:

- (1) Is there good reason to believe that the high proportion of untrained primary teachers is the major reason for the poor results on the competency examination?

(2) If so, what measures can be recommended that may have the effect of improving the primary teacher competency examination results without increasing the Ministry's expenditures on teacher training (both inservice and preservice) by more than twenty percent?

(3) Are there other plausible explanations for the relatively low performance of the teachers, which may not be related to formal training?

I am instructing you to prepare a written report of not more than about two to three pages, and to present the major points in it to him orally. If I approve of the content of your report and presentation, you will make the presentation to the delegation and I will use your report as background material for the discussion that will follow with the delegation. The report can have appendices giving more detail on the evidence behind its conclusions, and in fact that would be useful reference for the discussion. If there are matters on which you cannot come to firm conclusions, it would also be useful to have in an appendix suggestions about information that the Ministry should collect in the future in order to be able to come to more firm conclusions about such matters if they arise again; this will be essential in order to answer the National Assembly members' anticipated criticisms if the Ministry is forced to say it is not sure of an answer.

OBJECTIVE 1.2

TIME LIMIT: 20 MINUTES

To IDENTIFY STATED AND UNSTATED ASSUMPTIONS

Facilitator Activities

- Group facilitator introduces exercise and explains objective 1.2.
- Instruct groups that they have 20 minutes maximum to complete the exercise.
- Tell the group that they should keep notes for future analysis.

Trainee Activities

- Group discussion.
- Reaching consensus.
- Note-taking.

Specify Stated and Unstated Assumptions

Facilitator Activities

Trainee Activities

TASK

In the Case Study statement, identify four assumptions, either stated or unstated. Keep a record of these for your future analysis.

In this step, the Case Study statement is read critically for at least two purposes. First, it is important to identify the assumptions underlying any policy initiative. Second, those assumptions which are central to making recommendations must be evaluated, during the analysis of the current situation.

Solution

Four assumptions which can be identified include:

Stated

- That primary education is the most important ingredient for national development.
- That it is teachers who hold the major burden for educating our youth.
- That the high proportion of untrained primary teachers is the major reason for the poor results on the competency examination.

Unstated

- That teachers may be trained through formal certificate programs or in-service programs in order to improve their scores on the competency examination.

Task

Solution

Identifiable Assumptions

Notes | Notes

- Look for statements in support of the main point of the passage, in order to identify assumptions. If mentally eliminating a given passage does not seem to detract from the main point, the passage or idea is incidental. It should be noted that many ideas which are "correct" may nevertheless be incidental in context.
- Writers inevitably make assertions and assumptions in trying to persuade readers. Often these assertions are not held universally, but are contested by persons of other points of view. Trainees should ask themselves whether all ideas would be agreed upon by persons in cultures other than theirs, with different political ideologies than theirs, and so on.

OBJECTIVE 1.3

TIME LIMIT: 30 MINUTES

To SEPARATE VERIFIABLE ASSUMPTIONS FROM UNVERIFIABLE ASSUMPTIONS

Facilitator Activities

- Group facilitator introduces exercise and explains objective 1.3.
- Instruct groups that they have 20 mins. maximum to complete the exercise.
- Tell the group that they should keep notes for future analysis.

Trainee Activities

- Group discussion.
- Reaching consensus.
- Note-taking.

TASK

Identify two verifiable and unverifiable assumptions in the Case Study statement. Keep a record for your future analysis.

Solution

The verifiable assumptions in the Case Study statement will shape the analysis of the current situation, and will also become the basis for the analyses of proposals for improving teacher quality.

Unverifiable

- That primary education is the most important ingredient for national development.
- That it is teachers who hold the major burden for educating our youth.

Verifiable

- That the high proportion of untrained primary teachers is the major reason for the poor results on the competency examination.
- That teachers may be trained through formal certificate programs or in-service programs in order to improve their scores on the competency examination.

Verifiable and Unverifiable Assumptions

Facilitator Activities

Trainee Activities

Task

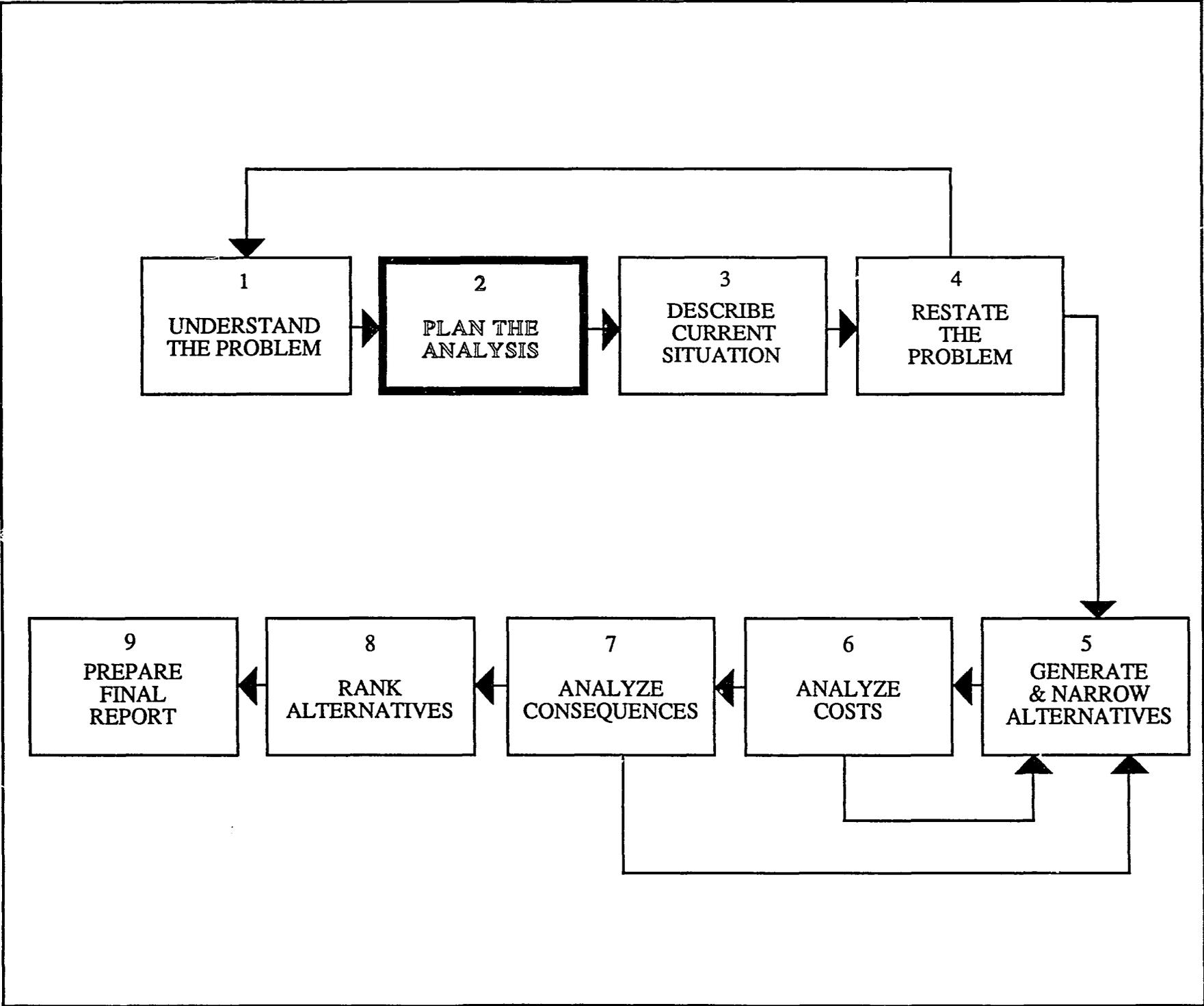
Solution

Notes | Notes

One technique in attempting to distinguish between the verifiable and unverifiable is to assign two members of the group to opposing points of view, and to have each of them present a method for bringing real-world evidence to bear on proving their points. Debate and ideological posturing are to be avoided. The point is not to evaluate the veracity of the assertions, but rather to see how one would go about deciding by using evidence. If it appears that no such method exists, the assertion is probably unverifiable.

2

**PLAN THE
ANALYSIS**



STEP 2 PLAN THE ANALYSIS

OBJECTIVE 2.1

Define Terms and Concepts

OBJECTIVE 2.2

Operationalize the Terms Defined

OBJECTIVE 2.1**TIME LIMIT: 30 MINUTES****To DEFINE TERMS AND CONCEPTS****Facilitator Activities**

- Lead facilitator introduces exercise and explains objective 2.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 30 minutes maximum to complete the exercise.
- Tell the group to keep written notes of their working definitions.

Trainee Activities

- Group discussion.
- Reaching consensus.
- Note-taking.

Define Terms and Concepts**Facilitator Activities****Trainee Activities****TASK**

Continuing with the main point of the Case Study statement, provide three definitions of teacher quality, as a group. Keep a record of these for your future analysis.

Task

The facilitator begins at this point to guide the trainees through a solution to the Case Study which will be carried through data analysis, proposed solutions, weighing the desirability of solutions, and final report. The facilitator must ensure that the groups follow the solution for which data are provided in the exercises, although groups may go beyond these solutions and suggest their own in addition.

Solution**Solution**

Thus, minimally, the following definitions of teacher quality should be included:

- The ability to pass a teacher competency examination.
- Certification by a teacher training college.
- Attendance at in-service courses.

Other definitions might include:

- The ability to inspire children to learn.
- The ability to maintain an orderly classroom.

Notes | Notes

Facilitators should make sure that trainees are not under the impression that the organizers of the workshop think that the trainees cannot do these things; the point of the exercise is two-fold: to remind people explicitly of the need to define terms, and especially the value of doing so self-consciously in the policy analysis context; and second, to build more group skills, more group cohesion, by doing these tasks as a group under substantial time pressure.

OBJECTIVE 2.2**TIME LIMIT: 30 MINUTES****TO OPERATIONALIZE THE TERMS DEFINED****Facilitator Activities**

- Facilitator introduces exercise and explains objective 2.2.
- Instruct groups that they have 30 minutes maximum to complete the exercise.
- Tell the group to keep written notes of their working definitions.

Trainee Activities

- Group discussion.

Reaching consensus.

- Note-taking.

**Operationalize
Terms Defined****Facilitator
Activities****Trainee
Activities****TASK**

Take the three definitions of teacher quality which you developed above, and operationalize each. Keep a record of these for future analysis.

Task

The facilitator must ensure that the groups follow the solution for which data are provided in the exercises, although groups may go beyond these solutions and suggest their own in addition.

Solution**Solution**

The following operational definitions of teacher quality at a minimum should be included:

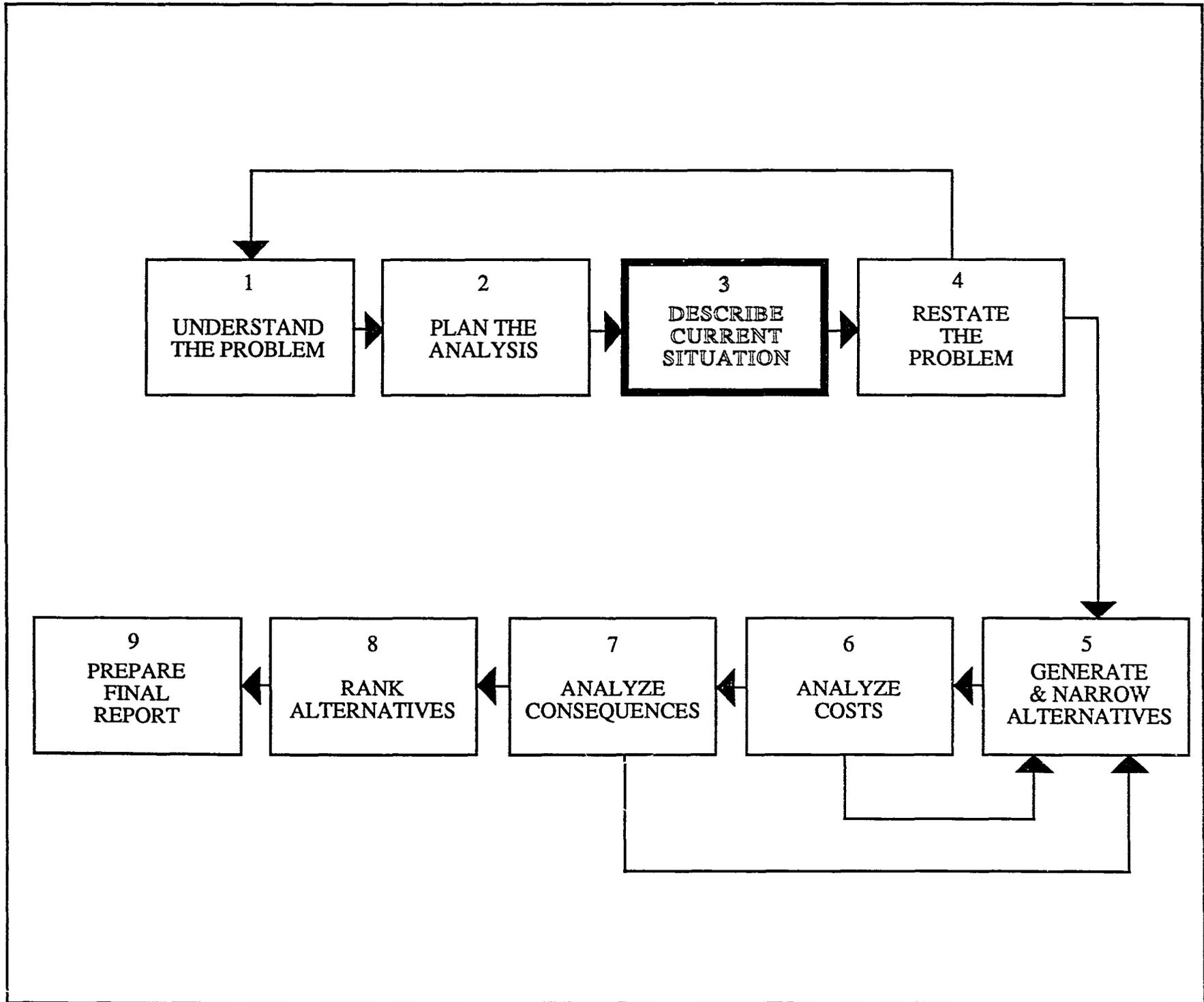
- The ability to pass both components of the teacher competency examination which was administered by the World Educational Testing Service, at a level of 70 percent.
- Receipt of a Primary Teaching Certificate from one of the teacher training colleges in the country, or from a teacher training college in another country.
- Attendance of eight weeks of in-service courses, with successful completion of all requirements.

Notes

Definitions may be quantitative or qualitative. The three listed above are quantitatively operationalized. Qualitative definitions could be offered for other notions of teacher quality. For example, the ability to inspire children to learn could entail observation of the teacher by a team of judges, who observe the effect of instruction on students.

3

**DESCRIBE
CURRENT
SITUATION**



STEP 3
DESCRIBE THE CURRENT SITUATION

OBJECTIVE 3.1

Interpretation of Univariate Statistics

OBJECTIVE 3.2

**Find Internal Inconsistencies
in a Statistical Table**

OBJECTIVE 3.3

Interpretation of Bivariate Statistics

OBJECTIVE 3.4

Spurious Correlations

OBJECTIVE 3.1

TIME LIMIT: 60 MINUTES

INTERPRETATION OF UNIVARIATE STATISTICS**Facilitator Activities**

- Lead facilitator introduces exercise and explains objective 3.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 60 minutes maximum to complete the exercise.
- Tell the group that the output is a short paragraph stating the mean percentage of certified teachers countrywide, the range of percent certified (lowest to highest), and anything else they find noteworthy from the table.

Trainee Activities

- Read text and tables.
- Delegation of responsibility.
- Statistical computation.
- Reaching consensus.
- Writing drafts.

**Interpretation of
Univariate
Statistics
Facilitator
Activities**

**Trainee
Activities**

TASK

Continuing with the Case Study example, complete the following table:

- Compute the mean number of primary teachers who are certified, and the mean uncertified.
- Compute the median number of primary teachers who are certified, and the median uncertified.
- Compute the percent certified in each town and district.
- Write a statement describing your findings, including the mean percentage of certified teachers countrywide, the range of percent certified (lowest to highest), and anything else you find noteworthy from this table.

Task

Solution

Methods for reaching the solutions are shown below. The correct table follows on the next page.

- For computing the mean number of uncertified teachers, the sum of certified teachers is divided by the number of towns and districts:
 $1894 / 13 = 145.7$

The mean number of certified teachers per district is:

$$4404 / 13 = 338.8$$

Solution

Find Internal Inconsistencies in a Statistical Table
Facilitator Activities

Trainee Activities

Task

Solution

OBJECTIVE 3.2

FIND INTERNAL INCONSISTENCIES IN A STATISTICAL TABLE

Facilitator Activities

- Facilitator introduces exercise and explains objective 3.2.
- Instruct groups that they have 30 mins maximum to complete the exercise.
- Tell the group to report their findings orally to the facilitator.

Trainee Activities

- Read text and tables.
- Statistical computation.
- Reaching consensus.

TASK

There are two errors in the following table. Identify them and offer plausible corrections for them.

Solution

- 1) The two entries in the "bursaries" row have been reversed. This can be detected by noticing that the raw expenditures have declined, but the percentages have gone up. It is clear that the 6469.3 should be in the third column, and the 5,011.1 in the first, since the percentages are correct when the numbers are switched.
- 2) The percentage of the budget on Primary Education (11.4) is not plausible. Judging by similar figures, it should be in the one percent range. Upon re-

MINISTRY OF EDUCATION RECURRENT EXPENDITURE BUDGET
1982-83/1983-84
(Current Price, Thousand Pula)

Activity/Department	1982-1983 (Authorized)		1983-1984 (Estimated)	
	Amount	Percent	Amount	Percent
Headquarters	6,238.0	12.3%	5,913.0	10.8%
Department of Technical Education	2,177.6	4.3	3,351.1	4.3
Bursaries	6,469.3 6,469.3	9.9	5,011.1 5,011.1	11.8
Department of Non-Formal Education	590.9	1.2	658.6	1.2
Department of Curriculum Development & Evaluation	752.4	1.5	825.2	1.2
Department of the Unified Teaching Services	28,769.6	56.9	30,646.1	56.0
Department of Primary Education	575.6	1.4 1.4	692.0	11.3
Department of Secondary Education	5,539.3	11.0	6,182.9	11.3
Department of Teacher Training	926.6	1.8	1,001.9	1.8
Total	50,580.9	100.0	54,740.0	100.0

Source: Financial Statements, Tables and Estimates of consolidated and Development Fund Revenues, 1983-1984

OBJECTIVE 3.3

TIME LIMIT: 30 MINUTES

**Interpretation
of Bivariate
Statistics****INTERPRETATION OF BIVARIATE STATISTICS****Facilitator
Activities****Facilitator Activities**

- Facilitator introduces exercise and explains objective 3.3., which has two sections: crosstabulation tables and bivariate scatterplots.
- Instruct groups that they have 30 minutes maximum to complete the crosstabulation exercise.
- Tell the group that the output is a short paragraph detailing the differences in teacher certification between towns and districts, and anything else they find noteworthy from the table.
- Instruct groups that they have 45 minutes maximum to complete the scatterplot exercise.
- Tell the group that the output is a short paragraph detailing the apparent relationship between district levels of teacher certification and the scores on the two components of the teacher competency examination.

**Trainee
Activities****Trainee Activities**

- Read text and tables.
- Delegation of responsibility.
- Statistical computation.
- Reaching consensus.
- Writing drafts.

Task 1**TASK 1**

Using the data from the following table, which you used previously, complete the crosstabulation table breaking down percent certified teachers by districts and towns. Notice how much clearer the discrepancy between teacher qualifications in districts and towns is represented in the crosstabulation table.

Write a statement detailing the differences in teacher certification between towns and districts.

Solution**Solution**

Totals are first computed for each of the four cells in the table by summing the columns of certified and uncertified teachers in towns and districts. Row and column totals are computed. Finally, percentages are computed in each cell.

The statement should point to the finding that only 69.0 percent of district teachers are certified, while 76.1 percent of primary teachers in towns are certified.

See the completed crosstabulation table below.

**Numbers of Teachers by Qualification
by Town and District**

<u>Districts</u>	<u>Uncertified</u>	<u>Certified</u>
Central	648	1,557
Ghanzi	39	89
Kgalagadi	67	123
Kgatleng	114	245
Kweneng	234	513
North East	127	206
North West	167	311
South East	29	162
Southern	279	593
<u>Towns</u>		
Francistown	24	151
Lobatse	19	100
Selebi-Phikwe	29	104
Gaborone	118	250
Total	1,894	4,404

TEACHER QUALIFICATION BY TOWNS AND DISTRICTS

	<u>Towns</u>	<u>Districts</u>	<u>Totals</u>
Certified	total=605 column %= 76.1 row %= 13.7	total=3,799 column %= 69.0 row %= 86.3	total=4,404 column%= 69.9 row %= 100.0
Uncertified	total=190 column %= 23.9 row %= 10.0	total=1,704 column %= 31.0 row % = 90.0	total=1,894 column%= 30.1 row %= 100.0
Totals	total=795 column %= 100.0 row %= 12.6	total=5,503 column %= 100.0 row %= 87.4	total=6,298

TASK 2

Task 2

- a) Continuing with the Case Study, using data from the following table, draw a scatterplot of the relationship between the percent certified teachers by district, against the average total score on the teacher competency test in each district. What can you tell from this scatterplot? Write a statement describing the apparent relationship between teacher certification and test scores.
- b) Next draw two similar scatterplots, but break the teacher competency test score down by its two components: classroom practices and professional knowledge. What can you tell from these scatterplots? How do they differ from the previous scatterplot? Write a statement detailing the apparent re-

relationship between teacher certification and the two sections of the teacher competency examination.

Solution

Solution

In the first part of this task, the scatterplot of the total competency examination scores reveals a rather strong relationship between percent certified and exam score. However, the scatterplots of the two individual sections of the examination (professional knowledge and classroom performance) reveals a weaker relationship between certification and "professional knowledge," while the relationship remains strong between certification and classroom performance.

There are several explanations for this. It may be that teacher training colleges emphasize the classroom practices that are valued on the examination. It may be that the validity of the professional knowledge aspect is in question; that is, that it is so obvious that formal training is not needed to learn them. It may be the case that important other variables are the real causes for the apparent relationship, such as rural-urban differences, experience differences between certified and uncertified teachers, and so on. In the next exercise, the influence of rural-urban differences is examined.

Teacher Competency Exam Scores

	% Cert.	Professional Knowledge*	Classroom Performance*	Total Score*
<u>Districts</u>				
Central	71	14	22	36
Ghanzi	70	13	25	38
Kgalagadi	65	12	21	33
Kgatleng	68	14	24	38
Kweneng	69	13	25	38
North East	62	10	22	32
North West	65	13	24	37
South East	85	16	21	37
Southern	68	13	23	36
<u>Towns</u>				
Francistown	86	16	36	52
Lobatse	84	17	35	52
Selebi-Phikwe	78	15	37	52
Gaborone	68	14	36	50

* Maximum scores are: 25 points for Professional Knowledge
40 points for Classroom Performance
65 points Total Examination

SPURIOUS CORRELATIONS

Facilitator Activities

- Facilitator introduces exercise and explains objective 3.4.
- Instruct groups that they have 60 minutes maximum to complete the exercise, which includes the drawing of three scatterplots.
- Tell the group that the output is a short paragraph describing the apparent relationship between teacher competency examination scores, controlling for rural-urban differences.

Trainee Activities

- Read text and tables.
- Delegation of responsibility.
- Statistical computation.
- Reaching consensus.
- Writing drafts.

Spurious Correlations

Facilitator Activities

Trainee Activities

TASK

Using the same data as in the previous exercise, split the data up by districts versus towns. Now draw two scatterplots showing the relationship between percent certified teachers and total competency test scores, one for towns and the other for districts. How has this affected the apparent relationship? What might account for this change?

Write a statement describing the relationship between teacher certification and competency test scores in districts versus towns. Include a sentence in your analysis on the differences in the two relationships.

Task

Solution

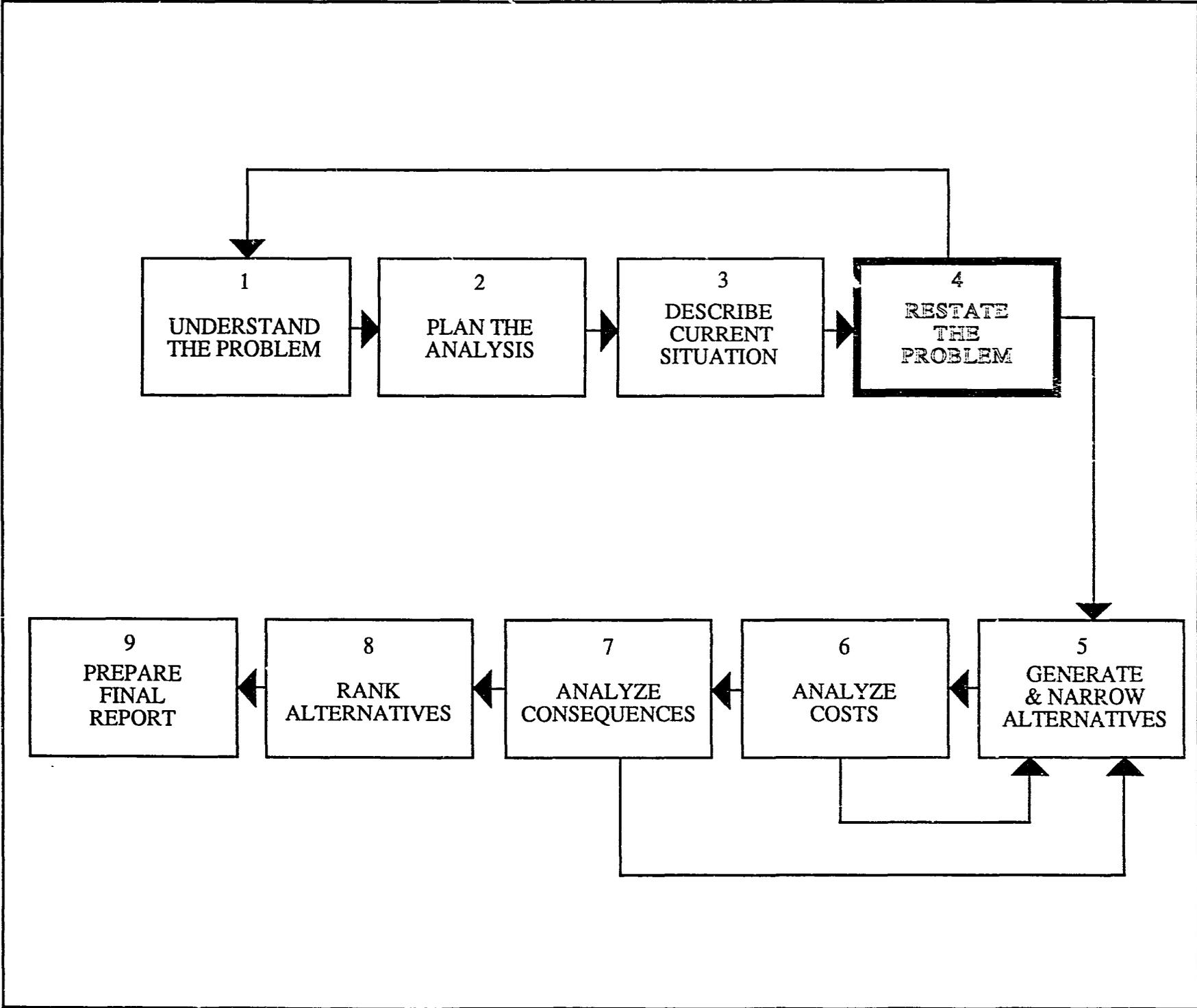
The important point for the trainees to discern from the three scatterplots is that the apparent relationship between teacher certification levels and competency scores disappears when controlling for rural-urban differences.

Solution

4

**RESTATE
THE
PROBLEM**

25



STEP 4 RESTATE THE PROBLEM

OBJECTIVE 4.1

**Visually Present Data in Order to Make
Statistics Clear to the Reader**

OBJECTIVE 4.2

Techniques of Statistical Projection

OBJECTIVE 4.3

Specify Goals or Targets

OBJECTIVE 4.1

TIME LIMIT: 90 MINUTES

To VISUALLY PRESENT DATA IN ORDER TO MAKE STATISTICS CLEAR TO THE READER**Facilitator Activities**

- Lead facilitator introduces exercise and explains objective 4.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 90 minutes maximum to complete the exercise.
- Tell the group that the output is three charts: a pie chart, a line chart, and a bar chart, which may be used in the appendices in their final report.

Trainee Activities

- Read text and tables.
- Delegation of responsibility.
- Statistical computation.
- Reaching consensus.
- Writing drafts.

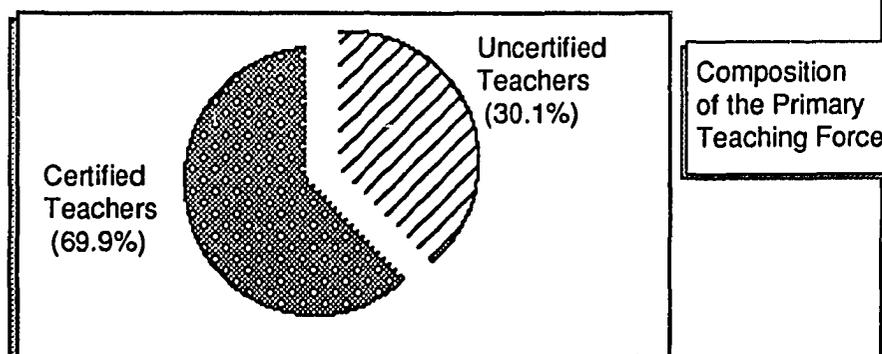
To Visually Present Data**Facilitator Activities****Trainees Activities****TASK 1**

Continuing with the Case Study example, draw a simple pie chart showing the composition of the teaching force broken down by certified and uncertified.

Task 1**Solution**

% of total x 360

Number of certified teachers	4,404	69.9	252
Number of uncertified teachers	1,894	30.1	108

Solution

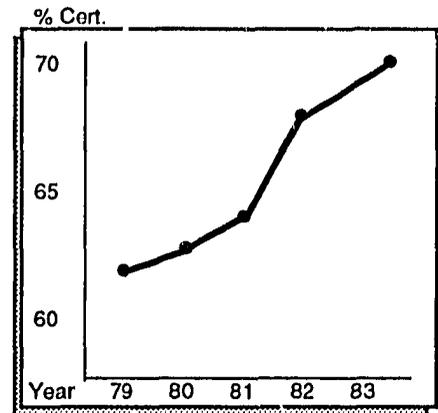
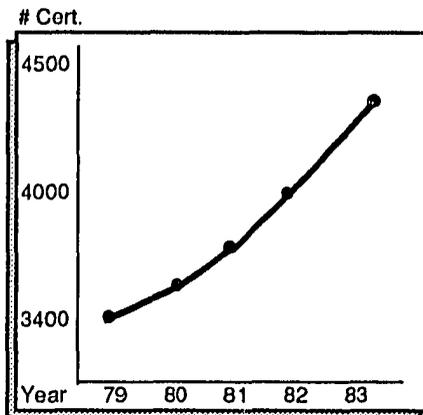
Using the following data, draw two line graphs:

- a) plot the number of certified teachers over the period 1979 - 1983.
- b) plot the percentage of certified teachers over the same time period.

Solution

Solution

Year	Certified Teachers	% Certified
1979	3,456	62
1980	3,544	63
1981	3,698	64
1982	4,012	67
1983	4,404	70



Task 3

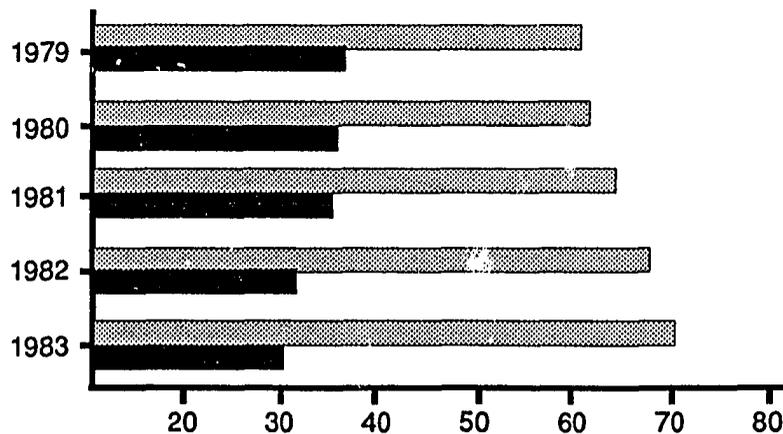
TASK 3

Using data from the following table, draw a bar graph showing the percentages of certified versus uncertified teachers over the period 1979 - 1983.

Solution

Solution

Year	% Uncertified	% Certified
1979	38	62
1980	37	63
1981	36	64
1982	33	67
1983	30	70



TECHNIQUES OF STATISTICAL PROJECTION**Facilitator Activities**

- Facilitator introduces exercise and explains objective 4.2., which includes two kinds of projections.
- Instruct groups that they have 30 mins. maximum to complete the first projection.
- After reviewing first projection, facilitator introduces techniques for second projection.
- Instruct groups that they have 60 minutes to complete the second projection.
- Instruct groups that the output is a summary paragraph of the second projections, which includes the assumptions made to accomplish it.

Trainee Activities

- Read text and tables.
- Making projections.
- Writing drafts.

**Techniques
of Statistical
Projection
Facilitator
Activities**
**Trainee
Activities**
TASK 1

Using a linear trend line, predict the percentage of trained teachers who will be in the system in 1989, using data from the following table.

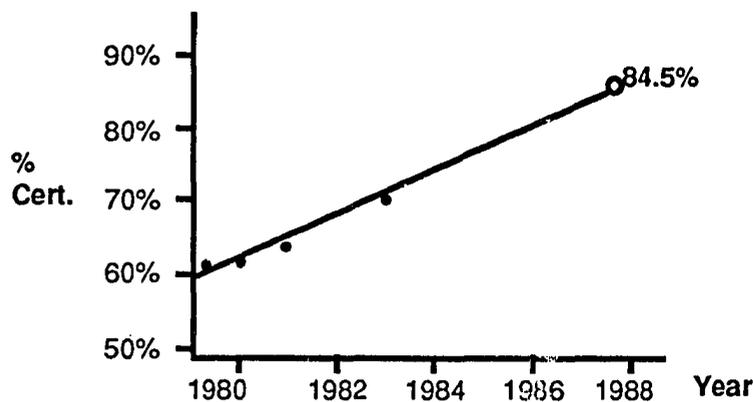
Task 1**Solution**

Compute the mean number of primary teachers who are certified, and the mean uncertified.

Solution

Year	% Certified
1979	62
1980	63
1981	64
1982	67
1983	70

The projected percentage of trained teachers will be 84.5%.



These data are for illustrative purposes, since in making a projection such as this, linear trend lines are unlikely to yield reliable projections. Trainees should be informed that the next projection they make will be the one used in the Case Study.

Task 2

TASK 2

Predict the percentage of primary school teachers who will be certified in 1989, using the following facts and assumptions:

- a) There are currently 194,897 students in primary schools.
- b) This represents an enrollment rate of 92%.
- c) The school age population is 210,000.
- d) The school age population is projected to grow at 3% per year.
- e) The enrollment rate is expected to grow to 98%.
- f) There are currently 4,404 certified teachers in the system and 1,894 uncertified teachers.
- g) It is predicted that 100 uncertified teachers will leave the system each year to attend Teacher Training Colleges.
- h) It is predicted that 120 certified teachers yearly will resign for other jobs or retire.
- i) The current capacity of the three Teacher Training Colleges is 900 students in the two-year certification program.
- j) The estimated output of the three Teacher Training Colleges is 440 newly certified teachers per year, all of whom will go into teaching.
- k) Assume that enough teachers will enter the system so that the current student teacher ratio will remain the same.

Solution

Solution

20.4% uncertified teachers in the system in 1989.

- 1) How many children do we predict will be in the primary school age population in 1989, given 210,000 in the age group in 1983, and a growth rate of 3%?

Answer: 250,751

1983	210,000	x 1.03 =
1984	216,300	x 1.03 =
1985	222,789	x 1.03 =
1986	229,473	x 1.03 =
1987	236,357	x 1.03 =
1988	243,448	x 1.03 =
1989	250,751	

- 2) Given a predicted enrollment rate of 98%, how many primary students will be enrolled in 1989?

Answer: $250,751 \times .98 = 245,736$

- 3) Assuming the current teacher-student ratio remains the same, how many teachers will we need in 1989?

Answer: 7,937

The current teacher-student ratio is:

$$(4404 + 1894) / 194,897 = .0323$$

If there are 245,736 students in 1989, and the teacher-student ration remains .0323, we will need $245,736 \times .0323$ teachers = 7,937 (approximately).

4) Now we fill in the following worksheet, to project the composition of the teaching force through 1989, given that we assume:

- we will need 7937 teachers in 1989;
- we will lose 120 certified teachers per year to retirement and other jobs, but will add 440 new certified teachers from from the teacher training colleges, a net gain of 320 certified teachers per year;
- we must use uncertified teachers to meet our need for teachers when certified teachers are not available.

Assumption: We need 7,937 teachers in 1989

Year	Certified	Uncertified	Total
1983	4,404	1,894	6,298
1984			
1985			
1986			
1987			
1988			
1989			7,937

Assumption: There will be a net gain of 320 certified teachers per year.

Year	Certified	Uncertified	Total
1983	4,404	1,894	6,298
1984	4,724		
1985	5,044		
1986	5,364		
1987	5,684		
1988	6,004		
1989	6,324		7,937

Assumption: We must use uncertified teachers to meet our need for teachers when certified teachers are not available.

Year	Certified	Uncertified	Total
1983	4,404	1,894	6,298
1984	4,724		
1985	5,044		
1986	5,364		
1987	5,684		
1988	6,004		
1989	6,324	1,613	7,937

Specifying Goals and Targets

OBJECTIVE 4.3

TIME LIMIT: 60 MINUTES

Facilitator Activities

SPECIFYING GOALS OR TARGETS

Facilitator Activities

1. Facilitator introduces exercise and explains objective 4.3
2. Instruct groups that they have 60 minutes maximum to complete the exercise.
3. Tell the group that the output is a short statement specifying goals and targets, including justification.

Trainee Activities

Trainee Activities

1. Read text and tables.
2. Group discussion.
3. Reaching consensus.
4. Writing drafts.

Task

TASK

Returning to the Case Study, specify concrete targets for the policy on improving teacher quality, using techniques of group consensus.

You should take into consideration the information from the previous step, especially the capacity of teacher training colleges and the projections already made.

You may also find the following data useful:

- A comparison of certification levels in similar countries;
- A comparison of scores on the teacher competency examination in similar countries;
- Budgetary data (remember the 20% budget increase limitation).

Write a statement specifying your goals and targets, including justification.

Solution

Solution

It is at this point that trainees must use judgment in specifying tentative targets, based on comparisons with other countries, guesses as to the effectiveness of proposed solutions, and their own policy experience.

Since teacher quality has been defined in step 2.2 as either certification from a teacher training college, or as a certain score on the teacher competency examination, two possible targets are offered here:

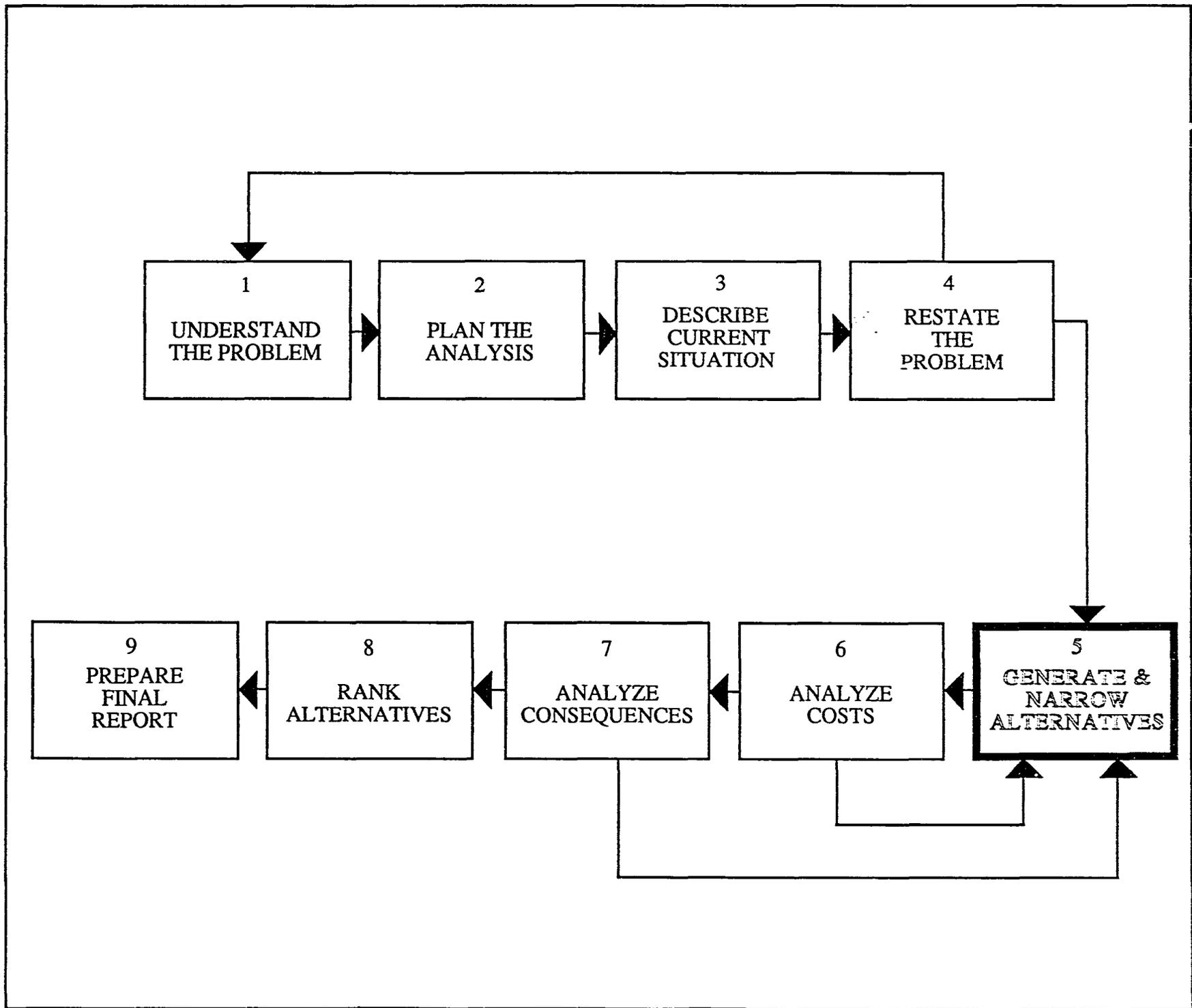
Goal: That 90 percent of the primary teaching force be certified by 1989. This seems reasonable given the levels presented for other countries in the table. Also, the projection made in the previous step has it that the country will have 80% certified teachers if nothing is changed. Thus, the need to do something, and the comparisons would lead to a figure in this general area. It is unlikely that a much higher goal would be feasible.

Goal: That the average score on the teacher competency examination for primary teachers reach 50 points of a possible 65.

Again, this seems reasonable, given scores in other countries, which currently have a mean of about 48 points (see table). The difficulty of using test scores as a goal will become apparent as the analysis proceeds. There is little way to assure any such outcome from a policy action, as it cannot be proven that there is a causal relationship between training at a teacher training college or at in-service and exam results.

5

**GENERATE &
NARROW
ALTERNATIVES**



STEP 5 GENERATE AND NARROW ALTERNATIVES

OBJECTIVE 5.1

List Alternative Solutions

OBJECTIVE 5.2

Eliminate Non-feasible Alternatives

OBJECTIVE 5.3

**Compare Obvious Implications of
Solutions With Obvious Constraints**

OBJECTIVE 5.4

Make Retained Solutions Concrete

OBJECTIVE 5.1

TIME LIMIT: 60 MINUTES

LIST ALTERNATIVE SOLUTIONS

Facilitator Activities

- Lead facilitator introduces exercise and explains objective 5.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 60 minutes maximum to complete the exercise.
- Tell the group that the output is a written list of possible solutions to achieve the goals specified in the previous step.

Trainee Activities

- Group discussion.
- Brainstorming
- Taking notes.

List Alternative Solutions

Facilitator Activities

Trainee Activities

TASK

Using group brainstorming techniques, generate a list of at least 15 solutions to the Case Study problem of how to improve teacher quality, according to the operational definition specified in the previous step.

The point of this exercise is to provide as many solutions as possible to achieve the goals of increasing the number of certified teachers and/or to attempt to improve performance on the teacher competency examination.

In brainstorming sessions, trainees should be reminded not to evaluate or censor any solutions, but to generate as many as possible. They will have the opportunity to eliminate non-feasible solutions in the next steps.

Solution

The facilitator must assure that at least the first two solutions (presented in bold face) are included and retained throughout, as they will be followed through in this manual, and cost and effectiveness data are available for them. Of course, trainees will wish to pursue other solutions, either by locating cost and effectiveness data for them, or by estimating such data.

List of Alternative Solutions

- Build new teacher training colleges
- Send uncertified teachers to inservice training programs
- Fire all uncertified teachers
- Recruit certified teachers from other countries
- Try to retain certified teachers by raising teacher salary scales
- Build a radio learning instructional system for teachers
- Shorten the time needed for a degree from a teacher training college
- Create double shifts at teacher training colleges to increase capacity
- Give automatic certification to teachers already teaching in the system
- Decrease primary school enrollment so that we will need fewer teachers

Task

Solution

List of Alternative Solutions

OBJECTIVE 5.2

TIME LIMIT: 20 MINUTES

**Eliminate
Non-feasible
Alternatives****ELIMINATE NON-FEASIBLE ALTERNATIVES****Facilitator
Activities****Facilitator Activities**

- Facilitator introduces exercise and explains objective 5.2.
- Instruct groups that they have 20 mins. maximum to complete the exercise.
- Tell the group to work with the list they generated in the previous step.

**Trainee
Activities****Trainee Activities**

- Group discussion.
- Reaching consensus.

Task**TASK**

Using the list of 15 solutions to the teacher quality problem developed in the step above, eliminate the alternatives which are obviously non-feasible. Use group consensus techniques.

Solution**Solution**

This exercise is meant to be completed quickly. Any techniques of reaching consensus previously practiced may be used. An example of what might be eliminated from the previous list as being unfeasible follows:

**Alternative
Solutions****List of Alternative Solutions**

- Build new teacher training colleges
- Send uncertified teachers to in service training programs
- Fire all uncertified teachers
- ~~Recruit certified teachers from other countries~~
- Try to retain certified teachers by raising teacher salary scales
- Build a radio learning instructional system for teachers
- Shorten the time needed for a degree from a teacher training college
- Create double shifts at teacher training colleges to increase capacity
- ~~Decrease primary school enrollment so that we will need fewer teachers~~

OBJECTIVE 5.3**TIME LIMIT: 60 MINUTES****COMPARE OBVIOUS IMPLICATIONS OF SOLUTIONS WITH OBVIOUS CONSTRAINTS****Facilitator Activities**

- Facilitator introduces exercise and explains objective 5.3.
- Instruct groups that they have 60 minutes maximum to complete the exercise.
- Tell the group to work with the list they generated in the previous step.

Trainee Activities

- Group discussion
- Reaching consensus
- Keeping notes.

Obvious Implications and Constraints**Facilitator Activities****Trainee Activities****TASK**

Using the remaining list of solutions to the teacher quality problem developed in the step above, compare the implications with the constraints. Use group consensus techniques to arrive at two or three remaining solutions.

Task

The goal of this step is to continue to narrow the list of proposed solutions, so that only two or three remain. This step will take longer than the previous one, since many of the solutions retained to this point will be feasible ones. Here, the trainees should generate implications and constraints for each solution, and carefully keep notes of them. At the end, group consensus techniques should be employed to reach the final list of two or three.

Solution**Solution**

Following is the example list with all but two solutions eliminated, including a few reasons for eliminating the others.

List of Alternative Solutions**Alternative Solutions**

- Build new teacher training colleges
- Send uncertified teachers to in-service training programs
- Recruit certified teachers from other countries
[Conflicts with nation-building governmental policies.]
- Try to retain certified teachers by raising teacher salary scales
[There is little known about the reasons for teachers currently leaving the system.]
- Build a radio learning instructional system for teachers
- Shorten the time needed for a degree from a teacher training college
[Anticipated opposition from professors in teacher training colleges.]
- Create double shifts at teacher training colleges to increase capacity
[Teacher training colleges are already working at their capacity.]
- Give automatic certification to teachers who are already teaching in the system
[Anticipated opposition from teacher's union and teacher training.]

OBJECTIVE 5.4

TIME LIMIT: 60 MINUTES

Make Retained Solutions Concrete**MAKE RETAINED SOLUTIONS CONCRETE****Facilitator Activities****Facilitator Activities**

- Facilitator introduces exercise and explains objective 5.4.
- Instruct groups that they have 60 minutes maximum to complete the exercise.
- Tell the group that the output is a series of concrete specifications for the proposals retained from the previous step.

Trainee Activities**Trainee Activities**

- Read text and tables.
- Group discussion
- Reaching consensus

Task**TASK**

Make the solutions you retained for the teacher quality problem concrete. Write a series of specifications for each solution.

The aim in this step is for the trainees to concretize their proposals in sufficient detail to proceed to an analysis of projected costs and projected outcomes. Trainees should be reassured that their implementation proposals will most likely be modified as the costing procedures and outcome analyses proceed.

Solution**Solution**

Possible implementation plans for the two retained proposals follow.

Build new teacher training colleges

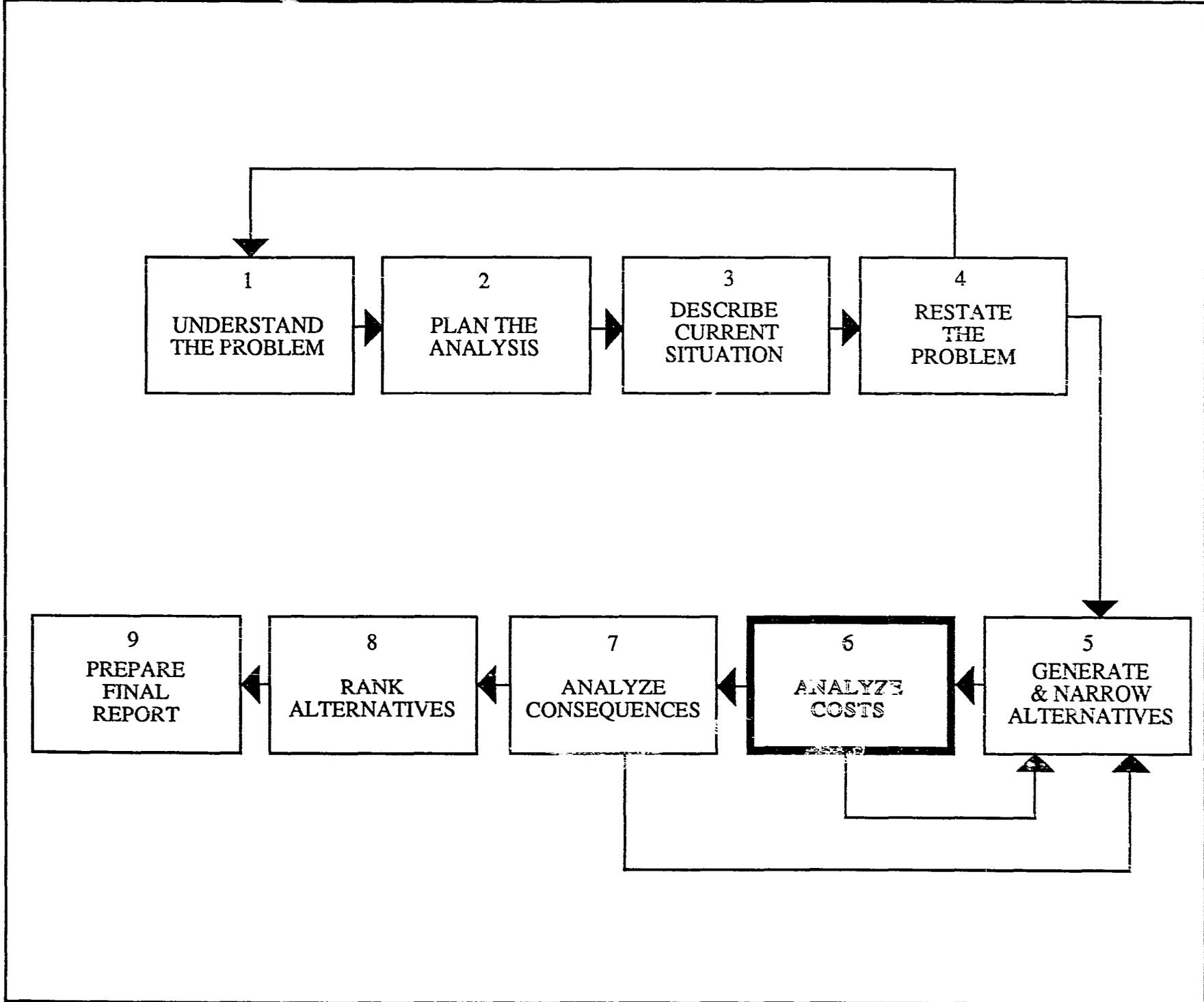
- Given budget constraints, one new teacher training college should be built.
- It will be operational at the beginning of the 1984-1985 academic year.
- It should be located in a rural area where other teacher training colleges do not exist.
- It will be staffed with new teacher training faculty.

Send uncertified teachers to In-service training programs

- Have all uncertified primary teachers attend an eight-week in-service training course.
- This will be accomplished over a five-year period, ending in 1989.
- Courses can be offered during the two-month school vacation.
- Courses will be conducted in each district.
- Use existing governmental structures, such as school buildings, to house the training sessions.

6

**ANALYZE
COSTS**



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STEP 6 ANALYZE COSTS

OBJECTIVE 6.1

Understand Cost Concepts

OBJECTIVE 6.2

Understand Recurrent and
Non-recurrent Costs

OBJECTIVE 6.3

Understand Direct and
Indirect Costs

OBJECTIVE 6.4

Understand Monetary and
Non-monetary Costs

OBJECTIVE 6.5

Make Financial Projections

OBJECTIVE 6.6

Understand Unit Costs

UNDERSTANDING COST CONCEPTS

Facilitator Activities

- Lead facilitator introduces exercise and explains objective 6.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 90 minutes maximum to complete the exercise.
- Tell the group that the output is a comprehensive list of costs associated with each of the proposals they have retained.

Trainee Activities

- Group discussion.
- Brainstorming.
- Reaching consensus.
- Taking notes.

Understanding Cost Concepts

Facilitator Activities

Trainee Activities

TASK

Continuing with the Case Study, identify the costs associated with each of the proposals retained for improving teacher quality. Keep a written record of the costs for each proposal.

Task

The list of costs which the trainees generate in this step will serve as the basis for all future exercises. Thus, it must be as comprehensive as possible.

Solution

Solution

A list of possible costs for each proposal follows:

Build a new teacher training college

- Construction and materials cost for building the teacher training college.
- Interest on loan for construction.
- Cost of professors in new teacher training college.
- Cost of operating new teacher training college (energy, maintenance, etc.)
- Increased governmental salaries for more certified teachers in system.
- Opposition from other governmental agencies who have existing proposals for new construction.

Send uncertified teachers to in-service training programs

- Keeping school buildings open during vacation (energy, maintenance, etc.)
- Travel costs of participants.
- Per diem expenses of participants.
- Travel costs of instructors
- Per diem expenses of instructors.
- Cost of curricular materials.
- Opposition by participants to working during vacation period.
- Salaries of instructors.
- Opposition by teacher training college faculty to certifying teachers who have not attended formal programs.
- Administrative costs of running the in service program.

ff

Recurrent and Non-recurrent Costs

UNDERSTANDING RECURRENT AND NON-RECURRENT COSTS

Facilitator Activities

Facilitator Activities

- Facilitator introduces exercise and explains objective 6.2.
- Instruct groups that they have 20 minutes maximum to complete the exercise.
- Tell the group to continue working with the list of costs they generated in Exercise 6.1.

Trainee Activities

Trainee Activities

- Group discussion
- Reaching consensus.
- Taking notes.

Task

TASK

Continuing with the Case Study, take the list of costs associated with each of the proposals retained for improving teacher quality, which you generated in the previous step, and classify each as recurrent or non-recurrent.

Solution

Solution

Build a new teacher training college

Non-

- recurrent**
- Construction and materials cost for building the teacher training college.
 - Opposition from other governmental agencies who have existing proposals for new construction.

Recurrent

- Interest on loan for construction.
- Cost of professors in new teacher training college.
- Cost of operating new teacher training college (energy, maintenance, books, etc.)
- Increased governmental salaries for more certified teachers in system.

Send uncertified teachers to in-service training programs

Non-

- recurrent**
- Opposition by teacher training college faculty to certifying teachers who have not attended formal programs.

Recurrent

- Keeping school buildings open during the vacation (energy, maintenance, etc.)
- Travel costs of participants.
- Per diem expenses of participants.
- Travel costs of instructors.
- Per diem expenses of instructors.
- Cost of curricular materials
- Salaries of instructors.
- Administrative costs of running the in-service program.
- Opposition by participants of working during vacation period.

UNDERSTANDING DIRECT AND INDIRECT COSTS

Facilitator Activities

- Facilitator introduces exercise and explains objective 6.3.
- Instruct groups that they have 20 mins maximum to complete the exercise.
- Tell the group to continue work on the list of costs generated in Exercise 6.1.

Trainee Activities

- Group discussion
- Reaching consensus.
- Taking notes.

Direct and Indirect Costs

Facilitator Activities

Trainee Activities

TASK

Continuing with the Case Study, take the list of costs associated with each of the proposals retained for improving teacher quality, and classify each as direct or indirect.

Task

As mentioned in the explanatory text in the exercise manual, the classification of costs as direct or indirect is less straightforward than, for example, recurrent and non-recurrent. The main purpose of the exercise is to alert trainees to costs which they may have overlooked. If such costs are identified, by all means they should be included in the list

Solution

Solution

Build a new teacher training college

Direct

- Construction and materials cost for building the teacher training college.
- Interest on loan for construction.
- Cost of professors in new teacher training college.
- Cost of operating new teacher training college (energy, maintenance, books, etc.)

Indirect

- Increased governmental salaries for more certified teachers in system.
- Opposition from other governmental agencies who have existing proposals for new construction.

Send uncertified teachers to inservice training programs

Direct

- Keeping school buildings open during the vacation (energy, maintenance, etc.)
- Travel costs of participants.
- Per diem expenses of participants.
- Travel costs of instructors.
- Per diem expenses of instructors.
- Cost of curricular materials.
- Salaries of instructors.

Indirect

- Opposition by participants of working during vacation period.
- Opposition by teacher training college faculty to certifying teachers who have not attended formal programs.
- Administrative costs of running the in-service program.

Monetary and Non-Monetary Costs

Facilitator Activities

UNDERSTANDING MONETARY AND NON-MONETARY COSTS

Facilitator Activities

- Facilitator introduces exercise and explains objective 6.4.
- Instruct groups that they have 20 minutes maximum to complete the exercise.
- Tell the group to continue working with the list of costs they generated in Exercise 6.1.

Trainee Activities

Trainee Activities

- Group discussion
- Reaching consensus.
- Taking notes.

Task

TASK

Continuing with the Case Study, take the list of costs associated with each of the proposals retained for improving teacher quality, and classify each as monetary or non-monetary.

This exercise is straightforward. However, facilitators may wish to tell trainees that some economists will claim that, in principle, any cost is quantifiable in monetary terms. For example, one could attempt to estimate what the cost in terms of lost time that political opposition to a given policy would be to a Minister, and such a cost might be expressed monetarily.

Solution

Solution

Build a new teacher training college

- Monetary**
- Construction and materials cost for building the teacher training college.
 - Interest on loan for construction.
 - Cost of professors in new teacher training college.
 - Cost of operating new teacher training college (energy, maintenance, books, etc.)
 - Increased governmental salaries for more certified teachers in system.

- Non-monetary**
- Opposition from other governmental agencies who have existing proposals for new construction.

Send uncertified teachers to in-service training programs

- Monetary
- (includes things operating, energy, maintenance, etc.)
 - Travel costs of participants.
 - Per diem expenses of participants.
 - Travel costs of instructors.
 - Per diem expenses of instructors.
 - Cost of curricular materials.
 - Salaries of instructors.
 - Administrative costs of running the inservice program.

- Non-monetary
- Opposition by participants of working during vacation period.
 - Opposition by teacher training college faculty to certifying teachers who have not attended formal programs.

Making Financial Projections

MAKING FINANCIAL PROJECTIONS

Facilitator Activities

Facilitator Activities

- Facilitator introduces exercise and explains objective 6.5.
- Instruct groups that they have 4 hours maximum to complete the exercise.
- Tell the group that the output is a detailed record of their cost computations for each proposal.

Trainees Activities

Trainee Activities

- Read text and tables.
- Delegation of responsibility.
- Making projections.
- Reaching consensus.
- Writing drafts.

Task

TASK

Continuing with the Case Study, take the list of monetary costs associated with each of the proposals retained for improving teacher quality, which you generated in the previous step, and project the cost of each proposal over its anticipated time period, reporting the recurrent, non-recurrent, and total costs for each.

Use the following data from the Case Study to help in computing these costs, and estimate other costs when data are not available. Keep a detailed record of your computations.

Solution

Solution

Proposal #1

Proposal #1, Build a new teacher training college: **Non-recurrent costs**

Construction and materials cost for building the teacher training college:

The memo from the Educational Planning Division estimates the cost of such a structure to be 89,200 Pula. However, this was the cost in 1981. If the inflation rate for materials has been 15%, and for labor and miscellaneous, 9%, an estimate of the 1983 costs would be computed as follows:

Materials:	1981	55,400 x 1.15 =
	1982	63,710 x 1.15 =
	1983	73,267

Labor, etc.:	1981	33,800 x 1.09 =
	1982	36,842 x 1.09 =
	1983	40,158

Total cost = 113,425

Interest on loan for construction:

Let us assume that the interest rate for the government to borrow money for the construction of the building is 10%, a reasonable estimate. Without using amortization tables for the computation, we may postulate that the government will pay off the construction costs over a period of five years, and will pay off one-fifth of the principal each year:

Year	Principal	Payment	Interest
1984	113,425	22,685	11,343
1985	90,740	22,685	9,074
1986	68,055	22,685	6,806
1987	45,370	22,685	4,537
1988	22,685	22,685	2,269
1989	0	0	0
total interest =			34,029

Cost of professors in new teacher training college.

Cost of operating new teacher training college (energy, maintenance, books, etc.)

Both the costs of instructors at the teacher training college and the costs of operating and maintaining a teacher training college have been estimated in the Case Study data statement on the cost per student at a teacher training college (the unit cost). This is 608 Pula per year.

Since the capacity of the teacher training college will be 300 students per year, and the cost per student is 608 Pula, a good estimate of the operating costs, including instructors, is $300 \times 608 = 182,400$ Pula per year.

Increased governmental salaries for more certified teachers in system:

Since more certified teachers will be added to the system under this proposal, governmental salaries for the teaching force will increase. The way to estimate these costs is to project the teaching force composition over the life of the program. Since we do not have data on the current experience levels of the teachers in the force now, one way to go about making this projection is to assume that all current teachers are at the midpoint of their pay scales.

We will project two scenarios: one if the proposal is implemented, and one if it is not. To do this, we will use the projection table from Exercise 4.2. We will also fill in the number of teachers needed between 1984 and 1989 to see what the cumulative cost of the proposal would be. Since enrollment rates are growing from 92% to 98%, we will assume a one percent increase per year.

Proposal #0- If the proposal is not implemented

Year	Certified	Students	Uncertified	Total
1983	4,404	194,897	1,894	6,298
1984	4,724	201,159	1,773	6,497
1985	5,044	209,422	1,720	6,764
1986	5,364	217,999	1,677	7,041
1987	5,684	226,903	1,645	7,329
1988	6,004	236,145	1,623	7,627
1989	6,324	245,736	1,613	7,937

Proposal #0

Next, we assume that teachers currently in the labor force are, on the average, in the middle of their respective pay scales, and that newly hired teachers will enter at the bottom of their pay scales, both certified and uncertified.

That is, the existing certified teachers, in 1983, average 4,176 Pula per year; the uncertified, 2096 Pula.

From the existing teacher training colleges, the 440 newly certified teachers entering the teaching force will begin at 3,600 Pula. The 120 certified teachers who leave the system will come from the existing group.

Included in these projections are the salary increments for all teachers concerned.

Year Certified

1983	4,404			
1984	4,724	original group:	$4,404 - 120 = 4,284 \times P4,272$	= 18,301,248
		certified 1984:	$440 \times P3,600$	= 1,584,000
			total	= 19,885,248
1985	5,044	original group:	$4,284 - 120 = 4,164 \times P4,368$	= 18,188,352
		1984 group :	$440 \times P3,696$	= 1,626,240
		1985 group :	$440 \times P3,600$	= 1,584,000
			total	= 21,398,592
1986	5,364	original group:	$4,164 - 120 = 4,044 \times P4,464$	= 18,052,416
		1984 group :	$440 \times P3,792$	= 1,668,480
		1985 group :	$440 \times P3,696$	= 1,626,240
		1986 group :	$440 \times P3,600$	= 1,584,000
			total	= 22,931,136
1987	5,684	original group :	$4,044 - 120 = 3,924 \times 4,560$	= 17,893,440
		1984 group :	$440 \times 3,888$	= 1,710,720
		1985 group :	$440 \times 3,792$	= 1,668,480
		1986 group :	$440 \times 3,696$	= 1,626,240
		1987 group :	$440 \times 3,600$	= 1,584,000
			total	= 24,482,880
1988	6,004	original group:	$3,924 - 120 = 3,804 \times 4,656$	= 17,711,424
		1984 group :	$440 \times 3,984$	= 1,752,960
		1985 group :	$440 \times 3,888$	= 1,710,720
		1986 group :	$440 \times 3,792$	= 1,668,480
		1987 group :	$440 \times 3,696$	= 1,626,240
		1988 group :	$440 \times 3,600$	= 1,584,000
			total	= 26,053,824
1989	6,324	original group:	$3,804 - 120 = 3,684 \times 4,752$	= 17,506,368
		1984 group :	$440 \times 4,080$	= 1,795,200
		1985 group :	$440 \times 3,984$	= 1,752,960
		1986 group :	$440 \times 3,888$	= 1,710,720
		1987 group :	$440 \times 3,792$	= 1,668,480
		1988 group :	$440 \times 3,696$	= 1,626,240
		1989 group :	$440 \times 3,600$	= 1,584,000
			total	= 27,643,968

<u>Year</u>	<u>Uncertified</u>	
1983	1,894	
1984	1,773	1,773 x 2,144 = 3,801,312
1985	1,720	1,720 x 2,192 = 3,770,240
1986	1,677	1,677 x 2,192 = 3,675,984
1987	1,645	1,645 x 2,192 = 3,605,840
1988	1,623	1,623 x 2,192 = 3,557,616
1989	1,613	1,613 x 2,192 = 3,535,696
		<u>total = 21,946,688</u>

**Summary of salary costs if
no proposal is implemented**

Certified teacher salaries	
1984.....	19,885,248
1985.....	21,398,592
1986.....	22,931,136
1987.....	24,482,880
1988.....	26,053,824
1989.....	27,643,968
Uncertified teacher salaries	
1984.....	3,801,312
1985.....	3,770,240
1986.....	3,675,984
1987.....	3,605,840
1988.....	3,557,616
1989.....	3,535,696
Total teacher salaries	
	164,342,336

Proposal #1- Build a new teacher training college: Recurrent Costs

If a new teacher training college is built, an additional 145 teachers can be assumed to be entering the system; there will still be 440 entering from the three existing teacher training colleges; there will still be 120 experienced teachers leaving from the original group, a net gain of 465 newly certified teachers, first entering the system in 1985:

Proposal # 1

Year	Certified	Students	Uncertified	Total
1983	4,404	194,897	1,894	6,298
1984	4,724	201,159	1,773	6,497
1985	5,189	209,422	1,575	6,764
1986	5,654	217,999	1,387	7,041
1987	6,119	226,903	1,210	7,329
1988	6,584	236,145	1,043	7,627
1989	7,049	245,736	888	7,937

Next, we assume that teachers currently in the labor force are, on the average, in the middle of their respective pay scales, and that newly hired teachers will enter at the bottom of their pay scales, both certified and uncertified.

That is, the existing certified teachers, in 1983, average 4,176 Pula per year; the uncertified, 2,096 Pula.

From the existing teacher training colleges, the 440 newly certified teachers entering the teaching force will begin at 3,600 Pula. The 120 certified teachers who leave the system will come from the existing group. And the 145 teachers per year coming from the newly built teacher training college will appear in the teaching force in 1985.

Included in these projections are the salary increments for all teachers concerned.

Year Certified

1983 4,404

1985 5,044 original group: 4,284-120 = 4,164 x P4,368 = 18,188,352
 1984 group : 440 x P3,696 = 1,626,240
 1985 group : 585 x P3,600 = 2,106,000
 total = 21,920,592

1986 5,364 original group: 4,164-120 = 4,044 x P4,464 = 18,052,416
 1984 group : 440 x P3,792 = 1,668,480
 1985 group : 585 x P3,696 = 2,162,160
 1986 group : 585 x P3,600 = 2,106,000
 total = 23,989,056

1987 5,684 original group: 4,044-120 = 3,924 x 4,560 = 17,893,440
 1984 group : 440 x 3,888 = 1,710,720
 1985 group : 585 x 3,792 = 2,218,320
 1986 group : 585 x 3,696 = 2,162,160
 1987 group : 585 x 3,600 = 2,106,000
 total = 26,090,640

1988 6,004 original group: 3,924-120 = 3,804 x 4,656 = 17,711,424
 1984 group : 440 x 3,984 = 1,752,960
 1985 group : 585 x 3,888 = 2,274,480
 1986 group : 585 x 3,792 = 2,218,320
 1987 group : 585 x 3,696 = 2,162,160
 1988 group : 585 x 3,600 = 2,106,000
 total = 28,225,344

1989 6,324 original group : 3,804-120= 3,684 x 4,752 = 17,506,368
 1984 group : 440 x 4,080 = 1,795,200
 1985 group : 585 x 3,984 = 2,330,640
 1986 group : 585 x 3,888 = 2,218,320
 1987 group : 585 x 3,792 = 1,668,480
 1988 group : 585 x 3,696 = 2,162,160
 1989 group : 585 x 3,600 = 2,106,000
 total = 29,787,168

<u>Year</u>	<u>Uncertified</u>					
1983	1,894					
1984	1,773	1,773	x	2,144	=	3,801,312
1985	1,575	1,575	x	2,192	=	3,452,400
1986	1,387	1,387	x	2,192	=	3,040,304
1987	1,210	1,210	x	2,192	=	2,652,320
1988	1,043	1,043	x	2,192	=	2,286,256
1989	888	888	x	2,192	=	1,946,496
				Total	=	17,179,088

**Summary of salary costs if a new
teacher training college is built**

Certified teacher salaries	
1984.....	19,885,248
1985.....	21,920,592
1986.....	23,989,056
1987.....	26,090,640
1988.....	28,225,344
1989.....	29,787,168
Uncertified teacher salaries	
1984.....	3,801,312
1985.....	3,452,400
1986.....	3,040,304
1987.....	2,652,320
1988.....	2,286,256
1989.....	1,946,496
Total teacher salaries	167,077,136

Summary of cost differences

If no new teacher training college, salaries will be:
164,342,336

If new teacher training college is built, salaries will be:
167,077,136

Thus the cost of the program in terms of salaries will be:
2,734,800 Pula

Summary of Costs for Proposal #1 (Build teacher training college)

Building cost.....	113,425
Interest on loan	34,029
Operating teacher training college for 5 years..	.912,000
Salary increases to government.....	2,734,800
Total Costs.....	3,794,254

Summary

The facilitator should note that trainees may come up with different cost estimates, depending on implementation. While it appears that the proposal is considerably above the 20 percent budget increase limitation, it is, in fact, quite close:

The authorized budget for teacher training is currently 1,001,900 Pula. Over five years this would amount to 5,009,500 Pula (not counting inflation), and 20 percent of this is 1,001,900 Pula. The portion of the cost estimate which is the increased salaries of the certified teachers, however, is an indirect cost, which would not be charged to the teacher training budget. Thus, while it is certainly a real cost of the proposal, it ought to be construed as not part of the 20 percent budget increase. This leaves direct costs of building, interest and operation, a total of 1,059,454 Pula, which is close enough to present to the Minister.

Proposal #2

Proposal #2: Send uncertified teachers to inservice training programs

The general operationalization of this proposal is that the 1613 untrained teachers who will remain in the system by 1989 all undergo in service training for an eight-week summer session. Due to the limited amount of cost data relevant to this proposal, many estimates will have to be made.

Travel costs of participants.

Since both rural and urban teachers will be involved in the in service, an estimate of the average distance traveled to the workshops will be set at 100 kilometers. Given the information in the cost data, the round-trip expenses for the 1,613 teachers can be computed as:

$$100 \text{ km} \times 2 \text{ trips} \times .16 \text{ Pula} \times 1,613 = 51,616 \text{ Pula}$$

Per diem expenses of participants.

Again, using the cost data, assuming the use of secondary schools for accommodations, we estimate 5 Pula per day for room, and 4 Pula per day for board, for 48 days (8 weeks less Sundays):

$$48 \text{ days} \times 9 \text{ Pula} \times 1613 = 696,816 \text{ Pula}$$

Travel costs of instructors.

Assuming a ratio of ten students per instructor (yielding $1613/20 = 81$ instructors, over the five-year period), and using the same travel estimates, we have:

$$100 \text{ km} \times 2 \text{ trips} \times .16 \text{ Pula} \times 81 = 2,592 \text{ Pula}$$

Per diem expenses of instructors.

The 162 instructors have higher per diem expenses than do the trainees, averaging 15 Pula for meals and 24 Pula for room:

$$48 \text{ days} \times 39 \text{ Pula} \times 81 = 151,632 \text{ Pula}$$

Cost of curricular materials.

The cost data for materials varies considerably, but the use of the average of 2.5 Pula per trainee per day seems appropriate:

56 days x 2.5 Pula x 1613 = 225,820 Pula

Salaries of instructors and administrative costs.

These are assumed to be zero, as instructors and administrators are paid during the summer anyhow.

Keeping school buildings open during the vacation (energy, maintenance, etc.)

These costs are assumed to be small during the summer, since heating is not required for the school buildings. The estimate for janitorial time is 1000 Pula per year for five years

Summary of Costs for Proposal #2 (Inservice Training)

Participant travel.....	51,616
Participant per diem.....	696,816
Instructor travel.....	2,592
Instructor per diem.....	151,632
Materials.....	225,820
Maintenance.....	5,000
Total Costs.....	1,133,476

Again, this estimate comes in slightly higher than the 20 percent budget limitation of 1,001,900 Pula over five years. If the group wishes to remain within the constraints, the facilitator may wish to suggest that the group wait until the next section, where the concept of unit costs are introduced. When unit costs are computed, the group may wish to modify their proposal to train fewer teachers, in order to stay within the constraints. Alternatively, an appeal to the likelihood of inflation increasing the budget in the next five years could be made, thus arguing that the proposal is close enough to pursue.

Understanding Unit Costs

UNDERSTANDING UNIT COSTS

Facilitator Activities

Facilitator Activities

- Facilitator introduces exercise and explains objective 6.6.
- Instruct groups that they have 60 minutes maximum to complete the exercise.
- Tell the group to keep careful notes of their computations.

Trainee Activities

Trainee Activities

- Read text and tables.
- Statistical computation.
- Taking notes.

Task

TASK

Continuing with the Case Study, take the financial projections of the cost of each proposal, which you completed in the previous step, and compute the unit cost for each proposal. Keep a detailed record of your computations.

This is a straightforward computation, given the cost projections already done on the previous step. The trainees do have some choices to make: should the unit costs be computed per year or over the life of the program, for example. The following solution computes the unit cost over the life of the program:

Solution

Solution

Proposal # 1

Proposal #1: Build a new teacher training college

The total cost of the program has been estimated at 3,794,254 Pula. Starting in 1985, and continuing through 1989, 145 new certified teachers per year will graduate from the new teacher training college for a total of 725 teachers.

Thus, the unit cost of proposal #1 is:

$$3,794,254 / 725 = 5,233.45 \text{ Pula per teacher.}$$

Proposal # 2

Proposal #2: Send all uncertified teachers to eight weeks of inservice training

The total cost of the program has been estimated at 1,133,476 Pula.

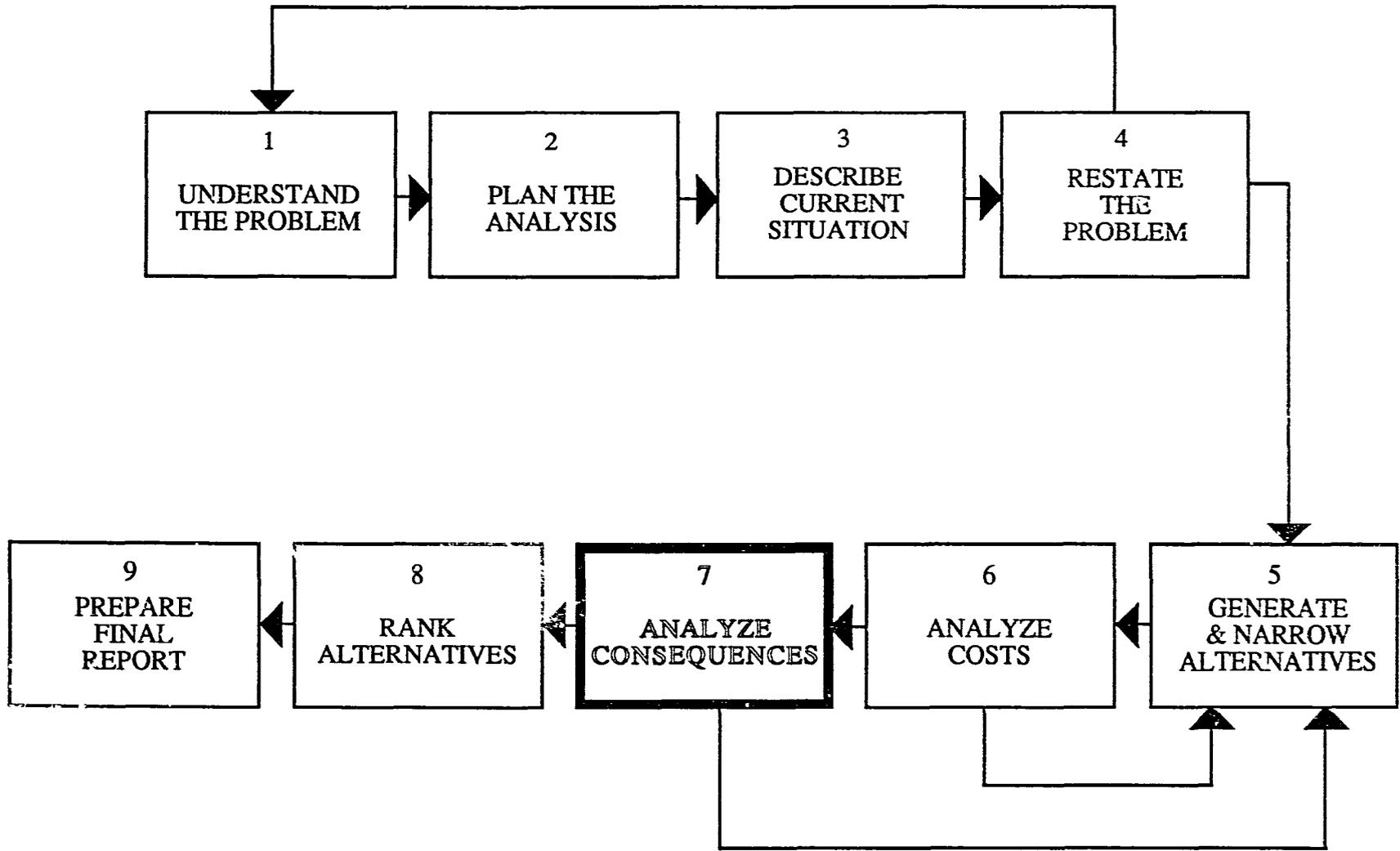
A total of 1,613 teachers will be served.

Thus, the unit cost of proposal #2 is:

$$1,133,476 / 1,613 = 702.71 \text{ Pula per year.}$$

7

**ANALYZE
CONSEQUENCES**



STEP 7 ANALYZE CONSEQUENCES

OBJECTIVE 7.1

Identify Implications and Effects

OBJECTIVE 7.2

Separate Effects Into
Quantifiable and Non-quantifiable

OBJECTIVE 7.3

Make Projections
of Quantifiable Effects

OBJECTIVE 7.1

TIME LIMIT: 60 MINUTES

IDENTIFYING IMPLICATIONS AND EFFECTS

Facilitator Activities

- Lead facilitator introduces exercise and explains objective 7.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 60 minutes maximum to complete the exercise.
- Tell the group that the output is a list of the consequences of their proposals for the improvement of teacher quality.

Trainee Activities

- Group discussion.
- Brainstorming.
- Reaching consensus.
- Taking notes.

Identifying Implications and Effects

Facilitator Activities

Trainee Activities

TASK

Returning to the Case Study, make a list of at least five negative and five positive consequences of each of the proposals for improving teacher quality.

There are many possible consequences of both proposals. If the group wishes to include more than ten, there is no reason to limit them. However, in order to pursue the cost-effectiveness analysis, the one consequence which must be retained for both proposals is an increase in teacher competency examination scores.

Solution

Proposal #1: Build a new teacher training college

Positive

- Teacher competency examination scores will improve.
- Country will look better in terms of percent certified teachers.
- New building in rural area will serve community development functions.
- Uncertified teachers will be upgraded according to this program implementation.
- Improved economy in the rural area where the teacher training college is located.

Task

Solution

Proposal #1

Proposal #2

Proposal #2:

Send all uncertified teachers to eight weeks on inservice training.

Positive

- Teacher competency examination scores will improve.
- Relatively low program cost.
- Possibilities of group and professional cohesion being formed during inservice workshop.
- Economic benefits to numerous sites chosen for the workshops.
- All uncertified teachers may be retrained in the system.

Negative

- Adding another formal level of certification to the career structure.
- Possible opposition from teachers unions.
- Opposition from participants at having to forfeit their vacation time.
- Added burden to Ministry for administration of the program.

OBJECTIVE 7.2

TIME LIMIT: 30 MINUTES

SEPARATING EFFECTS INTO QUANTIFIABLE AND NON-QUANTIFIABLE.

Facilitator Activities

- Facilitator introduces exercise and explains objective 7.2.
- Instruct groups that they have 30 minutes maximum to complete the exercise.
- Tell the group that the output is a list of the consequences of their proposals for the improvement of teacher quality, categorized as quantifiable versus non-quantifiable.

Trainee Activities

- Group discussion.
- Brainstorming.
- Reaching consensus.
- Taking notes.

Quantifiable v. Non-quantifiable Effects

Facilitator Activities

Trainee Activities

TASK

Returning to the list of positive and negative consequences for each of the proposals for improving teacher quality, categorize each as quantifiable or non-quantifiable.

There may be some disagreement among group members on which consequences are, in principle, quantifiable or not. This is to be expected: there is similar disagreement among scholars regarding these matters. The facilitator should keep in mind that the cost-effectiveness analysis which occurs in Exercise 8 must be based on quantifiable consequences which are common to both proposals. Therefore, what is crucial for the flow of the exercise is that the increase in teacher competency examination scores be a common quantifiable consequence of both proposals, and that there is group consensus on this matter. Notice we do not claim that teacher quality is not necessarily quantifiable, but that test scores are.

Solution

Proposal #1: Build a new teacher training college

Quantifiable

- Teacher competency examination scores will improve.
- Country will look better in terms of percent certified teachers.
- Improved economy in the rural area where the teacher training college is located.
- Very high indirect costs of operating teacher training college.

Task

Solution

Proposal # 1

Non-quantifiable

- Uncertified teachers will be upgraded according to this program implementation.
- Teaching trainees will have to be uprooted for two years.
- In the long run, country may not need four teacher training colleges.
- There may be a political battle over where the teacher training college is to be located.
- Instructors in the teacher training college may resist working in rural area.
- New building in rural area will serve community development functions.

Proposal #2

Proposal #2: Send all uncertified teachers to eight weeks of inservice training

Quantifiable

- Teacher competency examination scores will improve.
- Relatively low program cost.
- Economic benefits to numerous sites chosen for the workshops.
- All uncertified teachers may be retained in the system.
- Added burden to Ministry for administration of the program.

Non-quantifiable

- Possibilities of group and professional cohesion being formed during inservice workshop.
- Adding another formal level of certification to the career structure.
- Possible opposition from teachers unions.
- Possible opposition from teacher training college instructors.
- Opposition from participants at having to forfeit their vacation time.

OBJECTIVE 7.3

TIME LIMIT: 3 HOURS

MAKING PROJECTIONS OF QUANTIFIABLE EFFECTS

Facilitator Activities

- Facilitator introduces exercise and explains objective 7.3.
- Instruct groups that they have 3 hours maximum to complete the exercise.
- Tell the group that the output is a summary set of paragraphs explaining their projections of the quantifiable effects of each proposal, including assumptions made.

Trainee Activities

- Read text and tables.
- Delegation of responsibility.
- Making projections.
- Reaching consensus.
- Writing drafts.

Projections of Quantifiable Effects

Facilitator Activities

Trainee Activities

TASK

Using data from the following table describing teacher scores on the competency examination, broken down by level of training certification, project the quantifiable outcomes of each of the proposals for improving teacher quality. Keep a detailed record of your computations, and write a summary of your results.

Task

The most difficult and controversial part of attempting to project effects of social programs is having to impute causality to a proposed action, where, in fact, we know that the scores on a competency examination, for example, are the consequences of many factors besides teacher training. Nevertheless, one attempts to use whatever evidence one can find in order to have some idea of what may happen if one proposal or another is accepted. The key to conducting such projections is to provide numerous caveats as to the real uncertainty of outcomes.

The quantifiable outcome which is common to both proposals is the increase in teacher competency examination scores. The best data for estimating the effect of each program is presented in the table breaking down exam scores by level of training. Again, one must use this table with the understanding that training cannot be proven to be the single determinant of exam scores, but that this is the only information available for making an estimate.

The projection is made in the following way:

Solution | Solution

From the elaborate tables computed in Exercise 6.5, we know the following about the projected composition of the teaching force in 1989:

- If no proposal is implemented, there will be 6,324 certified and 1,613 uncertified teachers in 1989.
- If Proposal #1 (building a new teacher training college) is implemented, there will be 7,049 certified and 888 uncertified teachers in 1989.
- If Proposal #2 (sending all uncertified teachers to an inservice workshop) is implemented, there will be 6,324 certified and 1,613 inservice certified teachers in 1989.

From the table presented in Exercise 7.3, we know that the average total scores on the teacher competency examination for various levels of teacher certification are:

- Certified at teacher training college: 48.7
- Inservice certificate: 36.5
- Not certified: 25.3

From this information, estimates of the average performance system-wide on the teacher competency examination may be computed, for each proposal and for the alternative that no proposal is implemented.

<u>Projected Teachers in 1989</u>			
Numbers of # Teachers	No proposal	Proposal #1	Proposal #2
Certified	6,324	7,049	6,324
InService	0	0	1,613
Uncertified	1,613	888	0
Total	7,937	7,937	7,937

Projected Aggregated Competency Examination Scores In 1989

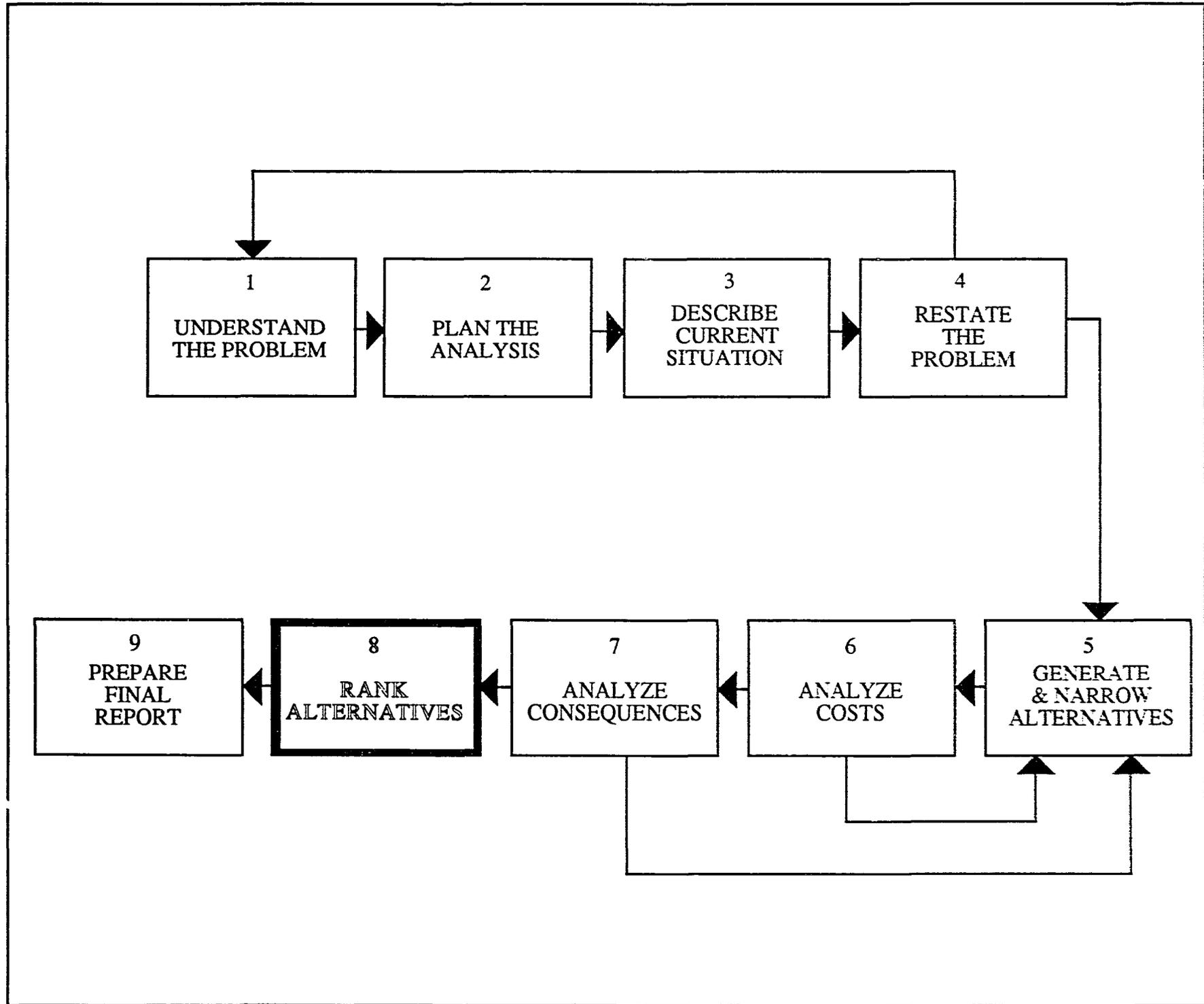
# Teachers	No proposal	Proposal #1	Proposal #2
Certified	6,324 x 48.7 = 307,979	7,049 x 48.7 = 343,286	6,324 307,979
Inservice	0 x x 36.5 = 0	0 x 36.5 = 0	1,613 58,875
Uncertified	1,613 x 25.3 = 40,809	888 x 25.3 = 22,466	0x 25.3 = 0
Total	7,937 348,788	7,937 365,752	7,937 366,854
System-wide Mean	348,788/7,937 = 43.9	365,752/7,937 = 46.1	366,854/7,937 = 46.2

Thus, under Proposal #1, we project a mean country-wide score on the teacher competency examination of 46.1; under Proposal #2, 46.2, and if no action is taken, a score of 43.9. The effects of each of the two proposals can be considered the difference between each score and the score of no action:

Effect of Proposal #1: $46.1 - 43.9 = 2.2$ point gain.

Effect of Proposal #2: $46.2 - 43.9 = 2.3$ point gain.

8
RANK
ALTERNATIVES



STEP 8 RANK ALTERNATIVES

OBJECTIVE 8.1

Understand Cost-Benefit Analysis

OBJECTIVE 8.2

Understand Cost-Effectiveness
Analysis

OBJECTIVE 8.3

Understand Cost-Utilities Analysis

OBJECTIVE 8.1**TIME LIMIT: 30 MINUTES****UNDERSTANDING COST-BENEFIT ANALYSIS****Facilitator Activities**

- Lead facilitator introduces exercise and explains objective 8.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 30 minutes maximum to read the materials.
- Tell the group that there is no task in this exercise, since cost-benefit analysis is not being used in the case study. Facilitator should encourage the group to ask questions.

Trainee Activities

- Read text.
- Group discussion.

Notes for Exercise 8.1

The text is fairly self-explanatory on cost-benefit analysis. Policy analysts who are not familiar with this technique are typically curious about it, so we chose to have this section in the workshop. However, it is applicable only when benefits are quantifiable in monetary terms.

In the case of educational policy analysis and decision-making, the use of cost-benefit analysis presumes a good acquaintance with multivariate statistical analysis, as well as with economic theory, both of which are beyond the scope of this workshop.

**Understanding
Cost-Benefit
Analysis****Facilitator
Activities****Trainee
Activities****Notes for
Exercise 8.1**

OBJECTIVE 8.2**TIME LIMIT: 60 MINUTES****Cost-Effectiveness Analysis****Facilitator Activities****Trainee Activities****UNDERSTANDING COST-EFFECTIVENESS ANALYSIS****Facilitator Activities**

- Facilitator introduces exercise and explains objective 8.2.
- Instruct groups that they have 60 minutes maximum to complete the exercise.
- Tell the group that the output is a summary paragraph reviewing the methods, assumptions, and findings in their cost-effectiveness analysis of the proposals for improving teacher quality.

Trainee Activities

- Read text and tables.
- Delegation of responsibility.
- Statistical computation.
- Reaching consensus.
- Writing drafts.

Task**TASK**

Using the projections of quantifiable outcomes you computed in Step 7.3, and the costs you projected in Step 6.5, conduct a cost-effectiveness analysis for each of the proposals for improving teacher quality. Which of the proposals is more cost-effective? Write a summary paragraph describing your results.

Having done the groundwork in terms of projecting costs (Exercise 6.5) and quantifiable outcomes (Exercise 7.3), the cost-effectiveness analysis is quite straightforward. While this can be done at the individual level, the solution presented here is at the system-wide level. If an individual-level analysis is preferred, unit costs (from Exercise 6.6) should be used.

Solution**Solution****Proposal #1****Proposal #1: Build a new teacher training college**

- We know from our analysis in Exercise 6.5 that the total cost of the proposal to build a new teacher training college is projected to be 3,794,254 Pula.
- We know from the projections computed in Exercise 7.3 that the predicted gain in mean teacher competency examination scores countrywide (over doing nothing) in 1989 is expected to be 2.2 points.
- To compute the cost-effectiveness of the overall program, we divide overall cost by predicted outcome:

$$3,794,254 / 2.2 = 1,724,661 \text{ Pula per point.}$$

Proposal #2: Inservice training

- We know from our analysis in Exercise 6.5 that the total cost of the inservice training program is projected to be 1,133,476 Pula.
- We know from the projections computed in Exercise 7.3 that the predicted gain in mean teacher competency examination scores countrywide (over doing nothing) in 1989 is expected to be 2.3 points.
- To compute the cost-effectiveness of the overall program, we divide overall cost by predicted outcome:

$$1,133,476 / 2.3 = 492,816 \text{ Pula per point.}$$

In summary, while the expected outcomes are virtually equal for the two proposals, Proposal #2 is much more cost-effective, given its lower cost for the same predicted outcome. The group should be reminded, though, that only one outcome was included in this analysis, namely teacher competency examination scores. In the next step, cost-utility analysis will be used to include non-quantifiable costs and benefits, and those quantifiable outcomes which were not comparable between the two proposals.

Proposal# 2

OBJECTIVE 8.3**TIME LIMIT: 2 HOURS****Cost-Utility Analysis****UNDERSTANDING COST-UTILITY ANALYSIS****Facilitator Activities****Facilitator Activities**

- Facilitator introduces exercise and explains objective 8.3.
- Instruct groups that they have 2 hours maximum to complete the exercise.
- Tell the group that there are two outputs: a paragraph reviewing the methods, assumptions, and findings in their cost-utility analysis of the proposals for improving teacher quality; and a summary paragraph stating the proposal selected by the group, and the justification for the selection.

Trainee Activities**Trainee Activities**

- Read text and tables.
- Delegation of responsibility.
- Statistical computation.
- Reaching consensus.
- Writing drafts.

Task**TASK**

Continuing with the Case Study, conduct a cost-utility analysis comparison for the proposals for improving teacher quality. Which of the proposals is the preferred one according to this technique? Is it the same one as in the cost-effectiveness study from the previous step?

Write a summary paragraph describing your results.

Finally, as a group, on the basis of your cost-effectiveness and cost-utility analyses, decide which of the proposals you will recommend to the Minister.

Write a summary paragraph stating your proposed action, and the group's justification for the selection.

There are several points to be aware of in doing the cost-utility analysis:

- Whereas in cost-effectiveness analysis, the outcome of the analysis is in monetary cost per unit of a desired outcome (e.g., teacher competency examination points), in cost-utility work, both non-monetary costs and non-quantifiable outcomes are converted into subjective but numerical outcome scores by the raters. Then monetary costs per unit outcome may be computed.
- Monetary costs must not be included in the utility ratings, as they will be included in the analysis itself.
- In doing cost-utility analysis, the alternative of no action (not implementing any proposal) must be included.

Solution

Let us present this solution in steps:

1. Collect the lists of non-monetary costs and all consequences, which were generated in Exercises 6.4 and 7.1, respectively. These lists may be improved upon, since some projected outcomes, such as gains in competency exam scores, have been projected. Have the participants reach consensus again on the two lists.
2. Generate a similar list for the alternative of implementing no proposal (which we will call Proposal 0).
3. Compute the monetary costs for Proposal 0. This is necessary, because the final utility ratings will be divided by monetary costs. This may mean that the costs for Proposals 1 and 2 will need to be adjusted (see below).
4. Instruct the group to rate each proposal subjectively, by weighing its costs and consequences, and excluding monetary costs from consideration.

The rules for rating are:

- 100 points go to each member's first choice.
 - 0 points go to each member's last choice.
 - Choices in between are to be rated higher than 0 and lower than 100.
5. Average the utility ratings for all members in the group.
 6. Divide the mean utility rating for each proposal by its monetary cost to obtain a ranking of utility points per Pula.

Example Solution

- Collect the lists of non-monetary costs and all consequences, which were generated in Exercises 6.4 and 7.1, respectively. These lists may be improved upon, since some projected outcomes, such as gains in competency exam scores, have been projected. Have the participants reach consensus again on the two lists.
- Generate a similar list for the alternative of implementing no proposal (which we will call Proposal 0).
- Compute the monetary costs for Proposal 0. This is necessary, because the final utility ratings will be divided by monetary costs. This may mean that the costs for Proposals 1 and 2 will need to be adjusted (see below).

Proposal #0: No action

Costs

Monetary

- Salaries of teachers in the system through 1989: 164,342,336 (from Exercise 6.5)

Solution

Example Solution

Proposal #0

Proposal #1

Non-monetary

- Political cost of Minister appearing not to be interested in teacher quality.

Consequences

Quantifiable

- Lower increase in teacher competency examination scores (country-wide mean will be 43.9, according to projection in exercise 7.3).

Non-quantifiable

- Opposition from educators
- Opposition from parents

Proposal #1: Build a new teacher training college

Costs

Monetary

- Construction and materials cost for building the teacher training college.
- Interest on loan for construction.
- Cost of professors in new teacher training college.
- Cost of operating new teacher training college (energy, maintenance, books, etc.)
- Increased governmental salaries for more certified teachers in system.

Total monetary costs estimated =

3,794,254 (from Exercise 6.5) +

164,342,336 (salaries with no proposal) =

168,136,590

Non-monetary

- Opposition from other governmental agencies who have existing proposals for new construction.

Consequences

Quantifiable

- Teacher competency examination scores will improve (country-wide mean will be 45.1, according to projection in exercise 7.3).
- Country will look better in terms of percent certified teachers.
- Improved economy in the rural area where the teacher training college is located.
- Very high indirect costs of operating teacher training college.

Non-quantifiable

- Uncertified teachers will be upgraded according to this program implementation.
- Teaching trainees will have to be uprooted for two years.
- In the long run, country may not need four teacher training colleges.
- There may be a political battle over where the teacher training college is to be located.
- Instructors in the teacher training college may resist working in rural area.
- New building in rural area will serve community development functions.

Proposal #2: Inservice training programs

Proposal #2

Costs

Monetary

- Keeping school buildings open during vacation (energy, maintenance, etc.)
- Travel costs of participants.
- Per diem expenses of participants.
- Travel costs of instructors.
- Per diem expenses of instructors.
- Cost of curricular materials.

Total monetary costs estimated =
1,133,476 (from Exercise 6.5) +
164,342,336 (salaries with no proposal) =
165,475,812

Non-monetary

- Opposition by participants of working during vacation period.
- Opposition by teacher training college faculty to certifying teachers who have not attended formal programs.

Monetary

- Salaries of instructors.
- Administrative costs of running the inservice program.

Consequences

Quantifiable

- Teacher competency examination scores will improve (country-wide mean will be 45.2, according to projection in exercise 7.3).
- Relatively low program cost.
- Economic benefits to numerous sites chosen for the workshops.
- All uncertified teachers may be retained in the system.
- Added burden to Ministry for administration of the program.

Non-quantifiable

- Possibilities of group and professional cohesion forming during in-service workshop.
- Adding another formal level of certification to the career structure.
- Possible opposition from teachers unions.
- Possible opposition from teacher training college instructors.
- Opposition from participants at having to forfeit their vacation time.

Instruct the group to rate each proposal subjectively, by weighing its costs and consequences, and excluding monetary costs from consideration.

The rules for rating are:

100 points go to each member's first choice.
0 points go to each member's last choice.
Choices in between are to be rated higher than 0 and lower than 100.

Average the utility ratings for all members in the group.
Divide the mean utility rating for each proposal by its monetary cost to obtain a ranking of utility points per Pula.

An example rating list for the group might look like this:

Monetary costs:

Proposal 0:	164,342,336
Proposal 1:	168,136,590
Proposal 2:	165,475,812

Members' rankings:

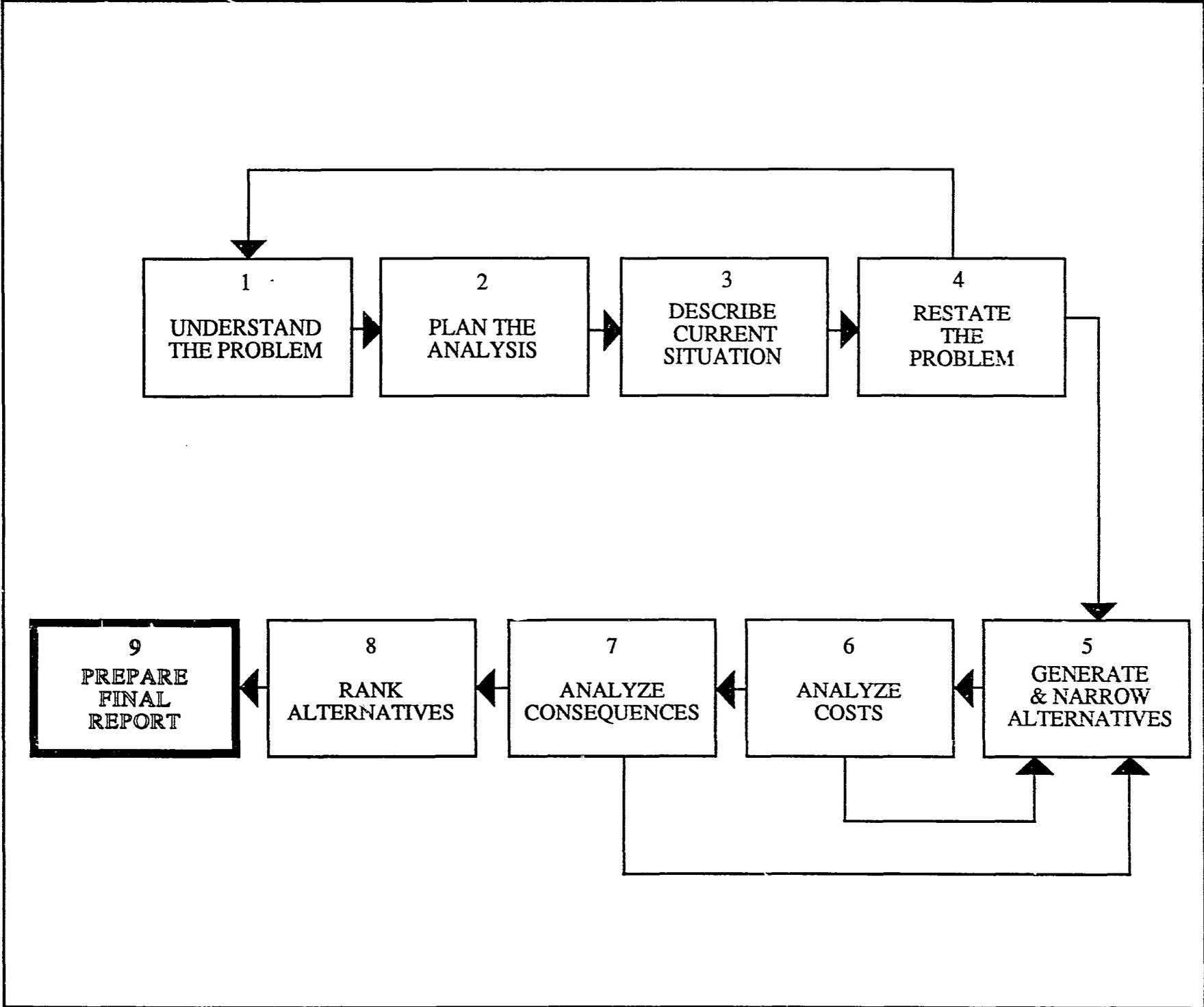
	Proposal 0	Proposal 1	Proposal 2
Member 1	0	100	40
Member 2	0	70	100
Member 3	100	0	20
Member 4	10	100	0
Member 5	40	100	0
Average:	30	74	32

The average scores are then divided by the monetary cost (in millions of Pula) for each proposal, and the final ranking reported as "utility points" per million Pula.

Proposal 0:	$30 / 164.3 = 0.1826$	Ranked # 3
Proposal 1:	$74 / 168.1 = 0.4402$	Ranked # 1
Proposal 2:	$32 / 165.5 = 0.1934$	Ranked # 2

Notice that, according to the rankings of this group, Proposal #1 came out first in the cost-utility analysis, while Proposal #2 was ranked highest in the cost-effectiveness analysis. This is not particularly unusual. Remember that non-quantifiable costs and consequences were not used in the cost-effectiveness work. Resolving the discrepancy between the two outcomes is a matter for group discussion and, eventually, consensus.

9
PREPARE
FINAL
REPORT



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STEP 9 PREPARE FINAL REPORT

OBJECTIVE 9.1

Outline Written Reports

OBJECTIVE 9.2

Draft Written Reports

OBJECTIVE 9.3

**Rewrite and Revise
Written Reports**

OBJECTIVE 9.4

Oral Presentation

OUTLINING WRITTEN REPORTS**Facilitator Activities**

- Lead facilitator introduces exercise and explains objective 9.1.
- Trainees split into groups with one facilitator per group.
- Instruct groups that they have 60 minutes maximum to complete the exercise.
- Tell the group that the output is an outline for their final report. They should begin with the outline proposed in the exercise, but should feel free to modify it if they see fit.

Trainee Activities

- Read text and outline.
- Group discussion
- Reaching consensus.
- Writing outlines.

Notes on Exercise 9.1 - 9.4

Trainees should be very familiar with the basic task here. What they may not be so familiar with is doing the job in a group under extreme time pressure. The key purpose here is to encourage group work under severe time pressure.

The participants probably have considerable substantive skills in outlining, report writing, etc. Facilitators should take care to avoid trainees forming the opinion that this is a useless exercise because it is something they already know how to do; facilitators may wish to be explicit in emphasizing the group aspect, and participating with the group in the exercise to encourage use of skills in the group context. Facilitators may be explicit in suggesting that the particular activity in terms of outputs is merely a means to an end, namely to foster group cohesion and skills within the group to enable the group to work rapidly and effectively together.

TASK

Continuing with the Case Study on the improvement of teacher quality, finalize the outline for the final report to the Minister.

You will want to begin by considering the following outline, which has been developed for this particular case, and is based on the sections you have already written for the previous exercises. However, you should feel free to modify it as you see fit.

Outlining Written Reports**Facilitator Activities****Trainee Activities****Notes****Task**

OUTLINE FOR FINAL REPORT TO MINISTER

- I. Introduction (from Step 1.1)
 - a. Who requested the report?
 - b. What is the reason for the report being written?
 - c. What is the context of the report?
 - d. Who prepared the report?
 - e. What information was used?
- II. Summary of conclusions
- III. Description of current situation
 - a. National percentages of certified teachers, competency examination scores (from Step 3.1).
 - b. Relationships between teacher certification levels and competency exam scores (from Step 3.3).
 - c. Relationships between teacher certification levels and competency exam scores, in towns versus districts (from Step 3.4).
- IV. Restatement of the problem
 - a. Projections of numbers of certified teachers in 1989 (from Step 4.2).
 - b. Statement of goals and targets (from Step 4.3).
- V. Analysis of proposed solutions
 - a. Statement of the two or three proposals considered (from Step 5.4).
 - b. Total costs and unit costs of the proposals considered (from Steps 6.5 and 6.6).
 - c. Projected outcomes of the proposals considered (from Step 7.3).
 - d. Cost-effectiveness analysis (from Step 8.2).
 - e. Cost-utility analysis (from Step 8.3).
- VI. Conclusions and recommendations
 - a. Proposed action and justification (from Step 8.3).
 - b. Limitations and recommendations for further data needs.
- VII. Appendices

DRAFTING WRITTEN REPORTS

Facilitator Activities

- Facilitator introduces exercise and explains objective 9.2.
- Instruct groups that they have 2 hours maximum to complete the exercise.
- Tell the group that the output is a draft of their final report to the minister.

Trainee Activities

- Delegation of responsibility.
- Writing drafts.

Drafting Written Reports

Facilitator Activities

Trainee Activities

TASK

Task

Using the outline for the final report developed in the previous step, assign various sections to different members of the group, and draft the final report.

OBJECTIVE 9.3

TIME LIMIT: 2 HOURS

**Rewriting and
Revising Written
Reports****REWRITING AND REVISING WRITTEN REPORTS****Facilitators
Activities****Facilitator Activities**

- Facilitator introduces exercise and explains objective 9.3.
- Instruct groups that they have 2 hours maximum to complete the exercise.
- Tell the group that the output is the final written report to the Minister.

**Trainee
Activities****Trainee Activities**

- Reading drafts.
- Delegation of responsibility.
- Reaching consensus.
- Writing report.

Task**TASK**

Revise the final report. Prepare it for submission.

OBJECTIVE 9.4

TIME LIMIT: 2 HOURS.

ORAL PRESENTATION

Facilitator Activities

- Facilitator introduces exercise and explains objective 9.4.
- Instruct groups that they have 2 hours maximum to complete the exercise.
- Tell the group that after their oral reports have been prepared, all groups will reassemble to present their reports, and for final critique.

Trainee Activities

- Outlining oral report.
- Delegation of responsibility.
- Reaching consensus.
- Oral presentation.

TASK

Prepare the oral report. Present it at a plenary session of all groups.

Oral
Presentation

Facilitator
Activities

Trainee
Activities

Task

APPENDIX

Appendix Exercise 0 Introduction

EXERCISE 0: GROUP DYNAMICS EXERCISES

Introduction:

Many studies on the functioning of groups have helped to dispel erroneous notions about group work, such as the lack of creative output and tendencies toward conformist behavior. Instead, three major principles have been established:

1. That group work oriented toward intellectual tasks, such as decision-making and problem-solving, generate superior results when compared with individual work;
2. That individuals participating in group work learn more than individuals of equal capacity working alone;
3. That decisions made by groups on a consensus basis tend to "anchor" themselves more and to affect the actual behaviors of participants.

However, the effectiveness of group work is affected by the following factors:

- The number of participants;
- The maturity level of the group.
- That the members of the group enjoy equal status.

The nature of the group

Small Groups

Small Groups

Groups which are small, and which are formed to conduct intensive work, can function well without a facilitator under the following conditions:

- That the groups is formed on an affinity basis;
- That participation in the group is limited to a few members (2-4);
- That the group members are highly motivated;
- That outside information sources are available to group members, and that the group task is limited to sharing and assimilating this outside information;
- That the group task is tied to its objectives, and the longevity of the group is contingent upon the goals which brought the group together.

Large groups

Larger and non-spontaneous groups are faced with obstacles which might interfere with productive work. Structuring of such groups is necessary, and the role of the group facilitator becomes essential. The facilitator must accomplish the following tasks:

- Ensure that a work plan is developed and elaborated;
- Keep the group centered around its task;
- Help to facilitate communication among group members;
- Ensure that equal status is established and retained among group members;
- Help the group make progress toward achieving its objectives.

Appendix
Exercise 0.1

EXERCISE 0.1 BUZZ SESSION TIME LIMIT: 30 MINUTES

Description:

This is a small group activity based on the participation of all group members. It typically involves a brief and intense discussion of a subject or a problem. Each participant is to express his or her ideas and opinions.

**Facilitator
Activities**

Facilitator Activities

•Present the following problem to the participants:

You have been invited to participate in a workshop on education policy analysis. What competencies do you expect to master? What problems in educational policy do you think are current and important?

- Constitute small groups (3 or 4 members).
- Facilitator immediately delegates a spokesperson for each group.
- Instruct the group to propose answers to the problem that reflect the general consensus of the group.
- Reconvene the groups in a plenary session to present their reports.

Description:

This is a creative technique used extensively in the problem-solving methodology of this workshop. It consists of letting one's imagination generate as many solutions to a problem as possible, without criticism or censure from other group members or oneself.

Facilitator Activities

Facilitator Activities

- Present a problem to the participants which is of interest to the particular group involved. It would be of great value to have this problem related to the topic of the workshop.
- Divide participants into groups of 8 to 10 persons.
- Instruct the group that each participant should work individually, and write out all solutions which cross his or her mind.
- When all participants have finished making their individual lists, all solutions should be listed and numbered on the blackboard or a large sheet of paper. All solutions should be listed, even when they appear very similar.
- Instruct the group on the rules of brainstorming:
 - a. Generate as many solutions as possible (at this stage, only quantity matters).
 - b. There are to be no comments or reaction permitted when a participant suggests a solution.
 - c. There should be no censorship of ideas, even if they appear far-fetched.
 - d. Make clear to the participants that this is a "production" phase-- not an evaluation phase.
- Go around the room again to allow participants to offer additional solutions suggested during the listing process.
- Finish the brainstorming phase by asking the participants to combine ideas

Appendix
Exercise 0.3

EXERCISE 0.3 REACHING CONSENSUS TIME LIMIT 2 HOURS

Description:

Once a list of solutions has been generated during the brainstorming session, the next step is to reach consensus on a limited number (2 or 3) solutions, which will be considered in detail for possible implementation. Two major steps are involved: selecting criteria for retaining solutions; and applying the criteria in order to decide on the two or three to be retained.

Facilitator Activity

Facilitator Activities

- Display the list of solutions generated in the brainstorming session. Be sure that the list is visible to each participant.
- Going around the room, each participant should propose one or more criteria for weighing the solutions.

The criteria will vary according to the nature of the problem under consideration. If participants experience some difficulties in selecting criteria, it could be suggested that they consider factors such as cost, available competencies, political resistance, anticipated consequences, relevance of the solution to the problem, and so on.

Criteria should be listed, and a general agreement should be reached on the final choice of the relevance and validity of the criteria. No more than five criteria are probably manageable.

- The long list of solutions should now be narrowed to no more than ten, by combining similar solutions, and by a very quick application of the criteria. By voice consensus, non-feasible solutions should be eliminated.
- In order to rank the final ten solutions, the following steps should be followed.

Number the remaining solutions from 1 to 10

Ask the participants to prepare a matrix with the criteria on the vertical, and the numbered solutions on the horizontal:

Solution #	1	2	3	4	5	6	7	8	9	10

Criterion #										

1										

2										

3										

4										

5										

- Ask each participant to allocate a score to each solution according to how well it satisfies each of the criteria, from a score of "1" for unsatisfactory to "5" for highly satisfactory. Each participant thus fills in each box in the matrix.

- The facilitator collects the completed matrices and adds up the points in each cell.

The two or three solutions which have received the highest total points will be retained for further study. They are the highest ranked proposals.