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ABSTRACT

This abridgement of "PLANS: Basic Program in Educational Planning and Problem Solving" is a condensation of the training manual for the PLANS model and is aimed at providing a brief presentation of the seven steps of the model. These seven steps identify the problem, define the problem, analyze the problem, generate alternative solutions, select an alternative solution, implement the solution, and evaluate and revise the solution. The program is based on a needs assessment that includes community involvement. Each step is presented in four parts: definition of the step (including a flow chart showing its relationship to the other parts of the model); a related skill exercise; an illustration of the step in relationship to a hypothetical problem; and materials and forms used to apply this step to a local problem. (Author/IRT)

PLANS MODEL

A SUGGESTED APPROACH FOR MEETING

THE STATE BOARD'S ACCREDITATION REQUIREMENTS

RE COMPREHENSIVE-SYSTEMATIC EDUCATIONAL PLANNING

(An abridgement of PLANS: Basic Program in Educational Planning and Problem Solving, Worldwide Education and Research Institute, Salt Lake City, Utah, 1971)

As prepared by the Wyoming State Department of Education

September, 1974

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Note: An abridgment of PLANS: Basic Program in Educational Planning and Problem Solving is a condensation of the training manual for the PLANS Model aimed at providing a brief presentation of the seven steps of the model.

The text concerning each step is organized around four basic themes:

1) Definition of the step, including a flow chart showing its relationship to the other parts of the model;
2) A related skill exercise;
3) An illustration of the step in relationship to a hypothetical reading problem; and,
4) Materials and/or forms used to apply this step to a local problem.

OVERVIEW

"The State Board of Education, though committed to the concept of comprehensive-systematic planning, has not endorsed any particular planning model as the example to be followed by the local districts." The State Department of Education, "likewise, has made no such requirement. It is, however, ready to assist the local districts who desire to use . . . the PLANS model."[1]

"A district may use any planning model it chooses, provided the model includes needs assessment with community involvement as the first step in the process and evaluation as the last step in the cycle. In addition, districts may elect to use the services of personnel other than State Department of Education staff."[2]

An effective, on-going cycle of systematic planning (needs assessment through evaluation) should allow the Local Education Agency to become accountable and to defend its level of accountability according to the extent to which agreed upon goals had been realized. Such goals must focus on learner needs.

Issues related to needs assessment, systematic planning, evaluation, school accreditation, accountability, and generation of information, upon which to base future decisions, often become clouded in issues

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[1]The Revised Accreditation-Evaluation Process for Wyoming Public Schools, August, 1973, p. 5.

[2]Ibid; p. 9.

related to politics, economics and philosophy - Local Education Agencies must not lose their perspective focused on the learner if they are to effectively play out their role in society.

The following guidelines should assist local districts and planning committees in maintaining their perspective:

1. The purpose of maintaining an educational accountability program is to improve the quality of education.
2. Any person or group sharing responsibility for the quality or nature of educational experiences should be accountable to the affected children, parents, community and to the larger society.
3. Although accountability is related to the products of education, accountability should be measured in terms of the input and the process, as well as the products of education.
4. Schools should be held accountable for objectives in the affective and psychomotor realms as well as in the cognitive realm.[1]

Goals and objectives should be selected so that they are broad enough to incorporate all the functions of the schools and yet specific enough to provide feedback to see if they are being accomplished.[2]

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[1]DeNorellis, Richard L. and Arthur J. Lewis. Schools Become Accountable: A PACT approach. ASCD, Washington D.C., 1974, pp. 12-16.

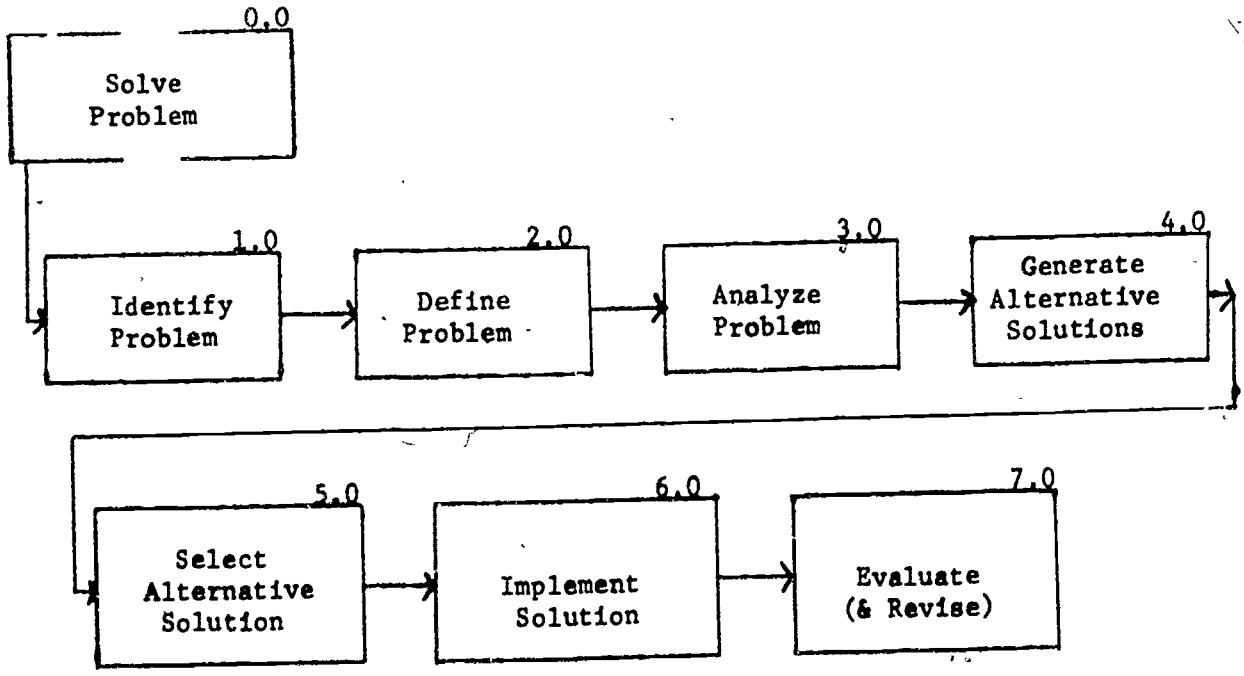
[2]Ibid; p. 17.

THE PLANS MODEL

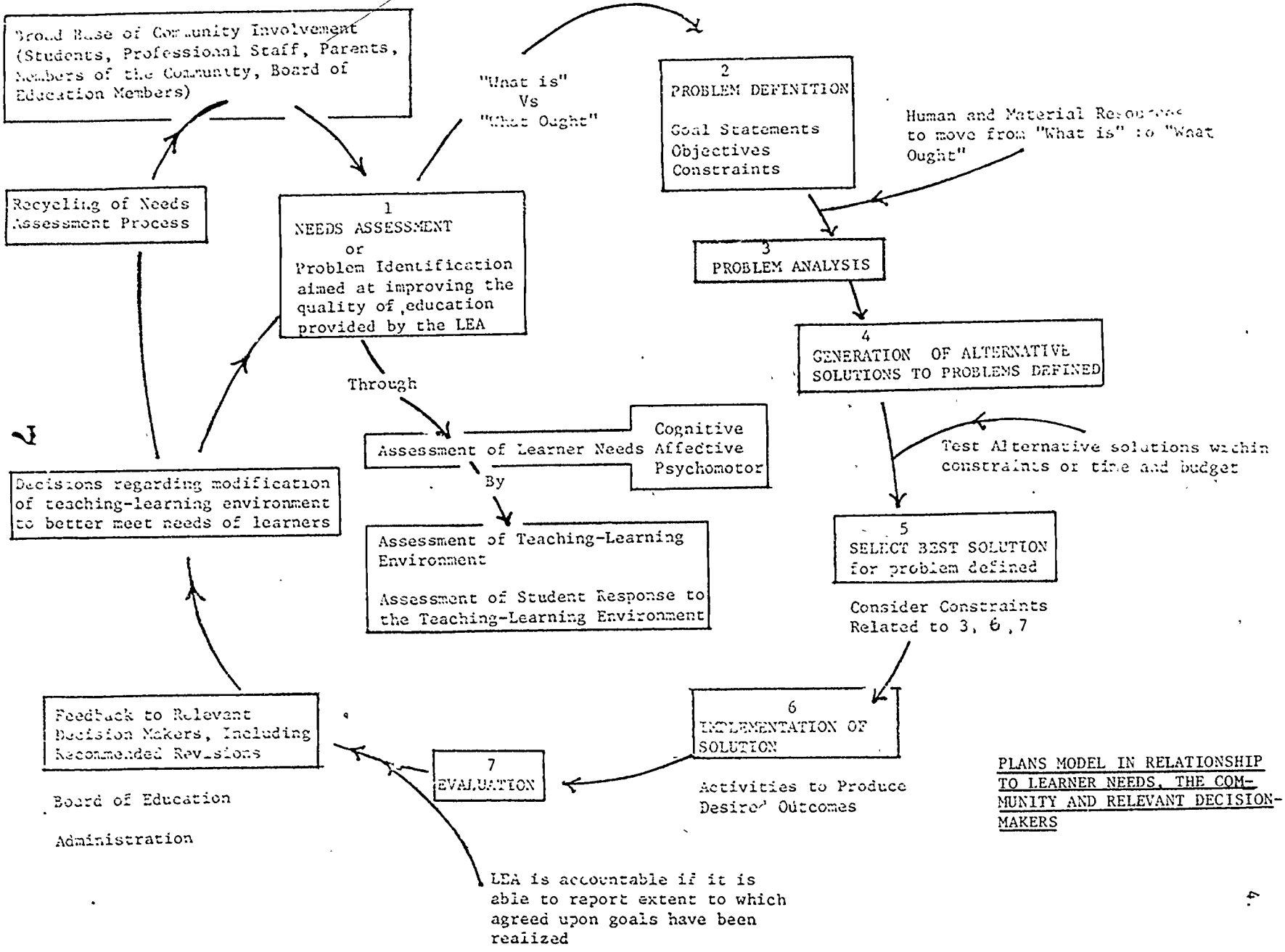
Major Concept:

THERE ARE SEVEN DISTINCT MILESTONES IN THE PROBLEM-SOLVING PROCESS.

These can be portrayed in flowchart form as follows:



All of the concepts and tools of the system approach to educational planning and problem solving are directly related to these milestones.



PLANS MODEL IN RELATIONSHIP TO LEARNER NEEDS, THE COMMUNITY AND RELEVANT DECISION-MAKERS

ILLUSTRATION OF PLANS MODEL FOR CREATIVE PROBLEM-SOLVING

A student is living at home but plans to be attending a college some 3 1/2 miles away this next month. He is a bright but very frugal student. Let us examine his procedure in solving his transportation problem to and from the college.

1.0 Problem Identification.

He first identifies his need for transportation. He reviews this and sees it as merely a sub-problem to the larger one he faces of getting a college education.

2.0 Problem Definition.

Next he defines the parameters of the transportation problem. The solution:

Must serve for the academic year (9 months).
Must fit within his budget ($100/yr.).
Must not take too much time (not more than 20 minutes each way).

He then defines the specific objectives of his problem:

1. Must be able to get to classes on time.
2. Must not create additional expenses or problems with parking, storage, etc.
3. Must be able to transport a large briefcase full of books plus other school requirements, i.e., lunch, coat, etc.

3.0 Problem Analysis.

As a next step he analyzes his problem this way:

Getting to school means to and from:

--getting from the house to the main thoroughfare,
--getting from the entrance to the thoroughfare to the campus entrance,
--getting from the campus entrance to the specific building wherein the class is held.

and

(The reverse)

4.0 Generates Alternative Solutions.

He then brainstorms and writes down the following alternatives:

--walk to college campus,
--ride the bus,
--buy a car,
--buy a bicycle,

4.0 Generates Alternative Solutions (cont.)

--join a car pool with other students,
--buy a motor bike,
--jog each way and figure it as a part of physical education,
--hitch hike,
--rent a room or apt. close by the campus,
--take classes by correspondence.

5.0 Select "Best" Alternative.

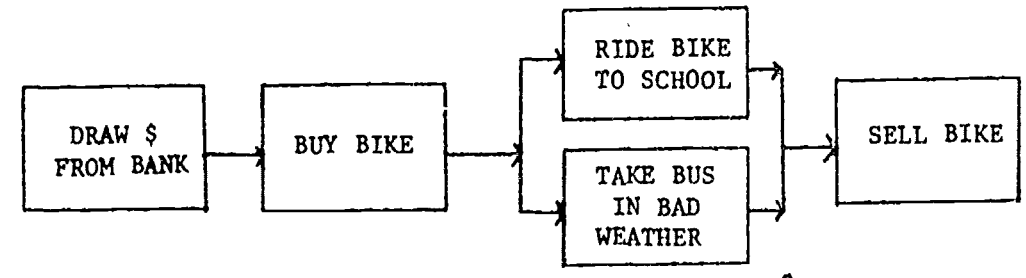
Now he gets selective of the foregoing ideas. He adds to and reprocesses some. He tries combinations and modifications. A sample of his considerations and deliberations are as follows:

--Walking is cheapest but too time consuming.
--Riding the bus will cost $10 per month but entails quite a lot of waiting and a great deal of walking to the bus and from the bus stop to the campus buildings.
--Buying a car is expensive on the initial outlay, but a resale at year's end could keep this under $100 with an older model. However, insurance costs, campus parking fees, gas, oil, and maintenance, plus licensing, etc., puts this over the cost constraint.
--Buying a bicycle can run up to $85 but would have a large part of this recoverable in resale. Maintenance and license costs are negligible and the ride can be made--reasonably level--in less than 20 minutes. The bike can be taken directly to the Campus building to minimize additional walking.
--A car pool has some expense, but under $100 for the year. It entails meeting the schedules of others and therefore some waiting around on campus. The advantages of fellowship are noteworthy, etc.

The upshot of his deliberations had him settle on buying a bicycle to ride for 90% of the time. The other times--snow or storms--he would ride the bus or hitch a ride with friends, etc.

6.0 Implement Solution.

After he had made his decision, he set up the following crude plan for carrying it out:



7.0 Evaluation.

He wants to confirm that his decision was a good one so he resolves to keep records on purchases, bus fares, time of going and coming, etc. He also feels confident that he can carry out the decision wit..in the constraints set forth.

* * * *

P.S. The student's plan went fine until February, at which time he met a girl. He went in debt, bought a car, and before the end of the year was married and renting an apartment near the campus.

TECHNICAL NOTE ON THE PLANS MODEL FOR CREATIVE PROBLEM-SOLVING

The foregoing illustration of the student and the problem-solving process was a way of illustrating a very powerful model. This is a method of discovering truth and commonly referred to as the scientific method.

The model is not a new one conceptually, although its rigorous applications to problems in education are relatively rare. In the author's experience, there is no other model in existence. There are only variations of this model and these variations are caused either by semantic differences or by regrouping the basic procedures into four, six, eight or more steps.

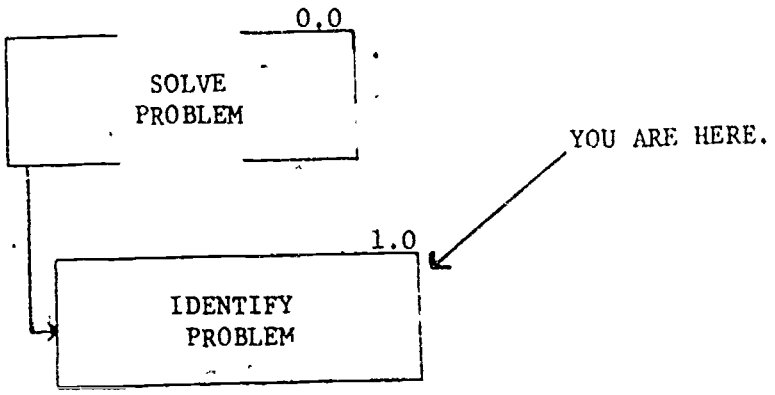
An Insight on Sequence. The eminent psychologist R. L. Thornkide has utilized these steps, outlined by Dewey and others but has cautioned against the stereotyped, sequential assumption of its use. He has emphasized that "...analysis is not neat, logical, and sequential. Actual behavior in response to a problem situation is often confused, illogical, and disorderly. Furthermore, each problem-solver and each problem to be solved has its own individual characteristics. Diversity rather than uniformity is the rule in the attack on problem situations. We do not find the problem solver going neatly and logically through the sequence of steps outlined above. Rather he jumps around, often starting in the middle, returning then to the initial steps, moving back and forth between hypothesis, problem clarification, appraisal of implications, and hypothesis again. Some of the phases outlined may fail to appear, as when a hypothesis is put into action without previously thinking through what it means or implies.

--R. L. Thorndike

"How Children Learn" - N.S.S.E. 49th Yearbook, 1950

It should be noted that the PLANS model handles this sequential phenomena by the use of iteration.

NEEDS ASSESSMENT AND/OR PROBLEM IDENTIFICATION 1.0



The first step is to state the need--the real need of the group under consideration. The real need should address the overall problem to be solved, and not only the educational problem; for the first thing we must recognize is that education, in itself, is only one solution to the problem. A statement of the need should be, for example, "We must provide better medical care," and not, "We need a programmed instruction booklet series for nursing training."

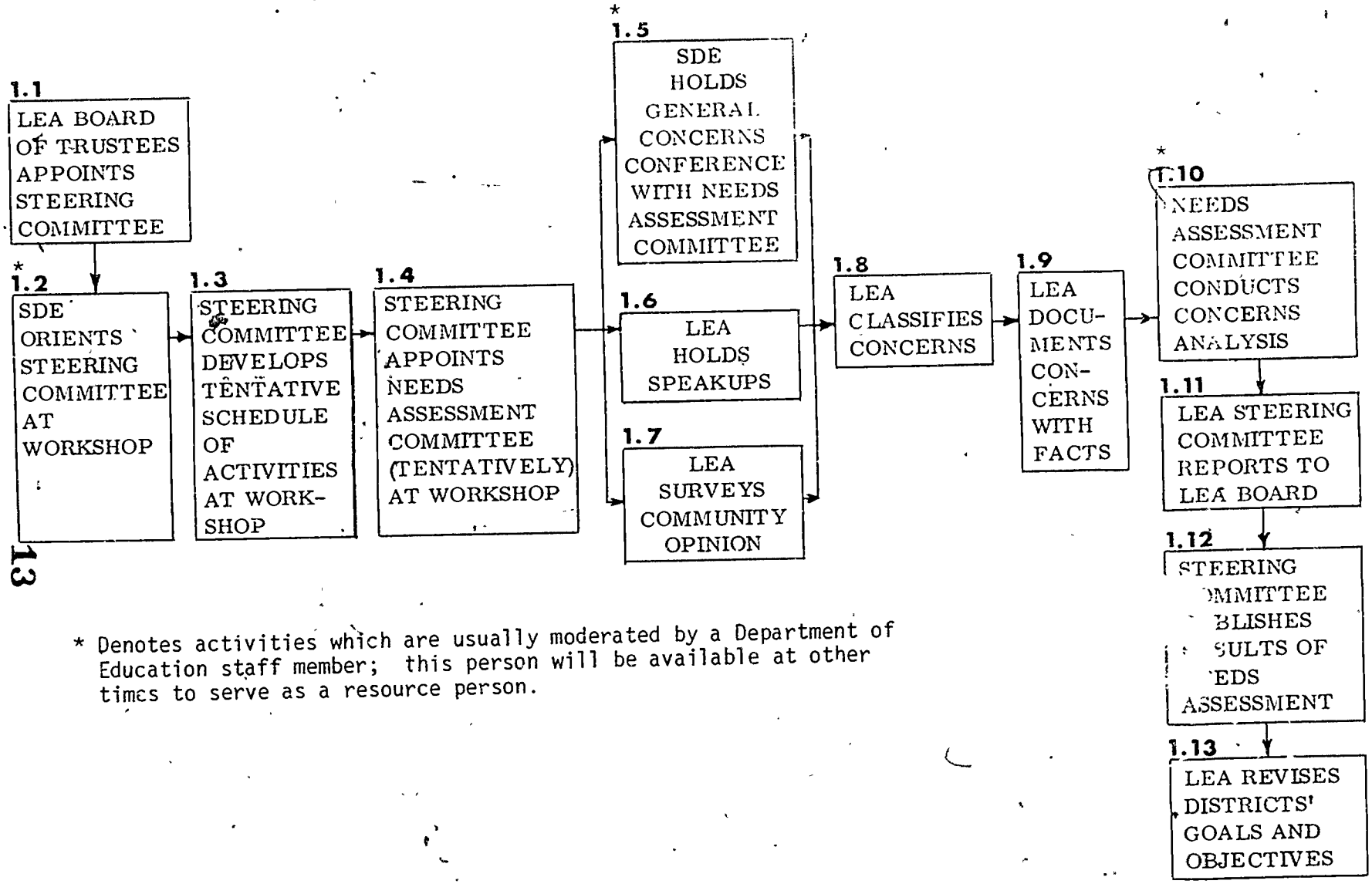
--Henry Lehman

Sensitivity to problems is a valuable trait.

American business and industry constantly reach out consciously searching for "unmet needs." The solution to these can mean opportunity.

--ALEX F. OSBORN
Applied Imagination

PROBLEM IDENTIFICATION: NEEDS ASSESSMENT (1.0)



* Denotes activities which are usually moderated by a Department of Education staff member; this person will be available at other times to serve as a resource person.

PROBLEM IDENTIFICATION SHEET

Please complete the following two sections:

Section 1: From your perspective, what do you believe are the most critical needs of education in the community where you are a resident? (List at least four and place them in priority order).

Most critical _____

_____

Second most critical _____

_____

Third most critical _____

_____

Fourth most critical _____

_____

Section 2: Please check below any of the proficiencies you have in the areas of planning and problem solving.

EXPOSURE	PARTIALLY LEARNED	MASTERY	
____	____	____	Concerns analysis and needs assessment.
____	____	____	Writing behavioral objectives.
____	____	____	Defining a problem (Constraints, Performance, Requirements, etc.).
____	____	____	Analyzing a problem (System analysis).
____	____	____	Generating alternative solutions (Brainstorming, creative checklists, etc.).
____	____	____	Processing tactical solutions into solution-strategies.
____	____	____	Selecting a "best" solution-strategy from among several.
____	____	____	Drawing implementation plans (i.e., Networks, PERT, flowcharts, etc.).
____	____	____	Developing an evaluation design.
____	____	____	Others (please specify) _____

NAME _____ DATE _____
Please Print

Note: The correct answers to this quiz as well as all others are found on page 78 of this manual.

DISTINGUISHING NEEDS FROM SOLUTIONS

Each of the following statements of concern were taken from those gathered in a large needs assessment study. It is assumed that the level of abstraction is to be at the pupil level. Knowing this, you are to indicate by a check mark in the appropriate column whether each of the concern statements represent a possible "need" or problem or is more appropriately classified as a "solution".

NEED	SOLUTION	
____	____	1. Schools inadequately prepare students for occupations.
____	____	2. There is a need for more programmed instruction.
____	____	3. Additional team teaching is needed to improve services to pupils.
____	____	4. School shops are inadequate.
____	____	5. Reading performance of some jr. high school students should be improved.
____	____	6. Students lack competence in communication skills.
____	____	7. There is a need for more adequate school buildings.
____	____	8. There is a lack of student interest and involvement in social problems.
____	____	9. There is a need for flexible scheduling in the local schools.
____	____	10. Schools do a poor job of preparing students to assume responsibility.
____	____	11. The individualization of instruction is inadequate in the local schools.
____	____	12. In some local schools, general morale is low.
____	____	13. The development of computational skills in the local schools is poor.
____	____	14. Elective course offerings in the local school curriculum need to be strengthened.
____	____	15. Students should be grouped by ability for instructional purposes.
____	____	16. Student handwriting is often illegible.
____	____	17. Student grammatical usage needs to be improved.
____	____	18. The extra curricular programs of the local schools is poor.
____	____	19. There is a need to educate learners in drug use and abuse.
____	____	20. There is a need to improve the teacher inservice training programs in the local schools.

DISTINGUISHING FACTS FROM VALUES

DEFINITIONS

Facts: That which has actual existence. A piece of information presented as having objective reality. A fact represents something that can be derived empirically--that is--something upon which two or more objective investigators can conclude after independent investigations.

Values: Precise signification; import. A conclusion about the significance or worth of a thing.

An expression of belief or conviction about something. An assumption about a thing.

EXERCISE

Which are facts (F), which are values (V)?

_____ 1. There were 390 students enrolled at the Parker City Elementary School on January 1, 1974.

_____ 2. All high school graduates should be able to read at the sixth grade level (that is - be functionally literate).

_____ 3. By the end of the third grade, pupils should have mastered their multiplication tables.

_____ 4. This year there has been an average of 4.5 fights per week on the playground at the Parker City Junior High.

_____ 5. All students should be treated with dignity and respect.

_____ 6. Reading is basic to all learning.

_____ 7. Some school authorities hold that a "hot lunch program" contributes to improved student performance.

_____ 8. All students should have a positive attitude towards school.

_____ 9. 85% of those responding to the community questionnaire indicated that the school district is "ineffective" in teaching young people how to become effective citizens.

_____ 10. At least 200 of the Parker City High School's senior class of 1974 should be enrolled in a college or placed in gainful employment prior to September 1, 1974.

CONCERNS ANALYSIS (STEP 1.10 of NEEDS ASSESSMENT)

CONCERN: Students' reading skills are inadequate

FACTS

	VERY MUCH	QUITE A LOT	VERY LITTLE	PRACT. NOTHING	DON'T KNOW NOT SURE	NO. AVERAGE
Cross Section of State (N=74)						
Schools ought to be doing	64%	28%	4%	1%	3%	349
Schools are doing	19%	49%	22%	4%	6%	271
					Important	78
Teachers' (N=32)						
Schools ought to be doing	84%	13%	3%	0%	0%	381
Schools are doing	19%	69%	9%	3%	0%	304
					Not Critical	77
High School Seniors (N=34)						
Schools ought to be doing	65%	18%	3%	3%	11%	323
Schools are doing	12%	50%	29%	6%	3%	262
					Not Critical	61

--Formalized reading instruction not started until 1st grade in Idaho
--Most districts in this region offer remedial reading programs during the school year and during the summer
--50% students needing remedial reading are receiving these services
--Research and observation show that pupils receiving 'reading readiness' programs are better prepared to receive reading instruction.
--Studies show that poor readers do not achieve well in other subject areas.
--NEA convention reported that those students 16-21 years of age out of school; 1 out of 4 is considered functionally illiterate.

VALUES

--Emotionally handicapped children need more individualized instruction and special methods of teaching.
--We believe reading is essential to an enjoyable life.
--We believe any child who is mentally capable should be taught to read.
--We believe that the home should help prepare the child to read by exposure to all good reading material at an early age 1-6.
--We believe that all elementary and secondary teachers should be trained in the mechanics of teaching reading.
--We believe that pre-school reading readiness should be provided by the school.
--We believe reading is an essential skill in spite of technological advancements of TV, stereo and other modern communication devices.

VALIDATED NEEDS:
--Learners, aside from EMR and other special groups, need to achieve a reading proficiency of 6th grade (functionally literate) or higher.
--20% of students in this region are not functionally literate.
--This concern will be resolved when 75% of students entering 7th grade are reading at 6th grade level as measured by standardized test.
--By 9th grade 90% students will have attained 6th grade reading level as measured by standard test.
--Extremely Critical by 1973

STATEMENT OF CONCERN:

FACTS (WHAT IS)

VALUES (WHAT OUGHT)

VALIDATED LEARNER NEED

1. LEARNER NEED STATEMENT:

2. TARGET POPULATION:

3. EXTENT OF THE PROBLEM (NEED):

VERY SIGNIFICANT GAP BETWEEN "WHAT IS" AND "WHAT OUGHT" ( )

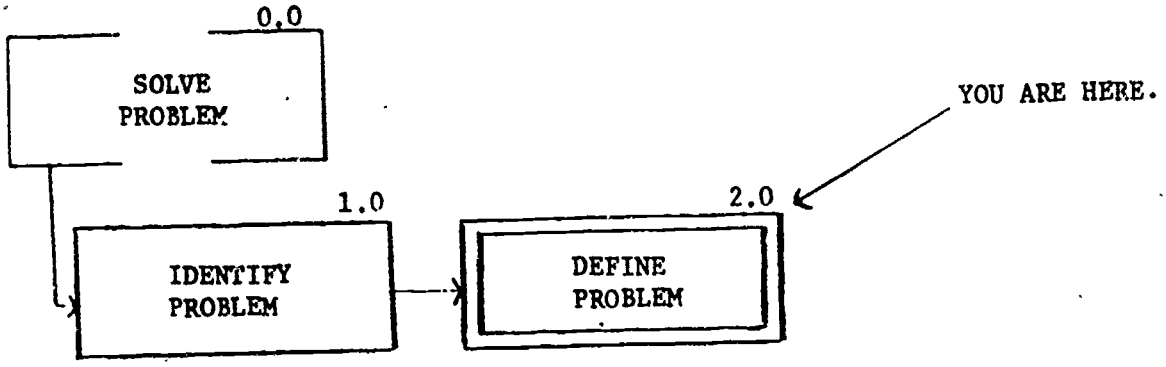
SIGNIFICANT GAP. . . ( )

INSIGNIFICANT GAP. . . ( )

4. MAXIMUM TIME ALLOWABLE FOR RESOLVING PROBLEM:

5. SUGGESTED SOLUTIONS:

PROBLEM DEFINITION 2.0



"The formulation of a problem is far more often than its solution, which may be merely a matter of mathematical or experimental skill."

--Albert Einstein

"A problem well-stated is half solved."

--John Dewey

"Knowing what you are looking for helps you to recognize it when you see it. But in the case of innovation, how do you know what you are looking for? You don't unless you state your problem so broadly, so basically, so all-inclusively and generically, that you do not preclude even the remotest possibility--so that you do not pre-condition your mind to a narrow range of acceptable answers."

--Prof. John Arnold
Stanford University

THE PLANS MODEL (2.0 - 7.0)

The main purpose of this item is to provide the local task force groups (teams) with a brief overview of Steps 2.0 through 7.0 of the PLANS model. But, first, let's review:

(1) Increasingly, educators at all levels are being pressured to explain and justify their policy decisions. Unfortunately, too often these decisions are based on hearsay, personal biases and other unreliable sources. One way local educators can become accountable to the community they serve is to engage in comprehensive - systematic planning.

(2) The PLANS model is a seven-step approach to comprehensive - systematic planning (problem solving). These steps are: identify the problem, define the problem, analyze the problem, generate alternative solutions, select the best solution, implement that solution, and evaluate and revise. Step one (needs assessment or problem identification) involves a total community effort to identify the critical learner needs with the local school district. Out of this initial effort is generated local goals and objectives, program activities and self-evaluation based on LEA goals and objectives.

STEPS 2.0 - 7.0 A summary:

The local school district has just completed a "needs assessment", Step 1.0 of the PLANS model. Its purpose, as you may recall, was to identify the most critical learner needs (problems), thus giving direction to the district as it plans for the future. The identification of learner needs is, however, only the beginning step in long-range planning. Now, the district must organize itself into task force groups (teams) in an effort to resolve these learner needs. Your principal task as a member of one of these teams is to find a solution to the learner need assigned to your team. This task will involve:

PROBLEM DEFINITION (2.0)

You must first define the parameters (constraints) of your need (problem) and establish the specific objectives which must be met if the problem is to be resolved. The validated learner need section of the concern analysis sheet will provide you with some ideas here.

Example:

Need Statement - There is a need to improve the reading achievement of our students.

Constraints - No more than $40,000 in additional monies. Goal must be achieved by June 1, 1975. Skills in other areas must be maintained or improved.

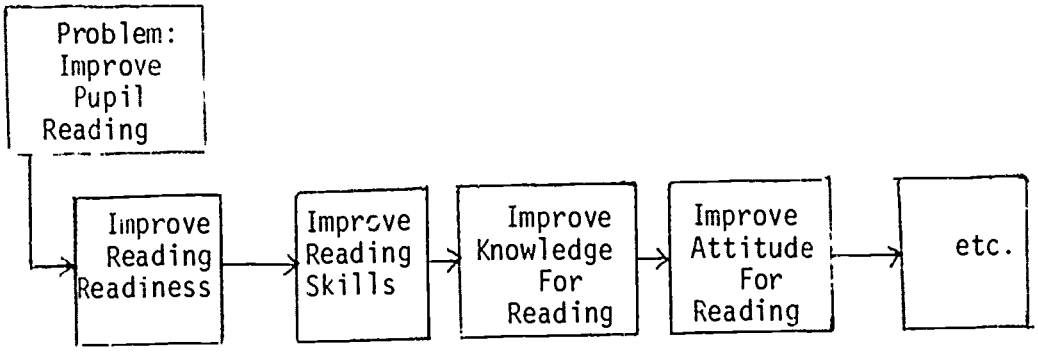
Objectives -

1. Ninety per cent of the students in the district by June 1, 1975 will be reading at a level commensurate with their ability as measured by their performance on a standardized reading achievement test.
2. Seventy-five per cent of the students by June 1, 1975, will show a positive attitude towards reading as measured by teacher judgment, number of books checked out of the library, and students' expressed opinion.
3. No decline in achievement in other subjects or skills will occur while improved reading achievement takes place as measured by the Iowa Test of Basic Skills.

PROBLEM ANALYSIS (3.0)

Next, your group must analyze your problem further; in other words, put it under a microscope and see its various parts, e.g., a human body is made up of a head, arms, legs, etc.

Example:



GENERATE ALTERNATIVE SOLUTIONS (4.0)

You now brainstorm, writing down as many possible solutions to your problem as your group can think of.

Example:

1. Individualized Reading Program
2. Teaching Machines
3. Team Teaching
4. In-service Training for Teachers
5. Speed Reading
6. Background Music
7. Summer School Program
8. (see page 104 of PLANS Manual for other examples).

SELECT BEST SOLUTION (5.0)

Next, you must find the best solution, or combination of solutions to your problem. First, identify the most important criteria which will guide your decision, e.g., cost, time involved, public acceptance, etc. Using a scheme similar to that found on page 44 of the PLANS Manual come up with the best solution.

ESTABLISH A PLAN TO RESOLVE PROBLEM (6.0)

Using a flow chart or diagram similar to that found on page 52 of the PLANS Manual, construct a detailed plan which points out the major parts

or events which make up the solution and when these events will occur, e.g., a reading specialist will be hired by 30 June 1973.

EVALUATION (7.0)

Any plan for resolving a need should provide for some means of determining how successful you have been in achieving your objectives (see example found on page 58 of the PLANS Manual).

Now, the district is ready to implement your plan for resolving the problem.

PROBLEM DEFINITION

Directions for Proceeding to Problem Definition:

Before you define the problem, perhaps it would be well to review the idea of measurable objectives. The same skills are required.

Writing Performance Requirements (Objectives).

A satisfactory performance requirement is one that fully communicates the intent of those who designed it.

As guidelines in writing satisfactory performance requirements, the statement should:

1. Describe what will be done to demonstrate clearly that the requirement has been met (nature of performance).
2. Define how well (or how much) the performance must be done--at least the lower limit.
3. Designate the important conditions under which the demonstration is to be conducted.
4. Detail the evaluation procedures by which assurance will be given of acceptable performance.

EXAMPLES:

(Non-measurable) A. The participant will understand the difference between process and product performance requirements.

(Measurable) B. Given a list of ten performance requirements, the participant will be able to identify at least eight correctly as to whether they are of the process or product type.

When you think you have sufficiently reviewed or acquired the ability to write or discern measurable objectives, complete the evaluative exercise on this topic and then proceed to the exercise on problem definition.

EVALUATIVE EXERCISE: RECOGNIZING WELL-DEFINED OBJECTIVES

Please mark in the appropriate column the way you judge each of the following:

MEASURABLE	NON-MEASURABLE		
____	____	1.	To choose appropriate clothing styles for individual types.
____	____	2.	To write the correct answers in the spaces provided to at least eight out of ten simple addition problems involving pairs of one digit numbers presented in linear form., 2+3=
____	____	3.	To verbally state one's name, address, and telephone number on command.
____	____	4.	To know the reasons for highway traffic laws.
____	____	5.	To be able to choose appropriate clothing given a social situation and weather conditions.
____	____	6.	To compare a photograph and a drawing or sketch.
____	____	7.	To recognize that proper health habits affect one's appearance.
____	____	8.	To develop an understanding of the concept of money within one class period.
____	____	9.	To understand the concept of juvenile status.
____	____	10.	To set up, prepare, and operate for 60 seconds a movie projector, of the type used in schools, and do this within ten minutes of class time.
____	____	11.	To underline ten, of twenty given statements which correctly state factors that contribute to safety in a swimming pool.
____	____	12.	To develop the concept of money and its uses.
____	____	13.	To really understand the concepts of form and balance in art.
____	____	14.	To write the numerals from one to ten inclusive on command with no hesitation.
____	____	15.	Circle the correct answers to multiplication problems.
____	____	16.	To demonstrate an understanding of simple addition facts by successfully computing with 80% accuracy, the sums of pairs of one digit numbers within fifteen minutes.
____	____	17.	Given a list of 50 nouns and 50 non-nouns, the student should be able to identify 45 nouns correctly out of 50 choices.
____	____	18.	To play actively with other children during noon-time recess.
____	____	19.	To orally explain the correct meaning of traffic signs that are round, octagonal, or diamond shaped.
____	____	20.	To find the number of swings per minute and the period of a pendulum set up by the teacher.

PROBLEM DEFINITION EXAMPLE

Validated Need Statement:

There is a need to improve the reading achievement of our students.

Problem Statement:

How can we improve the reading achievement of students not achieving to potential?

Mission:

Improve reading achievement commensurate with ability.

Constraints:

1. Not more than $40,000 additional.
2. Our goal should be achieved by June 30, 1972.
3. No more than two reading specialists (learning disability) teachers will be hired.
4. Skills in other areas must be maintained or improved as measured by SAT.

Performance Requirements:

What will be done:	Criterion Measures:
1. All students in the district since September 1969 must be reading at a level commensurate with ability.* Students in the district less than two years will reach this performance level by the time they have been in the district for two years.	o By June 1971. o 90% of all students. o Measured on Stanford Achievement test compared with I.Q. and S.E.S.
2. Attitude toward reading must be maintained or improved.	o Number of library books checked out per month. o Teacher judgment. o Student's expressed opinion.
3. No decline in achievement in other subjects or skills while improving reading achievement.	o Achievement test average will remain the same or be improved.

Mission Objective:

Prior to June 30, 1972 and at a cost not to exceed $40,000, the reading achievement of 90% of the pupils in all grades will be commensurate with their ability as determined by such measures as I.Q., S.E.S., etc. While this is being achieved, attitudes toward reading will remain positive and there will be no measurable decline in the expected achievement of pupils in other subjects or skills.

*(Definition: Achievement commensurate with ability = $\bar{x} \pm 3$ standard deviations)

PROBLEM DEFINITION FORM (2.0)

Validated Need Statement:

Problem Statement:

Mission:

Constraints:

Performance Requirements:

WHAT WILL BE DONE (How much? How many? etc)	CRITERION MEASURES (How will we know?

MISSION OBJECTIVE:

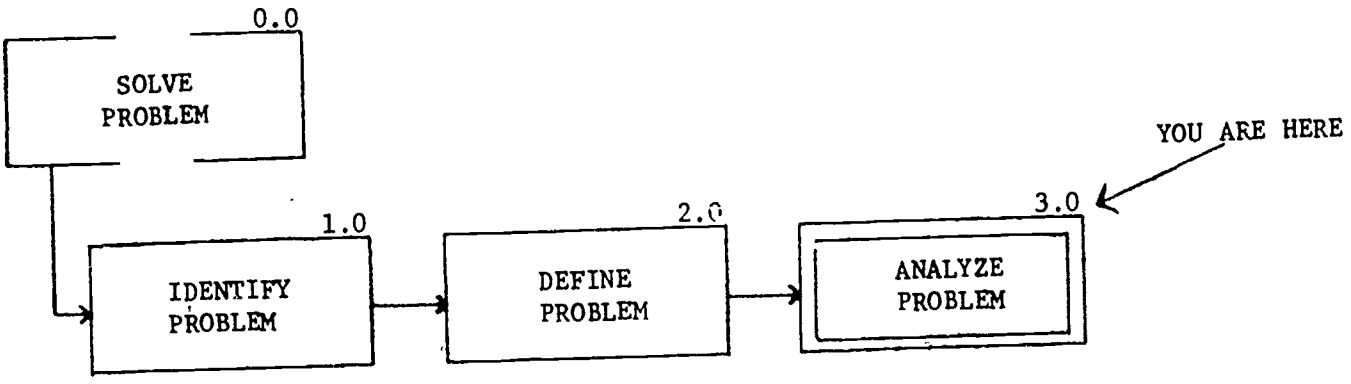
PROBLEM DEFINITION FORM (cont.)

Performance Requirements:

What will be done (How much? How many? etc.)	Criterion measures (How will we know?)

Mission Objective:

PROBLEM ANALYSIS 3.0



"Nor can analysis be slighted in any creative process. In many a case, the mere breaking down of the problem has revealed the answer, or has shown that the real problem is other than the one we had set out to attack."

--Alex F. Osborn
Applied Imagination, p. 117

"As John Dewey pointed out, our creative thinking will improve as we relate the new fact to the old, and all facts to each other. That's why, in addition to finding new facts, we need analysis to discover relationships. For instance, digging for likenesses can sometimes unearth a common factor which can serve as a principle in guiding our creative thinking."

--Alex F. Osborn
Applied Imagination, p. 108

"There are objectives within objectives within objectives. They all require painstaking definition and close analysis if they are to be useful separately and profitably as a whole."

--UTAH PLANNING

SYSTEM ANALYSIS: WHAT IT IS

This exercise deals with the process of analysis. Analysis may be defined as the process of breaking down an existing whole into its constituent parts. It is thus assumed that the parts have a logical relationship to each other and to the whole. Thus, when the process of analysis has been finished, all of the constituent parts will have been identified and separated into logical groups and their inter-relationships will have been established.

The process of analysis as described herein is to be used with problems or with systems. Problem definition has been covered in a previous exercise. Let us, therefore, turn our attention to the definition of a system. The first definition of "system" in Webster's Unabridged Dictionary is:

> "A complex unit formed of many often diverse parts subjected to a common plan or serving a common purpose."

A clearer definition from the dictionary may be obtained from its description of a biological system:

> "An assemblage of parts or organs of the same or similar tissues or concerned with the same function; e.g., the nervous system, the digestive system."

The foregoing definitions provide some preliminary insights to the reasons for adopting the following definition of a system to be used in this training exercise:

> A system is the sum total of parts working independently and in interaction to meet previously specified objectives.

It may thus be seen from the preceding definition of a system that system analysis would consist of breaking down an existing system into its constituent parts or functions and showing the separation of such parts into logical groups as well as showing the logical relationships that they have to one another and to the system as a whole.

DISTINGUISHING "WHATS" FROM "HOWS" IN THE ANALYSIS PROCESS

At this state of the problem-soving process it is important to defer solutions (hows) and continue to define objectives (whats) through the process of analysis. Most persons tend to be very much solution-oriented, therefore, it is important to recognize "whats" from "hows" and store away the hows (3.16) as they may emerge merely to get them out of the way at this time.

For purposes of illustration, suppose we are making an analysis of "Assisting Migrant Pupils." Some "hows" that might emerge are:

Purchase mobile classrooms

Hire bilingual teachers

Use more visiting teachers to go into camps

Acquire teaching materials that would motivate migrant pupils and reflect their environment.

The foregoing "hows" would be stored. They are not desired at this point. Instead we are looking for "whats." In this problem, some of the <u>whats</u> might be:

Assist migrant pupils with academic learning

Improve health of migrant pupils

Enhance the social aspects of migrant pupils lives

Improve the psychological and self-concept aspects of migrant pupils.

When you believe you can distinguish "whats" from "hows," complete the evaluative exercise on the next page.

EVALUATIVE EXERCISE: DISTINGUISHING "WHATS" FROM "HOWS"

Please mark the appropriate column to indicate your judgment of the following fruits from an analysis on "Assisting Migrant Pupils."

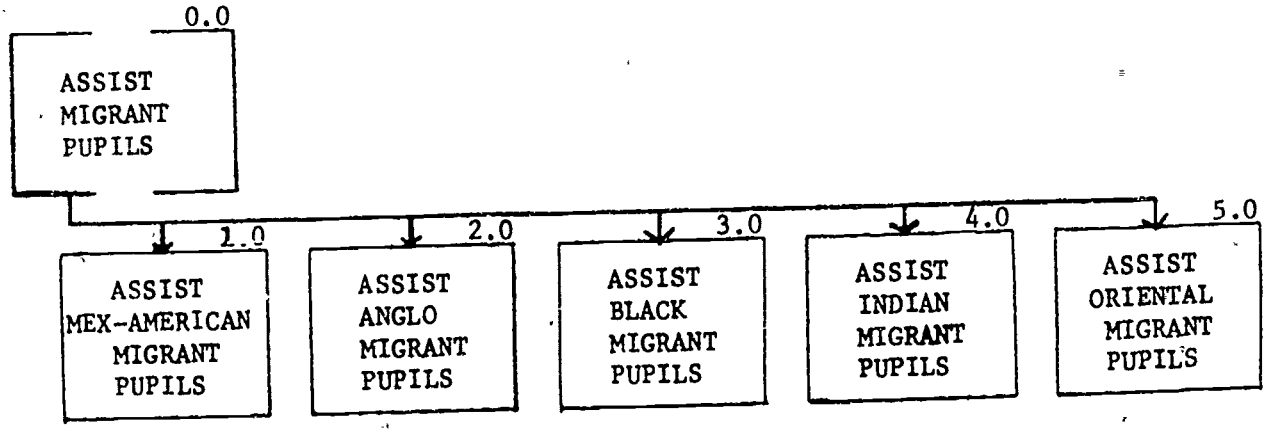
WHAT	HOW	FUNCTION OR ACTIVITY
____	____	1. Link migrant pupil data into an interstate project.
____	____	2. Make classrooms out of trailers that would follow the migrant pupils.
____	____	3. Upgrade the emotional well-being of migrant pupils.
____	____	4. Hire teacher aides from among the migrant pupils.
____	____	5. Improve the physical fitness of migrant pupils.
____	____	6. Establish boarding facilities at schools to retain migrant pupils while their parents migrate.
____	____	7. Hire some school-attendance officers.
____	____	8. Assist migrant pupils in acquiring salable skills.
____	____	9. Contract with other agencies such as O.E.O. or the Department of Agriculture to educate migrant pupils.
____	____	10. Provide for the moral and spiritual development of migrant pupils.

DIFFERENTIATING BETWEEN "PRODUCT-WHATS" AND "PROCESS-WHATS"

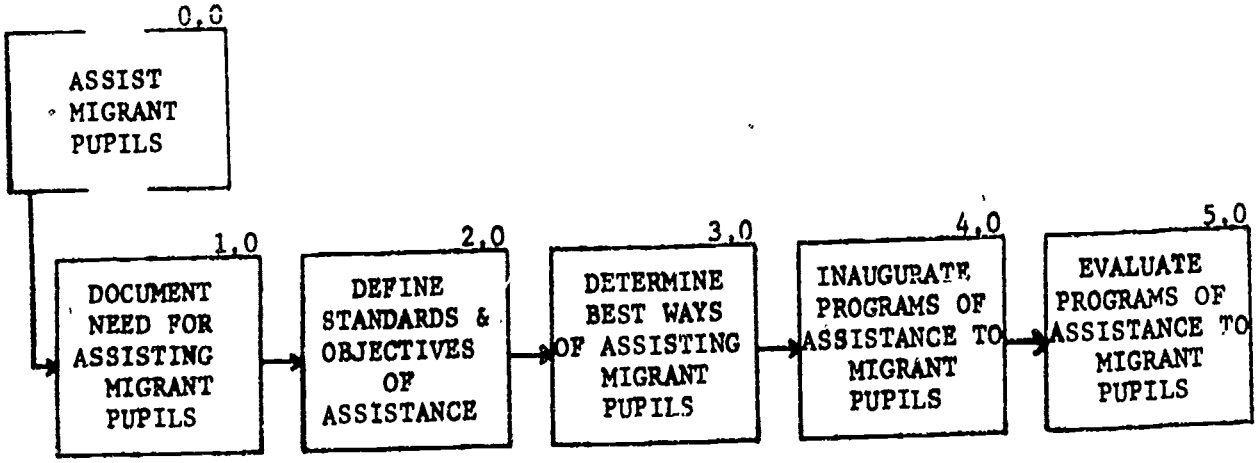
It is essential for the analysis procedure to distinguish between "process" and "product" whats. At this stage of the problem-solving process, only the "product-whats" are desired.

To help you recognize the difference, both types are shown in the analysis below.

PRODUCT-TYPE FUNCTIONS:



PROCESS-TYPE FUNCTIONS:



When you think you can distinguish between the "product whats" and "process whats" for a variety of problems complete the evaluative exercise on the next page.

EVALUATIVE EXERCISE: DIFFERENTIATING BETWEEN "PRODUCT-WHATS" AND "PROCESS-WHATS"

(From an analysis of "Assist Migrant Pupils)

PRODUCT	PROCESS	WHATS
____	____	1. Appoint steering committee.
____	____	2. Assist rural migrant pupils.
____	____	3. Evaluate existing programs for migrant pupils.
____	____	4. Improve lot of male migrant pupils.
____	____	5. Secure federal funds for assisting migrant pupils.
____	____	6. Help female migrant pupils.
____	____	7. Upgrade the lot of urban migrant pupils.
____	____	8. Conduct in-service training of teachers.
____	____	9. Improve pupil record system.
____	____	10. Assist suburban migrant pupils.

MISSION ANALYSIS

Directions: At this state you should have

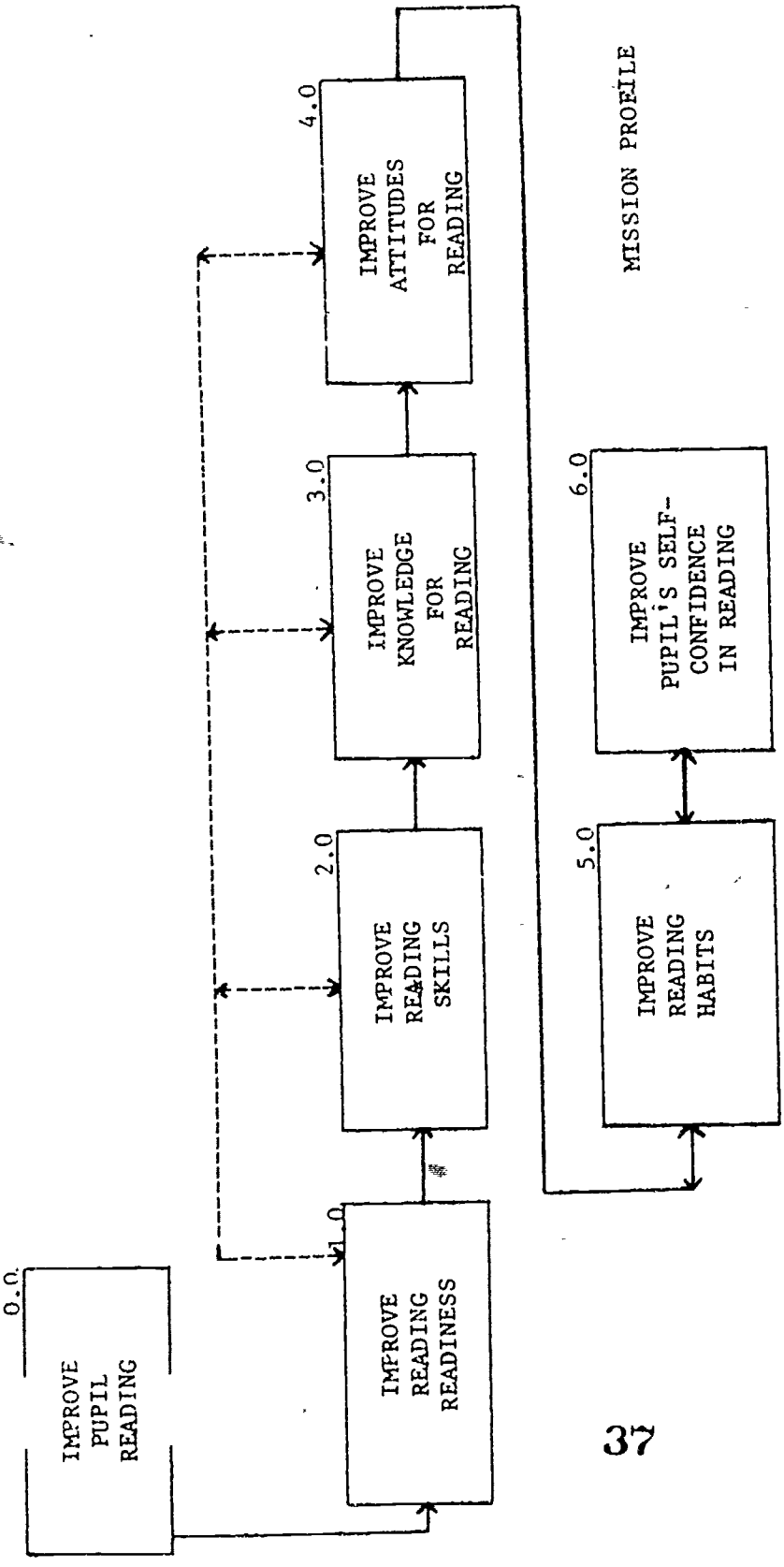
- A statement of need
- A statement of the problem
- Performance requirements for the problem solution
- Constraints on the problem solution

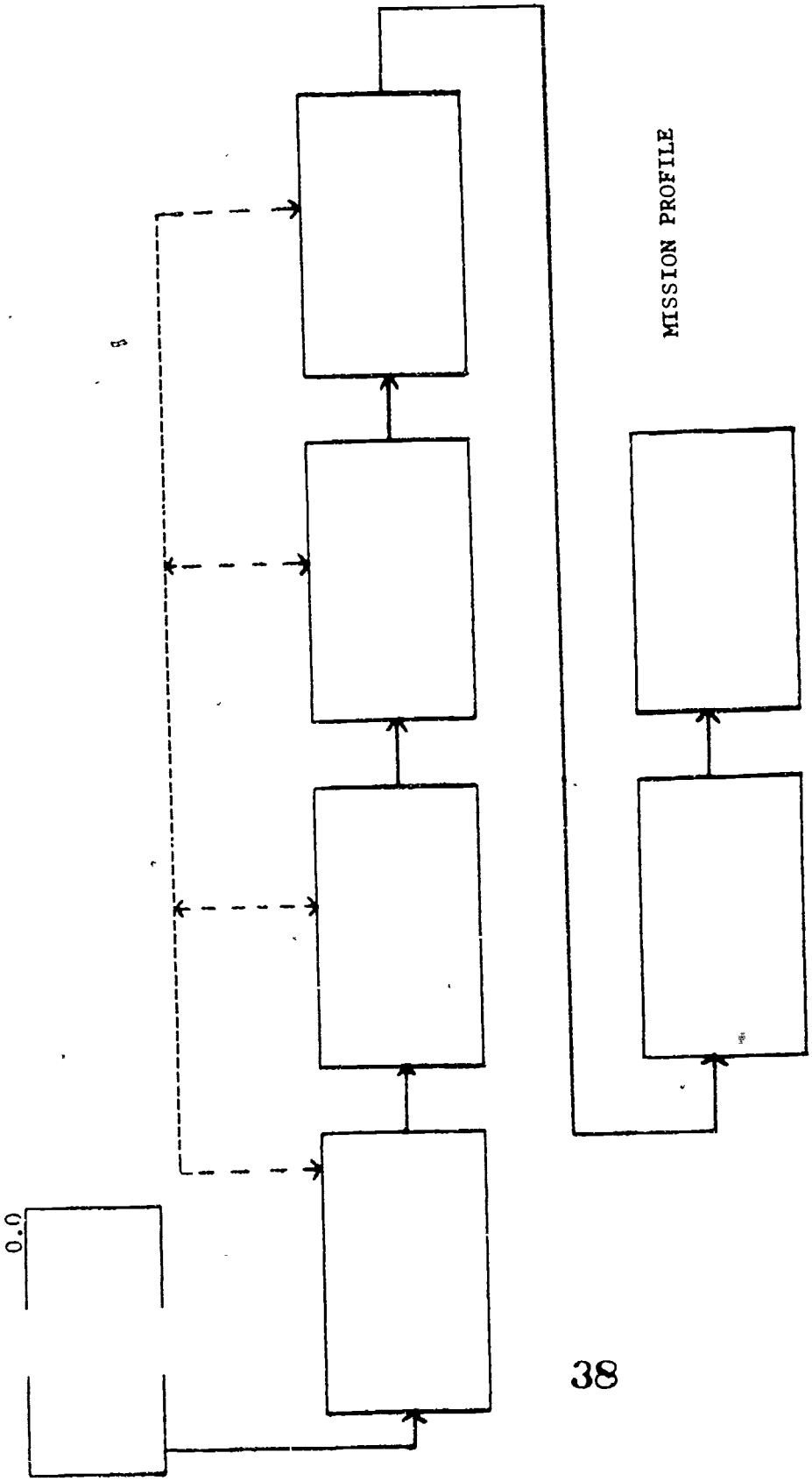
It is now essential that the constituent parts of the problem (defined as a system) be identified and separated into their logical relationship.

In order to do this a mission profile should be constructed. This would identify all of the MAJOR WHATS that must be accomplished (not more than 6 or 7) in order for the mission to be accomplished.

(Caution: We are looking for WHATS, not HOWS. That is, we want WHAT has to be done, regardless of HOW it is accomplished. If you discover a lot of HOWS in this process, write them on the sheet entitled SOLUTION BANK. This should get them off your mind, keep track of them, and help you then identify the WHATS).

Now complete, with the training Director's help as you need it, the mission profile on the next page which deals with "Improve Reading Achievement."


MISSION PROFILE
0.0
IMPROVE PUPIL READING
1.0
IMPROVE READING READINESS
2.0
IMPROVE READING SKILLS
3.0
IMPROVE KNOWLEDGE FOR READING
4.0
IMPROVE ATTITUDES FOR READING
5.0
IMPROVE READING HABITS
6.0
IMPROVE PUPIL'S SELF-CONFIDENCE IN READING


MISSION PROFILE
0.0

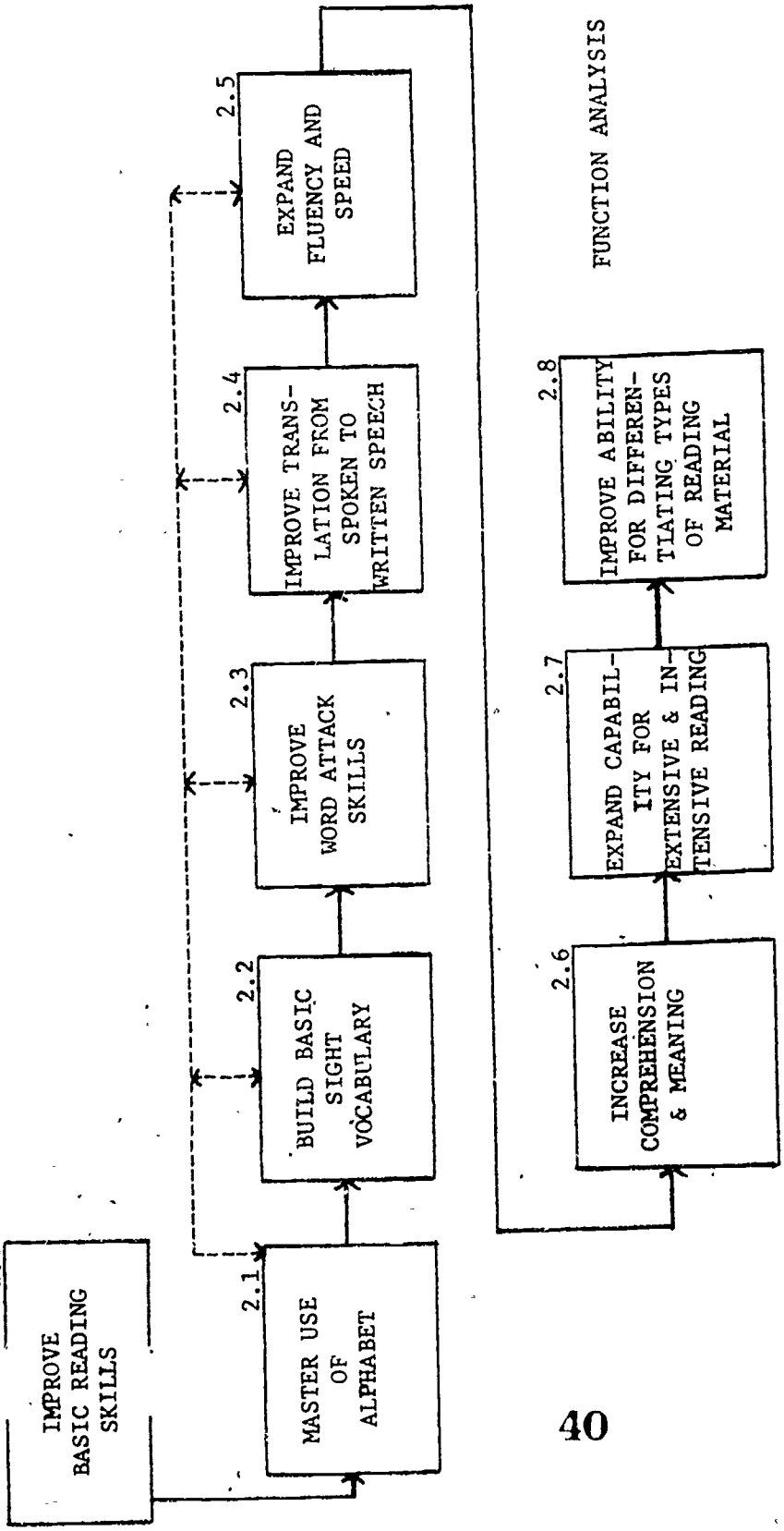
FUNCTION ANALYSIS

Directions: After you have completed the mission profile as best you can, take one of the milestones (boxes in the profile) and perform a complete analysis of it. This stage of the analysis is known as a function analysis.

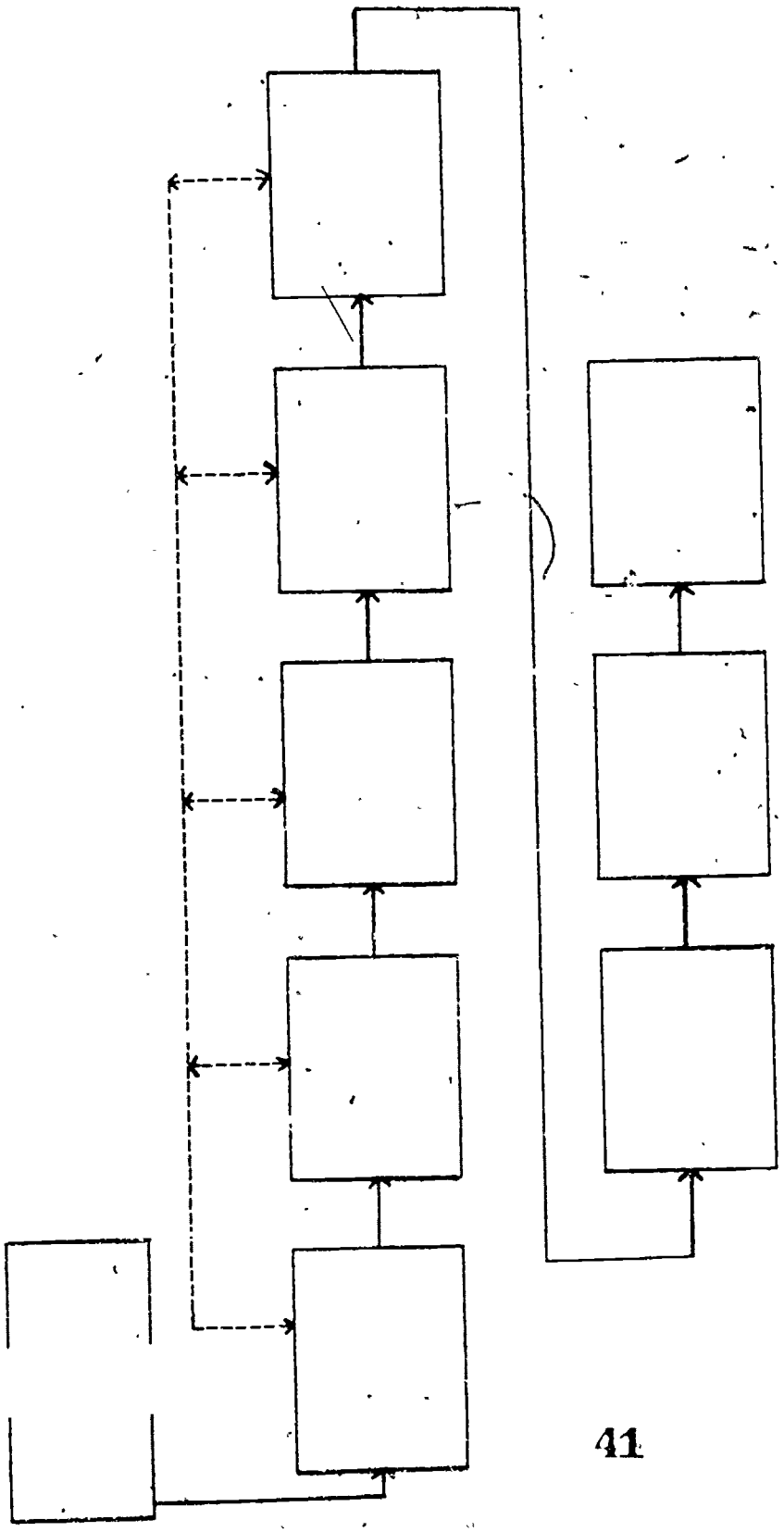
A block diagram is provided on the next page to help you to get started on the function analysis of the reading problem.

Now complete, with the Training Director's help as you need it, the function analysis of 2.0 provided on the next page.

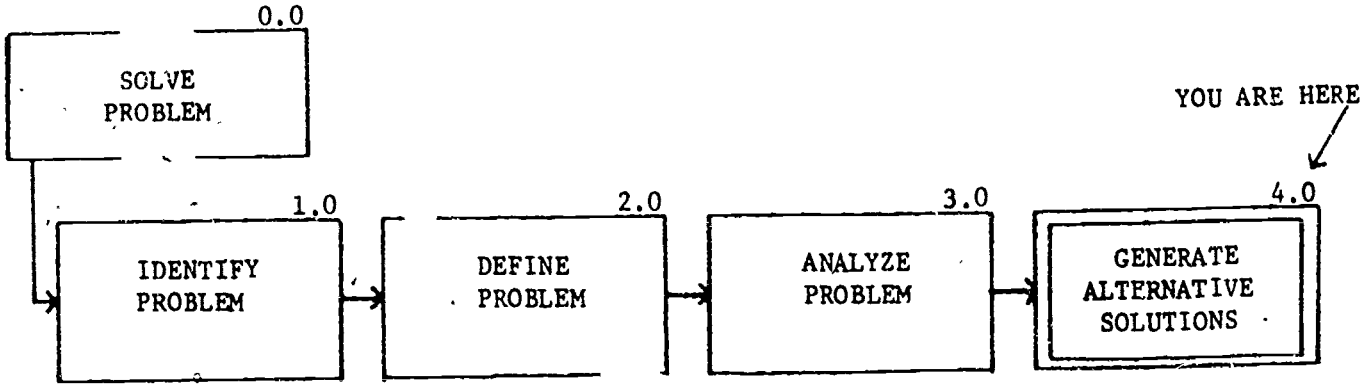
NOTE: If you should finish your function analysis before the other participants in your session, select another mission milestone from the profile and do a function analysis on it.


2.0
IMPROVE BASIC READING SKILLS
2.1
MASTER USE OF ALPHABET
2.2
BUILD BASIC SIGHT VOCABULARY
2.3
IMPROVE WORD ATTACK SKILLS
2.4
IMPROVE TRANSLATION FROM SPOKEN TO WRITTEN SPEECH
2.5
EXPAND FLUENCY AND SPEED
2.6
INCREASE COMPREHENSION & MEANING
2.7
EXPAND CAPABILITY FOR EXTENSIVE & INTENSIVE READING
2.8
IMPROVE ABILITY FOR DIFFERENTIATING TYPES OF READING MATERIAL
FUNCTION ANALYSIS

FUNCTION ANALYSIS



ALTERNATIVE SOLUTIONS 4.0



"The best way to have a good idea is to have lots of ideas."

--Linus Pauling

"Failure is the line of least persistence."

--Alfred W. Brandt

"As is true of any other art, idea production can be implemented by certain 'techniques'--especially by deferment of judgment during ideative effort."

--Alex F. Osborn

"And so it is in preparation for a creative project, analysis can help us relate our facts and thus enhance our ability to form a pattern--a pattern which can serve as a map in our search for solutions of the problem in hand."

--Alex F. Osborn
Applied Imagination, p. 109

SOLUTIONS GENERATED FOR THE PROBLEM OF "IMPROVING READING ACHIEVEMENT"

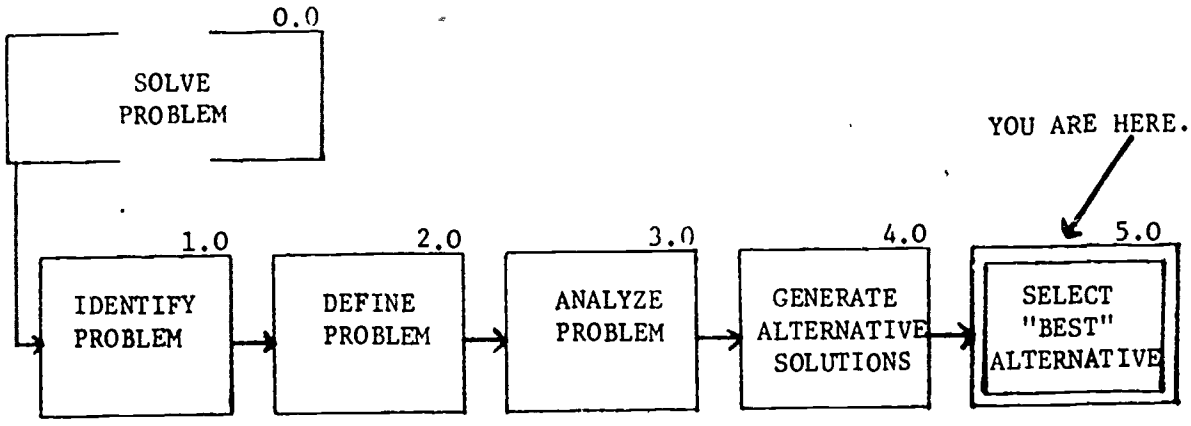
1. Pre-School
2. Indiv. Rdg.
3. Inservice Training
4. Dev. Better Rdg. Readiness
5. Teaching Machines
6. Pay for Reading (Incentive)
7. Prog. Rdg. Materials
8. Adequate Diagnostics
9. Pay Parent-St. Achieves
10. Remedials
11. Rdg. Specialists
12. Team Teaching
13. Teacher & St. Aids
14. Better Library - IMC
15. ETV - Other Media
16. Decrease Pupil - T. Radio
17. Home Visitation
18. Field Trips
19. Inst. Materials
20. Share Best Ideas
21. Summer Schools
22. Award Motorcycles
23. Provide More Time
24. Abandon Grades
25. Better Pre-Service
26. Upgrade Classrooms
27. Performance Cont.
28. Grad. Diploma for Dropouts Passing Rdg.
29. Speed Rdg.
30. Revolutionize Words (Phonetic Pron.)
31. Free Hot Lunches
32. Other Teachers Responsible
33. Option of no more Rdg. Classes if Pass Sta.
34. Tutorial Contracting
35. Get other Agencies to Teach
36. More Lib. Time
37. Bilingual Teachers
38. Inst. Parents to teach
39. Spec. Classes for Disadvantaged
40. Physical Exercises, Etc.
41. Nutrition & Clothing
42. Simplify English
43. Background Music
44. Physical Exam.
45. Psycho-Therapy
46. Use drugs

LIST SOLUTIONS SEPARATELY ON EACH LINE

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____

(Note: Use back of sheet for listing more.)

SELECT BEST SOLUTION 5.0



In actual practice, we may start our guessing even while preparing. Our analysis may lead us straight to the solution. After incubation, we may again go digging for facts which, at the start, we did not know we needed.

--ALEX F. OSBORN
Applied Imagination, p. 117

Analysis plays an indispensible part in problem-definition--especially in clarifying our objectives, and in making our targets more specific. In these ways, preparation can be better directed--time and effort can be saved by limiting our fact-finding to that which will serve best to further our creative thinking.

Analysis also plays a vital part in preparation as well as in synthesis and evaluation. In fact, analysis can be quite as helpful to creative thinking as to judicial thinking.

--ALEX F. OSBORN
Applied Imagination, p. 105

SELECTING THE "BEST SOLUTION" FOR YOUR ASSIGNED PROBLEM

Directions: Now that you have generated more than a dozen alternative solutions to the problem assigned to you, it is necessary to select the best one of these or the best combination of these. To do this, the selection criteria must be listed first. Selection criteria refer to those characteristics or qualities which you value if they were possessed by a candidate solution. By way of illustration, some of the classical criteria would be (a) time required to implement the solution; (b) cost involved to implement; (c) estimated benefit or effectiveness to be derived from the solution, such as in the reading problem, the rise in achievement scores anticipated from implementing the candidate solution.

Now consider your assigned problem and list five or six of these criteria and assign some kind of numerical weighting to each one. Thus, if you thought one criterion was worth twice as much as another, the numerical weighting should reflect this.

Now enter in the appropriate places on the next page the key words for each solution strategy and the numerical weighting for each criterion. You are now ready to proceed in evaluating each alternative solution. Write the summation for each solution in the column marked "total."

SHOW HOW YOU MADE A TENTATIVE SELECTION OF YOUR BEST SOLUTION.

READING: APPLICATION OF WEIGHTED CRITERIA FOR SELECTING "BEST" STRATEGY

SOLUTIONS - STRATEGIES		COST	TIME TO IMPLEMENT (X7)	PUBLIC ACCEPTANCE (X5)	EASE OF IMPLEMENTING (X4)		TOTAL
1. UPGRADE PERSONNEL: Hire specialists, conduct inservice training, provide incentives & recognition,		(6) 60	(8) 56	(10) 50	(9) 36		202
2. IMPROVE MATERIALS AND EQUIPMENT: Purchase variety, acquire programmed materials, buy technological aids,		(5) 50	(10) 70	(8) 40	(8) 32		192
3. INCREASE TIME: Hire additional staff, extend school day and school year, start at early age,		(1) 10	(4) 28	(4) 20	(6) 24		82
4. INDIVIDUALIZE INSTRUCTION: Acquire or create learning packages, provide aides and volunteers,		(3) 30	(6) 42	(6) 30	(6) 24		126
5. DECREASE CLASS SIZE: Hire more teachers and aides, inaugurate accountability,		(4) 40	(8) 56	(10) 50	(8) 32		178
6. FORM SPECIAL CLASSES FOR THE DISADVANTAGED: Begin remedial classes, etc.		(.5) 5	(8) 56	(8) 40	(7) 28		129

SOLUTION - STRATEGIES	Selection Criteria									TOTAL
1.										
2.										
3.										
4.										
5.										
6.										

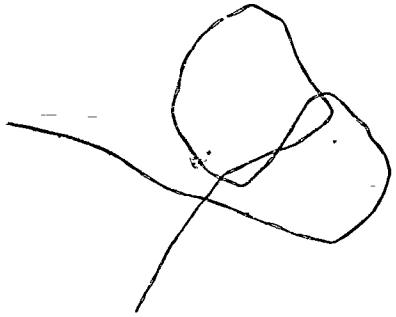
SOLUTION TO READING PROBLEM

The solution to the reading problem consisted of three elements:

(1) Hire a reading specialist who could conduct teacher workshops and follow-up with individualized teacher assistance.

(2) Train teachers in the diagnostic use of test results and in more effective individualized reading instruction.

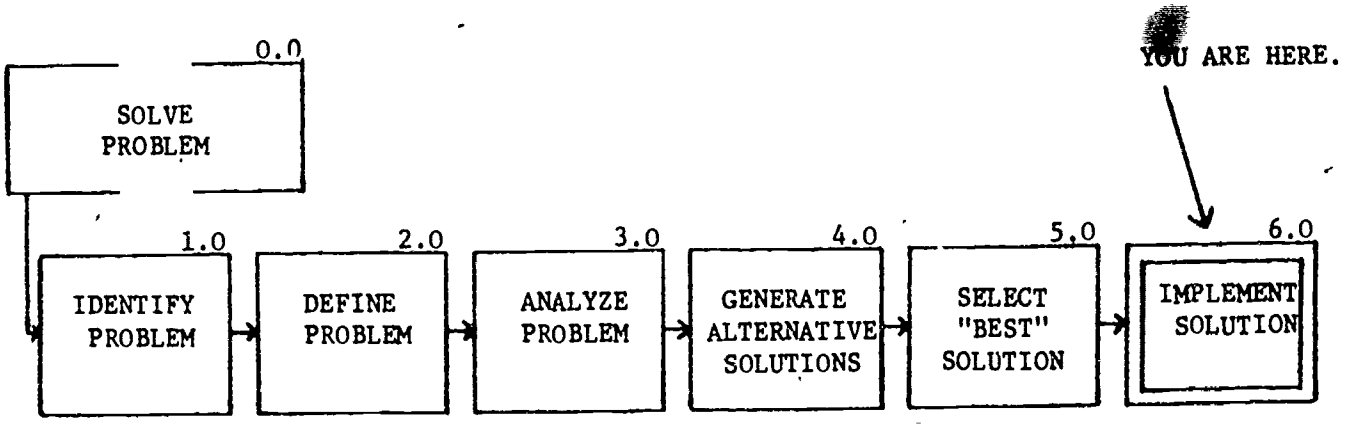
(3) Award a certificate of commendation to all teachers in the district whose classes have achieved the defined goals on improved reading.



SOLUTION

Directions: Write (narrative model) or draw (graphic model) on this page a detailed description of the solution you have selected to the problem assigned to you.

IMPLEMENTATION OF SOLUTION 6.0



The network approach to action planning is a major advance in improving management planning and control effectiveness. . . . The decision-making process has come to require increasing amounts of qualitative and quantitative data with the result that the need for new aids to sound decision making has been recognized. No management tool can make decisions, but tools such as network planning can provide the basis on which to build a realistic, economical management information system which will permit more informed decisions to be made.

--Archibald and Villoria[1]

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[1]Russel D. Archibald and Richard L. Villoria, Network-Based Management Systems (New York: John Wiley and Sons, Inc., 1968) ix.

IMPLEMENT SOLUTION: SESSION 6.0

GUIDELINES AND SYMBOLS USED IN FLOWCHARTING

In drawing implementation plans and diagrams, it is useful to observe the following rules or suggestions:*

1. All functions derived must be in a logical sequence.
2. A block must be square or rectangular.
3. All blocks must contain a number in the upper right-hand corner.
4. All blocks will be connected by solid lines.
5. All feedback functions will be designated by broken lines.
6. All functions in series sequence will be shown in horizontal sequence.
7. All parallel sequences will be shown in vertical sequence.
8. All numbers will be by functional level and identified according to the "parent" high level function following a decimal-like pattern.
9. All alternate functions will be designated by an "and/or" gate.
10. No function will be broken out into only one sub-function.
11. Each function derived will contain at least one action term. Strive to contain, whenever possible, only three given words in any one box.
12. All sub-functions derived must provide for the accomplishment of the parent higher-level function.

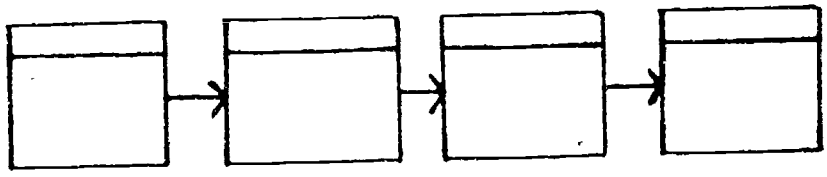
A functional flow-block diagram shows the order and stages of what has to be done. It shows all elements and how they go together to do something or to get something accomplished--and shows it graphically.

---

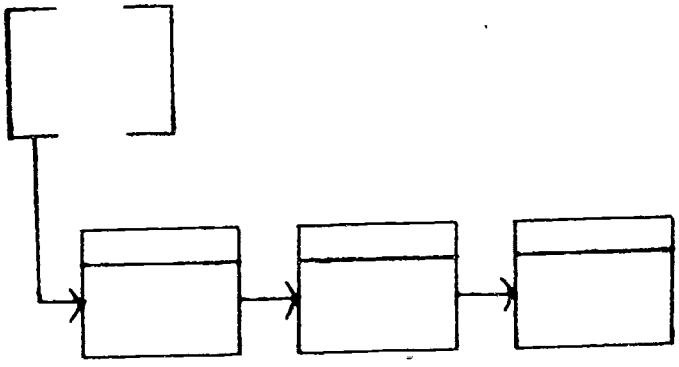
*This list of rules was compiled by Roger A. Kaufman and others, Functional Analysis in Education (Burlingame: OPERATION PEP, 1967).

GUIDELINES AND SYMBOLS FOR FLOWCHARTING (cont.)

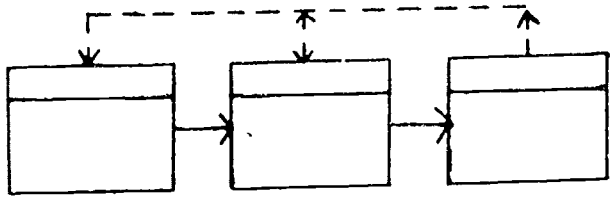
Connect blocks with a solid line in order to indicate the direction of flow. (Numbers may be used to show sequence.)



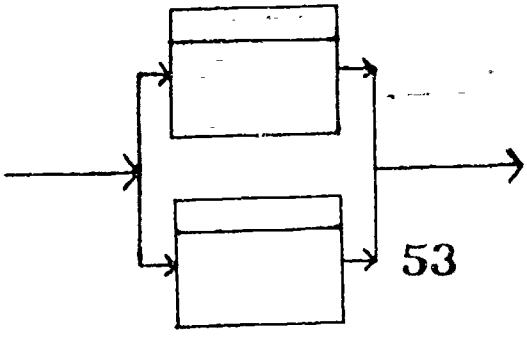
If a referent block is used it should be shown as an open block.



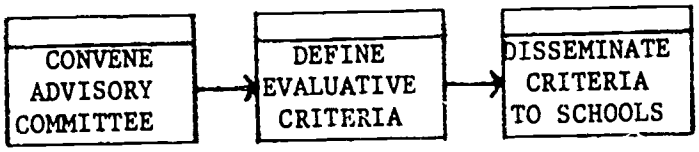
Feedback functions are shown by broken lines.



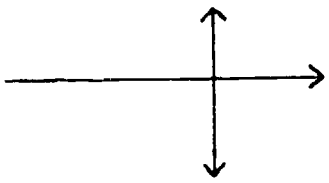
Function may be shown as occuring simultaneously.



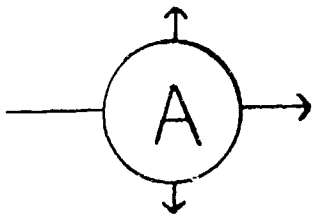
Strive to have each block contain less than five words (preferrably 3):



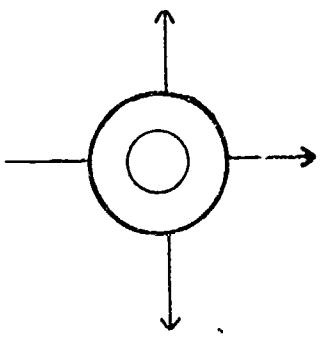
The "and/or" junction specifies that each alternative is to be exercised but designates no particular order.



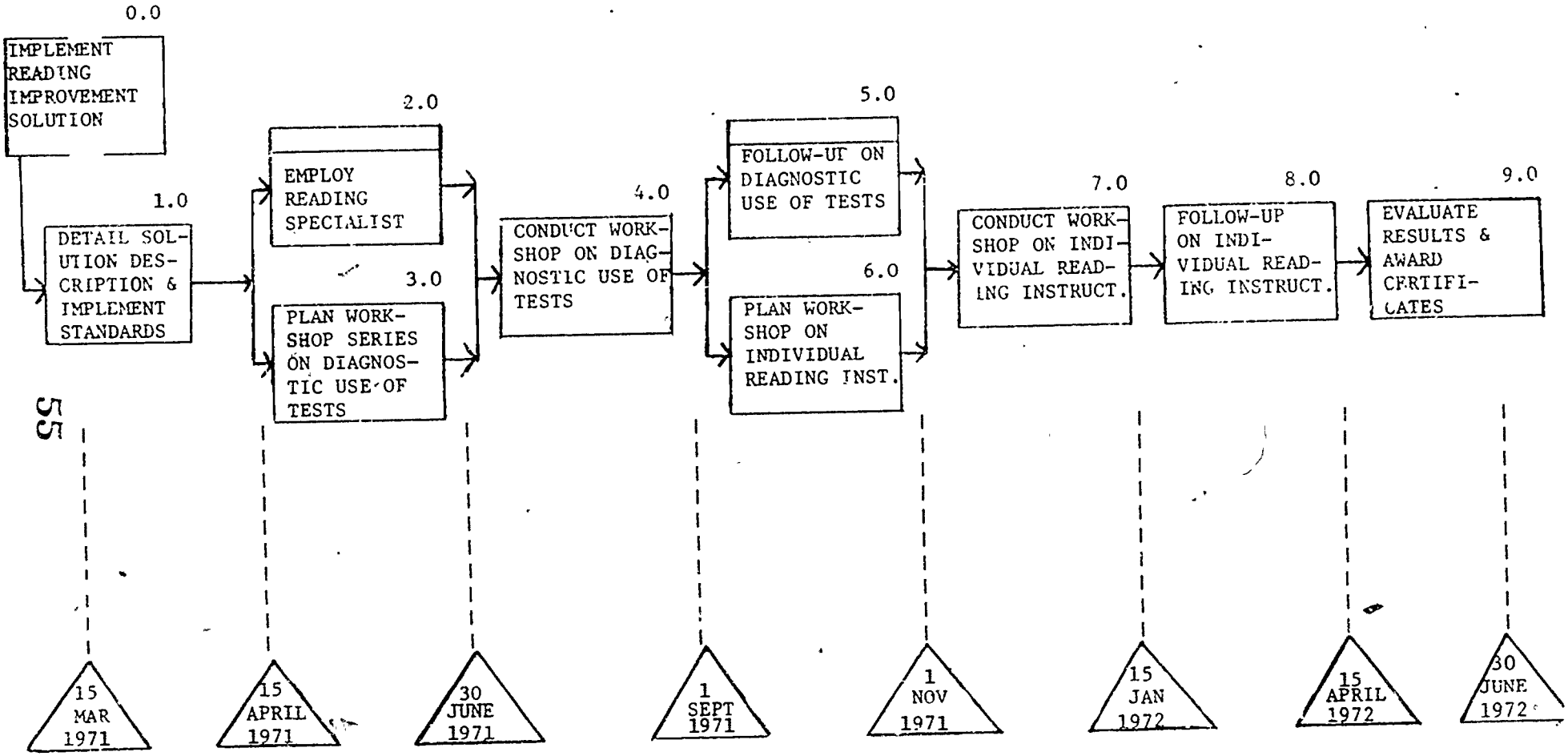
A mandatory "and gate" indicates the flow must go in each direction according to a designated order (shown by numbered blocks.)



A mandatory "or gate" requires that direction flow one way or another, but not more than one way.



PLAN ACTIVITY DIAGRAM FOR IMPLEMENTING THE READING IMPROVEMENT PROGRAM



55

15 15 30 1 1 15 15 30

52

PLANNING TO IMPLEMENT YOUR SOLUTION

Key Concept:

At this time, you should have selected the solution to your assigned problem and described it in detail. The task remains to implement it and then conduct an evaluation to see whether it did indeed solve the problem satisfactorily. In one sense, you face a completely new problem of "getting from where you are to where you want to go."* In most cases the biggest challenge to be faced is one of communication. That is, there must be a high level of communication between the plan* and those who have the responsibility to implement it.

Basic Procedure:

One authority has specified the implementation procedure as including:

PROCEDURE:

1. Delineate the activity elements, schedule of events, and resource requirements.
2. Plan a program to evaluate the selected alternatives in utilizing a pilot program (as a test phase if possible to minimize the risk).
3. Establish a controlled experiment.
4. Establish machinery to collect data performance financial, etc., to use for evaluation.
5. Implement the program with conviction.**

In the author's experience, a more detailed and useful procedure can be seen in flowchart form on the next page.

Directions:

After familiarizing yourself with the flowcharting techniques described in the preceding pages, you are to develop a detailed plan for implementing the solution to your assigned problem. Remember, the big challenge is to successfully implement and this requires communication.

---

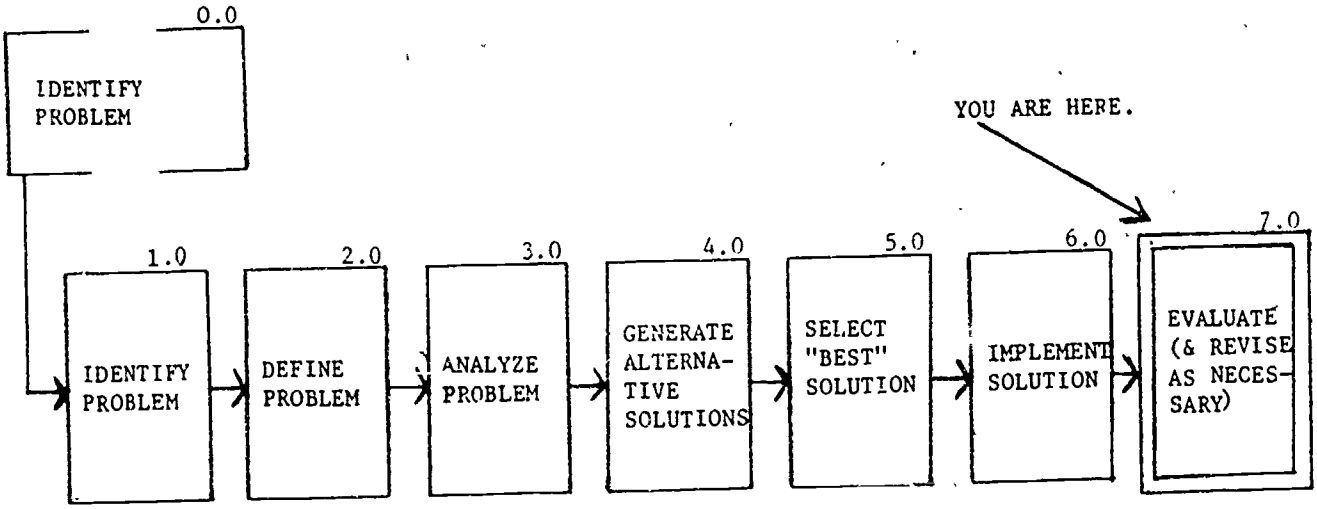
*A plan is the ordering of human, physical, and financial resources to accomplish a mission.

**Henry Lehman

IMPLEMENTATION PLAN

Draw a flowchart in final form on this page for implementing the solution to your assigned problem.

EVALUATION 7.0



"New techniques of observation and judgment need to be developed. In fact, we need a new technology of educational evaluation. We need new paradigms, new methods and new findings to help the buyer beware, to help the teacher capitalize on new devices, to help the developer create new materials, and to help all of us to understand the changing educational enterprise."

---ROBERT E. STAKE

EVALUATION

In the systems approach to planning and problem-solving, the element of evaluation is built-in at virtually every step. To point this out, and by the way of review, consider the evaluation model presented on the next page. Note that there are six separate steps in the evaluation model used by the author. These steps coincide with the various elements in the problem-solving model. Take a few moments at this time to identify the problem-solving elements within the evaluation model.

It should be noted that most of the elements for evaluation have already been generated during the problem-solving process. Let us enumerate some of these:

1.0 Problem Identification. In the concerns analysis a series of facts and values were made explicit to validate the need. These constitute the basis now for seeing that the need has been met--the primary purpose of evaluation.

2.0 Problem Definition. A series of constraints dealing with time, money, personnel, etc., were articulated that can now serve directly as evaluative criteria. Moreover, in the problem definition step, a number of performance requirements and specifications were developed in such a way that they could serve as evaluative criteria in gauging the success of the mission.

3.0 System Analysis. The analysis phase consisted of breaking the problem down into all of the "what's" that had to be accomplished in order for the mission to be successful. Now consider these "what's" as objectives. They have been fully enumerated and can serve as the basis for a very extensive evaluation.

5.0 Select "Best" Solution. In the selection process, a series of evaluative criteria were applied, such as cost, time, benefit, effectiveness, lack of program disruptiveness, public or staff acceptance, etc. These same criteria are now to be used in the overall evaluation to verify that the solution selected did in fact meet these criteria. Was the solution selected the "best" one?

6.0 Implement Solution. Many good programs or solutions in education fail, not because the idea was poor, but because it was poorly implemented. Part of the job of evaluation therefore is to determine how well the implementation phase was carried out. The plan itself serves as a basis for evaluation. It automatically carries with it some deadlines for the accomplishment of certain activities. It is the job of evaluation to reach back into the values and facts compiled, into the performance requirements, mission milestones and functions identified, and into the solution descriptions (model) and put these into usable form for monitoring the execution of the plan and assessing final outcomes.

DEVELOPING THE EVALUATION PLAN FOR YOUR PROBLEM

Directions: Now that your flowchart for implementing the "best" solution to your assigned problem is finished, your planning is nearly completed. There remains the elements of the plan for evaluation.

In order to complete the plans for evaluation, it is necessary to carry out the following series of steps:

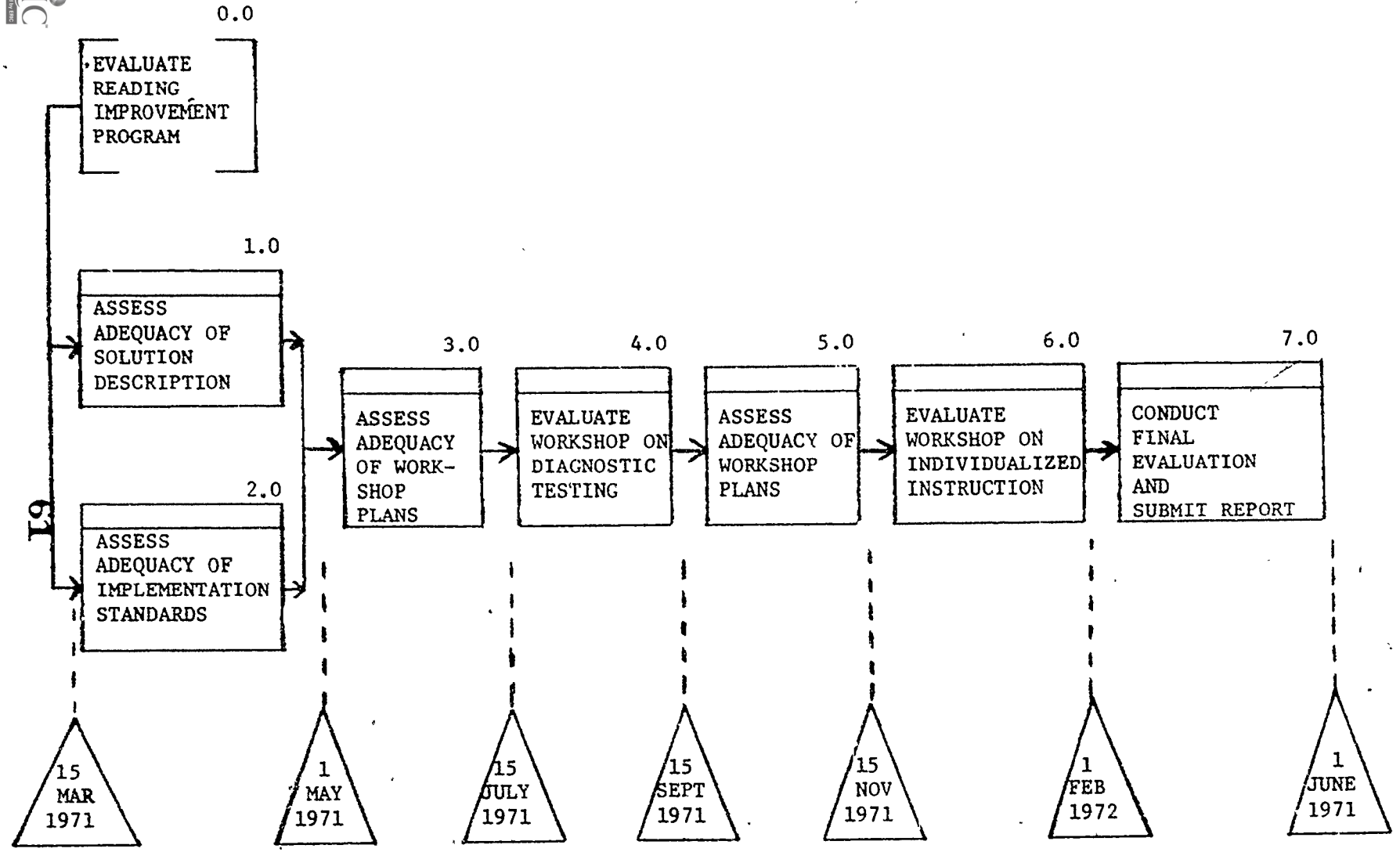
1. Review the written material on evaluation for this session and then draw up an evaluation design for the implementation and product evaluation for your problem.

2. Take at least one milestone in your evaluation plan and write out the specification for monitoring. Show tolerance limits.

   Suggestion:

   > Examine the milestone activities in the mission profile. Consider each of these as an objective. Now write a series of performance requirements or specifications on one of these milestones that would give assurance that it was done, and would reveal how much of it was done, how well it was done, and how one could tell indisputably. This will give you some of the key elements of the evaluation plan.

When you have completed this exercise in evaluation, please fill out the Training Session Critique Form and turn it in to the Training Director.



PLAN-ACTIVITY DIAGRAM FOR EVALUATING THE READING IMPROVEMENT PROGRAM

PLAN-ACTIVITY DIAGRAM FOR EVALUATING THE (Write in here the assigned problem or resultant program.)

GUIDELINES AND CRITERION MEASURES
FOR EVALUATING A MAJOR ACTIVITY IN THE

_____

(Write here the assigned problem or resultant program.)

GLOSSARY FOR SOLVING PROBLEM

Analysis - A process of breaking something down into its constituent parts.

Constraint - Hurdles, boundaries, or obstacles that exist or are established which may jeopardize in whole or in part the successful accomplishment of the mission with its specified performance requirements. A constraint is this limitation to a course of action. It may be a specific constraint such as a given supply of skilled manpower or a particular item of information; a general constraint, such as total available funds; or a legal or social constraint.

Function Analysis - The process used to determine what functions or jobs must be done to accomplish the mission objective, i.e., deriving all the WHATS that have to be done to assure with predictability the successful achievement of the mission objective. It is essentially the process of breaking a function into its constituent component parts. Functional analysis formally preceeds from the analysis of the functions identified in the mission profile. This process continues until all of the functions are analyzed and identified, and it shows all of the functions, sub-functions, etc., that are essential to describe "what" has to be done to meet the mission objective and its performance requirements. Through the process, top-level functions are analyzed into constituent lower-level functions. As the analysis process "moves down" problems are defined and functions identified in greater and greater detail.

Goal - A broad direction, general purpose, or intent. It is general and timeless and is not concerned with a particular achievement within a specified period of time.

Mission - The objective or job to be done, be it a product, a completed service, or a change in the condition of something or somebody. It also provides the intent and purpose, which clearly indicates which actions are to be taken and why. A mission is thus a goal, an objective, a purpose, an aim, a desired state or result to be achieved or reached. For example, to hit a given target or to come as near to it as possible. To achieve the maximum possible profit for the minimum possible cost under given constraints.

GLOSSARY FOR SOLVING PROBLEM

Mission Analysis - An initial phase of the system analysis process. It is used to produce the major functions or milestones to be accomplished. Mission analysis represents a process by which an investigator may arrive at a profile of major events to produce the outcomes when the desired goal has been achieved.

Mission Profile - The critical path for achievement of the end-product, that is, the intent of the mission or the job to be done. It is comprised of the major, logica ly sequenced, but mutually exclusive functions which must be performed to accomplish a mission. These major functions are frequently referred to as major milestones.

Objective - A quantifiable desired output within a time and space framework. By achieving the objective, progress toward the goal is advanced. In this model "objective" refers to measurable learner behaviors.

Performance Requirements - A series of criteria or standards by which the success--or failure--of the system or mission is to be ascertained. Normally these are comprised of products, specifications, performance characteristics, and restrictions. They allow measurements to determine how well the system is performing with respect to the goal. Thus, they specify in detail what is meant by the accomplishment of the goals for a particular problem. They may be seen as product specifications.

Program - A unique combination of personnel, facilities, equipment and supplies which operate together to accomplish common objectives.

A System - The sum total of parts, working independently and in interaction to meet previously specified objectives.

System Analysis - A process of determining the parts of a system and the way in which the parts relate one to the other and to the total system. It is used during the problem-solving process for (1) identifying the problem and (2) analyzing a problem and (3) setting goals.

System Approach - A technique that recognizes an enterprise as a whole; that is, seeing its totality. This requires an investigator to disregard former boundaries, and to cross them specifically in relating diverse operations and specialities toward definite purpose. When applied to educational problem-solving, it may be operationally defined as a formal, logical and internally consistent process.

GLOSSARY FOR NEEDS ASSESSMENT

Concern - The unrefined, unevaluated expressions that emanate from individuals or organizations in their attempts to identify needs or problems.

Concerns Analysis - The process of identifying all relevant facts, values, and policies related to a given concern. It is a technique used in problem identification.

Facts - That which has actual existence. A piece of information presented as having objective reality. A fact represents something that can be derived empirically--that is--something upon which two or more objective investigators can conclude after independent investigations.

Match-Mismatch Process - A process for identifying discrepancies that exist between "what is" and "what is required". In the process, the consistencies and inconsistencies (matches and mismatches) are determined between the discrepancies so that a profile of discrepancies may be derived. It is through this comparing action or activity that one may identify the array of discrepancies which are valid; that is, discrepancies that have a definite data base to support the fact that they are problems or needs.

Need - A discrepancy or differential between "what is" and "what should be" (i.e., "what is required," or "what ought to be"). In educational planning, "need" refers to problems rather than solutions, to the student "product" rather than the resources for achieving that product, to the ends of education rather than to the means for attaining those ends. Thus a need refers to a discrepancy or a "gap" or difference that exists between "what is" and "what is required". "What should be" in this model is expressed in terms of goals and behavioral objectives.

Needs Assessment - An investigation that entails the identification of discrepancies between "what is" and "what is required," together with the placement of priorities among the identified discrepancies. This is usually the first step in system analysis, since problem definition proceeds from the identification of a problem which has been isolated in a needs assessment.

Environment - The surroundings or environments of a system. The complex of factors that act upon a system and its various sub-systems and ultimately determine its nature, functions, and survival.

GLOSSARY FOR NEEDS ASSESSMENT

Operational Philosophy - An accumulation of identified values that are used as a kind of "guidance mechanism" in the total systems, or problem-solving, approach. It is an organized arrangement of all of the values (value bank) generated through the concerns analysis procedures.

Policies - Expressions of how a system operates. These may be written or unwritten, formal or informal. They are a special kind of facts that describe what is in terms of procedures.

Problem - The requirement to reduce or eliminate a discrepancy between what is and what should be to a specific level.

A problem exists when there is a goal to be attained with no well-defined or well-established way of attaining it; or when the goal is so vaguely defined or unclear that relevant means for attaining it cannot be clearly determined. A problem statement consists of less than a dozen words and is expressed in question form.

Problem Identification - A part of the needs assessment procedure which identifies relevant facts, values, and policies related to an expressed concern and then validates the concern as a problem in terms of accuracy, validity, feasibility, criticality, etc. (See concerns analysis).

Validated Need - A need is said to be validated when it is characterized by such things as focus, identification of target, contains a criterion, expresses criticality, time allowable, etc.

Value - Precise signification; import. A conclusion about the significance or worth of a thing.

An expression of belief or conviction about something. An assumption about a thing.

In the concerns analysis technique, it is possible and advantageous to define values in measurable terms. That is the value expressions should be stated in such a way that they are demonstrable, verifiable, and wherever possible measurable.

GLOSSARY FOR PROBLEM DEFINITION

Closed-Loop Model - A self-correcting system which allows for constant improvement. The concept of dynamic correction through feedback or recycle loops in the system definition. This may be compared to the so-called "helix of science," a repetition of definition, experiment, and correction that continuously produces improvements. This self-correcting feature assures that the system analysis process will yield data which are both internally and externally consistent and feasible.

Feedback - A general principle of systems analysis wherein an input to a system is received and transformed. The output of the transformation is then compared to the input, and any discrepancies are noted. Then, by suitable procedures, the output on the following cycle is corrected. Feedback may be continuous or periodic. The feedback principle always requires a "loop" of action.

In planning, feedback is the evaluative information which describes the functioning of a system and when there are malfunctions, is used as a basis for revision or modification of the system.

Iteration - A process of checking and rechecking back and forth against the mission objective, the performance requirements and constraints in order to insure internal consistency within and between functions and to answer the question of feasibility and practicality. A continual process performed throughout the entire system analysis. A checking back and forth between "what is required" and "what is achievable" in order to determine mission feasibility. A process central to the design of systems, and a major key to systems analysis and the system approach to planning and problem solving. It is also the process of checking for internal consistency.

Iterative - Repetitive. The iterative process of research or analysis refers to the repeated performance of a research study or analysis, each time improving it, sharpening it, and building upon the previous work.

Iterative Process - A process for calculating a desired result by means of a repeating cycle of operations, which comes closer and closer to the desired result.

GLOSSARY FOR PROBLEM DEFINITION

Mission Objective - A general, yet inclusive, statement of the problem or objective that consists of an explicit prose statement--expressed in operational terms--of the overall intent of the activities constituting the system or the job to be done. As a procedural guideline, mission objective should contain elements specifying what is to be done, where it is to be done, when it is to be done, and how much or how well it is to be done. It must also clearly communicate and contain the basis for evaluation.

Problem Definition - Systematically identifying all of the elements of a situation requiring goal attainment without a well-established way for such attainment. The complete definition is subject to criteria of clarity and precision and consists of (a) problem statement; (b) mission; (c) constraints; (d) performance requirements; (e) mission objective, etc.

Requirement - The need or demand for personnel, equipment, facilities, other resources, or services, expressed in specific quantities for specific time periods. For use in budgeting, item requirements should be screened as to individual priority and approved in the light of total available budget resources.

Specifications - The meaning of specifications (or standards) in socio-economic fields has come to be more than what is implied by the general use of the word. Thus, in business and industry, there are "standards and specifications." A standard is a general presentation of requirements of quality and performance, applicable to a group of materials, products, or services; whereas a specification is a more detailed presentation. Example: there are standards for steel, but there are specifications for particular types of steel and steel products. Synonym: criterion (but criterion is more qualitative and less precise than standard). (SRI)

GLOSSARY FOR PROBLEM ANALYSIS

Flow-Block Diagram - This is the format which shows graphically the analysis sequentially and with its relationships. It may be used to portray the mission profile, the functional analysis, or the task analysis or all of these compiled into an overall portrayal.

Function - One of a group of actions contributing to a larger action. Smaller actions are referred to as lower-level functions or sub-functions. Larger actions are referred to as higher-level functions. The highest level function is identified with the mission profile. Thus, functions are collections of elements to be performed or done to accomplish performance requirements.

Methods/Means - A solution, formed from the words:

Method - A strategy for accomplishing a requirement; that is, achieving some performance requirement.

Means - A vehicle or tool for implementing a strategy. A vehicle by which a strategy is achieved.

Methods-Means Analysis - A final phase of the system analysis process. This phase results in a determination of possible strategies and vehicles for accomplishing required product or outcome. It identifies the array of possible solutions to achieve a requirement or family of requirements, and it identifies the advantages and disadvantages of each. In a sense, the Methods-Means analysis identifies the array of "what-hows." Thus it is the identification of all possible methods (strategies) and means (vehicles) for implementing each strategy, and the listing of the advantages and disadvantages of each for achieving one or more of the specified performance requirements identified in a system analysis. (PEP)

Methods-Means Analysis Summary - A process which identifies the total array of strategies and vehicles (methods-means) for meeting the performance requirements at successive levels of analysis for each and all functions and tasks. It provides an overall compilation of what is available as far as methods-means is concerned with the advantages and disadvantages of each. The data thus provided are to be used in determining the final methods-means decisions used during system synthesis.

GLOSSARY FOR PROBLEM ANALYSIS

Problem Analysis - Breaking a problem into its component parts or functions and tasks. Used as a synonym for system analysis. (See system analysis)

Referent Function - The initial box in a flow-block diagram or model, which is open at top and bottom, and constitutes the beginning of functional analysis. It is this box that contains the function or sub-function from which the subsidiary sub-functions flow in a functional flow-block diagram.

Sub-Function - Since a function is one of a group of actions contributing to a larger action, we must view sub-functions in relative terms. The larger, overall actions are referred to as function; the smaller, component or lower-level functions are termed sub-functions. Thus, the sub-functions serve as the underlying or supporting elements or parts of an overall function.

Sub-system - A relative term referring to a number of elements or parts working independently and in interaction to meet specified objectives, since each sub-system may be viewed as a system by itself. However, if individual systems can be put together in a functional relationship to form a single system, then these become sub-systems to the overall composite system. Thus, the small constituent systems--which become an overall larger system--are referred to as sub-systems, since they are subordinate, secondary, or contain less than the usual total system as it is defined. Thus the sub-system is the underlying supporting part of the system.

Tasks - Units of performance; collections of units of performance that fit together smoothly, and form sub-functions in the same way that a group of sub-functions may fit together to form a function. Thus, units of performance, when sequenced in order--the order in which they occur--will "add up to a function or sub-function which they constitute." Thus, a task is to a function what a link is to a chain. Tasks are elements of a function which, when performed by people and things in proper sequential order, should resolve the parent function.

Task Analysis - The lowest level of system analysis. The "breaking out" process of a sub-function, all of the various tasks or jobs to be completed from an ordered sequence of events. Task analysis deals with particulars, that is, it is the lowest level breakdown that can be made without destroying the identity of the persons, places, things, etc., involved.

GLOSSARY FOR PROBLEM ANALYSIS

System - An entity consisting of elements whose relationships or interrelationships are illustrated as they have been carefully selected to achieve a specific purpose. The term "system" refers to a particular list or collection of variables and relationships selected by the analyst for a particular purpose. In its simplest conception, a system may be defined as the sum total of separate parts working independently and in interaction to achieve previously specified objectives.

System Analysis - A formal method and technique used to assist in deriving and implementing the closed-loop or helixical problem-solving method. As applied to educational problem-solving, system analysis consists of four elements; mission analysis, functional analysis, task analysis and methods-means analysis. It is a technique to identify the "whats" for meeting a mission objective or purpose of a system. It provides the data-base and criteria for making relevant and practical "how" determinations during system synthesis. Operationally, system analysis may be defined as a circular process of definition, test, and treatment. Thus it requires the investigator to make a preliminary definition, test it, perhaps make a system change, treatment, or improvement. Then, from his experience and observations, the analyst will be able to improve or correct his original definition and repeat the cycle of definition, analysis, and treatment again. This sequence of events may be compared to the so-called "helix of science," the repetition of definition of theory, experiment, and correction that continuously produces improvements in knowledge.

Systems Analysis - A formal inquiry intended to advise a decision-maker on the policy choices involved in such matters as weapon development, force posture design, or the determination of strategic objectives. To qualify as a system analysis, in contrast to operations analysis, a study must look at an entire problem as a whole. Characteristically, it will involve a systematic investigation of the decision-maker's objectives and the relevant criteria; a comparison--quantitative when possible--of the costs, effectiveness, and risks associated with the alternative policies.

GLOSSARY FOR ALTERNATIVE SOLUTIONS

Alternatives - Within any one agency this term means other possible programs besides those already decided upon. It suggests a comparison of two or more programs (i.e., two or more possible approaches) toward fulfilling the same objective. Used in this context the term is output-oriented; it suggests substituting an entirely different program (and therefore a different output or outputs) for a program already planned or in process. On the other hand, alternative ways to do a given job takes the program as given, and raises possibilities for changing the mix of inputs.

Brainstorming - A form of group dynamics designed to encourage creative and imaginative thinking about solutions to a problem by means of an uninhibited exchange of ideas.

Combine Alternatives - This creative principle is based on the concept of forced relationships. It urges that various aspects of a program or solutions be connected or interrelated in random ways in order to produce new ideas or solutions.

Deferred Judgment - This principle of creating calls for the deliberate deferment of judgment during idea-finding in order to prevent premature judgment from hampering imagination. Judgment is applied only after a wide variety of alternatives are listed.

Divide and Conquer - A creative principle in generating solutions is to spark new ideas. As Bovee has stated: "Ideas are like matter, infinitely divisible. It is not given us to get down so to speak to their final atoms--the way is never ending and the progress infinitely delightful and profitable . . . ."

Heuristic - Solution of a problem by a trial-and-error approach frequently involving the act of learning. This process often leads to further discovery or conclusions without providing proof of the correctness of the outcome.

Incubation - In the creative ideational process, incubation refers to the period when the creator is not involved in conscious activity with respect to his problem. Often during or after such a period, insights or ideas seemingly "well up" from within the individual.

GLOSSARY FOR ALTERNATIVE SOLUTIONS

Solution Strategies — Broad courses of action or policies to achieve objectives; answers to questions of "how?"

Strive for Quantity - In generating ideas, one of the creative principles stresses that a large volume is necessary. In short, all other things being equal, the greater number of ideas, the more likelihood of good ones.

GLOSSARY FOR SELECTING SOLUTION

BENEFIT-COST RATIO

An economic indicator of efficiency, computed by dividing benefits by costs. Usually, both the annualized benefit stream and the cost stream are discounted so that the ratio reflects efficiency in terms of the present value (q.v.) of future benefits and costs.

COST-BENEFIT ANALYSIS (BENEFIT-COST ANALYSIS)

An analytical approach to solving problems of choice which requires the definition of objective and identification of the alternative that yields the greatest benefits for any given cost, or what amounts to the same thing, that yields a required or chosen amount of benefits for the least cost. The term usually applies to situations in which the alternative outputs can be quantified in dollars. A chief characteristic of cost-benefit analysis is that its aim is to calculate the present value of benefits and costs, subject to specified constraints. See also: Cost-effectiveness analysis.

COST-EFFECTIVENESS ANALYSIS

An analytical approach to solving problems of choice which requires the definition of objectives, identification of alternative ways of achieving the objective, and identification of the alternative that yields the greatest effectiveness for any given cost, or what amounts to the same thing, that yields a required or chosen degree of effectiveness for the least cost. The term is usually used in situations in which the alternative outputs cannot be easily quantified in dollars. See also: Cost-benefit analysis.

CRITERIA

An objective standard, rule, or test by which a judgment of something can be formed. Premises on which priorities are established among alternatives in order to measure relative degrees of desirability.

EFFECTIVENESS

The performance or output received from an approach or a program. Ideally, it is a quantitative measure which can be used to evaluate the level of performance in relation to some standard, set of criteria, or end objective.

GAMING (Game Theory)

A type of simulation concerned with situations of conflicting interests. Mathematically, it is a process of selecting an optimum strategy in the face of an opponent who has a strategy of his own. The theory of games refers to a branch of mathematical analysis developed by von Neumann and Morgenstern to study tactical and decision-making problems in conflict situations.

GLOSSARY FOR SELECTING SOLUTION

MODEL

A schematic representation of the relationships that define a situation under study. A model may be mathematical equations, computer programs, or any other type of representation, ranging from verbal statements to physical objects. Models permit the relatively simple manipulation of variables to determine how a process, object, or concept would behave in different situations.

A decision model is a model which, in effect, performs management's planning and control functions--to the extent that management so delegates when the model is constructed and implemented.

SIMULATION

An abstraction or simplification of a real world situation. Hence, in its broadest sense any model is a simulation, since it is designed to replicate some existential condition(s). Simulations may take the form of either deterministic models (q.v.) or probabilistic models (q.v.).

MAN-MACHINE SIMULATION

Man-machine simulation is simulation in which both calculating machines and human decision makers interact in simulating a process or system.

PURE-MACHINE SIMULATION

Refers to those simulations that are carried out solely by machines. This is in contrast to man-machine or all-man simulation in which human decision makers serve as part of the model.

SUB-OPTIMIZATION

Selection of the best alternative course of action which pertains to a sub-problem, i.e., to only part of the overall problem or objective. Sub-optimization is usually necessary because alternatives at all the various levels of decision making cannot, as a practical matter, be analyzed simultaneously before decisions are made at any level. Also referred to as any intermediate stage in a long-run goal attainment program.

SYSTEM SYNTHESIS

A formal procedure of composing or combining the often diverse tasks and sub-functions into a coherent total that provides the best possible solution in achieving the mission objective. Formally defined, it is the execution of the last stages of the problem-solving process, i.e., determining solution strategy, implementing solution strategy, and determining strategy effectiveness. Functionally, however, synthesis is closely matched with analysis as a process, or as processes, which is used at each step in performing a system analysis. Thus, an analysis is performed each time a function or task is broken down into its component parts, and a synthesis is performed when these resulting analysis-data are recorded as a part of the data base.

GLOSSARY FOR IMPLEMENTATION

ACTIVITY

A program category (q.v.) expresses the purpose of a program; activity is a term which is sometimes used to refer to a way in which the purpose may be accomplished. For example, research and development, standards and regulation, distribution of information, and training of personnel, may be activities applicable to a particular agency program.

COMPREHENSIVE PLANNING

Planning which involves:
1. Consideration of all relevant factors
2. Participation of all agencies and persons who should contribute to the development of a given plan
3. Integrity and sophistication of planning
4. Long-range planning (IOWA)

Broader coverage--not simply piecemeal planning, but comprehensive co-ordination of the whole educational enterprise--including non-formal education--so that its various levels and parts will grow in balance, thereby avoiding serious wastes and maximizing education's contribution to national development. (IIEP)

CONTEXTUAL MAPPING

The extrapolation in graphic form of the interrelationships of functionally related technological developments. A "map" shows logical and causal interdependencies. (SDC)

COST-BASED BUDGETS

Budgets in which activity levels are measured in terms of value of resources consumed in carrying out the activity, rather than in terms of obligations (q.v.) incurred. These resource requirements, when distributed to program elements and categories and time phased to obligation requirements, provide a cost basis for PPB.

CPM AND PERT

CPM (Critical Path Method) and PERT (Program Evaluation and Review Technique) are network analysis models. Each has its own modeling language, but they differ in only one fundamental respect: CPM seeks to determine the expected times of completion of the total project and times of completion of the sub-projects of which it is composed. PERT goes further and seeks to estimate variances associated with these expected times of completion.

FLOW CHART

A pictorial description of a plan showing the sequence and interrelationships of all required events.

GLOSSARY FOR IMPLEMENTATION

IMPLEMENT

To carry out; fulfill, especially to give practical effect to and ensure of actual fulfillment by concrete measures.

INTERFACE

A surface forming a common boundary of two bodies, spaces, or phases. (Webster) In the system approach, the term applies to the specific relationship and/or interaction between elements or components of the system. It may describe the joining or common boundary line between two physical (or other) objects.

NETWORK

A flow diagram consisting of the activities and events which must be accomplished to reach the program objectives, showing their planned sequences of accomplishment, interdependencies, and interrelationships.

PERFORMANCE BUDGET

A budget based upon functions, activities, and projects, whose principal analytical orientation is the measurement of efficiency of operating units. For example, such a budget in an agency might require computation of the cost per unit of mail processed for one branch of the agency and the cost per loan application processed in another branch. See also: Program budget.

PLANNING

Planning is the selection or identification of the overall, long-range objectives of the organization and the making of systems analyses (q.v.) of various possible courses of action in terms of relative costs and accomplishments or benefits in order to aid managers in deciding on courses of action (i.e. programs) to be followed in working toward achieving those objectives. These analyses are variously referred to as cost-effectiveness, cost-utility, or cost-benefit (benefit-cost) studies.

Essentially, this level of planning involves deciding on what the organization is in business to do and generally how it is to be done. This is also called strategic planning.

REAL-WORLD

Not artificial, fictitious, illusory or apparent, but genuine; referring to the environment of a system; indicating there is no imaginary or assumed element, but refers to the actual, true; corresponding to known facts; implying an agreement between what a thing seems to be and what it is. Real-world refers to conclusions that are drawn on the basis of a definite data-base to support the fact that they are actual and not pseudo-problems or appearances.

GLOSSARY FOR EVALUATION

Comprehensive Evaluation - The establishment of systems of performance control based on the continuous assessment of program (project) operational management processes and resultant products.

Control - (1) The act or power of asserting authority especially in pursuance of a specific plan of action (2) superintendence of guidance; (3) the act of evaluating, through the use of reports or records or by inspection of operations, current performance compared with planned objectives or established standards. The term includes, when such evaluation shows unsatisfactory performance, the action taken for purposes of correction.

Evaluation -

1. Activities undertaken in an attempt to determine the value and/or success of a program, project, technique, etc.

2. A systematic procedure of collecting and analyzing information for the purpose of decision making.

Performance Contracting - The arrangement for technical assistance in program (project) operations through contracts which condition compensation upon the accomplishment of specified performance objectives.

Program Auditing - A performance control system based on external reviews conducted by qualified outside technical assistance, designed to verify the results of the evaluation of an educational program (project) and to assess the appropriateness of evaluation procedures for determining the effectiveness of program (project) operation and management.

NEEDS ASSESSMENT WORKSHOP

As participant, this orientation program needs your evaluation of each session. Please give your assessment and comments on the following:

PROGRAM ELEMENT	OUT-STANDING	VERY GOOD	FAIR	POOR	VERY POOR	COMMENTS
1. The quality & relevance of the subject matter.						
2. The expertise or skill of those presenting the subject matter.						
3. The appropriateness and usefulness of the instructional materials (manuals, etc.)						
4. The timing or sequencing of the various elements presented.						
5. The deployment, grouping or planned interaction of the participants.						
6. The productivity and/or usefulness of the individual work session(s).						
7. The comments or assistance given to you on your local problem. (oral or written).						

***Below or on the reverse side of this page, PLEASE ENTER ANY OTHER COMMENTS YOU CARE TO MAKE:

NAME (optional)

KEYS

Needs from Solutions	Values from Facts	Well-Defined Objectives	Preference List	WHATS from HOWS	Product WHATS from Process WHATS
1. N a. N	1. F	1. N	N	H	Process
2. S b. S	2. V	2. B	B	H	Product
3. S c. S	3. V	3. B	N	W	Process
4. S d. N	4. F	4. N	B	H	Product
5. N e. N	5. V	5. N	N	W	Process
6. N f. S	6. V	6. N	B	H	Product
7. S g. N	7. F	7. N	N	H	Product
8. N h. S	8. V	8. N	N	W	Process
9. S i. S	9. F	9. N	B	H	Process
10. N j. N	10. V	10. B	B	W	Product
11. S k. N	PRODUCT AND PROCESS PERFORMANCE REQUIREMENTS	11. B	B		
12. N l. S		12. N	N		
13. N m. N	1 -	13. N	B		
14. S n. S	2 -	14. B	N		
15. S o. S	3 +	15. N	N		
16. N p. N	4 +	16. B	N		
17. N q. N	5 -	17. B	B		
18. S r. S	6 +	18. N	B		
19. N s. N	7 -	19. B	N		
20. S t. S	8	20. B	B		
	9 +				
	10 -				