A study to determine the feasibility of developing a training program for educational systems/cost analysts
by Clifford Earl Winkler

A dissertation submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of DOCTOR OF EDUCATION
Montana State University
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Abstract:
This study has its roots in the problems our educational institutions are having in maintaining viable operations. Two methods of solving economic problems are: (1) to increase income and (2) to reduce expenditures to the point where income equals expenditures.

The use of systems techniques can assist in making available resources go much further by assisting educational administrators in finding the true needs of the organization.

Development of skill in educational systems requires training= Training systems, however, cannot be created until a background of theory and practice has been created= A literature study was done to determine if an adequate background of theory and practice existed for the proposed systems/costing function. The literature search indicated educational systems/costing procedures, implications,. and practices in each of these areas: (1) establishing educational goals and objectives; (2) effects in varying educational organization types; (3) use of educational technology; (4) use in school business practices; and (5) use in educational evaluation.

A survey was done to ascertain where in the United States training in educational systems and costing could be received. Three institutions were found with a total productive capacity of 60 personnel. A survey of possible users pf the services of educational systems/ costing personnel was done and a projected demand of 4,247 positions found, thus indicating net need for the expansion of training facilities for such personnel.

Thirty-eight major institutions indicated a desire to cooperate in the development of a training program for this type of personnel, and a list of 437 experts or potential program developers was found.

On the basis of these available resources, the background of theory and practice, and the demonstrated need, the conclusion was drawn that it is feasible to develop a training program for educational systems/cosing personnel.

A STUDY TO DETERMINE THE FEASIBILITY OF DEVELOPING A TRAINING PROGRAM FOR EDUCATIONAL SYSTEMS/COST ANALYSTS

by

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A dissertation submitted to the Graduate Faculty
in partial fulfillment of the requirements for the degree

of

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ABSTRACT

This study has its roots in the problems our educational institutions are having in maintaining viable operations. Two methods of solving economic problems are: (1) to increase income and (2) to reduce expenditures to the point where income equals expenditures. The use of systems techniques can assist in making available resources go much further by assisting educational administrators in finding the true needs of the organization.

Development of skill in educational systems requires training. Training systems, however, cannot be created until a background of theory and practice has been created. A literature study was done to determine if an adequate background of theory and practice existed for the proposed systems/costing function. The literature search indicated educational systems/costing procedures, implications, and practices in each of these areas: (1) establishing educational goals and objectives; (2) effects in varying educational organization types; (3) use of educational technology; (4) use in school business practices; and (5) use in educational evaluation.

A survey was done to ascertain where in the United States training in educational systems and costing could be received. Three institutions were found with a total productive capacity of 60 personnel. A survey of possible users of the services of educational systems/costing personnel was done and a projected demand of 4,247 positions found, thus indicating net need for the expansion of training facilities for such personnel.

Thirty-eight major institutions indicated a desire to cooperate in the development of a training program for this type of personnel, and a list of 437 experts or potential program developers was found.

On the basis of these available resources, the background of theory and practice, and the demonstrated need, the conclusion was drawn that it is feasible to develop a training program for educational systems/costing personnel.

Chapter 1

STATEMENT OF THE PROBLEM

INTRODUCTION

Forward

The investigator intends that this work may facilitate the growth of American Educational Systems in accordance with the principles of John Dewey. He too was interested in the efficient use of educational resources. To wit,

> There are two ways of approaching the problem of elimination of waste in the educative processes of the schools. One is administrative. This takes the existing system as a going concern, and inquires into the breaks and overlappings that make for malajustment and inefficient expenditure of time and energy on both the part of pupil and teacher. Useless, and therefore harmful, mental motions are harmful and not merely useless because they set up bad habits. The other may be called PERSONAL, PSYCHOLOGICAL or MORAL (italics added). By these adjectives is meant that the method starts from the side of personal growth of individual needs and capabilities and asks what school organization is best calculated to secure continuity and efficiency of development.
>
> . . .John Dewey, 1940, Education Today, page 203. . .

Background

The American educational system is now under great stress because of costs inherent to its operation. Taxpayers are turning down both operational levies and bond issues (Croft,1970). Teachers have organized into unions and are now demanding "their rights". This force and the usual upward price pressures of inflation are compounding the problems of school systems in maintaining viable operations (Furno, 1971:89).

American industry was faced with a similar situation in the early 1900's: inflation, rising costs, and no great technological breakthroughs to improve productivity. One response which helped to solve the industry dilemma during this period was the introduction of the efficiency expert (Haber,1964).

The efficiency expert of this period was usually an independent contractor who would do surveys of a company, a department, a section or a job and make recommendations as to the improvement of production or reduction of costs. Out of the experience of this period developed the professions of Industrial Engineering and Cost Accounting.

The premise of this study is that the time is now right for the development of an <u>educational equivalent</u> of the industrial engineer and cost accountant. The conditions are approximately the same: (1) rising costs, (2) technological breakthroughs on the horizon but not here, (3) a body of experience with costing which is just beginning

to be codified. The tools to be used are approximately the same: just as American industry in the 1900's had to be taught how to organize the efforts of people into continuous production systems, the educational administrators of the 1980's must be taught how to efficiently apply technology and the efforts of teachers into the intrinsically continuous development of individual students.

FORMAL STATEMENT OF THE PROBLEM

Problem Statement

The problem of this study is to establish the feasibility of creating a training program for educational systems/cost analysts.

The term "Educational Systems/Cost Analyst" is being used to stand for the concept of the educational equivalent of the industrial engineer or cost accountant. This is a coined term for use in this study. A by-product of the study will be a clearer definition of the role that such professionals might play. The terms educational systems analyst and educational cost analyst will be used interchangeably with the term educational systems/cost analyst.

The term "Feasibility Study" is the process of gathering information about a proposed activity; collating that information and providing the data for deciding whether to undertake the activity.

The term "Training Program" was used to describe the process of teaching/learning wherein specific skills and concepts are taught to

pre-defined levels of proficiency.

The Nature of a Feasibility Study

According to Webster's Third New International Dictionary (1963:305), the word "feasible" has the following meanings:

> ADJ. 1: capable of being done or carried out (a_____plan)
> 2: capable of being used or dealt with successfully, suitable
> 3: reasonable, likely syn. see possible.

A feasibility study would, therefore, evaluate a plan of action to determine the extent to which it was reasonable, likely to succeed, suitable or capable of being carried out with the expenditure of a reasonable number or amount of resources.

The Northwest Region Educational Laboratory (1970:3) used four stages of educational product development and dissemination. They were: 1. Search 2. Feasibility 3. Product Development and 4. Product Dissemination. The four stages were divided into 37 steps. The steps associated with the Feasibility Stage were:

> B. Feasibility Stage
>
> 5. Knowledge Search. Available literature and knowledge relating to the proposed product(s) and the potential users should be reviewed and pertinent data and information accumulated.
>
> 6. Feasibility Analysis. Assessing the practicability of the proposed product(s) in terms of the nature and size of the market; sales and distribution methods; production requirements, management, personnel and organization requirements; and economics.
>
> 7. Copyright Patent Search. Assurance that the products or ideas are free from prior rights through copyrights, patents and/or contracts.

8. Feasibility Screening. Review of data and information from items 5, 6, and 7 as indicated in the Decision Matrix.

The Plan to be Evaluated for Feasibility

The word "feasible" is an adjective and as such it refers to something. In this instance that something is the following plan:

1. "Experts" in educational systems will be located.
2. The body of knowledge relating to educational systems functions will be collated by this group of experts.
3. The experts will be brought together to create a training program for educational systems/cost analysts.
4. The training program will be further validated and developed in a consortium of universities that teach teachers.
5. The graduates of such programs will be placed in educational institutions.

Components of the Plan: A Background of Theory and Knowledge

No profession can be developed unless a body of knowledge has already been created and organized to the point where its practitioners have marketable skills or knowledge. The contention of this study is that such a body of knowledge exists in disbursed form. Educational systems analysts will need the same tools that business systems analysts need plus techniques that are unique to the educational situation. They will need skills in educational and psychological

measurement that are not required of their business counterparts. They will need an understanding of human growth and development that is not required of their business counterparts. Just as the industrial engineer knows industrial production, the educational systems analyst will be required to know techniques of teaching and curriculum implementation. Like the industrial engineer whose production plans can be completely destroyed by the group norms of the workers, the educational systems analyst must be alert to and understand the dynamics of human groups that are reflections of the homes and communities from which students come. In addition, the proposed analyst must be cognizant of the processes of change, political action, and public relations, as well as the more prozaic aspects of management theory. Each of the fields mentioned have been and are now being researched and organized. The requisite knowledge exists even if it is not yet organized into a training program.

Current Programs for the Training of Educational Systems/Cost Analysts

One of the reasons for the copy/patent search step in the Northwest Region Educational Laboratory's 37 steps of product development of new educational techniques is to insure that effort is not wasted on topics that have been completely covered elsewhere. The wheel has been invented. There is no longer any point in attempting to do the job again. The same point applies to the development of a

program to train educational systems analysts. If the perfect system exists, there is no point in developing another. The feasibility study must, therefore, evaluate any programs discovered from the standpoint of national adequacy. The discovery of programs which can be expanded to meet national need will indicate that the development of another program is NOT FEASIBLE.

Criteria for Feasibility

In addition to the question of currently available training programs, there are four questions that must be answered before any developmental program may be deemed feasible:

1. Is there a demand for the product?
2. Is the demand currently being met?
3. Can the product be produced and distributed at reasonable cost?
4. Are there any legal or cultural barriers to its development?

These questions will be discussed in the summary of this study.

PRACTICALITY OF DOING A FEASIBILITY STUDY

The intent of the next few pages will be to provide a synopsis of the current state of development in education systems and costing analysis. The intent of this synopsis will be to show that:

1. There is a growing interest in educational systems and costing technology.

2. There exists a developing body of knowledge in this field.

3. The penetration of systems and costing technology into existing professional training programs is currently very slight--but that it does exist to some extent.

The conclusion will be that it is feasible to do a feasibility study because of the interest growth curve and the developing state of knowledge in this field of endeavor.

Growth of Interest in Applying Systems Technology to Educational Problems

Since 1953 the interest in Educational Systems Analysis has grown, as indicated by citations in the Education Index, from zero to 82 entries as indicated by Figure 1 (Page 9).

Moreover, the entries from 1957 to 1963 were essentially industrial engineering citations on how to teach systems concepts. Beginning with 1964, however, the application of systems concepts to educational problems really began with Ostenso's (1963) "Development of a Generalized Cafeteria Simulator". 1964-1965 followed with Winthrop's "Contemporary Intellectual Ferment and the Curriculum of the Future" (1965), Pace's "Data Processing: Systems Analysis" (1964), Bishop's "Supervision and Curriculum Director at Work: System Approach to Information Flow and Decision Making" (1965), Becker's "System Analysis: A Prelude to Library Data Processing" (1965), and Vandermeer's "Systems Analysis and Media: A Perspective"(1964).

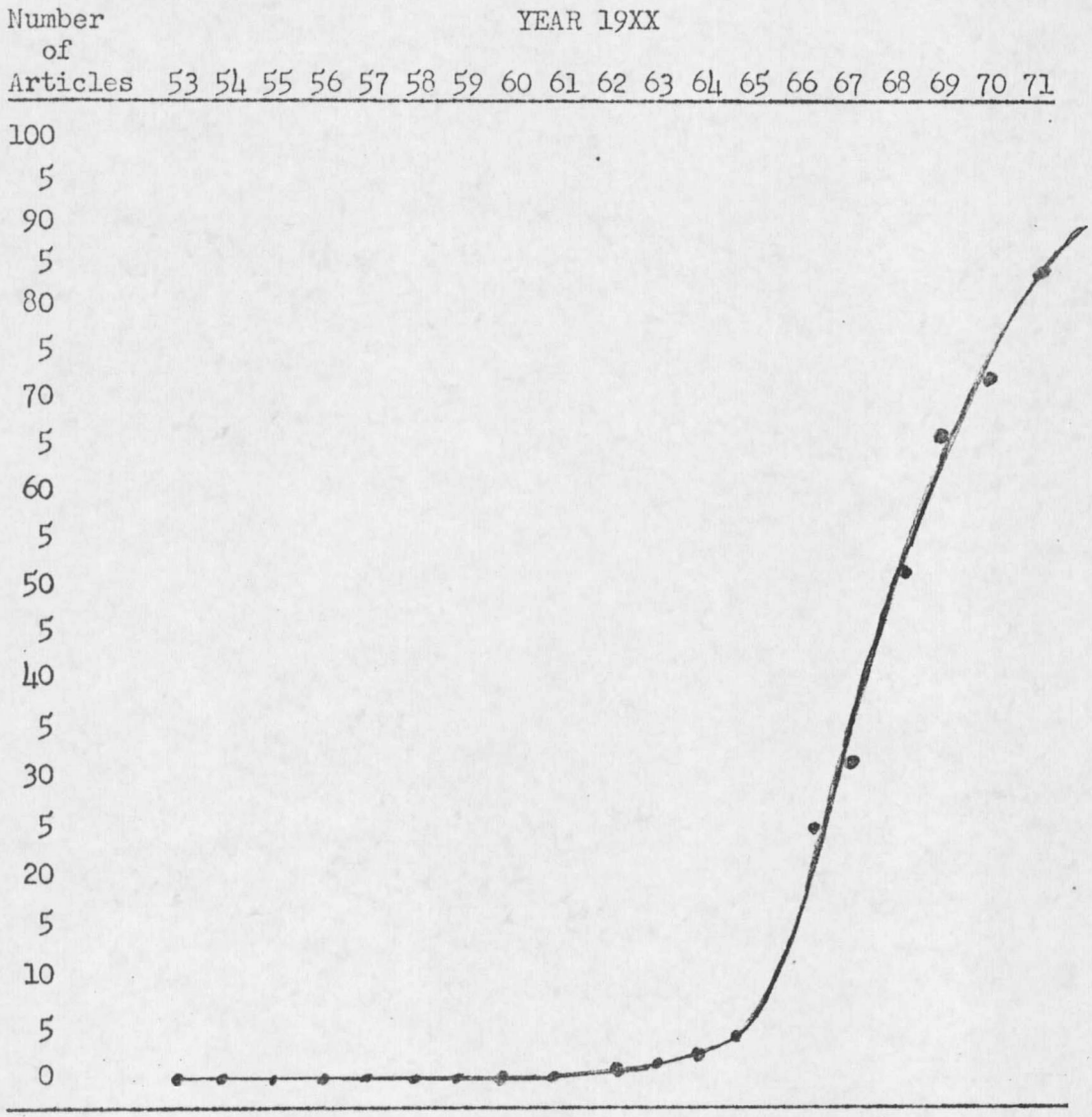


Figure 1. Number of Articles by Year in Education Index Categorized as Systems Analysis or PPBS

We have, therefore, in 1964-1965 the beginnings of the application of systems technique to the whole of the educational process from Audio-Visual through Business Management through Curriculum to Supervision. Figure 1 indicates how interest in the concept has grown in an exponential manner since 1964.

Status of Present Coursework in Educational Systems/Costing

There are 831 college catalogs maintained by the Montana State University Library. A random sample of 30 of these catalogs as given in Table 1 (Page 11) indicates:

1. Courses in educational costing, if found at all, will be found in the largest and most avant-garde of the educational graduate schools. In the sample, only one (1) such course was found--at the University of Tennessee.

2. Educational Systems Technology has made more progress in being incorporated into educational training programs than Educational Costing. The leader in this sample was Florida State University, which had more courses than the remainder of the sample combined.

3. Computer uses in Education has made more penetration into the professional training than any of the remaining topics of systems concern except for courses in Theory of Organizational Management.

4. Courses in Educational Business Management are few and far between although one school (Rutgers) offered a major in this field.

5. Courses in organizational theory have made little penetration into the training of administrators as separate courses. Again, management theory seems to be concentrated in the business and engineering schools.

Table 1. Distribution of Education Courses in a Random Sample of College Catalogs

	Education Courses	Educational Costing	Educational Systems Techniques	Computer Uses	Educational Business Management	Scientific Decision Making	Organizational Theory
1.	284	0	1	1	0	0	1
2.	190	0	0	0	0	0	1
3.	63	0	0	0	0	0	0
4.	0	0	0	1	0	2	2
5.	0	0	0	0	0	0	0
6.	113	0	0	2	2	0	1
7.	236	0	0	0	0	1	2
8.	63	0	0	0	1	0	1
9.	164	0	0	1	2	0	0
10.	63	0	0	0	0	0	0
11.	80	0	0	0	0	0	0
12.	0	0	0	0	0	7	6
13.	123	0	0	0	0	0	0
14.	0	0	0	0	0	0	0
15.	154	0	0	0	1	0	1
16.	6	0	0	0	0	0	0
17.	300	0	1	2	1	1	2
18.	200	0	0	1	1	0	4
19.	30	0	0	0	0	0	0
20.	20	0	0	0	0	0	0
21.	285	0	1	0	1	0	1
22.	0	0	0	0	0	0	0
23.	16	0	0	0	0	0	0
24.	437	1	0	1	2	0	0
25.	16	0	0	0	0	0	0
26.	404	0	0	2	0	0	0
27.	2	0	0	0	0	0	0
28.	794	0	5	5	1	1	1
29.	0	0	0	4	0	0	0
30.	131	0	0	0	0	0	0
Totals	4174	1	8	20	12	12	23
Mean	139.1	.03	.27	.67	.4	.4	.77
Median	67	0	0	0	0	0	0

Definition of Terms

The following terms have particular relevance to this study. They are used in this manner:

a. Feasible. Capable of being completed at reasonable cost.

b. Educational System. An organization of humans, machines, and equipment dedicated to the achievement of educational or training objectives.

c. Educational Cost (benefit). The effort required to achieve educational or training objectives measured in human or dollar quantities. A benefit is a negative cost.

d. Supply. The number of educational systems/costing personnel produced by NCATE approved schools.

e. Demand. The number of educational systems/costing personnel needed by public schools and colleges, university administrators, and chief state school officers.

f. Public School. School districts listed in the U.S.O.E.(1970) Directory of Public Elementary and Secondary Schools.

g. College and University. Institutions of higher education listed in Patterson (1971).

h. Chief State School Officer. Persons listed as the Chief State School Officer in the U.S.O.E. (1970) Directory of Public Elementary and Secondary Schools.

i. NCATE School. Institutions of higher education with teacher training programs approved by the National Council for Accreditation in Teacher Education.

SUMMARY

Preliminary Generalizations

It would seem, therefore, that there is a need to develop training courses for Educational Systems/Cost Analysts. Judged from journal articles, interest on the part of professional educators seems to be high, and the body of knowledge exists.

As judged from a sample of available college catalogs at MSU, progress in incorporating these techniques into the undergraduate or graduate educational training programs has been slight.

On the basis of the preliminary data, further effort in establishing the feasibility of creating a training program for educational systems/cost analysts is judged to be warranted.

Contributions to Result from the Feasibility Study

This study will result in the following contributions to the field of professional education.

1. A logically derived, substantiated decision as to the practicality of developing a training program for specialists in educational systems and educational costing.

2. A review of the literature on educational systems and costing.

3. A list of universities interested in working on the topic.

4. A list of people who are recommended to generate the training program.

5. A definition by practicing educational administrators of the functions that an educational systems/cost analyst should perform.

6. A listing by rank of the training topics thought to be important to the training of educational systems/cost analysts by practicing educational administrators.

7. A projection of the number and salary range of probable positions for specialists in educational systems and costing.

Chapter 2

SELECTED REVIEW OF THE LITERATURE

Forward.

. . .Public schools have traditionally been required by law in the name of "prudence", to account for the monetary resources they consume. They have met these basic requirements, but it has been unusual for them to take the next logical step, in the name of "stewardship", and relate these monetary inputs to institutional objects and outputs. Educators have used as their rationale for not doing so the complexity of their products and of the educational process. Their reluctance probably stems from a misunderstanding of the role of quantitative analysis in policy decision making, to be referred to hereafter as cost-effectiveness analysis.

Cost-effectiveness analysis cannot make decisions. It only makes available and arranges data in such a fashion as to sharpen the judgements of decision makers. Without analysis, there is no basis on which to make decisions other than intuition. Intuition (or subjective judgement) can never be removed from educational decision-making, but its use can be greatly limited. Reliance upon subjective judgements alone places too much importance on the biases of the decision-maker. The few, admittedly primitive, applications of cost-effectiveness analysis to educational problems suggest decision making by intuition has resulted in educational firms operating at a low level of efficiency with respect to stated institutional objectives.

. . .Austin D. Swanson in Browder (1971:287). . .

THE DEVELOPMENT OF EDUCATIONAL OBJECTIVES AND GOALS THROUGH NEEDS ANALYSIS

Introduction

The systems function is primarily one of carefully analyzing the objectives and goals of an organization of humans, machines, and resources. These facilities and goals are analyzed in order to optimize goal achievement while minimizing resource requirements.

Systems personnel must, therefore, have skill in assisting others in analyzing their goals, in analyzing their resources, and in analyzing their organizational procedures. While they may possess these skills in themselves, their function is always "staff" in that ultimately the work is performed by others.

This section of the review of the literature will be devoted to an analysis of the goal setting process in educational institutions from the standpoint of the systems analyst. It will demonstrate that goal setting is as much of a science as it is an art. The Community Oriented Change Process Model (COCPM) of the Northwest Region Educational Laboratory will be used as an example of an educational goal-setting training program currently in development. Programs like this would be useful in the training of educational systems/costing personnel.

Approaches to the Establishment of Educational Goals and Objectives

Methods of approaching the problem of establishing educational goals can be classified into roughly three approaches:

1. Philosophical
2. Traditional
3. Experiential

In each of these three approaches, the systems technique can be applied to sharpen the definition or meaning in terms of resultant student behavior. It can be used to define in a succinct manner the nature of the teaching/learning environment.

The philosophical approach. Given any internally consistent logical set of relationships about the nature of man and reality, then it is possible to design a curriculum which will be consistent with that point of view (DeYoung,1972:361). Curriculum design can be essentially a very logical inductive/deductive process wherein the young can (within limits) be trained to think and act in a manner consistent with the philosophical dictates of the culture or sub-culture. Prime examples of this approach to the establishment of educational goals and objectives are: Jesuit education, Monastic education, and education in Communist China and Russia (Charters,1923: 3-33), (Beauchamp,1961:112).

The traditional approach. A second approach to the design of curricular goals is to follow the pre-existing patterns of training without attempting to change them to meet current conditions (Charters, 1923:12-26). This approach has something to recommend it in that the whole point behind formal "schooling" is to transmit the cultural heritage through the use of reason (Dewey, 1940:331). This approach also has the advantage of being conservative. If the curriculum used next year is the same as that used this year, then the results of that curriculum will be approximately the same if the effect of individual differences in students is ignored. In fact, the results next year might even be better than the curricular results this year--if teacher practice results in better classrooms.

The experiential approach. The third and possibly most widely used approach to establishing educational goals and objectives and the curriculum that results from them is that advocated by John Dewey (1949: 110-111). Pragmatism, as the Dewey approach is often called, is dominated by the theme, "Does it work as based on experience?". How is this question evaluated? It can only be evaluated in terms of the pre-existing aims of education. Charters (1923:11) makes this point as follows:

> Summarizing, we may say that in order to determine the content of curriculum the aim of education must be stated in terms both of ideals and activities. When the aim is stated in terms of ideals only, there is always a gap between the aim as stated and the curriculum as ostensibly derived from such a statement.

> Conversely, when the activities are stated without the ideals which dominate them, there is no means of selecting the proper method of performing the activities.

Dewey established the philosophical basis for the modern approach to building curriculum with Pragmatism. Some say that Pragmatism is not a philosophy because it has no epistomology nor cosmology. It does, however, lay a rational basis for doing what must be done in order to achieve a desired result (Dewey,1949:16).

As a result of the Pragmatic approach to curriculum construction, much effort in the last 40 to 45 years has been devoted to a logical analysis of the nature of educational curricula in a democracy (Stratemayer et al., 1958:16). In the process of doing this, attention given to the needs of individual students versus that of society as a whole has run the gamut from the techniques of Progressive Education to the recommendations of Admiral Rickover (1959). Yet, in spite of the emphasis upon the needs of society in a democracy (Cay,1966), the needs of the child in the classroom (Flemming,1963), and improved methods of dealing with groups (Benne,1961:1-15), something seems to be missing.

Complexity in Setting Educational Goals and Objectives in a Democracy

The something missing in simplistic models of educational goal setting in a democracy is the myriad of groups, sub-groups of religious, ethnic, economic, and sociological factions that comprise our nation.

Every father, mother, aunt, uncle, grandfather and grandmother is a member of one or more combinations of these groups. They elect school boards, pass bond issues and operational levies for schools. They have attitudes, hopes and desires that are directly reflected in the every-day activities of every classroom. How can the curricular goals be modified to suit their desires as reflected in the needs of their children?

A system for doing just this exists. It is the Community Oriented Change Process Model (COCPM) currently under development by the Northwest Region Educational Laboratory. The COCPM consists of a semi-standardized approach to a process for generating the most appropriate set of educational goals and objectives for a school system. It is a system designed to train school administrators, teachers, and community workers in the techniques of setting educational goals and objectives through community action so that every community can arrive at its own balance of curricular forces.

COMMUNITY ORIENTED CHANGE PROCESS MODEL

Importance of the COCPM

The COCPM is a training program of the type probably required for one who would specialize in educational systems and costing (Stutz, 1972:7-85). For this reason, it will be discussed in somewhat greater detail in this section.

The COCPM Approach to Establishing Educational Goals and Objectives

The concept of the systems approach to the establishment of educational goals and objectives as presented in the remainder of this chapter is essentially derived from the developmental model used by the RFD Program COCPM Activity of the Northwest Region Educational Laboratory (NWREL) as it stood in 1972 (NWREL, 1972a).

The NWREL:COCPM unit is engaged in researching and developing techniques of facilitating community involvement in educational practice. The end product of their efforts will be a system for training educational leaders in the use of the best that is currently known about group involvement technique in facilitating educational change. It follows the system flow such as that given in Figure 2 from an article by Jesser (1969).

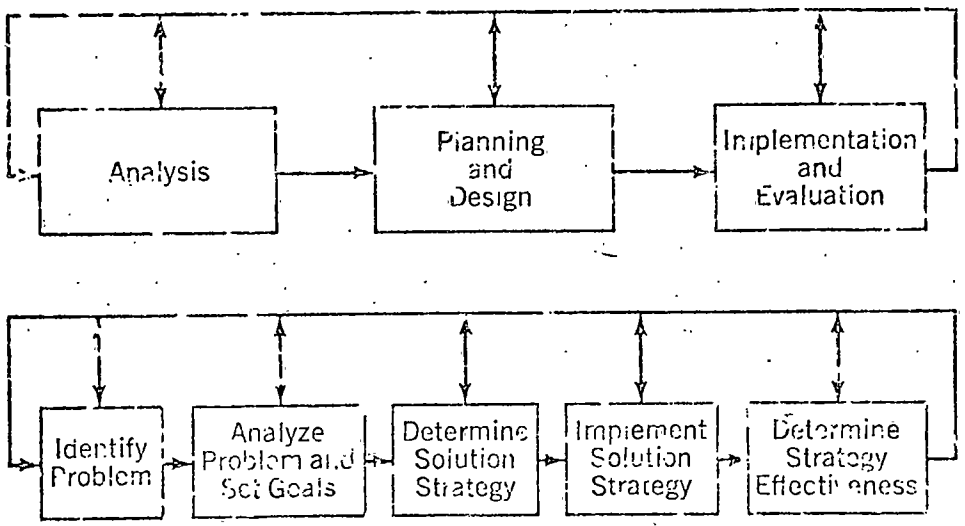


Figure 2. Basic Phases in the Systems Approach to Planning. Upper: A Simplified Flow-Chart of the Process. Lower: A more Detailed Breakdown of the Systems Approach.

The COCPM builds upon the iterative process of analysis--planning and design--implementation--evaluation--analysis by building a set of entry procedures wherein the following steps are started:

1. Preparation for Entry (NWREL,1972a)*
2. Needs Assessment (NWREL,1972b)
3. Skill Building (NWREL,1972c)
4. Search for New Ideas (NWREL,1972c)
5. Installation of New Ideas (NWREL,1972d) (NWREL,1972e)
6. Evaluation of New Ideas (NWREL,1972f)

The total training process to set up this program takes approximately 30 days spread over one to one-and-a half years. Once started the system can be established to be cyclic self-perpetuating.

Figures 3 to 11 (Pages 24-32) are reproductions of flip charts used as an orientation to the COCPM. They are reproduced by permission of Dr. Raymond Jongeward, one of the original developers of the program and currently director of the COCPM development. They are included here because they outline the sequence and logic of the events that must occur in order to generate effective community involvement in the development of the goals and objectives for a school district.

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*See Literature Cited, Northwest Region Educational Laboratory (NWREL).

Letter from the board requesting assistance in implementing the COCPM. Any directed change process operating within a formal structure should be formally recognized by that structure to prevent future conflict over roles. This recognition should include a recognition of the general purposes of the project; the powers conveyed to the project; and a statement of its legitimacy. In the COCPM, this function is served by a formal letter from the Board of Education to the Rural Futures Development Program, COCPM Activity of the Northwest Region Educational Laboratory. In a generalized system which would be used by an educational system/cost analyst, a letter like this would be required if he were an outside consultant. If he were a staff member, then his position description could be used to fulfill the same purpose. Covering letters or memoranda from the superintendent to the principals involved is extremely good insurance in this case also.

Financial commitment. The organization of people into effectively functioning groups dedicated to cooperatively reaching mutually derived goals does not happen by accident. Human effort is required. In our society, priorities in the use of human effort are set by allocating money. The development of educational goals and objectives is no exception. If they are to be developed effectively, time and effort (money) must be spent upon the task. Table 2, Page 36, gives a sample budget for the implementation of a COCPM.

THE COMMUNITY ORIENTED CHANGE PROCESS MODEL

is Designed To

Include

A Broad Representative Group

of Local People

School Board Members

School Administrators

School Faculty

Students

Community Citizens

in
Educational
Planning and Decision Making

Figure 3. Chart 1 of the Northwest Region Educational Laboratory Community Oriented Change Process Model Orientation Presentation

THE COMMUNITY ORIENTED CHANGE PROCESS MODEL BASIC PRINCIPLES:

1. The worth and dignity of each individual.

2. Good schools demand the participation of individuals in making decisions that directly affect them.

3. Teaching citizens skills in problem-solving, decision-making and interpersonal communication will increase group productivity.

4. Leaving skills with community leaders inspires confidence in own ability and lessens continuing dependence on outside help.

5. Getting community members involved and staying involved is the goal which will result in improved educational opportunities for the community.

6. Recognizes that differences of opinions and conflict do exist but can be dealt with constructively if open and honest communication is established.

7. Spreads decision making among students, teachers and citizens.

8. Assumes that teachers and administrators are willing to serve in the role of consultants to citizen groups as they study educational problems.

9. Reorients the roles of administrators and teachers to become facilitators and implementers of changes that have been agreed upon by citizen groups.

10. Recognizes that most often decisions are made on an emotional rather than a factual base but attempts to make citizens more 'data bases'.

Figure 4. The Community Oriented Change Process Model Basic Principles

THE COMMUNITY ORIENTED CHANGE PROCESS MODEL CONSISTS OF THE FOLLOWING STAGES:

1. Preparation for entry
2. Needs Assessment
3. Skills Building
4. Search for New Ideas
5. Installation of new ideas
6. Evaluation of newly installed ideas

Complete implementation of the Model in a School District requires approximately 30 days spread over one year.

Figure 5. Six Stages of COCPM Development

STAGE 1

PREPARATION FOR ENTRY

INITIAL CONTACT WITH: SCHOOL BOARD, ADMINISTRATION AND FACULTY

DESCRIPTION OF MODEL

EXPLANATION OF COMMITMENTS REQUIRED:

1. Letter from the Board requesting assistance in implementing COCPM

2. Financial Commitment

3. Commitment of Board, Administration and faculty to philosophy of COCPM - including necessary time commitment.

4. An A-V documentation of the present status of education in the community.

Figure 6. Orientation Chart for COCPM Preparation for Entry Stage

STAGE II

NEEDS ASSESSMENT

PROCEDURE:

1. Students, staff and community members participate in process of gathering and tabulating information and data on school system and write a preliminary report of results.

2. Opinions and attitudes of the community toward education are obtained.

3. School record data on students, staff facilities, curriculum and finance are collected.

4. Descriptive information on the community is also recorded.

5. Opinion leaders are identified from:

   A. Students
   B. Staff
   C. Community

Figure 7. Orientation Chart for COCPM Needs Assessment Stage

OUTCOMES:

1. A group of students, staff and citizens who become increasingly aware of school problems because they have participated in the needs assessment.

2. A preliminary document summarizing educational needs of the community.

3. A representative mix of community leaders who will be involved in later activities.

Figure 8. Orientation Chart for COCPM Outcomes

STAGE III

SKILLS BUILDING WORKSHOP

COMMUNITY ACTION TEAM

1. Approximately 20-25 opinion leaders (students, staff and citizens) are trained in problem-solving and communication skills in a 40 hour workshop.

2. Use the Needs Assessment document and other information to identify priority educational problems, writes a set of goals for the school district, develops an informal communication system, becomes aware of the uses of power and develops action plans on major educational problems.

3. Roles of the CAT are defined as well as procedures to be used in the future.

4. The CAT elects its own chairman and secretary to facilitate its work.

5. Staff and student involvement parallels CAT activity with plans for in-service.

Figure 9. Orientation Chart for COCPM Skills Building Workshop

STAGE IV

SEARCH FOR NEW IDEAS

1. CAT with its Task Force Team's (TFT's) are supplied with information and data during study of priority problems.

2. CAT searches literature, community resources and other information sources for all needed data.

3. Representatives from CAT, students, staff and community members make a site visit of innovative schools to obtain more ideas.

4. Site Visitation Team reports back on its findings.

5. CAT develops list of innovations that hold promise for their future schools.

6. CAT determines priority of these for suggested incorporation into school system.

7. CAT recommends priorities to school board.

Figure 10. Orientation Chart for COCPM Search for New Ideas Stage

STAGE V

INSTALLATION OF NEW IDEAS

1. Ideas recommended by CAT to School Board and approved by them are scheduled for installation.

2. Long range and short range goals are specified.

3. New ideas not requiring new materials and/or outside assistance are implemented as rapidly as possible.

4. New ideas requiring new materials/equipment facilities are identified and appropriate plans made.

5. New ideas requiring outside assistance are identified and consultants found to help in the installation.

6. For each idea installed a preliminary plan for evaluation will be included.

Figure 11. Orientation Chart for COCPM Installation of New Ideas Stage

STAGE VI

EVALUATION

1. CAT members are taught appropriate skills needed to determine effectiveness of new programs.

2. CAT members participate in gathering information and data needed to assess the new programs.

3. CAT members will tabulate and analyze data and draw up recommendations for consideration of the school board.

4. CAT will consider new problems and/or new ideas for discussion and/or implementation.

5. CAT will review its own operation to determine what alterations, if any, are needed to increase its effectiveness.

6. CAT will establish plan of operation for new year.

Figure 12. Orientation Chart for COCPM Evaluation Stage

Figure 13

Orientation Chart of the COCPM Group Relationships

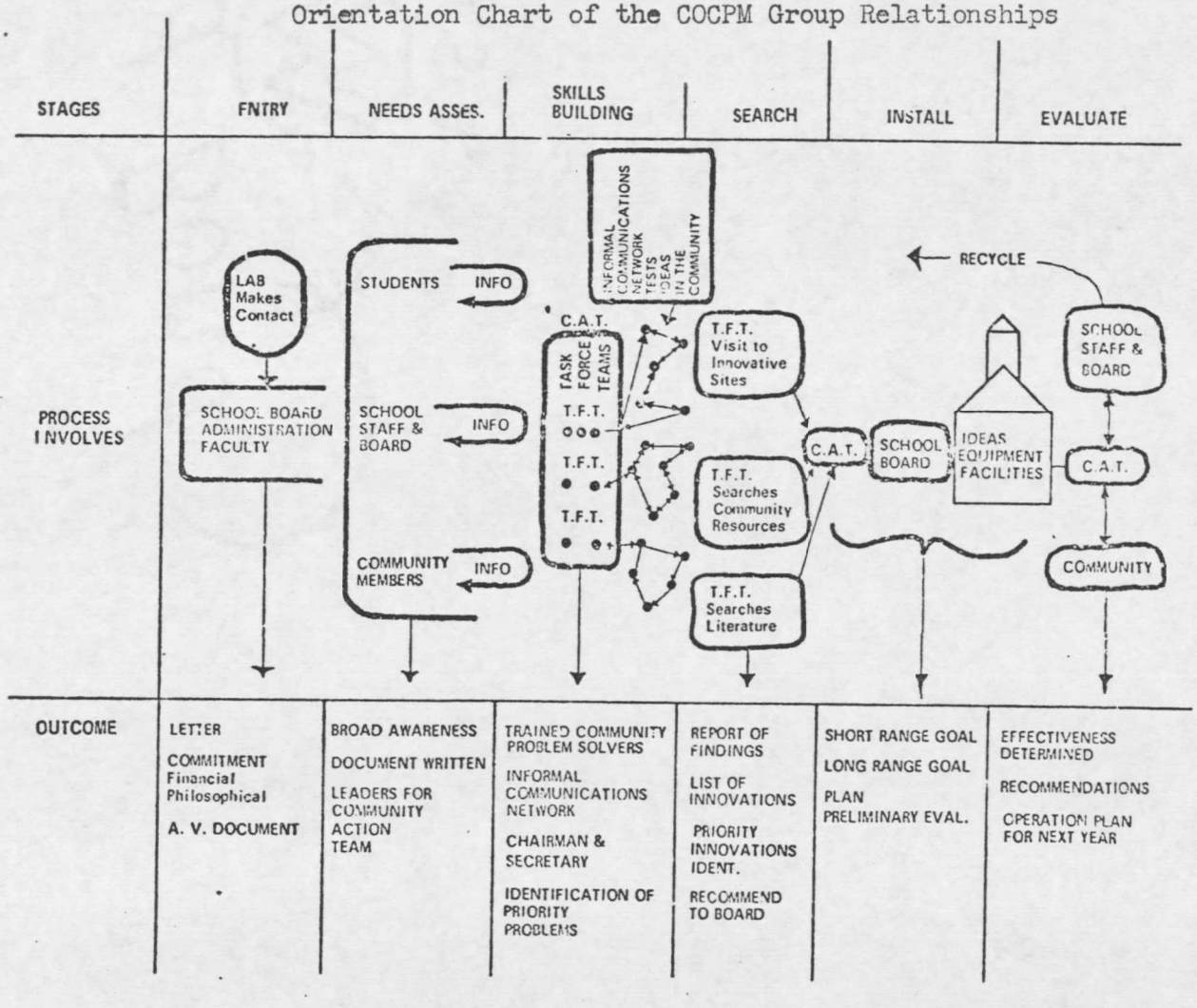


Table 2

Illustration: COCPM Budget

Phase	Item	Manpower	Dollars
I.	Team Development Phase (3 months)		
	1. COCPM Leader	1/2 time 3 mos.(30 m.d.)*	$3,000
	2. Photographer	5 m.d.	250
	3. Secretary	1/3 time 3 mos.(20 m.d.)	600
	4. Travel		400
	5. Supplies and misc. expense		200
			$4,450
II.	Needs Assessment Phase (3 months)		
	1. COCPM Leader	1/2 time (30 m.d.)	$3,000
	2. Consultant fees (Survey leaders)		2,000
	3. Secretary	1/2 time (30 m.d.)	900
	4. Printing		500
	5. Travel (for paid and unpaid survey leaders)		1,000
	6. Postage (for questionnaires that must be left)		100
	7. Supplies and misc. expense		100
	8. Data processing		300
			$7,900
III.	Search and Goal Setting Phase (3 months)		
	1. COCPM Leader		
	1.1 Problem Solving Work-shop	10 days	$1,000
	1.2 Search for new ideas	10 days	1,000
	2. Consultant fees (Survey leaders)		2,000
	3. Secretary	3/4 time (45 m.d.)	1,200
	4. Travel (task force to see pilot schools)		4,000
	5. Supplies and miscellaneous		200
	6. Curricular materials		1,000
			10,400

*Man Days

Table 2 (continued)

Phase	Item	Manpower		Dollars
IV. Installation Phase (3 months)				
1.	COCPM consultant (phased out here)		(5 m.d.)	$ 500
2.	Secretary	1/4 time	(15 m.d.)	450
3.	Substitutes for teachers during in-service training time			2,000
4.	Curricular materials			3,000
5.	Consultant fees			500
6.	Supplies and miscellaneous			150
				6,600
Annual Total for First Year of COCPM				$29,350
V. Evaluation Phase (Next fiscal year)				
1.	Evaluation consultant		(10 m.d.)	$ 1,000
2.	Secretary	1/5 time	10 months	1,200
3.	Evaluation instruments			1,000
4.	Miscellaneous			500
Annual Total Second Year of COCPM				$ 3,700
Cost of One Complete Two Year Cycle				$33,050

Comments on the illustrative budget. Note that the illustrative budget does not include such items as overhead expenses, personnel benefits, etc. The intent is to give the reader some insight into the relationship that exists between the financial plan and the action plan that will result from that plan. This illustrative budget highlights the following facts:

(1) the process of developing educational goals can be reduced to a trainable science; (2) the process of developing educational goals is a budgetable expense; and (3) it is a legitimate cost of doing business.

Who makes educational goals and objectives in the COCPM model? In the COCPM method of educational goal development, all relevant groups jointly decide upon the objectives to be met by the schools and the major goals of instruction to be used in the process of evaluation. As indicated in Figure 3, Page 24, the groups most likely to be represented in the process are: (1) school board members, (2) school administration, (3) school faculty, (4) students, and (5) miscellaneous citizen groups. As indicated in Figure 11 (Page 32), the results of the task force groups does not become official policy until the school board agrees to act upon the recommended program. They will usually not do so unless the program has first been submitted to them with the approval of the school administrative officials. Even the approval of the school administration does not preclude the use of professional judgement on the part of the teachers involved. In short, the authority and responsibility roles remain unchanged. The change comes in the techniques used to carry out the responsibilities.

The mechanism of change: the community action team (CAT). Since the Community Action Team (CAT) will have great flexibility in what it does or does not do, it is imperative that the original charter for

this organization be very clear. The change agent consultant (COCPM leader) should also have had some experience in working with groups like this so that he can help the CAT to avoid overstepping its consultative role to the educational institution. This team is usually formed at one or more general meetings to which the public is invited (encouraged) to attend. Meetings restricted to other specific target groups such as students, teachers, board members, etc. may also be held. Members of the CAT are not elected at these meetings. These meetings are used to select topics of general concern and to solicit nominations for the CAT on the basis of personal interaction. A sociometric analysis (computerized) is then used to insure that the largest group possible has a direct channel to the CAT. The CAT will also have sub-committees called Task Forces. The Task Forces are temporary groups which are gathered to do particular jobs. Jobs of particular interest which may require Task Forces are: Pre-assessment, organization, needs assessment, search, installation and evaluation. In fact, each Task Force can be broken into smaller and more specific functions as needed, for example, pre-assessment of the educational needs on the north side of town, etc.

Preparation for entry. The first step in the process, as previously indicated, revolves around the questions of legitimacy, financing, philosophy and pre-assessment. In the original version of COCPM the COCPM leader played the role of news photographer and

and photographed such things as: the condition of the parks and schools, drop-outs at work and play, the condition of neighborhoods, and community services. Such pictures provided graphic stimulation at group meetings to encourage discussion of school problems. It also provided the "before" evidence for evaluation purposes. In some instances the audio-visual presentation or documentation may be delayed to become part of the pre-assessment or needs assessment programs.

Image of potential. The COCPM model as reported in Figures 3-9 provided for community participation in the initial organizational meetings. The usual method used a general meeting which was broken into work groups after the general orientation session. Each work group of four to seven persons listed their concerns, and at a designated time all reported back to the general session. At this point each work group gave its report and an over-all priority was given to the concerns by group vote. Unfortunately, in the usual situation the number of concerns which were voiced were greater than the resources available to solve them. The original model solved this problem by putting a priority from 1 to N on all concerns and dealt only with those of highest priority. In spite of the fact that concensus methods of selection were used, the model tended to force groups into fighting for "their" concerns. The ultimate effect of this tended to increase community division instead of welding groups together to solve the communal educational problems.

Current (1973) versions of the COCPM materials are attempting to solve this problem by incorporating the "Image of Potential Ideal" (IOPI) as propounded by Dr. Ron Lippit and Dr. Ed Moe.

The IOPI is used by the group leader as the means through which the concerned groups can express their ideals, hopes, and desires for the future of their school three to five years hence. Once a concensus description of that school is developed, then the barriers to the attainment of that ideal are analyzed.

The community educational needs survey questionnaire procedure is then created from the reference point of the IOPI and the perceived barriers.

It is not currently known whether this will overcome the fractionalization tendencies noticed in previous trials of the COCPM.

Skills building. After the CAT (Community Action Team) has been formulated from the opinion leaders of the community, the COCPM leader starts a workshop in the skills necessary to do a good needs survey, curricular analysis, finding solutions, implementation, and evaluation of educational results. The process does not assume that people know how to use the universal skills of problem-solving, decision-making and inter-personal communication. These are also stressed.

As the practical application of their new-found knowledge, the CAT develops the Needs Survey Questionnaire and the Needs Questionnaire Survey Procedure. They then administer the questionnaire according to

their procedure. The first product result of this group will be the Needs Survey. Skills building will continue, however, until the first evaluation report is completed.

Search for new ideas. Finding needs, developing an IOPI, specifying barriers will all come to naught if a plan cannot be devised to achieve the ideal or to overcome the "barriers". Since effectiveness in solving problems is highly dependent upon the conceptual and physical tools used in the solution, one very useful solution strategy is to search for tools that have been used to solve similar problems. This is the next step after the submission and acceptance of the Needs Assessment. This search will entail not only library study, survey of vendors, ERIC searches, etc., but it may (and usually does) involve an on-the-site visitation to pilot schools by a task force team. They will see the innovation in action and will evaluate its usefulness to their school situation. Since the skills building sessions are parallel to this activity, the site task force visitation team is well armed with questions to determine if they are seeing an innovation or a public relations gimmick.

Money for this type of search was included in the COCPM budget (Table 2, Page 35) as was money for collecting samples of useful materials found.

When the search for new ideas approaches the point of diminishing returns, the plan of action is developed out of the tools and

concepts available.

Installation of new ideas. The budget (Table 2, Pg. 35) also includes money to buy the materials necessary for the pilot trials of the innovations deemed to be useful. It also includes monies to provide for the required in-service training time to insure that teachers know how to use the innovation.

Evaluation of the newly installed ideas. The newly installed ideas may solve the problems presented by the barriers—or they may not. The innovation may have been good, bad or indifferent. Its implementation may have been good, bad or indifferent. At some point in time someone should look at the effects of the innovation and make a rational decision to continue it, change it, or kill it. It is the function of the evaluation task force of the CAT to do just this. After the innovations have been in effect for some time, the task force should review the situation and make a recommendation as to its continuance. One of the criterion upon which an innovation may be legitimately accepted or rejected is that of cost in terms of dollars, teacher time, or student time. If an innovation costs more in student time and effort than a conventional method of reaching the same goal, then it should be rejected even if by some odd happenstance it costs less in dollars.

Section Summary

This section reviews some of the current developments in the

process of systematically developing objectives and goals for educational institutions.

The Community Oriented Change Process Model of the Northwest Region Educational Laboratory was used as one illustration of the type of training needed by educational system/cost analysts who might wish to act in the role of consultant to an educational institution in the establishment of its goals and objectives.

EDUCATIONAL SYSTEMS AND SCHOOL ORGANIZATIONAL PATTERNS

Introduction

Once tentative educational objectives and goals for an educational institution are established, then implementation plans become necessary. As indicated in the previous section, effective implementation is highly dependent upon the tools available and the administrative organization within which the curricular experience is to take place. This section will be devoted to a discussion of relationships between educational costing and methods of school organization both between and within classrooms as they relate to the projected organization role of educational systems/costing analysts. It will be shown that educational costing can be applied in the various organizational patterns. It will also be demonstrated that educational costs will vary by organizational type. As a result, the need for an educational quality control unit as an adjunct to any educational organization will be developed.

Types of Educational Production Techniques

Viewed from the standpoint of the learner, there are three types of learning situations: self-instructional, tutorial, and group. In the self-instructional situation, the learner takes total responsibility for the direction of the learning situation. In the tutorial

situation the responsibility shifts to one or more teachers. In the group situation, the responsibility for the direction of the learning process shifts to the teacher and the student becomes one of many.

When these three types of educational situations are viewed as educational production techniques, they fall into two groups: continuous and discontinuous or batch. Both tutorial and self-instructional techniques are continuous in the sense that the student starts where he is, and the tutor modifies his goals of instruction until he is able to start where the student is. Group instruction by definition must be discontinuous in the sense that the instructor must attempt to optimize the instructional goals to the overall level of the class. In the process of generalizing to the instructional level of the total class, the instructor meets the overall needs of none. Discontinuities in the instructional process arise for each student in such a situation. If the student is unable to bridge the gap with his self-instructional skills, failure results. When the student is able to bridge the gap, learning has occurred. In this latter case, the student is said to have been "motivated" to learn since he has reached a goal which was set for him by another person or society. In this study, the term "batch" will be used to describe the process wherein a group of students achieve the "same" educational objectives simultaneously in groups or batches. The term "continuous" will be used to describe instructional organizations wherein the instructional process is tailored to the

needs and interests of each individual.

Significance of Batch and Continuous Methods of Instruction to Educational Costing

Most educational institutions in the United States use a batch method of educational production as opposed to the continuous method. At first glance, this difference might seem superficial to educational costing. It's not. Under the batch or grade method of organization, the application of technology to the educative process cannot reduce educational costs. It can only increase them. The reasoning for this statement goes something like this: Given that students may progress educationally only by age groups and that technology cannot make students physically age faster, then technology cannot increase educational production, and any money spent on it is "wasted". This reasoning is further reinforced by the fact that teachers are always required by educational institutions to perform the "custodial" or "baby-sitting" functions of the institution. Under the batch method or organization it takes 12-13 years to produce a high school graduate; 4 more years to produce a bachelor's degree; one or two more years to produce a master's degree and one to four years beyond that to produce a doctorate. The student from academically accelerated classes may be able to handle himself more effectively in targeted situations than students taught by the conventional textbook method, but without extremely sophistocated educational evaluation, the results will not be known for twenty years.

Even then, specific causitive factors will have been completely confounded by the intervening history.

To summarize, without administrative changes in the institutional certification and record keeping systems, educational innovation can only increase educational costs when such innovations are used in addition to conventional instruction (Trump,1961:12). This has long been known. There have been many attempts to overcome the difficulties inherent in the grade organization. The following paragraphs review some of them.

Plans of Educational Organization

Doll (1970:13) characterizes the period from 1900-1970 as a period where the interplay of many educational forces caused the development of many innovative approaches to the organization of public education. Among the systems he mentions are: (1) the Dalton Plan: (2) the Winnetka, Ungraded School and Open School Plans; (3) the Unit Method, Activity, and Core Programs; (4) Ability Grouping and Tracking; (5) the Trump Plan, Team Teaching, and Flexible Scheduling; and (6) the Lancasterian System, Tutorial Systems and Cross-Age Peer Help Systems.

Each of these methods will be discussed with an emphasis upon the educational costing problems and opportunities inherent in the organization method.

The Dalton Plan. This plan of educational organization is often called the Independent Study Plan; the Contract Plan; the Dalton Contract Plan; and/or the Pueblo Plan. According to Deighton (1971:592), "The first attempt at non-graded education at the secondary school level took place at Pueblo, Colorado from 1888 to 1894 under the direction of Preston Search." His plan consisted of dividing each high school subject into smaller units called contracts. Each contract provided for a variety of instructional approaches and a variety of achievement levels. The instructional approach used by any one student was arrived at by mutual agreement between the student and his teacher. Non-promotion was eliminated as teachers reported the number of units each student completed rather than a grade or mark. "Individual progress was emphasized as opposed to group progress. Search's work at Pueblo and subsequently at Los Angeles in 1895 influenced further development toward individualization in San Francisco (where the Pueblo Plan was extended to include the elementary school) and the University of Chicago High School." Deighton (1971:592) continues by saying:

> The Dalton Plan, developed by Helen Parkhurst in 1919, was applied first to a school for the handicapped and later to a public high school in Dalton, Mass. The plan called for dividing the subjects into academic and vocational groupings. The academic subjects were organized sequentially, and students worked and progressed on an individual basis. Students contracted for units of work in each of the academic subjects, and conferences were held with teachers to determine completion of the requirements. The vocational part of the curriculum included grouping on a non-graded basis.

From a cost analysis standpoint, the contract plan is probably the most versatile of all organizational structures. If the school system wishes to adopt absolute standards of achievement, these can be reflected in standard contracts to be completed. Students completing them would be permitted to graduate early, thus reducing school size and thus school cost. Teachers using this plan find that the students will quickly group themselves into homogenous groups for particular subjects. When a group is having problems, all members in that group are having the same or similar problems so remediation is usually easy for the teacher to achieve. The writer has had classes of 45 students with up to three different subjects in mathematics being taught simultaneously while using this organization. Class control was never difficult. Class achievement was always one to two years over previous tested results. Why then has this system never become standard throughout American education? It would seem that a system which would permit high pupil/teacher ratios (low per pupil costs) and achieves superior educational results should quickly drive out inferior systems. Why hasn't the contract method done this? There are two primary reasons for this lack of growth.

The first of these problems is the problem of individual differences. Slow students will progress at approximately a normal rate under this system of instruction. Fast students will progress on an average of 2 to 4 times as fast with individuals progressing up to 10 times as

fast (Taylor,1970:1-10). The result is an increase in the spread of abilities in successive classes. If the instruction in those classes is not individualized, then system stresses occur and pressure is placed on the "contractual" classes to return to a more conventional method of instruction.

The second problem is an out-growth of the fact that the faster students do cover much more material. As a result of this, teachers often find themselves forced to design new materials while concurrently utilizing the old with the remainder of the class. This can be very traumatic for the uninitiated teacher.

In summary, this system creates benefits to the student in terms of matching his abilities and interest to the subject matter to be learned at a cost of requiring more self-reliance of the student, more long-range planning on the part of teachers, and flexibility in the school administrative, record keeping and certification procedures.

The Winnetka Plan, Ungraded School, and Open School plans. The Winnetka Plan of school organization represents a compromise between the Dalton Plan and more conventional graded instruction. In this plan, the common essentials are taught through self-paced, individually assigned materials. These subjects came in the morning. The afternoons were reserved for group activities in which individual interests and abilities were stressed. No specific standards were required in the

afternoon work (Deighton,1971:6:592). This statement, although accurate, misses the spirit of the Winnetka System as stated by Carleton Washburne (1963:106):

> The individualization of the tool subjects requiring mastery of skills by everyone at the appropriate stage of his development resulted in sufficient economy of time and effort to make possible an extensive program of group and creative activities. As we have just seen, these included long, continuous projects in the elementary schools and economic enterprises in the junior high school. They included art, music, dramatic expression, electives, clubs, physical education and recreation, school practice of citizenship and democracy, and the school assemblies. In all of them, the ideas, the special interests, the talents and the abilities of each child had scope. In almost all of them (art is a partial exception) each child learned to coordinate his special interests with those of his fellows and to cooperate with other children toward a common end.

Development of tool subjects as a system function. The aforegoing paragraph in turn does not do justice to the planning, research, and care used in creating the individualized instructional materials in the Winnetka Schools. The tool materials in reading, arithmetic, spelling, geography, social studies, etc. were based upon carefully done analyses of the skills and vocabularies necessary to the students in order to succeed as adults and in high school (Winnetka is an elementary/middle school system).

Concepts and skills required for mastery were carefully analyzed to insure that they were appropriate to the maturity level of the child and that appropriate sequencing of instruction was done. In addition,

the rule was developed that all materials must be self-instructional. Teachers do not waste time in grading drill subjects. Games and grading instructions permit the child to grade his own drills. The system requires the child to perform all initial tests to a 90% level and all review tests to a 100% level.

Social promotion and record keeping in the Winnetka System. Since the system extends from nursery school to grade eight, social promotion creates no discontinuities in the child's education. He simply starts where he left off in his development of his tool subjects. This is ungraded education at its best. The recording system for basic skills is kept by the teacher, the child, and the parents. It is known as the "Goal Book". Washbourne (1963:28) states:

> . . . When a child passed a test he took his goal card to the teacher who entered the date . . .
>
> Since each child kept his own goal card at his desk, the teacher had a record of her own in her "Goal Record Book". Here a page was given to each subject. For arithmetic, for example, the names of all the children were in the left-hand column alphabetically. At the head of all the rest of the columns were the names of the tests in that subject, ranged in order from left to right. So when a child passed a test the teacher not only entered the date in the child's goal card, but her own record book.
>
> The system facilitated the supervision of instruction as follows:
>
> When the principal or I visited the classroom, we often inspected the teacher's goal record book. At a glance we could tell which children were making unusually slow progress by the short row of dates after their names (ibid).

Marland (Washbourne, 1963) gave the history of Winnetka subsequent to the tenure of Washbourne as superintendent of schools there. In the process of doing this, he indicated very clearly the necessity of a curriculum development unit and an in-service training program for school systems that wish to operate like Winnetka. In the period after Washbourne left (1941) until Marland arrived in 1956, no renewal curriculum had been created; two-thirds of the staff had been replaced but only half of the replacements were sufficiently trained to carry on adequately with the system. The printing unit and their in-service graduate school had been dissolved. In other words, the system developed at Winnetka was so dependent upon Washbourne that it quickly began to die when he left. Marland reversed this trend by renewing the curriculum development activity. Between 1956 and 1963, the curriculum was completely rebuilt. New science and mathematics programs were created, and the social studies and language arts programs were extensively revised. The underlying system or procedure of operation remained essentially the same, however. Goal books and a dedication to individualized instruction were retained.

It would seem, therefore, that educational systems which utilize individualized instruction must continually revitalize themselves. The process of curricular study requires much attention to detail; and if done correctly, requires much attention to the efficient use of student and teacher time. It also requires that the classroom efforts

of teachers and students be integrated into a consistent master plan. Training in the skills necessary to assist in the development of such curricula is a proposed function of the educational system/cost analyst. Perhaps, if Winnetka had had access to analysts such as this when Washbourne left, fifteen years of slow disintegration would not have occurred.

In like manner, Winnetka is not a high school district. Yet the same type of revitalization of instruction could be most useful at the secondary level. It might be the proposed system/cost analyst could assist in extending the exploratory spirit of Winnetka to secondary education. In any event, the tools, procedures and methods used in Winnetka would be most useful to the system/cost analyst.

Winnetka exhibited aspects of the "open school" as well. While at Winnetka the open portion of the curriculum was confined to the afternoons, the modern approach to open education extends the activity/unit approach into the whole day. According to Hart (1969:262), this type of school organization is based upon the idea that the organization of the school can be restructured on a day to day basis to meet the needs of individualized learning plans of students as designed by master teachers or teaching teams.

Under this method of operation, lessons may be taught by technology, temporary groups on projects, or by ordinary teachers as needed. Since the organization facilitates large group instruction as well as

small group instruction, the overall cost should be no greater than conventional instruction.

According to Hart, the organization also lends itself to the specialization of the evaluation function by the development of an evaluation team that is directly responsible to the superintendent. This team is responsible for the evaluation of the progress of each individual student--not the evaluation of instruction. The evaluation of the instructional processes is left to the principal and his staff.

The evaluation team under this concept also makes out the report cards and takes care of the permanent records of individual students (Hart,1969:262-272). It would seem that systems personnel with evaluation and record keeping skills would be extremely helpful in the implementation of this concept of open education.

Educational systems and the unit methods: activity and core programs. The Unit Method of teaching is the means whereby most teachers organize their efforts and bring continuity into student activities that are designed to meet more than one objective in the process of completing a single activity (Jones, 1939). For example, a unit in American History might involve a trip to the art museum. While there, the students might be expected to see artifacts used at the time of the American Revolution. In addition, they might be expected to learn something about early American painters; the techniques of painting

the painters used; something about the geology of the Eastern United States; the reason for winning or losing certain battles of the American Revolution.

The only way to make sense from such a hodge-podge of objectives is to carefully plan the sequence of activities which go into the unit of work (Jones, 1939:78-95). Each of these activities will bring its own logistics problem. For example, supplementary books to be made available; art materials; tests to be prepared; games to be planned; and so forth. The unit is a complete plan of action. As such, it is pre-planned. Estimates of the length of time required to complete each unit can be made, and materials and supplies can be ordered in advance. In fact, the materials required can be placed in the budget request of the preceding year if it is known that the unit will be used.

Obviously, well planned units do not occur by accident. Moreover, the problem of sequencing instructional objectives so that, for example, the units used in September lead logically to those used in October and those in October reinforce skills taught in September is a task of monumental proportions. The educational system/costing analyst has tools available to assist teachers with the problem of unit development. One such tool was TAG (Teacher's Automated Guide) of the Portland, Oregon Public Schools. Originally, TAG was a computerized information retrieval system wherein units of instruction were entered into the computer system with key words identifying the objectives, subject,

grade level, reading levels, etc. Teachers wishing to plan a sequence of instruction could call upon the system to list available units on a cathode ray tube screen. The teachers would select those they wished; and the system would list the unit plans. If the system lacked a unit the teacher needed, then the teacher would create a unit in the usual manner. He would, however, record his plans on a special form. One copy of this form would go to the computer center where it would be entered into the system.

While the computerized version of TAG became a victim of economics, the system still exists in manual form. Through the use of this system, teachers can still share the effort of planning. The system thus makes teacher loads a little lighter while making a greater variety of instruction available to students.

The unit method can be used with almost any curricular organization. In particular, it is most useful when used with Activity and Core organized programs.

Good (1959:149) defines the Activity Curriculum as:

> A curriculum design in which the interests and purposes of children determine the educative program; selection and planning of activities are cooperatively done by teachers and pupils; problem solving is the dominant method.

Good (1959:150) defines the Core Curriculum as:

> A curriculum design in which one subject or group of subjects becomes a center or core to which all the other subjects are subordinated and upon which they depend for sequence since they have no independent principle to determine their status in the program.

The unit constitutes the intermediate level of goals and objectives for either of these systems. In addition, the unit will contain the plan of action and the materials required to carry it out. It should also contain logical ties to preceding units and insofar as possible to units that follow. Since both the Activity and the Core approaches utilize multiple goals, evaluation of the results of instruction becomes more difficult and the sequencing of instructional objectives becomes much more difficult. When the effects of individual differences in growth and learning rates are added to the complexities of objectives inherent in these curricular approaches, the objectives of instruction will vary radically from class to class and within classes from time to time. According to Swanson (Deighton,1971,2:458), without firm objectives educational cost effectiveness analysis becomes impossible. Does this mean that educational systems and costing analysis is impossible with the Activity or Core Organizations? As indicated in the discussion of the Winnetka System, the answer is "Yes" unless evaluation becomes individualized to the point where the growth patterns of individual students is evaluated. The physical development of children can be monitored with a Wetzel Grid of height and weight. Why then could not their intellectual development be monitored with similar techniques? Obviously, they could be so monitored. This will require a close relationship between educational measurement, evaluation and record keeping technique. Educational systems personnel could

perform this function.

Educational costing and ability grouping, and tracking. Ability grouping will always result when provision for individual differences in learning ability are made in "batch" educational systems. When students that "fail" or do poorly are grouped into special sections for remedial or slower paced work, a selection process has taken place. It is almost axiomatic that students so grouped will be more likely to be placed in the same sections for instruction in the non-remedial subjects. Likewise, the exclusion of students with learning problems from certain instructional groups will result in a higher net ability level in the students that remain. When this natural selection according to ability is augmented by a system of intelligence testing and a curriculum for each set of classes, a "Track" system has been developed.

If and when the divergence of abilities within a class pass some ill-defined point, effective group (batch) teaching becomes difficult. Teachers are usually the first to complain about the overload that occurs when the spread of abilities in a class is too large. According to Taylor (1970:3), their complaints are justified. It seems that students of differing abilities do require differing instructional approaches. In his study with three groups of Army trainees with AFQT scores of 10-21; 45-55; and 90-99, he found:

Any strategy will work with high aptitude trainees, but the

one which seems to be the most efficient is no structured program at all. They learn most effectively when left alone. They should be given the instructional objectives, the freedom to choose their own study methods, to schedule themselves, to decide whether to practice or not, to decide whether to work alone or in groups, and to declare when they are ready to be tested. Set the tasks to be mastered before them, give them the materials, and get out of the way. A highly structured program which, in effect, puts them into a lockstep holds them back. The built-in feedback provided by a highly structured program is not required. They provide their own feedback. Further, these individuals are so oriented toward learning and have been so successful in their previous experience that motivating them presents little problem.

. . . The middle aptitude trainees presented much the same picture. Like the highs, they seem not to need to have things structured; they do not need teaching in the formal sense nor do they require built-in feedback. They too are able to structure for themselves and chart their own progress. However, they differ from the highs in that they find the presence of a live instructor supportive. . . . In the absence of a monitor, they turn to one another with their questions. Again, motivation is not a big problem.

. . . The low aptitude trainees have presented a quite different picture. They require complete structure in which instructional sequences are broken down to small steps, presentation rate is kept slow, repetition rate is high, language level is kept at the most elementary level, and the content is presented in a functional context which provides extensive practice. Most important the presence of a live instructor seems to be essential. (He goes on to state that the instructor could be an appointed or elected peer).

Findley et al. (1971) delineated four types of ability grouping and thoroughly castigated three of them as follows:

D1 Ability grouping of all children in all activities on the same basis.

D2 Ability grouping on the basis of all learning of basic skills and knowledge on the same basis, but association with generally the children of the same age in physical education and recreation.

D3 Ability grouping for academic skills on the same basis, but association with the generality of children in less academic activities, including physical education, art, music and dramatics.

D4 Ability grouping for learning of individual subjects or related subjects on different bases related to progress in mastering different areas, i.e., "achievement grouping", but association with the generality of children in non-academic areas.

Their recommendations were:

(1) Ability grouping of types D1, D2, and D3 should not be used.

(2) D4 may be used where the information is the first step in a program of diagnosis and individual instruction.

(3) Provision should be made for frequent review of the person's grouping status as part of the instructional program.

(4) Tutoring, team teaching, individually programmed instruction, and early childhood education should be explored and exploited.

(5) Tutoring of younger children by older children should be explored and exploited.

(6) Heterogeneous grouping should be the rule except as #2.

(7) Stratified heterogeneous grouping as used in Baltimore grouping by 10's should be utilized and refined.

(8) Favorable self-concept should be a goal in itself, but it is a supportive factor in learning. An attitude of firm confidence and hope by the teacher is fundamental. Techniques for conveying such an attitude can be learned. (Findley, 1971:8)

The method of 10's to which they refer is really a method of 9's (Hall, 1971) wherein a large group of children are ranked by ability into 9 groups (9 groups of 10 if you have 90), the nine groups are broken into three groups of three sub-groups. The highest sub-group in each of the three large groups became the top group (sub-groups 1,4,7); the middle sub-groups become the next middle group (sub-groups 2,5,8); and the low sub-groups become the low groups. This

system will reduce the variability in all classes. Yet, each class has a measure of talented and non-talented students. Sections cannot have reputations as "bright" or "dumb" because "bright" and "dumb" students will be in all three classes.

Most European school systems also use ability grouping or "streaming" (tracking) as it is called over there. Somehow the results they get from their ability grouped system are very superior to the results that we get. Rickover (1963) found that the English high school graduate who passes his General Certificate in Education has the equivalent of our Bachelors Degree. Since 20 to 30 per cent of British children do pass this examination, their system is very effective. According to Rickover (1963:166), their effectiveness is based upon a slightly longer school day and year, a dedication of purpose, and quality control of schools through their National Examinations.

Hart (1969), in a rather idealistic analysis of the school of the future, places educational quality control at the heart of the system. Current technology in educational measurement and evaluation as well as cost accounting theory and advanced techniques in the application of computer technology put the Hart ideal well within the bounds of the possible. This is a function that should be performed by a specialized function within the school. This paper proposed that the function be performed by the educational system/cost analyst.

Educational costing and the Trump plan, team teaching, and flexible scheduling. J. Lloyd Trump (1959) started a dominant experimental thrust of team teaching in the 1960's with the report of the N.A.S.S.P. (National Association of Secondary School Principals) Commission on the Experimental Study of the Utilization of Staff in the Secondary School. Among other things, this report recommended that instruction be given in three modes: large group (over 100), small group (12-15), and independent study. This was also the period when flexible scheduling was making possible a reorganization in the programmatic structure of secondary schools (Rollins, 1961). The large group sessions made it possible to release teachers from classes long enough for them to meet and operate as teams. Later in the decade, the experimental use of paraprofessionals made possible another augmentation of the team concept (Blair, 1964). The use of flexible scheduling together with linear programming makes possible the application of industrial optimization techniques to facility utilization. Some techniques similar to this are currently built into the computerized scheduling algorithms such as Quad S (Stanford School Scheduling System--4 s's). The advent of modular scheduling together with the use of an integrated student data base made it possible to conceive of using some of the esoteric approaches to automated student scheduling which would optimize facility utilization while maximizing student learning.

Trump (1961:112) didn't go quite so far with his recommendations

of the ideal split between large group instruction, small group instruction, and individual instruction. He recommended the following breakdown of student time: 40% large group, 20% small group, and 40% independent study. Obviously this recommendation would have to vary with conditions. Since conditions continually vary, some-one, something, or some-body must insure that resources available are optimally utilized by students and teachers. Teachers, students, and administrators are quite good at improvising. However, the organization usually runs much smoother when the use of resources is scheduled according to priorities in a planned program. Moreover, the length of time resources are locked up by inefficient activity is essentially the type of problem that can be solved by using CPM (Critical Path Method) and PERT (Program Evaluation Review Technique) scheduling techniques.

The extreme flexibility inherent in flexible-scheduling as envisioned in the Trump Plan, particularly when augmented by team teaching and/or cross-age peer help and tutoring, makes this method of organization adaptable to almost any situation. Its very adaptability can be one of its problems. For example, students from differing classes can conceivably be rescheduled for help sessions. What happens when some of these sessions must be cancelled for some reason? Suddenly, we have need of a very sophisticated communication system. The students must be found and notified. Sessions must be rescheduled. This requires prior knowledge of rescheduling possibilities, etc. In short,

a system must be established which is responsive to changed conditions. The final evaluation of any system is always in the achievement of its students. The more flexible the system; the more variability permitted in student objectives; the more difficult the evaluation job. The evaluation techniques required are well known. Systems such as this require more of them and more sophisticated application.

It would seem, therefore, that systems/costing personnel should know computerized scheduling and record-keeping as well as techniques of gathering data for the evaluation of unstructured situations.

Educational costing and the Lancasterian System, Tutorial Systems and Cross-Age Peer Help Systems. The "cheapest" educational organization ever devised other than no formal educational system at all was the Lancasterian Method. Under this system, 100 to 150 students would be assigned to one teacher. He, in turn, would divide the students into groups of 10 to 15. One student, big enough to keep order and smart enough to learn quickly, was picked from each group to be the monitor. Each group was assigned a space on benches around the edges of a large hall. The teacher was at one end of the hall with bench space for ten or fifteen students arranged so that he was in line of sight to the whole class. The teaching method used was lecture/drill. The teacher would bring the monitors to his desk and exercise them in the lesson of the day. The monitors in turn would then

present that lesson to his group of 10 or 15 while the teacher prepared the next study drills. When the monitors returned to the teacher's station, the students would practice the drills they had been given.

Hart's comment about this method is (1969:59):

> . . . For all the limitations of the Lancastrian schools from our modern point of view, they stand as an excellent example of organization serving function. And it is probably not too much to claim for them that they kept the idea of free public education afloat at a time when the rapid growth of cities might have sunk it for years to come.

Note that the system contained elements which we are now finding very effective in school organization. Tutoring works. Shaver (1971) found when tutoring in reading and English using 4, 7, and 10 grade students on a one to one and a one tutor to three student basis that students who were tutored made significantly greater gains in reading and better grades than matched controls. Furthermore, the gains persisted. Interestingly enough from a costing standpoint, the one to one method gave slightly better results in the first year but they did not persist to a greater extent than the one to three method. So that at the end of the second year, both groups had equivalent gain.

It would seem therefore, that a tutoring program on a one to three basis would be worth considering as a supplement to the instruction of low achieving students.

The tutors used in Shaver's experiment were mothers. In the

Lancasterian system, the monitors were other children. What does the literature say about the use of peers as tutors? Hunter (1968) did a study which involved 31 Hunter College students and approximately the same number of fifth and sixth graders and second and third grade students. The college students acted as consultants to older children teaching younger children. No statistical evidence was given, but the system was recommended. Rosenshine (1969) reviewed 16 studies and concluded that tutoring does indeed benefit the tutor. He also has something to say about the situation in which tutoring has measurable benefits:

> At present, our conclusion that well structured, cognitively oriented tutoring programs are relatively few, but when they do occur, there are usually measurable benefits to pupils. The majority of tutoring programs apparently do not have these characteristics but consist of less structure, helping, affective interactions. In these "softer" situations anecdotal reports are that the tutors and the pupils develop increased pride, positive attitudes toward self and school, enhanced self-image, and greater patience. Such ends may be sufficient for some readers, but no reader should believe that increased pride is equivalent to increased reading ability until the results are in.

He also lists the characteristics of successful and unsuccessful programs. Successful programs had these characteristics:

1. Careful planning, including clear statements of academic objectives.

2. High intensity of treatment with instruction and materials closely relevant to the objectives.

3. Individual attention to pupils' learning problems.

His list of unsuccessful program characteristics include:

1. Diffuse objectives, 2. Attempting a wide variety of enrichment services, and 3. More time spent on cultural activities and less on academic.

It would seem, therefore, that tutorial methods offer an alternative which could augment any more formal organization. The cost analyst when considering this as a recommended alternative should insist on the inclusion of Rosenshine's three criteria of successful tutorial programs and the exclusion of the characteristics of unsuccessful programs. Given these conditions, instructional systems can conceivably be created which could increase measured learning and rated attitude change while reducing educational costs.

Summary

In this section, evidence was found that the use of batch instructional methods will severely limit the extent to which the instructional processes can be automated. Continuous or individualized instructional methods were seen as being optimal for automation. The Dalton Contract Plan, the Winnetka Plan, the Ungraded School Plan and the Open School Plan were seen as examples of continuous progress plans.

Evidence was found that high quality individualized educational programs emphasize the teaching (learning) of the tools of knowledge or

tool subjects. The development and isolation of such tools was seen as a system function.

Evidence was found that systems techniques can be applied to Activity, Core, Graded, and Tracked plans of educational organization. The complexity of instructional goals inherent in the use of these organizations was found to be evidence for the use of educational evaluation based upon student growth profiles. Such evaluation will require the use of systems technology.

Systems and costing functions exist in every form of educational organization. The form of organization used will in large measure determine the type of systems problems encountered and the opportunities presented. In every organizational form the need for evaluative feedback on student progress independent of the process of teaching itself was seen. The conclusion is almost inescapable that some type of quality control unit attached to the office of the chief executive of educational institutions is necessary. The conclusion also logically follows that educational systems and costing personnel belong in that unit.

EDUCATIONAL SYSTEMS AND TECHNOLOGY

Introduction

A background of theory and knowledge must exist in order to develop a training program. The purpose of this section is to establish that said background of theory and knowledge exists as applied to educational systems, costing and educational technology.

Types of Technology Available

Many educational analysts have studied the instructional applications of various media such as radio, television, motion picture, audio tape, DAIRS (dial access information retrieval systems), computer assisted instruction, computer mediated instruction, etc., as efforts in the process of storing and transmitting information (Senour, 1971:3). In the process of so doing, most stress the importance of recognizing individual student needs, and interests (Skinner, 1968). There are many instructional materials and devices currently being marketed which manufacturers claim will increase the speed of instruction while individualizing the process. As a result, educators are faced with the problem of validating these claims and determining the best materials and devices to fill the needs of students (Edseiger, 1969).

According to Senour (1971), there is a current emphasis upon using the "systems approach" in the selection and employment of instructional devices. The programmed text has proven to be as effective

in terms of student learning time (Hughes and McNamara, 1961). As a result, conversion of programmed instruction to computer assisted instruction occurred early in the 1960's (Coulson, 1962) and promises to be less expensive than instruction guided by a teacher (Winkler, 1968).

Senour (1971) indicated that:

> In designing an information storage retrieval system to be used for instructional purposes, three basic considerations must be taken into account: First, information (subject matter) should be stored in a form that makes it readily available to the learner. Second, stored information should be retrievable in a display form (i.e., print, pictoral, auditory, etc.). Third, it should provide the capacity for the learner to selectively control the display of the information.

The simplest way to provide the learner access to stored information is to put it on a shelf and direct the learner to it. Libraries and books are simple and sometimes a very effective design for a learning system. If the system requires the use of machinery as in audio tape, film and filmstrip libraries, the student can be directed to the appropriate learning station with the proper equipment.

A more sophisticated system is DAIRS (Stewart, 1969). DAIRS (Dial Access Information Retrieval System) is a closed circuit video or telephone system which permits the student to dial into a central location where the information tapes and playing equipment are stored. The DAIRS will then start a video presentation that once started cannot be controlled by the student. Video DAIRS costs approximately 5 times

as much as a straight telephone DAIRS. The DAIRS concept has been added to the CAI (Computer Assisted Instruction) concept and the result is the TICCIT (Time Shared Interactive Computer Controlled Information Television) system produced by the MITRE Corporation and Behavioral Research Laboratory (Stetten, 1972). This system uses the concept of a closed circuit video DAIRS controlled by two mini computers. A total system costs about $300,000 and will support about 150 terminals. Terminals are color t.v. sets with typewriter or touch tone pads added. It is currently the ultimate in teaching machines. Each person may be working on individual parts of individual programs which may involve movement when necessary. Is such a system cost effective? It depends upon the situation; it depends upon the availability of software; it depends upon the number of students to be taught. It depends heavily on the concept of sunk cost. (After anything has been purchased its cost becomes a "sunk cost" in that any benefits received from its purchase must be derived from its use.) The cost effectiveness of the system is quite different one minute after the contract is signed to deliver such a system. The situation is also quite different if someone is willing to give the institution such a system. In other words, cost effectiveness analysis as to the "best" way to achieve instructional goals is so highly dependent upon the mix of resources available that it is a semi-continuous process.

The use of an off-the-shelf system with cassett audio tapes;

workbooks; 8, super 8, and 16 mm single concept films; filmstrips; slides and sound on slide systems could be much less expensive and just as effective as TICCIT system in some situations. Which situations? This is an analyst's problem to decide. Most of the aforementioned systems would require the use of rather expensive presentation equipment ($300 to $500). However, one could buy 1000 of them for the cost of one TICCIT system. Audio cassette player/recorders cost about $30. The tapes cost about $1 to produce from masters. What system should be used in any specific situation? Again, only analysis can tell.

Necessity for Software

All of the aforementioned "hardware" systems are useless without "software". Software consists of the single concept film, video presentations, lecture on cassette tape, slides with the presentations, etc. The actual instruction is done by the "software" of these systems. It is, therefore, the most crucial element. In appropriately used systems, the software will also be the most expensive part. It will be the most expensive part of the total system because many applications will be made available to the hardware through the software. Each application will have a relatively small cost. In a fully justified system, the equipment will be kept in use for a large majority of the time. In order to do this, many applications are

required. The cost of software will be high for this reason.

In planning for the implementation of any hardware system, provision should be made for a continuing budget in succeeding years to buy or make new materials so that instruction may remain current and the institutional costs optimized through a balancing of sunk costs in the equipment already purchased and updating through the introduction of new applications.

Necessity for Usage Records

If equipment is worth having, it is worth using. How can the administration of a school system know if previously purchased equipment is being adequately used? The only way they can possibly know is through the use of equipment use reports. The creation of such reports can be very bothersome for the user if care is not taken in the methods of data collection to be used.

When centralized A-V centers are used, the check-in/check-out records are an indication of the demand for the equipment. Such records should utilize computerized mark-sense control cards so that the usage records can be created without spending half of the personnel budget in keeping records. The design of such record control systems is a function of the systems analyst.

When the equipment is located in an instructional area, timers can be added to it to indicate use time. These timers plus the software check-out record will indicate whether the equipment is being

efficiently used. The ultimate test of effective use of the total system is the achievement test which should follow every unit of instruction.

Implementation of Automated Instruction

The technology movement in education has been in operation since the introduction of the "Horn Book" in the 17th century (Butts, 1947:301). As a result, every school probably has some instructional equipment available. Very commonly this equipment was purchased and used on a departmental basis. As conditions and people changed very often this equipment was relegated to some dark corner of a storage room and is used once a year--if at all. Bomar (1971) at the University of North Carolina at Greensboro outlined a procedure they used to implement a technological upgrade.

The procedure they used for upgrading their media services proceeded according to this plan:

I. Quantitative Survey of Instructional Media
   A. Scope of the Survey
      1. Inventory of Media
         a. Hardware
         b. Software
      2. Inventory of Instructional Facilities
   B. Procedures
      1. Orient Deans and Department Heads to Study
      2. Prepare Checklists
      3. Brief Surveyors (Office of Institutional Studies)
      4. Collect Data
      5. Compile Data for Review Committee
      6. Make recommendations that must be implemented immediately
      7. Target date for completion: December 1, 1970

II. Qualitative Survey of Instructional Media
  A. Scope
    1. Services
      a. Inventory of Existing Services
        (1) What Exists
        (2) Potential for Expansion to Campus Wide Level
      b. Identification of Needs
        (1) Immediate
        (2) Emerging
    2. Audiences to Survey
      a. Deans and Department Heads
      b. Faculty (sample)
      c. Students (sample
  B. Procedures
    1. Orient Deans and Department Heads to Study
    2. Develop Interview Schedules
    3. Conduct Interviews with Deans and Department Heads
    4. Compile Data for Review by Committee
    5. Target Date for Completion: February 1, 1971
    6. Prepare Questionnaire Based on Inventory of Service Needs Identified in Phase 1.
    7. Select Faculty and Student Samples
    8. Survey Samples Using Questionnaire
    9. Compile Data for Review by Committee
    10. Target Date for Completion: May 1, 1971

III. Committee Recommendation and Report
  A. Review Findings
  B. Obtain Consultant Help as Needed
  C. Prepare Final Report
  D. Target Date for Completion: May 30, 1971

Note that this procedure involved the cooperative effort of the total staff. Bomar was simply the secretary to the group. In other words, the accomplishment was a group accomplishment. This approach to the upgrading of institutions has much to recommend it. It does require, however, the analyst (secretary) have skill in working with groups. Insofar as he lacks these skills, he may require training in such techniques as "T" group work, Management Grid, Group Dynamics, etc.

(Blake, 1966). The technique also requires that the analyst be willing to subordinate his/her ego enough to be willing to work through groups.

An Example of a Semi-automated School

Keister (1973) in reporting on the current status of the Golden West College in Huntington Beach, California makes the following points: (1) This is an automated school with the bulk of all instruction being carried by audio tutorial media. (2) Individualized audio-tape/slide workbook lessons are extensively used. (3) The system has an IBM 370/155 available with 30 terminals for drills, lessons and reviews. (4) They have 590 programs in current use. (5) The system is designed so that hard copy from a microfishe file is automatically available to students using their CAI system. (6) Lecture facilities are available for "more than 300" students at one time. These facilities feature split-screen projectors, random access slides, and rear-screen video projection. (7) Closed-circuit color t.v. hook-up allows zoom close-ups of laboratory demonstrations. (8) Speaker phones permit the lecturer to dial off-campus experts and broadcast the dialogue to the audience. (9) Telephones can be plugged in anywhere in the Forum to allow students to ask questions. (10) Teachers design their own materials with the assistance of a full staff of artists, layout men, designers and electronic technicians. (11) Their printing plant turns out six million pages per year.

Reported results. The cost per student at this institution is $756.84 per academic year. He cites a comparable figure for other 2-year colleges in the area as being $900 to $1000. School Management (1973:24-44) gave the cost of education per ADA student in California as being $1023 to $1118 depending on the size of the district. National averages were 973.26 in 1971-2 and $1,016 in 1972-3 (page 24). It would seem that the application of technology to the educational process can lower costs. What about the quality of instruction? Keister reports a pre-post study done in Golden West College in biology. Before the introduction of the auto-tutorial system, 44% of enrolling students dropped the course; 18% received F grades; and only 8% received A's. Current drops are 22%; only 8% fail; and 20% get A's. It was inferred that the same grading standards were being used; but, it was not explicitly so stated. The results claimed are well within reasonable limits drawn by other studies.

In addition, the school has its own UHF t.v. channel. One-half hour courses are repeated three times a day with students receiving help by phone when they so desire. Students also get texts, syllabus, and as many meetings with the "facilitator" as they need. The courses currently available and taught this way are: psychology, consumer economics, physical geography, anthropology, and sociology.

Buy "Software" or Make your Own

Keister (1973) further indicated that the Golden West College was heavily involved in creating its own teaching materials. He stated that the Golden West teachers do so because they like the "feel" of their own materials. This statement leads to the question, "How much does that 'feel' cost?" In evaluating whether a teacher should be "permitted" to create his own materials, the analyst should consider the following:

1. Cost of producing the material locally (P). This figure should include:
    1. The cost of non-availability from an estimate of the length of time required to complete the project.
    2. The amount of teacher time required times his salary
    3. Cost of materials plus wear and tear on facilities
    4. Less sunk-cost of personnel time and facilities that would not be used were it not for this project
2. Cost of similar materials commercially available (CA)
3. Cost of marketing the materials (CM). (3.1 less 3.2 + 3.3)
    - 3.1 Estimated royalty from publishers for materials of type produced (or estimated revenue)
    - 3.2 Estimated cost of production
    - 3.3 Estimated cost of marketing

The cost (benefit) of teachers creating their own materials in terms of the preceding analysis becomes:

Cost (benefit) = P-CA-CM

A negative cost is a benefit. Hence, the teachers should not produce their own materials unless a negative value is indicated. This will occur when the cost of commercially available material is very high, the cost of production is low and/or a negative cost (benefit) or profit can be made from marketing locally produced materials.

Evaluating "Hardware" Costs

The following factors should be considered in evaluating the cost of machines and equipment to augment or replace classroom instruction.

(1) Cost. The initial cost of equipment is highly dependent upon the availability of rental and leasing plans. Such plans usually include the price of money (interest rate) and maintenance of the equipment. In addition, the rental and lease plans usually contain an additional profit margin for the risk and administrative expenses involved in the rent/lease program as opposed to a straight purchase. A third method of financing available is lease/purchase. Such plans are similar to lease plans except that the rates are usually somewhat lower as the leasor runs no risk of repossessing a machine whose value has depreciated.

(2) Interest rate. When evaluating the feasibility of purchase of equipment versus the cost of manual instructional techniques, the value of money should always be included in the analysis. This is true even if the equipment is purchased out of current operating expenses.

(3) Annual use cost. The annual use cost is equal to the total cost of the equipment including interest rate and maintenance costs divided by the estimated life of the equipment times the proportion of the year the equipment is actually used. This figure should be figured on a shift day basis so as to be comparable to the salary cost of labor. Note that if this technique is used, the cost of unused equipment will be much higher. In like manner, equipment that is fully utilized will have a much lower use cost.

(4) Service and operational costs. As noted in point 3, service and operational costs on an annual basis should be added to the yearly cost. Such service costs usually provide the benefit of an extended equipment life. Unfortunately, this extended life cannot extend the life of the equipment beyond the point of technological obsolescence.

(5) Technological obsolescence. Technological obsolescence is the point at which repairs, new parts, and cost of operation exceed the cost of new equipment. For example, IBM 7090 computer systems, which sold new (rented) at some $3,000,000 ($60,000 per month) some 15 years ago, are currently available on the used computer market for a few thousand dollars, and no one is willing to buy. Why? The answer is that a system such as this would cost about $8,000 a month to maintain and operate. For $8,000 a month, one can purchase IBM 370/125's which can do many things a used IBM 7090 could not.

The same principle applies to most new technology. In order to be beneficial, most new equipment should pay for itself in three years. Depreciation beyond 5 years of life almost guarantees technological obsolescence.

Benefits (negative relative costs) of the use of technology in the classroom are found primarily in increased pupil/teacher ratios. The reason for this is that it is rare for an educational institution to set objectives and teach to a criterion level. Hence, it is rare for an educational institution to know what it costs to teach students to a criterion level. Hence, technological innovation, which could reduce cost on the micro level, cannot be evaluated on that level as comparisons do not exist. Techniques for evaluating situations like this are available. Standard psychological experimental design techniques can be used in situations such as this to ascertain cost per unit

learned under the teacher (control) and the technological (experimental methods).

Testing for Curricular Relevance

While the techniques discussed so far will enable the analyst to recommend an approach which should optimize the use of presently available technology, it does not permit him to make any inferences as to whether or not a particular curriculum should be implemented or not. Crane and Apt (1969) outline a procedure for developing an index number which should aid in deciding whether or not an instructional sequence should be included in the curriculum offerings. Such procedures are valuable in that they provide a check-list of items to be tested during the decision making process. Such check-lists have not yet reached the point where normative data is available.

Summary

The intent of this chapter was to establish that techniques of evaluating the effectiveness of technology exist and that the use of technology can reduce educational costs.

Evaluating the use of technology in instruction involves the following:

1. Evaluating the hardware costs.

2. Evaluating the cost of purchase or production of software.

3. Evaluating the effectiveness of the system in the teaching process.

4. Evaluating the probability of increasing pupil/teacher ratios without increasing teacher work load.

Cost-effectiveness of the use of technology in education thereby becomes a trade-off problem of finding the point of most effective use of human teachers and mechanical aids to optimize the effectiveness of the teaching-learning process.

SYSTEMS, COSTING, AND SCHOOL BUSINESS FUNCTIONS

Introduction

The total expenditure of most educational institutions for supplies, administration, transportation, and buildings is usually about 35% of the total budget (School Management, 1973). While efficiency gains in these areas of the school budget will not increase the productivity as much as increasing the productivity of the teaching act, efficiency gains in these areas will increase the productivity of the total institution when funds are released to enhance instruction.

In this chapter the question is asked, "How can educational systems and costing assist in improving the business and administration of educational institutions?"

The Nature of School Business Functions

Hill and Colmey (1964:vii-x) divide the educational business functions into the following areas of concern:

1. Role of business personnel
2. Management methods in school business admimistration
3. Law for the school business administrator
4. School community relations
5. Revenue sources for public schools
6. Budgeting for current operations
7. Accounting and auditing
8. Special fund management and debt service
9. Purchasing and distribution
10. Plant management and construction

11. Plant operation and maintenance
12. Insurance
13. Transportation
14. Food Service
15. Personnel Management
16. In-service Training
17. Negotiating with school personnel groups

The business functions of the proposed profession of educational systems and costing analysts will be discussed from this outline. The chapter will indicate some of the functions that could be performed by persons with skills in records design, systems flow, computer systems analysis, and cost accounting.

Importance of School Business Functions

In defining the relationship of educational administration and educational business administration, Hill and Colmey (1964:14) indicate:

> . . . Practically every "educational" decision (such as to add a new textbook, lengthen the school term, hire a teacher, or provide new facilities) has dollars and cents or business implications. Likewise, every business or dollars and cents decision (such as to cut or increase costs of new facilities or maintenance, change salaries, cheaper or less equipment, etc.) has educational implications.

Role Relationships Between School Business Officials and Educational Systems and Costing Personnel

Life is a process wherein each person attempts to optimize the circumstances of living. The ideal role relations between educational systems and business personnel is a typical life problem. If, as may happen, the institutional business personnel are also educational planners and evaluators, it may well be that the educational systems,

costing personnel and school business persons are the same group. By contrast, the institutional business personnel may be well qualified in accounting or purchasing; but they may have little or no experience in educational planning and evaluation. Moreover, they may have little or no interest in being cross-trained. Role relationships will be quite different in each of these cases. Both are staff functions, however. Both must consider themselves as being essentially service organizations. When systems and business functions are specialized, as in the second case, both the systems personnel and the school business personnel will find that they have a mutual dependence. The business personnel will find that the systems personnel are an excellent source of labor and brain power for special studies and the application of systems and procedures to paper flow problems. Problems such as these occur when a school is implementing a PPBS or making significant changes in the budgeting or cost allocation procedures.

For their part, the systems and costing personnel will often require historical spending data and current data on the interrelationships between expenditure types. Each specialty is supportive of the other and both are subordinate to the instructional process.

Management Methods

Both school business and systems personnel are responsible to the central management for the performance of their functions. They

are not management personnel in the sense that school superintendents, principals, and department heads are management personnel. For this reason, the relationship between such staff functions and the line effort of instruction must remain advisory.

If either the business or the systems personnel see changes in procedures that should be made, it is their function to report these either formally as in formal presentations or informally through verbal contact or written memos. Action, if taken at all, must remain a line function.

As Hoffman (1973:46) states: ". . . to put it succinctly, I'm convinced that in education many people don't know who their bosses are . . . The teacher's boss is their principal, and the principal's boss is their superintendent or someone he has designated . . ."

While one might argue with Hoffman's position on philosophical grounds, no one would place systems or school business officials in that chain of command.

School community relations. Banack (1973) outlines the necessity for target group analyses and communications tailoring in the public school setting of Rochester, New York. Rochester has three basic newsletters designed to appeal to 14 audiences. A district-wide publication is mailed to every resident. The objective of this publication is to educate more through information.

Opinion surveys are used to ascertain what topics need attention or prove appealing. For example, sad stories are always something that appeal to everyone. Other articles are developed for specific audiences. The next publication is the regular elementary newsletter. The front half of this is used by the superintendent's office, the back half by principals of specific schools. A high school newsletter was also developed which used this same format. The school system conducts 15-20 polls per year for these purposes.

Revenue sources. Most educational institutions are somewhat constrained as to the sources of revenue available to them. The sources are usually:

1. Taxes - local, state, federal
2. Gifts and bequests
3. Student tuition and fees
4. Grants in aid for the development of special programs
5. Special developmental projects
6. Endowment funds
7. Rents, royalties, copy
8. Commercial ventures

Each of these sources of income is ordinarily constrained by laws governing the corporate charters of the institutions. Thus is many states it is legal for non-profit educational institutions to engage in profit making activities. There comes a point, however, where the income from such sources ceases to be "incidental" and the character of the institution changes. At that point, the tax status and charter of the institution may be radically revised.

Within these limits every educational institution makes investment decisions. They decide whether or not to spend time to write proposals to get funding for special projects. They decide how much time, effort and money to spend in dunning graduates and benefactors for gifts and bequests.

Decisions as to the investment of endowment funds must be made. The income from these funds is often available to discretionary use. Decisions must be made as to their expenditure in terms of current consumption or reinvestment in endowments or as seed money for developmental projects.

Operations analysis can be very helpful in providing additional data for decision making in this area. Since this is a standard tool for systems personnel, it should be helpful in providing assistance to administrative decision making in these matters.

Budgeting, PPBS and PPBES. According to Casey (1964:13):

> The school budget is the blueprint of what the educational program will be and what it will cost. It predicts the expenditures necessary to support the program and identifies the amount of receipts necessary to meet these expenditures.

He further delineates three types of budgets: The annual budget, the capital expenditure budget, and the long range financial planning budget. These will be discussed in due course.

The education plan. All three budgets should be based upon an educational program. The programs, if adequately planned, will facilitate the control function of management by stating the objectives of instruction in measurable terms associated with each line item by administrative sub-division. Objectives in this level of detail and organized so that they can be used for control purposes, will require staff participation. Jenkins and Lehman (1973:2) in discussing nine pitfalls in PPBS indicated:

> Implementation of PPBS requires released time for a school district's staff, both administrative and instructional. Even though school systems adopting PPBS are aware of this, most of them are unwilling or unable to provide their staff with released time. The usual result is poorly worded objectives, unclear program structures, inadequate coding for budgets, few evaluative criteria and, in general, a partial and hap-hazard adoption.

Education is a full-time function. A contrary view to that of Jenkins and Lehman is that planning is part of both the teaching and educational administrative function. As such, released time for budgeting should not be necessary. Every teacher should have his plans for the coming year. These plans should be sufficiently detailed so that they will know within broad limits the supplies they will use; their film, filmstrip, and audio tape requirements; their need for standardized tests, etc. If these items are associated with objectives to be met, then PPBS becomes possible. The annual budget then becomes an aggregate of all teachers plus administrators and maintenance

requirements over all schools.

This implies that the formulation of the budget is a "systems" problem in which everyone should participate (in business technology MBO management by objective). The problem with this approach is communication and quality control. Some teachers may feel that "other things" are more important. They will require stimulation if the budget calendar dates are to be met. Even when a dedicated job of collecting micro data is done, the problem of compiling the items into programmatic statements remains. Many principal and assistant superintendent hours are spent on this task.

Budgets have a way of being cut by school boards and the general public. When a budget is cut, how are funds reallocated? If the budget is prepared on a programmatic basis with several levels of activities, this is no problem. When the public picks a funding level, consistent plans for that level pre-exist. If only one level has been proposed, then a process of cut and fit must be used to make projected income equal projected outgo.

What can systems personnel do to assist in this process? They can assist with forms design, system flow procedures, cross-check procedures, accounting code quality control checking procedures.

Accounting and auditing. The accounting and auditing function of most educational institutions is an area where significant savings

in personnel costs are quite possible. There are computer networks currently in existence which can supply most of the administrative accounting for school systems for costs which vary from $3 per student per year in Region X Texas (Goodian, 1972:19) to $8.80 per student per year in OTIS (Hoog, 1973).

The OTIS (Oregon Total Information Systems) eliminates the need for school system bookkeeping personnel. The system is sufficiently automated so that a half-time secretary can take care of the data input for a school system of 5000 students. The system operates "on line", that is, the secretary types in transaction data on a teletype, IBM 1050, or 2250 terminals. The computer does size checks on the transaction and stores them in a daily transaction file. The transaction may be changed any time during that working day. After the system closes down for "on line" operation at the end of its 10 hour day, the system updates all ledgers and stores the transactions.

The system automatically writes the standard monthly checks and mails them to the school administration for distribution. Auditing consists of checking the transaction against bills and purchase authorizations. The OTIS system also provides classroom computing power to member schools.

Most systems functions for computerized accounting are completed at the time of conversion from the manual accounting procedures. Every computerized system has its own conventions. In the case of OTIS, the

most important of these are:

1. Account numbers are limited to 13 digits.

2. Zero (0) in the lead position of an account number is a "control break" which will generate a summary total for all accounts with a number in that column. Because of this account #0000000000000 is reserved to signal a grand total. Account 0100 gives the sub-totals of all 100 accounts (101, 150, etc.).

Each school sets up its own account structure within the above rules. As a result, there is no requirement for identical account structures. They do, in fact, vary by school district. The additional digits beyond the first four or five are usually used to identify organization, school, or program as in a PPBS system.

Systems and costing personnel are useful in establishing the initial procedures and paper flow for schools in a computerized network. For functions like this, they are more useful if attached to the Regional Computer Center.

WICHE efforts. The National Center for Higher Education Management Systems (NCHEMS) at WICHE (Western Interstate Commission for Higher Education) is involved in the development of a generalized management information system for institutions for higher education. Their approach has been one of tackling the task largely from the side of theory. Computerized sub-systems of the total system supposedly

exist and with the aid of manual calculation are supposedly capable of developing useful data for administrative decision making.

Technical Report 35 (Miyataki, 1973:223) gives their recommended accounting structure which involves six categories:

a.	Beneficiary Group Measures	3 + Group ID
b.	Target Group Measures	1 + Group ID
c.	Resource Measures	5
d.	Financial Measures	6
e.	Activity Measures	3 (does not include any subject breakdown)
f.	Outcome Measures	5
		23 + 2 group IDs of at least 3 digits

The digit requirement given above is based on the investigator's count of categories given in Appendices A to E of Miyataki's report. The WICHE efforts still have a long way to go before they are a useful application in institutions of higher education. Assuming 23 digits for the WICHE measures; a 4 digit organizational group identification code; a 3 digit fund account code and a 3 digit location code, the result would give a total of 33 digits to be entered on every system transaction. Human beings usually require specialized training in order to operate beyond 5 to 7 digits. Thus, the WICHE system will require extensive specialized training for every person who enters data into the system. In comprehensive management information systems,

everyone enters some data either directly or indirectly. The human factors implications of training a total staff to input a thirty to forty digit code for every transaction (and thousands of transactions) are not good. Needless to say, there remain several lifetimes of work available for analysts trying to implement the WICHE system. Lest this statement seems too pessimistic, there are methods of transaction and program encoding which may be able to considerably shorten the aforementioned transaction code length. For example, the transaction for each of the above areas could be fed into the system from different terminals or into different programs. The result would be a much more reasonable task for the human operator. Such methods as alphanumeric sequencing could also be used to shorten transaction code length by permitting the use of 34-35 characters instead of 10 (10 numbers + 26 characters of the alphabet = 36 characters, but zero and oh (0) are often not used in order to avoid confusion between them. Zero is often used as a place holder or level indicator and thus is not available for identification purposes). The ultimate solution to coding problems like this is the use of natural language input (English). This solution is under current development at RAND Corporation.

Special fund management. (1) What are special funds? Special fund management usually presents a problem in most school business functions. Internal special funds are such things as: school

activity accounts, extracurricular activity funds, internal school funds such as library fines, deposits, etc., special, revolving or quasi-commercial funds such as vending machines, cafeteria funds, etc., inventory accounts, and petty cash funds. External special funds are such items as trust funds, grants-in-aid funds and debt service funds.

(2) What relationships might education systems and costing personnel have to special fund management? Special funds are fraught with possible problems for everyone involved. Since these funds often involve the handling of large sums of money, problems of security, custodianship, and accounting often occur. Clear, written, and self-checking (within the organization) paper flow systems and procedures that support these functions will prevent many problems. As systems age and new personnel take over, methods of operation often deviate from the original plan. When this occurs, an evaluation of current procedures should be done. If the new procedure is better, then the plan should be changed. If the new procedure is not better, then the personnel should be retrained. Systems people are trained in paper flow technique. Their skills should be used.

Purchasing. Purchasing, like special fund management, is a school function where abuses can and have occurred. Like special fund accounting, these abuses can be prevented through the use of purchase

orders that require administrative and purchaser signatures and standardized purchasing routines. Purchasing is one area in educational systems where the concept of standard costs as borrowed from industrial cost accounting, could be applied.

Standard costs. A standard cost is the amount that a unit of goods is expected to cost under normal or ideal conditions. Normal or currently attainable standard costs are usually preferred (Horngren, 1972:188-212), but ideal costs are sometimes used to give the purchasing agent a goal. The difficulty with "ideal" standard costs is that they often place too much stress on the agent, and they do not provide the administrator with a gauge as to how poor purchasing results must be before he becomes concerned. The use of normal standard costing gives the administrator such a gauge.

Plant Management

To build or not to build. In recent years the rapid rise of our school age population has forced the construction of hundreds of new schools at a cost which in some cases will not be fully paid for fifty years to come.

The question arises as school populations begin to fill the available space as to whether or not to build a permanent facility or to develop some type of temporary solution to the problem. All too

often the answer has been "build", when the assumptions, constraints, and alternatives to the creation of a new edifice were not thoroughly explored. Many school systems have mortgaged their educational futures for 20 years with bond issues paying 7 to 8% plus a 5% sinking fund during a time of very high construction costs. Did such schools have other alternatives? A systems study can often indicate that they do.

For example, an Oregon school district recently built a new high school because their old (1949 vintage) high school was nearing capacity and a new multimillion dollar housing project was scheduled to be built in the area. Based upon this assumption and the assumption of a 1950's birth rate in the subdivision which was not yet in, a bond issue campaign was begun and won. The bonds were sold at the time of the highest interest rate in the history of the nation. Currently, the subdivision has been re-designed to cater to retired persons; and its building program stretched over ten years. The birth rate in the rest of the city has dropped very significantly. They currently have two half full high schools, and for the first time in twenty years the public turned down an operational levy.

How could a systems study have helped? First, a good simulation of the projected population growth would have used several different birth rates and subdivision development rates so that the full impact of these factors could have been evaluated. At the time the basic

work for their building program was done (1967-68), the U.S. Bureau of Census (Eckler, 1968:4) had already projected a sharp down turn in nationwide birth rates and the zero population growth program had begun.

Second, there is an inverse relationship between interest rates (Keynes, 1935:92) and amount of residential construction. It could have been predicted that if interest rates rose more (Shapiro, 1968:61), the building of the sub-division might have been delayed or abandoned.

Third, a good simulation would have included as an alternative to a new building the use of temporary or residential type construction which could have been sold when no longer needed. (Mobile Classrooms, Inc., 1966:53; Brubaker, 1966:22-5).

These citations are used to indicate that a systems study utilizing techniques well known in the 1960's could have saved one school system from a serious mistake. As a result of that mistake, by the way, the school system had to give up a curriculum planning program which employed teachers in the summer to solidify curriculum plans and materials for the coming year. The type of techniques used in long range planning, such as building programs and demographic analysis for purposes of predicting trends in curriculum change, should make extensive use of modeling and simulation as an aid to decision-making.

The simulation of the probability of an economic development is

no simple task; if it were everyone would be a millionaire. There exist, however, techniques that can use the subjective probabilities of decision makers in a decision model which will permit objective results to occur from their subjective estimates (Learner, 1967:50-72). These techniques, when combined with multiple guesses or "runs" through the algorithm (or computer program), result in simulation of the effects of decisions under varying conditions or assumptions. With models like these, school boards can have a better idea as to the effect of their decisions on school building programs.

Plant operation. According to Hill and Colmey (1964:169) operation refers to the custodial services and maintenance. These items in turn refer to cleaning standards, inspection procedures, cleaning scheduling, utilities and plant security, staffing, preventative maintenance.

1. Cleaning standards. Hill and Colmey (ibid, pg. 172) give the minimum school housekeeping standards as follows:

a. Soft floors - mop daily, scrub 3 times a year, wax 3 times a year.
b. Wood floors - mop daily,
c. Furniture - wash once a year, dust as needed, refinish as needed.
d. Chalk-board - weekly clean
e. Chalk-erasers - clean as needed.

f. Chalk troughs - clean weekly.
g. Upper windows - twice a year.
h. Lower windows - 4 times a year.
i. Upper walls - as needed.
j. Lower walls - once a year.
k. Woodwork - wash as needed.
l. Sinks and lavatories - clean daily.
m. Waste baskets - remove trash daily.
n. Light fixtures - change bulbs as needed, clean 2 times a year.

They also give an inspection guide (ibid, 174-175) to be used as a guide to organized inspection of the building. In addition they give as a general guide to the number of men necessary, as square feet + 15,000 + 1 man per each 10 acres or 4 men per 275 elementary children and 1 man per 200 secondary children.

2. A systems approach to plant operation. The above indices are rules of thumb which have proved their worth over time. What happens, however, if the school should adopt the educational objective of making the students responsible for the cleaning and maintenance of the school? How does one operate the plant in such a situation? Do you need more or fewer custodians? Do you need more or fewer inspections? Will operational costs go up or down? Systems personnel should be able to assist school administration in establishing systems to evaluate questions like this.

3. Maintenance. Anderson (1966:102) lists many ways in which computerization can facilitate the operation of schools. Among them are: scheduling and costing, replacement scheduling (necessary for long range planning-budgeting), and analysis of product durability. Again, these are functions that adequately trained personnel should be able to install and implement at any time in the last 7 years.

4. Maintenance and operation feedback. Most larger computer operating systems have an annual calendar. They can be programmed to automatically generate reports from the data they contain; or if the data is missing it will request that data. The signal for this is the change of date at midnight. Appropriately programmed computers do not forget to look at their calendars or forget to send memos reminding principals to scan their maintenance inspections. In fact, they could mail the memos automatically. They could mail reminder notices if the reports did not arrive. All of this could be done without human intervention, if this was desired.

Why inspect? Inspection gives administrative personnel an opportunity to commend the staff on a job well done or to boost them a little if it isn't. It gives them the knowledge that, after all, someone cares.

From the reports that are received as well as utility and repair bills, conclusions can be drawn as to the adequacy of the staffing and

operational procedures implemented. As indicated by the Anderson article, the techniques have been available for a long time.

5. Maintenance contracting? The data generation system should provide a cost performance figure so that costs can be compared to the cost of privately contracted maintenance service. Private contractors (Hutchinson, 1970:40) do provide an alternative solution. The determination of whether or not to use such a service should be posed upon a complete systems study.

Insurance

Schools are multi-million dollar businesses with buildings and equipment usually worth hundreds of thousands if not millions of dollars. One of the big problems the insurance manager for a school district has is balancing his insurance policies against the value of the buildings and equipment to be insured.

According to Green (1968:227-297), the problem is essentially this: buildings and equipment depreciate. When they do, they are worth less. If they are destroyed by fire or natural disaster and if they are insured for more than their value, the insurance company will pay to the value of the depreciated building or equipment only. The excess premium is a "gift". By contrast, we are in an inflationary period. When the value of buildings and equipment inflates faster than they depreciate, their value gains instead of loses. If disaster

strikes and the school is under-insured, the insurance company will pay only the proportional value of the loss. Hence, the insurance manager must have complete and accurate accounts of all insurable buildings and equipment. These accounts must be increased by inflation and decreased by depreciation. Moreover, a valuation schedule should be maintained so that the reappraisal of value is made on a periodic basis.

Curves drawn between appraisal values by equipment (building types) can then be used for estimating the value during the period between appraisals.

Another serious problem is policy payment. Payment schedules should be created on each insurable item. These schedules should be part of a system which automatically notified the insurance officer that action is to be taken. Such notification can be computerized, although carefully operated manual systems are adequate for this purpose.

Transportation

1. Importance of school transportation systems. According to School Management (1973:24) transportation expenses consume 2.9% of the total school budget. Featherstone (1969:32) has this to say about school transportation problems:

> What, if anything, can the members of the board of education do about the usually minor but irksome complaints? Nothing that will eliminate them, but they can take a few steps to hold them to a minimum. First, they can see to it that the criteria for school bus service provides for the most adequate transportation services possible with the funds available and that they are fair to all. Second, they can assure themselves that these criteria are being fairly applied to all--that no person or persons is receiving more favorable treatment than others. And finally, they can assign all complaints to the administrators. It's not only easier that way, it also makes for a better run district.
>
> And the final advice is this: accept the fact that when all is said and done, transportation is still likely to cause more day to day headaches for the school district than sex education, student protest and militant leaders combined.

How can systems help? According to Stewart and Miskow (Stewart, 1970:40-44), the following factors are most important in running a safe busing program:

A. Buy the right bus

B. Keep the bus in top shape

C. School bus routes should make sense

D. Select drivers with thought

E. Train your drivers

F. Give your program real supervision

G. Make students safety conscious

The Stewart and Miskow article outlines the organization and operation of a school transportation program in greater detail than given here (see Appendix MM, page 251). The function of systems is to develop procedures to implement this outline. This is done by

specifying who performs what, when, how, in order to achieve desired results, and monitored by the administration in such a way as to automatically signal problems so that the who or what can be changed if necessary. What will these procedures involve? They will involve paper flow analysis, job/task analysis, record keeping, development of inspection schedules and forms, and the use of computer assisted management as in VSP (Vehicle Scheduling Program).

V.S.P.--Vehicle Scheduling Program. One of the early applications of systems technology to education and simulation was school bus route planning. School bus route planning turns out to be a problem of minimizing the number of buses and bus route lengths, and number of bus runs while maximizing the number of bus stops under constraining conditions. Note that the conditions are antithetical. More buses give shorter bus route lengths, but the object is to minimize the number of buses--which gives longer bus routes. Add to this principles from C1 to C10 (Appendix MM, page 251-52) and the problem becomes highly complicated.

Is it worth the effort? According to Knuehnle and Mappes (1970: 38) it is:

> . . . Computer scheduling at Toms River, New Jersey represents a pilot project that has done so well to date that just about everyone connected with it looks forward to the next so-called installment in the saga. The school district serves 12,000 students with a fleet of 103 buses. During the school year, 96 buses travel one

> million miles transporting children to and from school. That averages approximately 10,000 miles per bus. Toms River was selected for the VSP pilot project because it had an efficient network of manually prepared routes and an enviable safety record.
>
> Although final returns are not in, initial results of the school bus scheduling venture show some promising statistics.

They proceeded to list the values of the VSP program as follows:

1. The number of backup buses and reserve capacity can be reduced because re-scheduling is so easy. New schedules can be developed in 3 days as opposed to four weeks. Individual schools can be re-scheduled in 3 minutes.

2. With the computer program, the state's 10,000 buses are never overloaded, the children are picked up and deposited under maximum safety conditions, the best possible routes are developed, and the most dependable, safety-conscious drivers are behind each wheel.

3. The VSP had an impact on promoting higher safety standards even as it saved considerable amounts of money. It helped provide a consistent implementation of state policies and the equitable distribution of state funds.

4. Information needed for vehicle maintenance is handled also: records of gas and oil consumption, repairs, bus mileage accumulated, etc.

5. Studies of driver capabilities, under varying circumstances are handled also.

He concludes by indicating (ibid:39):

> A panacea it is not, but VSP has already demonstrated that the basic aim of route scheduling--to produce better routes more economically and with an even greater concern for safety factors--can be accomplished. What planners and programmers are working toward now is to make VSP function at an even greater level of efficiency for its fundamental, three-fold purpose: safety, personnel and finance.

School Lunch Program

One of the business services provided in modern schools is that of providing the school lunch. School lunches are provided in a variety of ways. In general, they vary from school controlled local kitchens in every school, to school controlled satellite systems, to the use of outside contractors.

The system which is optimum at any particular point in time may change as conditions change. For example, the Long Branch, New Jersey (Korey, 1973:28) Public Schools used a commercial cold lunch program for feeding their students because of the lack of adequate space and facilities in their schools. When neighboring districts built their own schools and reduced the Long Branch student load, it became possible for them to institute their own central kitchen and satellite system.

The factors that seem to be relevant in determining the type of system a school system utilizes for its lunch program seem to be:

1. The socio-economic status of the students
2. The need for jobs in the local school area
3. The facilities available in the central location and the

satellite schools.

4. The availability of funds

Taste testing. The cost-effectiveness of a food service program is highly dependent upon the number of people who use the service. It is important, therefore, for a system to achieve as high a percentage of pupil participation as possible.

Children are people too. Given a choice of taking their lunches or eating school fare, they will optimize their taste. When it happens that they prefer home food to school food, the cost effectiveness of the total operation drops as equipment has already been paid for, personnel is already hired, food is already purchased, etc. As Michaels (1973:23) indicates, children do have preferences and they will act accordingly.

He makes the point that adding soybean meal to the hamburger dilutes the taste and children prefer the pure hamburger. This is probably true, but budgeting constraints do exist. Three things must be optimized; taste, cost and nutrition. This is a straightforward linear programming problem. Any system analyst should be able to set up systems for optimizing these variables on a "real time" basis for the food service department.

As in Michael's study, taste must be determined from experiment. Taste to product penetration statistics must be determined from

historical records. Cost varies in accordance with current prices and optimum adulteration. Add to this, the complexity of product mix (i.e., hamburger and fries versus hamburger and potato chips or potato salad, etc.) and the result is a highly complex situation that could well use simplification technique.

Personnel Management and In-Service Training

School systems which have access to generalized information systems have a big edge in the effective use of their personnel. The human tendency to stereotype other human beings is one tendency which leads to inefficient personnel usage. Very often administrators feel that since teachers are in charge of specific academic areas, they can play no other role. One does not ordinarily think of English teachers as coaching wrestling or teaching mathematics and engineering drawing. But, it does occur. One does not ordinarily think of the physics teacher as being well qualified in history. But, it does occur.

The general tendency of administrators, when faced with a requirement to increase the curricular offering, is to take a cursory look at present staff and then start the personnel acquisition procedure. This may be neither wise nor cost effective for his system.

When the personnel management information system exists, one push of a computer button can reveal many interesting possibilities. It may be that he doesn't need another person. For example, an English

teacher might pick up a Latin course, while a social studies teacher picks up the extra English course and a health teacher picks up the extra social studies course and a coach picks up the health course. In all cases highly qualified people have been used. The curricular offering of the school increased by one course.

How is this management system developed? Two general approaches have been used in the past. The first requires full staff participation in the administrative planning of the curricula. In this system the staff as a whole decides to add the Latin course and the staff, as a whole, does the scheduling and course assignment. The shifting of courses occurred because of each person volunteering as a result of group interaction. The second approach involves a very careful personnel analysis of individual teachers at the time of hiring and periodic updates through interviews. As a result of these interviews, some type of automated record keeping system is developed. These are usually EAM (Electronics Accounting Machine) punched card records, edge punch card systems or tape/disk records in an integrated management system. In the second system, the possibility of a personnel shift is found through an automated technique. The administrator must then make the necessary individual and group contacts to complete the process.

In-service training. In like manner, a qualified teacher might not be found for a proposed course. One way to solve the problem is to hire one--if you can get him. Another is to upgrade the staff through an in-service training program. Who is to be selected to learn to teach the new course? Again, either the group process or the automated system could be used.

In-service training has the advantage of developing staff loyalty to the school. Such programs have a tendency to make the staff member feel that he is important to the school program and that he is receiving more recognition. This feeling is sometimes called morale, and is reflected in the classroom as enthusiasm. Enthusiasm of the teacher seems to be one of the most important ingredients in the instructional process (Barr, 1961).

Thus it is that systems of locating the talents of present personnel can make a big difference in the effective operation of any educational institution.

Systems personnel can and should be able to assist in the development of procedures to facilitate these programs.

The computer and personnel selection. One of the more interesting applications of computer technology is the use of the computer as a collating machine in applicant selection where there are many more

applicants than positions available. Crowe (1972:40) in SCHOOL MANAGEMENT illustrates his use of the concept as given in Figure 14. This printout of candidates available for various positions is developed from the history of the applicant as his/her application is processed. The original data is entered into the system upon application. This includes the applicant's name, availability date, date of application, degree(s), experience, choice and certification status. Candidates from this list are selected for interviews on a standardized interview format. This format leads to a score which is recorded later under rate. (See Figure 14, page 115.)

While this system is probably very useful at its current stage of development, it provides the basis for even more useful procedures later. For example, the system could be programmed to tell which raters were most effective in which subjects. The rating scores could be weighted by subject area to arrive at optimal scoring by item weight. Later data could evaluate teacher effectiveness ratings and initial ratings and thereby improve the screening interview procedures themselves.

Negotiation.- One of the most interesting tools for assisting in the salary negotiation process is a computer program available through the Northwest Region Educational Laboratory, Portland, Oregon, called CASH. This program permits an aid at the meeting to put in proposed changes in salary schedules and fringe benefits, and it immediately

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AMER. HIST.

RATE	NAME	AVA DATE	APP DATE	EXP	DEG	CHOICE 1	2	3	CRT
	BAUER MARILYN J	11-10-70	11-10-70	00-00	BA			C	Y
	BEESON DAVID	01-22-71	10-18-70	00-00	BA		C		Y
	BUEHLER LESTER K	09-01-71	12-16-70	1-3	MS		C		Y
	DIONDO JOSEPH J	07-01-71	10-14-70	4-6	MS			C	N
	BEKENEYER BRUCE A	01-15-71	11-06-70	00-00	BA	C			N
	BYRNE GARY E	10-22-70	10-22-70	4-6	MS			C	Y
	COHEN MARCIA A	11-23-70	10-13-70	00-00	MS		C		N
	CURRY ANN	01-02-71	08-10-70	00-00	BA		C		Y
	FELIX STANLEY	01-01-71	12-01-70	00-00	BA		C		N
	FANTER DAVID C	11-11-70	11-11-70	1-3	BA+	C			Y
	GILMORE RICHARD C	01-15-71	11-20-70	00-00	BA	C			N
	GENONI JOSEPH A	01-01-71	03-05-70	1-3	BA+	C			Y
	GERARD CAROL	12-01-70	12-01-70	4-6	BA+			C	Y
	GIDLOW LAURIE A	09-01-70	03-08-70	1-3	BA	C			N
	HESTER SID G	01-02-71	12-11-70	00-00	BA+		C		N
	HENSLEY THOMAS L	08-19-71	12-01-70	1-3	BA+	C			Y
	HARRIS JACQUELINE	06-04-71	11-23-70	1-3	BA		J		Y
	HANSEN DAVID	09-01-71	11-06-70	1-3	BA		C		Y
	LARAMIE TERESA M	01-16-71	11-12-70	00-00	BA	J			Y
	LAMBORN JOHN E	01-01-71	11-05-70	00-00			C		N
	MCCARTY CHERYL A	01-25-71	11-16-70	00-00				C	N
	MADDEN ANDREA	02-01-71	11-30-70	00-00	MS		C		N
	MOEHLENKAMP	12-04-70	12-04-70	1-3	BA	C			Y
	MILLER KATHLEEN	01-01-71	12-11-70	00-00	BA			C	N
	NELSON ROBERT E	01-01-71	03-14-70	1-3	BA+	C			Y
	PLAGGE MARGUERITE	01-01-71	12-11-70	7-10	BA	C			Y
	PARSONS CHARLES N	11-24-70	11-24-70	00-00	BA		C		N
	PHILLIPS LEE B	01-04-71	12-01-70	1-3	BA+	C			Y

Figure 2.

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GRADE 2

RATE	NAME	AVA DATE	APP DATE	EXP	DEG	CHOICE 1	2	3	CRT
	RABINOVITZ FRANCES	01-01-71	08-05-70	10-XX	MS			E	M
	RICHARDSON GLENDA	08-27-70	08-27-70	1-3	BA+		E		M
	REDDEN HOLLY E	10-15-70	02-05-70	00-00	BA			E	
	ROONAN ESTELLE R	01-25-71	09-30-70	00-00	BA			E	M
	SEIBERT BETTY J	01-01-71	10-20-70	1-3	MS			E	Y
	SLATER JEAN	09-01-70	08-22-70	1-3	BA	E			M
	SUCHOWACKY SUSAN	12-17-70	12-16-70	00-00	BA+	E			Y
	SMITH DONNA	06-11-71	12-11-70	00-00	BA			E	M
	STEINER JUDITH M	08-15-71	11-30-70	1-3	BA		E		Y
92	[redacted] BARBARA	10-05-70	09-20-70	1-3	MS	E			
77	[redacted] SUSAN E	08-15-70	02-20-70	00-00	BA		E		M
	THOMAS PATRICIA M	01-01-71	12-08-69	00-00	BA			E	Y
	TUCKER SHARON M	01-25-71	11-30-70	00-00	BA		E		M
	TAKAHASHI IZUMI	01-01-71	10-14-70	00-00	BA			E	Y
77	[redacted] JILL	01-01-71	05-02-70	1-3	BA		E		Y
	VORENBERG LINDA J	11-30-70	11-23-70	4-6	BA		E		Y
	VENKER BARBARA A	11-30-70	11-04-70	00-00	BA	E			Y
	WOOD BARBARA	11-13-70	10-14-70	00-00	BA	E			M
	WILLARD DIANE S	10-15-70	11-20-69	1-3	MS		E		M

Figure 14. Parkway School District Computerized Personnel Display

calculates the short and long term cost to the system in terms of their current educational staff. There is no need to adjourn for the night to burn midnight oil in using a hand calculator to tet the data. The full implication of changes are presented quickly and accurately.

Section Summary

The intent of this section was to briefly review some systems applications in the operation of the school business functions. Seventeen areas of educational institution business functions were briefly discussed as were the use of the following systems analysis tools: paper systems flow; PPBS; target group analysis; communications analysis, operations analysis technique; management by objectives; budgeting; automated accounting; human factors in accounting systems; feedback systems; standard costing; simulation; standardization procedures in plant operation; maintenance, and transportation; appreciation/depreciation problems in insurance control; product mix problems (linear and dynamic programming) as applied to school lunch programs and bus routing; management information systems application in accounting, personnel management in-service training, and the negotiation process.

On the basis of the number and variety of systems techniques currently in use, the conclusion is hereby drawn that the inclusion of systems technique in the training of educational administrative specialties has a grounding in current literature on the subject.

EDUCATION SYSTEMS AND EVALUATION OF THE EDUCATIONAL PROCESS

Introduction

The intent of this section is to review some of the principles and problems involved in the application of systems and costing technology to educational evaluation and auditing. The review will establish that a background of theory and practice exists which could be used in the development of a training program for educational systems/costing analysts.

Historical Background

Callahan (1962) in Education and the Cult of Efficiency outlined the effect that the efficiency movement started by Frederic Taylor had upon the American educational system. While the efficiency movement itself started in industry about 1895, the first major impacts of the movement on education occurred in 1911 to 1913 with attacks on the inefficient educational system by the SATURDAY EVENING POST and the LADIES HOME JOURNAL (Callahan, 1962:47).

Unfortunately, the tools of achievement testing, aptitude and attitude testing, sampling theory, objective instructional sequencing, and computerized record keeping had not yet been developed. The result of the public pressure and the inability of educational administrators to either objectively justify the current position of

the schools or to recommend instructional improvements was an emphasis upon the indices of cost and a neglect of the measures of quality.

The tools then available were business type accounting, subjectively defined and weighted rating scales, and of course, Taylor's principles. Taylor's principles (1911:19) were:

> First. They develop a science for each element of a man's work, which replaces the old rule of thumb method.
>
> Second. They scientifically select and then train, teach and develop the workman, whereas in the past he chose his own work and trained himself as best he could.
>
> Third. They heartily cooperate with the men to insure all of the work is being done in accordance with the principles of the science which has been developed.
>
> Fourth. There is almost equal division of work between management and the workman while in the past almost all of the work and the greater part of the responsibility were thrown upon the men.

Note that in themselves the principles, even as applied to the educational process, are not bad. If properly applied, they should lead to a happier, more efficient school system. Unfortunately, educational administrators were none too careful about the "elements" they chose. The result was that "cost-effectiveness" became such items as: cost-per-pupil-drill, percentage of children of each year of age in grade for the school district, the average length of time required for a child to do a definite unit of work, the average daily attendance for room and child, the percentage of children allowed to complete school, the percentage going to high school, etc. (Callahan, 1962:69).

Thorndike's transfer of training studies indicated that only the "identical elements" in both the application situation and the training situation would be transferred. Many American educational administrators concluded from this that all education is thereby equivalent. This was typified by Frank Spaulding in his 1913 address to the Department of School Superintendents of the NEA wherein he concluded that curricular decisions should be made on a dollar cost basis rather than a development of the mind basis (ibid. pg. 73). Other educators such as Washbourne, as previously noted, used the same evidence to find which elements should be present in both the educational and the applied situations. Their efforts resulted in such things as reading difficulty studies, improved spelling lists, and the introduction of "practical arts" into the curriculum (Washbourne, 1963).

Callahan's concept of an American tragedy in education.

Callahan (1962:244) feels that the net result on the American educational system was a tragedy.

> The study of various aspects of the actions administrators took between 1910 and 1929 in applying business and industrial values and practices to education, together with an attempt to explain why they took these actions has formed the substance of this volume. It seems in retrospect that, regardless of the motivation, the consequences for American education and American society were tragic. And when all of the strands in the story are woven together, it is clear that the essence of the tragedy was in adopting values and practices indiscriminately

> and applying them with little or no consideration of educational values or purposes. It was not that some of the ideas from the business world might not have been used to advantage in educational administration, but that the wholesale adoption of the basic values, as well as the techniques of the business-industrial world, was a serious mistake in an institution whose primary purpose was the education of children. Perhaps the tragedy was not inherent in the borrowing from business and industry but only in the application. It is possible that if educators had sought 'the finest product at the lowest cost'--a dictum which is sometimes claimed to be a basic premise in American manufacturing--the results would not have been unfortunate. But the record shows that the emphasis was not at all on 'producing the finest product' but on the 'lowest cost.' In all of the efforts which were made to demonstrate efficiency, it was not evidence of the excellence of the 'product' which was presented, but data on per-pupil costs. This was so partly because of the difficulty of judging excellence but mostly because when school boards (and the American people generally) demanded efficiency they meant 'lower costs.' This fact more than any other was responsible for the course of events in educational administration between 1910 and 1929.

Elements of the Evaluation Movement

Ayres (1918:9) indicates:

> The importance of the (educational evaluation) movement is not only in its past and present achievements, but in the hope of the future. Knowledge is replacing opinion, and evidence is supplanting guess work in education as in every other aspect of human activity.

Ayres' statement was not prophesy. It was axiomatic. Significant improvements in the application of evaluation techniques to educational processes have occurred and are currently available. Although

as Provus (1968:243) states:

> There is surprising little theory on which to base good evaluation practice. The theoretical constructs which appear most relevant to the practitioner are derived from studies by Lippet (1958) and Miles (1965) on organizational health and change; Rogers (1955), Lewin (1951) and Corey (1953) on self-realization through group work; the work of Silvern (1965) on functional analysis of curriculum, Wiener (1948) on control and communication systems; and from Tyler's original work on curriculum development theory (1950). . . . However, despite the name of the title of a new educational periodical, THEORY INTO PRACTICE, there appears to be very little linkage between program evaluation going on in public schools today and the kind of theory discussed by university theorists.

Provus then proceeds to outline the Pittsburg Evaluation Model which is an empirical solution to their need for an evaluation system.

The Pittsburg evaluation model. The purpose of evaluation in the Pittsburg Model is to determine whether to improve, maintain, or terminate educational programs. In this system, evaluation is the process of (1) agreeing upon program standards, (2) determining if discrepant results occur between standards and results, and (3) using the discrepancy information to identify weaknesses of the program. After weaknesses of the program have been identified, problem solving techniques are used to isolate and specify the exact nature of the problem.

Types of developmental programs: Instant. According to Provus (1968:246), the most common type of program in public school work is of the instant installation variety. Programs formulated under Titles I and III of ESEA are largely of this variety. "They have been quickly formulated without careful planning or design to utilize available resources. Also in the (instant) category are most of the 'new' programs mounted by public schools staffs determined to 'do something better' on their own initiative." He feels that efforts of this type are only rarely planned and defined with sufficient precision to permit adequate evaluations. Such programs are also so inadequately planned as to permit no form of "feed-back" during the operation of the program. Feed-back during the operation of a program is called "formative evaluation". If enabling objectives are inadequately defined formative evaluation becomes impossible. Very often when the enabling objectives of a program are not well defined, the goals of the program will shift as a result of interim pressures and "summative" or final evaluation also becomes impossible. As a result, most "instantly developed" educational programs are evaluated poorly if they are evaluated at all.

Types of developmental programs: Canned programs. Provus' second "less common" but widely used type of program is the "canned" variety. With this kind of program either a commercial, a public, or

non-profit developer has determined its standards in advance of installation, and guidelines for installation, including staff training, are usually very explicit. Unfortunately, many such programs which proclaim themselves as being of this type are not. Many are based upon an "author's" concept of what the objectives should be without any type of empirical validation. Quite often the instructional sequencing is also based upon "expert opinion" rather than empirical validation. In other words, even canned programs must be subjected to empirical validation techniques and every educational institution should have systems developed to evaluate such programs before they are introduced.

Types of developmental programs: Locally created. The third and least common type of program is one that has been carefully designed by the school system itself. Provus indicates that "a few school systems have managed to organize the technical skills necessary to do this job successfully." However, in the two instances known to Provus (1968:246) sizable sums were required from outside the district. The Winnetka system (Washbourne, 1963) of the 1920's and 1930's was a good example of the effective use of this approach.

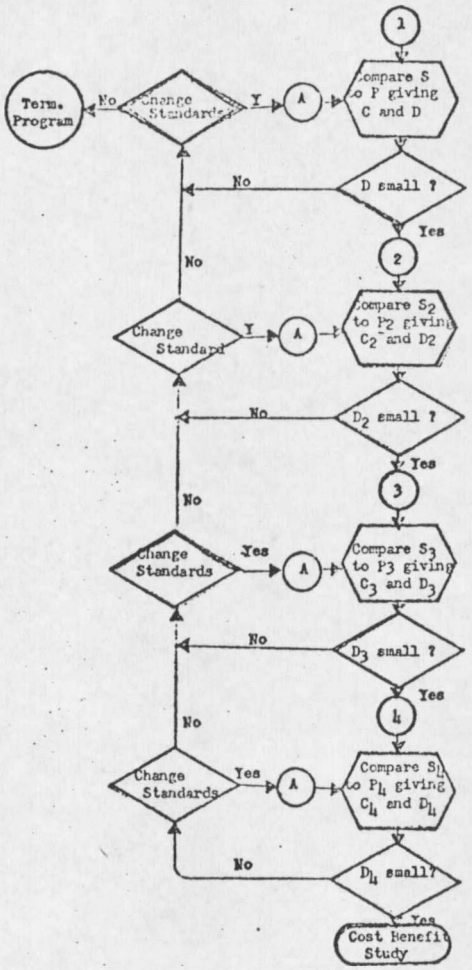
Evaluation of programs currently operational. Provus goes on to state that the evaluation of programs already staffed and under way contains four developmental stages and involves three major categories that can be broken into nineteen sub-categories.

The four developmental stages are: (1) definition, (2) installation, (3) process, and (4) product. His process of evaluation involves moving through stages and content categories in such a way as to facilitate a comparison of program performance with standards while at the same time identifying standards to be used for future comparisons. Figure 15, page 125, gives the logic Provus uses in relating his four developmental stages. In Figure 15, the comparison of the performance gives rise to discrepancy information which is used as the basis of a decision to continue the activity or to change the standards. This process is continued throughout the four steps. If the program is completed then a cost-benefit study should be done to validate that the results were efficiently obtained.

The manager of the program will be just as concerned with the time it takes to get to Stages 2, 3, and 4 as with the criterion comparison. The longer it takes to get to these stages, the greater the risk in case of failure.

Figure 16, page 126, gives the taxonomy for Provus' system of educational evaluation of activity content.

Applying the system within stages. Figure 16 details the questioning process that must occur if adequate discrepancy information is to be isolated at each stage. The questioning strategy given in Figure 16 should also be augmented by a detailed questioning strategy



S stands for the current evaluation standard
P stands for the evaluated performance
C the act of comparing the performance to the standard
D stands for the discrepancy information
A stands for a change in performance or standards

Figure 15. Conceptual Flow of a Developmental Program Evaluation System

System	Resource	Cost
INPUT		
Staff qualification by position Staff preprogram training Student selection criteria Student entry behavior Media Facilities Administrative conditions	Acquisition Time	Fixed Costs
PROCESS		
Student with: Student Staff Media Facilities Staff transactions with: Staff Students Media Facilities Administrative Other Student-Staff Relative to Objectives	Operating Time Storage	Operating Costs
OUTPUTS Enabling Objectives Terminal Objectives Ultimate Objectives Interrelationships between EO, TO, and UO	and Cumulative Time	Storage and Cumulative Costs

Figure 16. Taxonomy of Program Content

which is too detailed for purposes of this chapter (Provus, 1968: 267-282). This strategy also entails a semi PERT approach to the sequencing of enabling objectives into terminal and ultimate objectives.

Teachers and Misplaced Responsibility

When teachers worked alone in one room schools, there was some justification for evaluating the results of instruction and crediting the teachers thereby. As soon as the one room school divided into two rooms with graded or semi-graded classes, a quantum shift in the responsibility occurred. At this point, the responsibility for the progress of instruction shifted to the "school as a whole". Thus, the failure of the lower grade teacher to teach a child to read creates a responsibility for the upper grade teacher. In like manner, outstanding performance by the lower grade teacher in some area such as science will create opportunities (and problems) at the upper grade that would not have existed had the deviant performance not occurred.

Teacher effectiveness is, therefore, a system responsibility and should be evaluated on a system basis. Departments, schools, and the administrative organization itself are all reflected to a greater or lesser extent in the teaching act. The failure of a teacher to "teach" is in this sense a "system" failure. It is the responsibility of the system to insure that no student is deprived because of the

shortcomings of a teacher. One of the functions of educational administration is to ensure that this evaluation is done. It is the function of the educational system/cost analyst to assist in establishing evaluation procedures that are valid, objective, and reliable.

Status of the Evaluation of Teachers

Barr (1929) spent his whole professional career trying to discover the nature of a good teacher. In terms of the Taylor analogy, if he could discover one, then it would be possible to weed out the bad by using the excellent example as a model. While he found much about teacher characteristics, he did not solve the riddle. In 1961, he concluded:

> Good teachers cannot be separated from poor teachers in terms of specific teacher behaviors (there is an appropriateness aspect to teacher behaviors that must be taken into consideration, Barr, 1961, ii).

He continues his point by stating:

> The evaluation of teaching can be objectified through the use of teacher and pupil behaviors and operational definitions of the personal and professional prerequisites to teacher effectiveness.

The third point he makes is that thoroughly competent persons may view teacher behavior differently and there exist many ways of combining these emphases in teacher evaluation work.

Herman (1973:201-204) spends a whole book in outlining system techniques for the evaluation of the educational system staff.

He summarized the process into six components: 1. Information input, 2. Information analysis, 3. Decision making, 4. Implementation, 5. Performance output, 6. Output analysis.

1. Information input component. This is the data bank component. It might be organized in such a way that staff members might be assigned responsibility for data collection once the decision making component determines which data are needed. In the sub-systems it might involve a combination of various supervisors and categories of employees. It might also make use of students, residents and others.

2. Information analysis component. This component provides the data collected in a format of standards, statistics, charts and so forth as decided upon by the decision making component.

3. Decision making component. This component should consist of representatives of each category of employee, representatives of building level and central office administration and representatives of the policy making board. This group could be supplemented with participants from the student body, the residents of the community and outside experts. This component makes all decisions as to time schedule, techniques of evaluation, purposes of evaluation, persons to do the evaluations and all other decisions necessary to make the program operational.

4. Implementation component. This component operates the program of evaluation once decisions are made as to the nature of the staff evaluation program. In the case of the buildings and grounds sub system this component might consist of the superintendent of buildings and grounds, the shift supervisors, the head custodians, and two employee representatives from each school building.

5. Performance output component. This component takes responsibility for the quantifying of performance outputs. This component determines how well behavioral objectives were achieved and how well units of work were produced in a given time period by each employee and by each group of employees. This function could be assigned to the personnel office, the administrative and supervisory staff, an outside firm or some combination of employees and administrators.

6. Output analysis component. This component puts quantified data into useful form for the decision making component. It could be a function of the same group or office that functions as the information input analysis component.

The "X" Factor (Use of Student Experiences) in Teaching Evaluation

Rickover (1964) indicated that the English educational system produced high school graduates which are academically the equivalent of our college graduates. This seems to be true not only of the English,

but of the French, German, Australian, Egyptian, Lebanese, etc. (Beck, 1970). The question arises as to why if foreign school systems are so superior to the American in developing "quality" graduates, the net scientific and productive capacities of their societies consistantly remains lower than the American. It would seem that there is something in the educational processes of the United States or the processes which occur in the classroom here which facilitate the function of living more than the extention of classical education seems to do. Adam Curie (1964:226-245) had this to say about formal education:

> Contemporary attention is so concentrated on the role of education in development that we are inclined to forget its capacity to stunt growth. Yet in most societies for most of recorded time, education has been a reactionary force rather than a progressive one. Education, often closely associated with religion, has tended more to hallow antiquity than to promote innovation.

Paul Hanna (1965) gives some clues as to why "quality" educational systems such as those mentioned may be more of a national harm than long term good. His point is essentially systematic in that the macro level of input-throughput-output must be considered in the design of any educational system. Input involves the social, scholastic and ethnological factors that students bring to school. It involves the contemporary world in which students live (Butts, 1947:654-655).

Hanna (1965) puts the concept in slightly different form:

> Schools and colleges do not and should not preempt to themselves any monopolistic role of educating. The job of creating human capital is far too large for any one sector to accomplish single handedly. . . . The reverse side of the coin is equally significant for consideration. Too often our colleagues in engineering, health, economics, or public administration, working through informal or non-public administration, working through informal or non-public school channels, ignore the formal institutions--probably because schools have conventionally focused on education as consumption (italics added).

The evaluation of the instructional processes should, therefore, include the value of the productive capacity of students both as a cost and a benefit. As a cost, the products lost to society because children and students are not working is considerable. To the extent that they do produce something worthwhile this cost is minimized. At the same time something more important seems to be happening in the manner that John Dewey predicted (1929, 1938). The process of making formal education relevant to the experience of students increases the number of "identical elements" in both situations and should thereby increase the ability of students to solve problems.

The element of making experience relevant to the instructional processes is not only important from the standpoint of student motivation; but it also provides those vital identical elements which provide for transfer of training to "real life" situations. Any system of instructional evaluation should, therefore, evaluate in some manner the extent to which current problems and experiences of students become the subject matter of instruction. In the system developed by Herman (1973),

this "X" factor was missing as a system requirement.

The Educational Audit

Educational audits like financial audits are of two types: internal and external. Educational evaluation as discussed thus far in this chapter when it results in summary reports that can be reviewed by administrative officials and governing boards is synonymous with an internal educational auditing system.

The external educational audit, by contrast, utilizes an outside or "independent" evaluation expert or body of experts to conduct the audit. In fact, one of the responsibilities of an external auditor is to audit the internal educational auditing system. The "profession" of educational auditing is only now beginning to be developed. However, the general process of educational auditing is now fairly well standardized. Most systems involve a pre-audit stage, a translation stage, an instrumentation stage, the establishing of a review calendar, the audit, and a dissemination stage (Lessinger, 1970).

Hegedus (1971) designed an educational auditing unit for the Delaware State Department of Education which included the following: Pre-audit (Phase 1), Site visit (Phase 2), the Audit phase (Phase 3), Dissemination (Phase 4), and Reply (phase 5). This audit system was designed to monitor the progress of state sponsored or co-sponsored projects. Bearing this in mind, the Phase 1 becomes a standardized

procedure of becoming familiar with the project plans, the project reports and the project setting. A list of questions to be asked is generated from the background study. Phase 2 consists of the on site visit to clarify any points not clear in the reports. Phase 3, the audit report, is "a comparison of the proposed program management, operation, funding, personnel, facilities, materials, equipment and time schedule with the actual status of them. The purpose of such a report is to provide feedback to the project director and other responsible program personnel."

The audit report will generally contain descriptive statistics of the project, a summary status or overview, a comparison of the proposed and actual activities, and recommendations. The report as a whole will indicate, with supporting evidence, the extent to which the project is accomplishing what it was designed to accomplish. The auditor will assess the fulfillment or nonfulfillment of those key steps which are being taken to meet the project objectives. In Phase 4, dissemination of the educational audit report, the report is sent to the local chief school officer and the local project director. A report of completed audits without the inclusion of the audit statement is sent to the state board of education as a board agenda item. Phase 5, reply to the audit report, a reply is to be made by the school district involved to the director of the division of planning, research, and evaluation within three weeks of receipt of the

audit report. Finally, Hedegus (1971) concludes:

> Upon receipt of this reply, it will be acknowledged by the director of the division or the person responsible for audits in general. If challenges are raised by local school personnel in this reply, then appropriate personnel in DPI will acknowledge those challenges and seek a resolution of the problems created.

The Lessinger Implementation

The Lessinger (1970) Implementation is similar to Hegedus except that:

1. Pre-audit. In the pre-audit stage the outside auditing agent is selected by the educational institution instead of supplied by the state.

2. Translation stage. In this stage a set of specifications is produced "revealing what the student will be able to do as a result of the educational experience, the manner in which the evidence is secured, and the standards which will be applied in interpreting the success of the student in meeting the objective (ibidem:34).

3. Instrumentation. The third step is instrumentation. In this stage the auditor determines the instruments to be used such as questionnaire, standardized interviews, etc.--which will be developed to gather the evidence agreed upon in the translation stage.

4. Review calendar. The review calendar is a document that tells when reviews will take place and what they will cover.

5. Audit stage. Plans made in stages 1 to 4 are carried out.

6. Public report. After the audit is conducted and reviewed, a public report of the findings of the auditor is made.

Educational Systems, Evaluation and the Auditor

Educational auditing is essentially an outside appraisal of an inside process. If it is to be effective without excessive costs to the educational institution, the internal educational auditing and accounting functions should be operational. Under this condition, the auditor audits the evaluation or internal auditing functions of the school. This technique insures the maintenance of a continuous quality control system in the educational institution. Educational accounting like business accounting should be responsible to the chief executive officer as a staff function.

Conclusion

The intent of this section was to review some of the principles and problems involved in the application of systems and costing technology to educational evaluation and auditing. Educational auditing was viewed as an evaluation process external to the institution. Educational systems was viewed as a supportive function which carries the feedback function necessary to institutional functioning between audits. The internal audit was seen to have implications for the evaluation of teaching, administration, and their interaction in terms of the system.

The evaluation of teachers and teaching was seen to be a highly complex task which involves not only the static pre-defined curricula but must also include room for the inclusion of current student experiences.

CHAPTER SUMMARY

Organization

This chapter was organized into five sections wherein the following five educational systems functions were discussed: (1) establishing educational goals and objectives; (2) the effect of the type of educational organization on the role of educational system/cost analysts and resultant educational costs and costing technique; (3) the effect of educational technology in creating a costing role for educational systems/costing personnel; (4) the use of educational systems/costing personnel as an aid in optimizing the effectiveness of the school business functions; and (5) finally, the background of theory and practice which establishes a role for educational systems/costing personnel in educational evaluation.

Results of the Literature Survey

The literature indicates that a role exists for educational systems/costing personnel in each of the five aforementioned areas. The literature indicates that systems/costing personnel will need skills in assisting others in analyzing their goals, in analyzing their

resources, in analyzing their organizational procedures, in analyzing the types of technology to use to augment or replace current instructional procedures, in establishing procedures of business operation and control, and lastly, in establishing systems of educational evaluation and auditing which will be sufficiently flexible to include the experiences each student brings to the educational institution while being sufficiently comprehensive to evaluate the effectiveness of instruction and the teaching process.

Evidence was found that inappropriately applied indices of instructional cost-effectiveness could actually be harmful to our educational institutions. This evidence further strengthens the case for the training and professional development of those who will design the indices of educational success or failure and the means whereby the indices are summarized for management and public consumption.

Chapter 3

DESIGN OF THE STUDY

The Concept of a Feasibility Study

Every feasibility study must involve these elements:

1. It must determine the need (demand) for the final product.
2. It must determine the current supply for the product.
3. It must determine if resources are available to create (more of) the product if the supply/demand equation indicates the need of a greater supply.

The Determination of Demand

In the case of Educational Systems/Cost Analysts the demand is reflected in: (1) the number of positions which would be available for appropriately trained persons and (2) the amount that prospective employers would pay for such services.

Accordingly, a mail survey of groups likely to employ Educational Systems/cost Analysts was designed (See Appendix A, Page 210). This survey was sent to the following prospective employers:

1. Chief State School Officers of all States and Territories of the United States. There were 55 of these.
2. A stratified random sample of public schools based upon the United States Office of Education (USOE) Education Directory of 1968-69 (1970) as follows:

2.1 All school districts with over 100,000 students (26).

2.2 Forty school districts of the group with 25,000 to 99,999 students (40 of 165 districts).

2.3 Forty school districts of the group with 10,000 to 24,999 students (40 of 538 districts).

2.4 Forty school districts of the group with 300 to 9,999 students (40 of 11,047 districts).

School districts with fewer than 300 students were not included in this study.

3. A sample of 40 four-year colleges and universities was taken from Patterson's Americation (Ellison, 1971) and the questionnaire was sent to the president of the selected institutions. (40 of 1472 institutions).

4. A sample of 40 two-year colleges was also selected from Patterson's (1971) and the president of each institution was sent a questionnaire. (40 of 1164 institutions).

The Determination of Supply of Systems/Costing Personnel

Since anyone who works with children in a public school in a teaching or supervisory capacity must have a teaching certificate, and since a teaching certificate is required in all states, and since the National Council for Accreditation of Teacher Education (NCATE) is

recognized by the National Commission of Accrediting as the sole national agency for accreditation of teacher education, (DeYoung, 1972: 305-306), NCATE accreditation was selected as signifying that a college or university could produce Educational Systems/Costing Analysts - if it chose to do so. The American Council on Education (1964) has a listing of NCATE certified colleges and universities. This certification is further qualified into levels of certification. For purposes of this study, NCATE schools were divided into two levels: (1) Doctoral and (2) Masters Degree or less.

Since the possibility existed that one school could have supplied the entire need of all educational institutions in the United States for educational systems and costing personnel, and since that school (if it existed) would most probably be large enough to give the Doctorate in Education, the decision was made to use a total sample of all 84 NCATE schools certified at the doctoral level.

A sample of 40 of the remaining teacher education institutions was taken and the heads of the Education Departments were sent the same "educator" questionnaire to determine if training in educational systems and costing had penetrated to the Master's level.

The "Employer" Questionnaire

The questionnaire (see Appendix B, page 211) sent to prospective employers of Educational Systems/Cost Analysts was designed to flow from little structure in the first few questions toward an increased probing or "testing the limits" toward the end of the questionnaire. The first question was designed gather data on the current status of persons currently employed in educational systems or costing positions. The next question was designed to gather some idea as to the trend in the immediate future for such personnel--as the prospective employer defined such personnel.

Questions 3 through 6 were suggestive of roles that educational systems personnel could perform. The intent of these questions was to establish a common frame of reference to which all respondents replied. Comparisons between classes of respondents then became possible on their concepts as to the role and training that systems personnel in education should have. These questions also acted as a "warm-up" for the crucial Question 7, ". . . how many would you hire, and how much would they be paid at each of the following levels?"

There were several reasons for using this questionnaire design. First of all, little is known about the current status of this type of personnel. Next, very little is actually known about the role expectancy that practicing school administrators have about persons who fill educational systems or costing roles. The first two questions were

designed to glean some data on these points.

Question 1.1 - How many do you currently hire (full time equivalent)? This question was designed to gather some data as to the extent of penetration of systems thinking into the working world of educational administration. The data gathered here when compared with the data gathered in Question 7 will present some idea as to the growth potential for appropriately trained personnel.

Question 1.2 - What are their titles? This question was designed to produce some data about the job titles under which personnel currently performing educational systems and costing are currently working. As indicated in Chapter 1, the profession has not yet developed to the point where a single descriptive title can be used to label this group of personnel. Ascertaining the titles currently used should help to identify areas for further study.

Question 1.3 - What are their duties? This question was designed to illustrate the meaning of the titles given in Question 1.2. In addition, this essay response provided clues to those functions which the administrators associate with systems and costing.

Question 1.4 - Will there be changes in their job functions in the near future? This question should provide an indication of the

trend of the profession in the near future.

Question 1.5 - What is their salary level by training level? This question was designed to produce comparison data for the salary data in Question 7. In those cases where salary data is given, comparisons can be made to determine if more emphasis in training might make a difference in payment levels.

Question 2. Question 2 was designed to probe the limits as to how much administrators have learned to wish for in the way of help from educational costing specialists.

Question 2.1 - Ideally, what functions (jobs) would you like for them to perform? Here the administrator's perception of the nature of educational systems and costing work is solicited.

Question 2.2 - What training would you like for them to have? This question was aimed primarily at degrees, experience and subject matters.

Question 2.3 - What specific skills would you want them to have? Here the administrator was given an opportunity to express his concerns and desires for additional professional assistance in the educational costing function.

Question 2.4 - Would teaching experience be required? Question 2.4 was asked to determine if a new profession of education systems/ costing should be considered as specialization occuring after basic teaching certification or if it should be considered as a unique specialty.

Question 3. Question 3 consists of a series of statements about possible functions of an educational costing analyst. The respondent is asked to rate these on a scale from 1 or very low importance to 5 or very high importance. This question will be used to generate those functions that administrators use as part of their definitions of educational systems (See Chapter 5).

Questions 3.1 to 3.3 - Additions and deletions from existing and proposed courses. The first three questions (3.1 to 3.3) are of particular significance because they relate educational costing directly to the teaching process. The very essence of the PPBS and educational technology movements relate to the point that there is a continuum of methods available to reach a given educational goal with given students. Some are more cost effective than others. Budget and classroom decisions are thereby forever intertwined. Do educational administrators see the relationships and will they sense this as an important function? The results of questions 3.1 to 3.3 should provide some clues.

Question 3.4 - Studies of changes in the organizational standards of evaluation. Since questions 3.1 to 3.3 relate to educational costing functions that may not be commonly accepted by the educational administrators, this question may be interpreted as a step toward the functions more commonly associated with industrial engineers and cost accountants.

Question 3.5 - Studies of the cost effectiveness of equipment changes. This question suggests a shift of concept toward a more conventional business approach as the function of educational costing specialists. Note, however, that the term cost-effectiveness can refer to the analysis of the energy costs of teaching/learning situations using various types of equipment.

Question 3.6 - Studies of changes in management and administrative job functions. This question was designed to suggest the role of outside observer of the administrative structure as a function of educational costing analysts. This function, if accepted, would provide an official channel for limiting the Parkinsonian growth of large school bureaucracies.

Question 3.7 - Cost benefit studies of land and building acquisitions. This question suggests a further shift toward the more conventional role of the costing analyst as a school business official.

Question 3.8 - Cost benefit studies of changes in manpower accounting functions. Manpower accounting is not commonly used by educational institutions. Hence, administrator acceptance of this function would indicate that the function should be more commonly used and that the costing analyst should be in charge of its implementation.

Question 3.9 - Cost benefit studies of record keeping systems. One of the mistakes most commonly made by large organizations is that of retaining old forms and record keeping procedures long after their original purpose has disappeared. One reason why this occurs is that this function of pruning the record-keeping system is not the professional function of specialists ordinarily used by educational systems. Very often bureaucracies grow by keeping records which no longer have viability. Elimination of useless functions such as these often can significantly reduce both the overhead and production costs of any institution.

Question 3.10 - Cost benefit studies of changes in budgeting procedures. This question gains its importance from Question 3.9 and from recent emphasis in education of PPBS systems of budgetary allocation of funds. Every school system should rationally decide upon the amount of PPBS thought to be included in their accounting system. Switching to a PPBS system can cause profound changes in the operation of a school. New methods of keeping records will be required. Teaching

will be drawn closer to the stated objectives of the school. Such changes should not be undertaken lightly. Even the budgeting process itself should not be taken lightly. The design of the budget of any educational institution is always a time consuming task which consumes a significant portion of the total organizational energy.

Question 3.11 - Cost benefit analysis in cost estimation procedures. This question gains its importance from the principle that every bureaucratic structure if left unchecked will grow to the point where it feeds on its own procedures. Educational costing could also be a victim to the Parkinsonian Law.

Question 3.12 to 3.15 (other). These questions were designed to ascertain if the administrators had functions in mind which were vital to them which were not mentioned in the preceeding list. Statements listed here will be used as topics of discussion by the group of professionals which will design the training program (if feasible). In this manner, the essay comments of the respondents can have a non-linear weight on the final training program.

One of the difficulties with a check list approach to gathering data is the fact that ideas not included in the check-list could be the most significant to the targeted population. If the respondents were not permitted to express their own ideas, the result could be a case of

missing the forest in a check-list of trees. These items together with Questions 1, 2 and 6 were designed to avoid this type of mistake.

Question 4 - Determining the degree of usage of educational facilities is another function of an educational cost analyst. On the same five point scale, how important would the following types of usage studies be to your organization? The intent of this question was to determine the importance of building and utilization studies to the respondents and to ascertain their concept of the importance of time and motion study of students, instructors and middle management.

Question 5 - How useful (5 point scale) would it be to have the educational cost analyst in charge of educational audits for your organization? The educational audit is currently the most visible effect of the accountability thrust in current educational administrative thought. The intent of this question was to determine the extent to which this function would be considered important in the training program of educational costing analysts.

Question 6 - How much training in the following topics should an educational costing analyst have? (The scale is: 1-none necessary, 2-a minor course topic, 3-a major course topic, 4-a full course, and 5-more than one course). The intent of this question was to establish

a comparison between the desires of educational administrators and offerings of educational administration currently available in our colleges and universities. The twenty-six items under this question were repeated on the "Educator" questionnaire so that a direct comparison between need, (desire) and offerings could be made. The twenty-six items included were:

1. PERT or CPM training
2. Training in operations analysis
3. Training in organizational simulation and modeling
4. Training in job analysis technique
5. Training in time and motion study
6. Computer programming training
7. Training in PPBS (Program Planning and Budgeting System)
8. Training in educational measurement and evaluation
9. Training in curriculum construction
10. Training in the programmed learning process
11. Training in the use of audio visual aids and teaching machines
12. Training in the development of management information systems
13. Training in computer assisted and managed instructional techniques
14. Training in interview methods of collecting systems data
15. Training in forms analysis for systems study
16. Training in accounting and record keeping
17. Training in cost accounting for educational institutions
18. Training in school law
19. Training in business law
20. Training in organizational theory and analysis
21. Training in communication theory and analysis
22. Training in techniques of funding special projects
23. Training in educational budgeting and finance procedures
24. Training in proposal writing
25. Training in educational needs analysis technique
26. Training in educational audit techniques

Other_____

Question 7 - If you could hire persons trained as you described in Question 6, how many would you hire and how much would they be paid at each of the following levels? The intent of this question was to establish the number of positions that could be made available if a training program were available to train them.

The salary per year item was included to ascertain if accepting this type of training would be worthwhile to young persons in the process of selecting a career ladder. The levels of training included were: Associate of Arts, Bachelor of Arts, Master of Arts, Specialist, and Doctorate.

The "educator" questionnaire. The questionnaire that was sent to the heads of education departments of NCATE schools (See Appendix C, Page213) has established three things:

1. It establishes the current supply for educational system/cost analysts so that a supply/demand comparison can be made.

2. It establishes the availability (or lack thereof) of personnel who could create a training program for educational system/cost analysts.

3. It provides the basis for generating a list of educational institutions interested in working on the problem.

Even assuming that a net need for the training of personnel in educational systems and costing exists, a project to develop this

training program would not be feasible unless personnel were available to do the creation and unless institutions were available in which to do the training and to evaluate the effects of the developing training program.

The "Educator" questionnaire answers both of these needs. In addition, it provides a by-product which permitted the comparison of the "Employer" and "Educator" questionnaires.

Statistical Procedures Used in Analyzing Data

This study was primarily descriptive. For this reason, the statistical techniques required were descriptive statistics: means, medians, standard deviations, and standard errors of the means.

Standard errors for the proportion of the targeted employer populations were calculated in accordance with the method recommended by Glass (1970:248). This technique is essentially a tabular method wherein the spread of proportions is estimated from the ratio of the sample size to the population sizes.

Since conclusions in this study were to be drawn from the total number of positions available to systems/costing trainees, the total number of positions in the population represented by the sampled strata was obtained by multiplying the number of positions in each strata by the ratio of the population to the sample sizes. The standard error of the sum was found by adding the variances of each strata and taking

the square root as recommended by Johoda, Deutsch, and Cook (1953).

Chi Square technique was used to ascertain if the sampled strata could be considered as a single population for purposes of train- program development.

Summary

This study determined the feasibility of developing a training program for those interested in doing educational systems/costing work by comparing the results of two surveys.

The first was a survey of those institutions which were likely to hire such persons. From this survey, the characteristics of the training required, the number of estimated positions, and the approximate salary of such personnel was established.

The second survey was sent to institutions that could implement such a training program. This survey determined the extent to which training was currently available and the extent to which personnel and institutional support could be found to develop such a program.

Chapter 4

RESULTS OF THE STUDY

Forward

I pass with relief from the tossing sea of Cause and Theory to the firm ground of Result and Fact.

. . .Sir Winston Churchill, The Malakand Field Force. . .

RESULTS OF THE SURVEY

The primary purpose of the survey was to estimate the potential supply and demand for systems and costing personnel in educational administrative positions. From this supply-demand relationship an estimate of feasibility is to be derived. If the supply-demand relationship is in the area of over-supply or balance, then it would not be feasible to build a training program for this type of personnel.

A second purpose of the survey was to ascertain the extent to which the skills required by systems and costing personnel were already being taught by our universities and colleges. If United States colleges and universities are currently teaching everything desired by educational administrators in their systems and costing personnel, then creation of a training program--if feasible--becomes primarily a task of rearranging current practice into optimum form.

A third purpose of the survey was to determine if there are institutions willing to cooperate in the development of a training program for educational systems and costing personnel.

A fourth purpose was to determine if personnel would be available to build such a training system.

The survey will be interpreted in terms of these four purposes.

ADEQUACY OF THE RETURNS

Table 3 indicates the number of cases in the target population, the sample size, the number of returns received, and the percentage of return to sample size.

In all cases, the returns equalled or exceeded the 70% standard set by the Montana State University Department of Educational Services for adequacy of returns in mail surveys (Thibeault, 1973). A telephone follow-up was not needed to reach this level of return.

Table 3. Relationships: Returns, Sample Size, and Target Populations

Target population name	Population number	Sample size	Number of returns	Percentage
Four year universities	2143	40	32	80%
Two year colleges	1164	40	30	75%
Chief State School Officers	55	55	50	91%
Public Schools 300-9,999	11,047	40	29	72%
Public Schools 10,000-24,999	538	40	32	80%
Public Schools 25,000-99,999	165	40	29	72%
Public Schools over 100,000	26	26	22	85%
Education Departments (College and University)				
NCATE Doctorate	84	84	68	81%
NCATE Masters or less	364	40	34	85%

WHAT IS AN EDUCATIONAL SYSTEMS/COST ANALYST?

As indicated in the first chapter, those persons who possess a cluster of specific skills in systems, curriculum, measurement, and business functions were generally defined in the survey instrument as Educational Systems/Cost Analysts. The definition was purposely presented in open ended form so that the administrators could convey their concepts of the exact nature of this function.

This portion of this chapter is devoted to an analysis of the responses to these open ended questions. The intent of the analysis is to delineate administrator definition of the term.

Who Are Educational Systems/Cost Analysts?

Part of the first question on the questionnaire asked for the title of persons currently doing educational and systems functions in the sampled institutions. Table 4, Pages 158-160, presents a listing of their responses. There were some 45 different titles found. No single title seemed to predominate. The titles most frequently used were Budget Officer and Systems Analyst. The remaining titles ran from A to V or Accounting System Analyst to Vice President.

Table 4. Titles of Educational Systems/Cost Analysts Categorized by Type of Institution

		Public Schools							
		4 yr.	2 yr.	State	Small	Medium	Large	Very Large	Total
1.	Accounting Systems Analyst			1					1
2.	Administrative Assistant						1		1
3.	Analyst	1							1
4.	Assistant Dean & Registrar	1							1
5.	Assistant Director of Information Retrieval	1							1
6.	Associate Director		1						1
7.	Assistant Supt. for Finance and Business					1			1
8.	Budget Analyst			4					4
9.	Budget Officer	2						3	5
10.	Comptroller				1				1
11.	Computer System Analyst			1					1
12.	Consultant - PPBS								2
13.	Coordinator of Planning			1					1
14.	Coordinator - System Analysis			1					1
15.	Cost Analyst	1							1
16.	Dean of Admissions		1						1

Table 4 (continued)

		Public Schools						
		4 yr.	2 yr.	State	Small	Medium	Large	Very Large	Total
17.	Deputy Supt. of Planning and Accountability							1	1
18.	Director of Accounting						1	1	2
19.	Director of administration					1			1
20.	Director of Finance						1		1
21.	Director of Information Retrieval			1					1
22.	Director of Institutional Research	1							1
23.	Director, Office of Management			1					1
24.	Director, School Supervisor				1				1
25.	Educational System Analyst							1	1
26.	Fiscal Consultant	1							1
27.	Fiscal Coordinator					1			1
28.	Institutional Analyst							1	1
29.	Management & Budget Analyst							1	1
30.	Manager of Fiscal Affairs					1			1
31.	Manager of Fiscal Operations						1		1
32.	Management Analyst			1					1

Table 4 (continued)

		Public Schools						
		4 yr.	2 yr.	State	Small	Medium	Large	Very Large	Total
33.	Management Information Specialist			3					3
34.	Management System Analyst						1		1
35.	Operations Engineer			1					1
36.	Planning Analyst			1					1
37.	Planning & Assessment Specialist							1	1
38.	Planning Specialist						1		1
39.	Program Analyst			1					1
40.	Research Analyst			1					1
41.	Research Specialist - Educational Finance		1						1
42.	Staff Assistant	1							1
43.	Statistical Services & Planning			1					1
44.	Systems Analyst			4					4
45.	Vice President		1						1

In Table 5 the titles from Table 4 were recategorized into eleven larger groups. According to this analysis of their titles, most educational systems/costing personnel seem to be assigned to business and finance positions, planning positions, and information retrieval positions. These three categories accounted for over half of the titles mentioned.

Table 5. Titles Categorized by Major Emphasis

	Category	Number of Mentions	%
1.	Administration & Management (general)	2	4
2.	Business & Finance Function	13	29
3.	Computer Function	2	4
4.	Costing Function	2	4
5.	Curriculum Function	1	2
6.	Information Retrieval & Records Function	7	16
7.	Planning Function	7	16
8.	Research Function	3	7
9.	Supervision of Instruction	1	2
10.	Evaluation Function	1	2
11.	Not Classifiable	6	14
		45	100

Job Functions of Educational Systems/Costing Personnel

In Question 1.3 on the "Employer" questionnaire, the administrators were asked to list the job functions currently assigned to educational systems/costing personnel. The results of this question

are given in Table 6, Pages 162-163, Current Functions of Educational Systems/Costing Analysts from Question 1.3.

Table 6. Current Functions (Duties) of Educational Systems/Cost Analysts (From Question 1.3).

		Total Mentions
1.	Advise Chief Executive	2
2.	Analytic Studies as Required	3
3.	Budget Formulation & Control (of requests)	12
4.	Coding Data	2
5.	Consultant on Statistics & Production	1
6.	Contingency Studies	1
7.	Cost Accounting Functions	2
8.	Cost Analysis Studies	3
9.	Cost Benefit Studies	1
10.	Cost Forecasting Studies	1
11.	Cost/Load Studies	1
12.	Cost Reduction Studies	1
13.	Data Analysis	1
14.	Design Evaluation & Research Programs	1
15.	Design Internal Systems & Procedures	2
16.	Educational Costing Studies	1
17.	Educational Program Analysis	1
18.	Educational Systems Development	1
19.	Evaluation of Educational Programs	5
20.	Federal Programs--Administration	1
21.	Financial Reports	1
22.	Fiscal System; Plan, Development, Update & Control	3
23.	Inventory Control	1

Table 6 (continued)

		Total Mentions
24.	Liason with Computer Center	1
25.	Librarian, Data Processing, Statistical Programs	1
26.	Long Range Planning	1
27.	MIS - Build and Maintain (NCHEMS)	9
28.	Master Program Scheduling - Build & Maintain	1
29.	Organizational Studies	1
30.	Performance Contract--Design & Analysis	1
31.	Personnel Cost Analysis	1
32.	Population Projections (Student)	1
33.	Program Audits	1
34.	Program Planning & Budgeting Functions	9
35.	Programming (Computer)	2
36.	Provide Research Information	1
37.	Review Local Aid Programs	1
38.	Review Local Aid Programs	1
39.	School Business Management	1
40.	Space Studies	1
41.	Staffing Studies	3
42.	Systems Studies	2

Table 7, Summary of the Current Functions of Educational Systems/Cost Analysts, presents the picture of an educational system costing analyst as a person capable of doing special cost related studies of a business and educational evaluation nature from data generated or maintained in an MIS or educational business accounting

system. He is also very likely to have budgetory and/or program planning responsibilities.

Table 7. Summary of Current Functions of Educational System/Cost Analysts

	Function	Number of Mentions	%
1.	Administrative	4	4.8
2.	Advisory and Consultant	3	3.7
3.	Business Management	2	2.4
4.	Budget Formulation & Control (Including PPBS and Forecasting)	25	30.1
5.	Computer Systems & Programming	4	4.8
6.	Cost Accounting & Cost Studies	9	10.9
7.	Data Processing	3	3.6
8.	Educational Evaluation	7	8.2
9.	MIS Functions	10	12.1
10.	Organizational Studies & Procedure Development	3	3.7
11.	Special Studies	13	15.7
	Total Mentions	83	100.0

Stability of Job Function for Educational Systems/Cost Analysts

The intent of Question 1.4 was to ascertain if the functions of educational systems personnel have sufficiently stabilized so as to make the development of a training program feasible. When fields are rapidly developing and changing, the teaching of specific skills is likely to be immaterial to future needs. As a result, today's

skill could be tomorrow's retroactive inhibition. The data in Table 8 indicates that the administrators feel 28 to 5 that the educational systems personnel are sufficiently stabilized so that drastic changes in job function will not occur.

Table 8. Changes in the Job Functions of Systems/Cost Analysts in the Near Future

Population	Yes	No	?
Colleges	1	5	0
State Departments	1	14	2
Public Schools	3	9	1
Totals	5	28	3

Those questionnaires mentioning changes included the following reasons:

1. The implementation of an NCHEMS (WITCHE) management system.
2. The implementation of a state wide standard accounting system.
3. Changes caused by federal funding switches.
4. More emphasis upon systems that have an effect upon instruction.
5. More emphasis upon performance evaluation.

Would a Training Program Increase the Number of Positions Available?

The questionnaire was designed to provide data in the number of positions available now and the number of positions available after training. Table 9 presents the change in the number of sample groups

positions which would have occurred if an organized training program were available.

Table 9. Number of Positions in Sample Groups for Educational Systems Cost Analysts Assuming the Availability of a Training Program

Population	Now	After Training
4 year colleges	6	26
2 year colleges	3	9
State Department	11	90
PS 300-9,999	1	8
PS 10,000-23,999	3	13
PS 25,000-99,999	4	24
PS over 100,000	6	23
	34	193

The data in Table 9 indicates that educational administrators would increase their use of educational systems and costing personnel by a factor of 5 (34 to 193) if appropriate training were available.

Ideal Job Functions for Educational Systems/ Cost Analysts

Question 2.1 was "If you were to hire more educational costing specialists, ideally what would their functions be?" Table 10, Page 167, presents a listing of the functions listed by the sampled educational administrators. Interestingly enough, the administrators wished their analysts to do more computer programming, cost analysis

studies, and cost benefit studies as their top priority items.

Table 10. Ideal Functions of Educational Systems/Cost Analysts

	Function	Number of Mentions	%
1.	Accounting	1	1
2.	Advises Chief Executive	1	1
3.	Analytic Studies as Required	2	2
4.	Audits, Education Programs	3	3
5.	Business Management	3	3
6.	Consultant on Cost Effectiveness	2	2
7.	Cost Accounting Functions	3	3
8.	Cost Analysis Benefit and Reduction Studies	19	18
9.	Curriculum Development	1	1
10.	Educational Costing Studies	9	9
11.	Evaluation of Educational Programs	5	4
12.	Forms Control	2	2
13.	Feasibility Studies	1	1
14.	Financial Reports	1	1
15.	Income Projection	1	1
16.	MIS - Build & Maintain (NCHEMS)	6	5
17.	Operations Research	2	2
18.	Organizational Studies	3	3
19.	Population Projections	1	1
20.	PPBS	8	8
21.	Programming (Computer)	10	10
22.	Purchasing	1	1
23.	Search for Income	1	1
24.	Simulation and Modeling	1	1
25.	Staffing Studies	5	4
26.	Student Flow Studies	5	4
27.	Statistical Analyses	3	3
28.	Systems Studies	3	1
29.	Teaching Effectiveness Studies	1	1
30.	Work Flow	1	1
	Totals	105	100

Training Requirements for Educational Systems/Costing Analysts

Questions 2.2 and 2.3 solicited the administrators' opinions as to the training and specific skills they wished their analysts to have. The data from these questions is given in Table 11.

Table 11. Training and Specific Skills Desired by the Sample Administrators from Questions 2.2 and 2.3

		Total Mentions	%
1.	Accounting	21	10.5
2.	Affective Measurement	1	.5
3.	Behavioral Management	1	.5
4.	Budgeting	2	1.0
5.	Business	6	3.0
6.	Business Management	6	3.0
7.	Business Data Processing	1	.5
8.	Business Education	1	.5
9.	Classroom Teaching	1	.5
10.	College and University Management	1	.5
11.	Computer Science	11	5.5
12.	Communication Skill	3	1.5
13.	Contract Writing	1	.5
14.	Cost Analysis (Cost Benefit Study)	13	6.5
15.	Cost Control	1	.5
16.	Curriculum	1	.5
17.	Data Processing (Detail Data Recording)	6	3.0
18.	Economics	4	2.0
19.	Education	6	3.0
20.	Educational Administration & Finance	6	3.0
21.	Educational Cost Analysis	2	1.0
22.	Educational Needs Analyses	2	1.0
23.	Engineering	1	.5
24.	Evaluation (Educational Measurement & Reporting)	13	6.5
25.	Factor Analysis	1	.5
26.	Information Science	1	.5
27.	Industrial Engineering	1	.5
28.	Internship	1	.5
29.	Linear Programming	1	.5
30.	Literary Skill	2	1.0

Table 11(continued)

		Total Mentions	%
31.	Mathematical Skill	1	.5
32.	Monte Carlo and Simulation (modeling)	2	1.0
33.	Management by Objectives	1	.5
34.	Management & Administration	9	4.5
35.	Management Information Systems	3	1.5
36.	Office Politics (human relations skills)	7	3.5
37.	Organization Theory	3	1.5
38.	Project & Problem Presentation Technique	1	1.0
39.	Personnel	1	.5
40.	Physics	1	.5
41.	Planning (PPBS)	17	8.5
42.	Psychology (General and Educational)	3	1.5
43.	Public Administration	1	.5
44.	Public Speaking	2	1.0
45.	Research Design	4	2.0
46.	School Transportation	1	.5
47.	State Accounting Procedures	1	.5
48.	Statistics	12	6.0
49.	Supervision	1	.5
50.	Systems Design & Analysis	10	5.0
51.	Teaching	1	.5
52.	Typing	1	.5
		201	101.0 *

* 101.0 - 100.0 = Error of rounding

The skill most frequently mentioned was accounting (21 mentions) followed by PPBS (17 mentions), Evaluation Skills (13 mentions), Cost Benefit Study Skill (13 mentions), Statistical Skill (12 mentions), Computer Science Skills (11 mentions), Systems Skills (10 mentions), and Management and Administrative Skill (9 mentions). Human relations Skills (7 mentions) were usually presented as being the most important skill of all.

Degree requirement. According to Table 12, the Masters degree level of training was the most popular with the administration surveyed. Two administrators mentioned that no degree would be required. The associate of arts degree was not voluntarily mentioned by any group. This point is interesting in that a demand for associate of arts people was found--if an appropriate training program for them could be devised (see data Question 7, Table 15, Page 176).

Table 12. Degree Requirement for Educational Systems/Costing Personnel

Population	Degree					
	None	AA	BA	MA	SP	DOC
4 year college	0	0	2	4	0	4
2 year college	0	0	0	2	1	1
State Departments	2	0	8	19	1	4
Public School 300-	1	0	4	1	1	1
Public School 10,000-	0	0	5	3	0	0
Public School 25,000-	0	0	5	1	0	1
Public School 100,000-	0	0	0	5	0	2
	3	0	24	35	3	13

Teaching Experience Requirements

Table 13, Page 171, indicates the teaching experience required by the sampled administrators. Teaching experience was not to be required by the majority of the administrators in all groups.

Table 13. Teaching Experience Requirements for Educational Systems/ Cost Analysts

Population	Yes	No	Helpful
4 year college	2	15	0
2 year college	1	4	0
State Departments	4	28	24
Public School 300-	2	7	0
Public School 10,000-	7	6	1
Public School 25,000	3	7	3
Public School 100,000	1	7	3
Total	14	72	31

Most administrators indicate that teaching experience would be helpful, however.

Roles of Educational Systems/Costing Analysts as Reported by the Administrators

Questions 3.1 to 5 (Table 14, Page 173) of the "Employee" questionnaire were designed to record administration attitudes towards aspects of the possible roles of educational systems/costing persons. Since administrators were responding to the same standard question, cross comparison of attitudes between groups of administrators becomes possible.

The scale of response ran from 1 (very low) to 5 (very high). Three (3) was a neutral point. Scores less than three (3) will,

therefore, be interpreted as being unimportant functions for costing personnel as far as the sampled administrators are concerned.

The functions deemed to be most important to the administrators surveyed were:

3.5 Studies of the cost effectiveness of equipment changes (4.1).

3.6 Studies of changes in managerial and administrative job functions (4.0).

3.10 Cost benefit studies of changes in budgeting procedures (4.0).

Since all three of these functions tend to be perceived as business functions as opposed to "educational functions", the administrators tended to view educational systems from the viewpoint of business systems analysis. This view is further reinforced by the low ratings received by:

4.4 Time and Motion Study of Students (2.7).

3.3 Techniques of teaching within proposed courses (2.8). The median response for Question 3.3 was 2.8, thus function was seen to be of high (4.0) importance to the two year college group. This is the group (see Chapter 2, Section 3) that is currently automating much of its teaching. Hence the analysis of the teaching function within courses is logically associated with current problems. Other functions which seem to be of particular concern to two year colleges

Table 14. Comparative Role Perceptions of Educational Systems/Cost Analysts.*

Studies of:	Median of samples	4 year colleges	2 year colleges	State departmnt	Public sc ovr 300	Public sc ovr10,000	Public sc ovr25,000	Public sc ovr100,000
3.1 Additions & deletions from existing courses	3.5	3.5	3.6	2.7	2.8	3.5	3.7	2.0
3.2 Techniques of teaching within existing courses	3.2	3.2	3.4	3.0	3.2	3.1	3.8	1.7
3.3 Techniques of teaching within proposed courses	2.8	3.2	4.0	2.9	2.7	2.8	3.8	2.2
3.4 Changes in standards of evaluation	3.4	3.5	3.4	4.0	3.0	3.2	3.5	3.3
3.5 Cost effectiveness of equipment changes	4.1	3.4	4.1	3.5	4.0	4.4	4.3	3.6
3.6 Changes in management & administrative job functions	4.0	4.0	4.0	4.4	3.7	4.0	3.6	3.8
3.7 Land & building acquisitions	3.2	3.6	3.2	3.0	3.1	3.7	3.7	3.3
3.8 Manpower accounting procedures	3.8	3.8	3.8	3.8	3.5	4.1	3.7	3.4
3.9 Cost-benefit of record keeping systems	3.7	3.5	4.0	3.7	3.9	4.2	3.4	3.3
3.10 Cost-benefit of changes in budgeting procedures	4.0	3.6	4.1	4.3	3.6	4.3	4.0	3.9
3.11 Cost-benefit of changes in cost estimation proc.	3.6	3.6	4.4	3.8	3.1	4.2	3.2	3.4
4.1 Usage studies of building utilization	3.7	4.1	4.1	3.7	3.5	4.3	3.7	3.7
4.2 Equipment utilization	3.8	3.6	4.1	3.7	4.2	4.3	3.6	3.8
4.3 Time & motion of instructors	3.0	2.5	3.3	3.1	3.2	2.8	3.0	2.1
4.4 Time & motion of students	2.7	2.4	2.5	2.7	3.2	2.6	2.8	1.8
4.5 Time & motion of middle management	3.2	3.0	3.8	3.8	3.1	3.8	3.2	2.7
5. Educational analyst in charge of educ. audits	3.4	3.3	3.8	3.4	3.4	3.4	2.7	3.3

*1 Very low 2 Low 3 Neutral 4 High 5 Very high

are:

3.9 Cost benefit of record keeping systems

3.10 Cost benefit analyses of the cost estimation procedures (4.4)

4.1 Building utilization studies (4.1)

4.2 Equipment utilization studies (4.1)

It is interesting to note that 4 year colleges and medium size school systems were equally concerned with Building Utilization while State Departments and larger school systems were not as concerned with these topics.

There is sufficient patterning in the data to suggest that the organization of the training course should be in terms of a core of topics with the option of special work for those that would like to specialize in systems techniques for colleges, state departments, small, medium sized, and large public schools.

DEMAND FOR EDUCATIONAL SYSTEMS
COST ANALYSTS

Table 15, Page 176 , presents the projected net demand for systems and costing personnel assuming the availability of an adequate training program. Each projection of position by strata was created by multiplying the number of positions found in the sample by the ratio of the population size to the sample size. Confidence limits for the estimates of the proportion were then calculated in the manner recommended by Glass (1970:173). The standard error of the means were calculated in the manner recommended by Glass (1970:248).

The projected mean demand was 4247 positions with a standard error of 108 positions. By degree level these 4247 break into 183 for the Associate of Arts; 1112 at the Bachelors level; 1600 at the Masters level; 784 at the Specialist level; and 568 at the Doctoral level.

Table 15. Projected Demand for Educational Systems/Cost Analysts

Population	Projection of Total Demand by Degree						
	AA	BA	MA	Sp	Doc	Total	Limits*
4 year colleges	54	429	589	107	214	1393	± 180
2 year colleges	87	0	87	58	29	261	± 34
State departments	3	16	37	16	18	90	± 10
Public Schools 300-	0	552	828	552	276	2208	± 114
Public Schools 10,000-	27	81	27	27	13	175	± 15
Public Schools 25,000-	12	33	20	20	12	97	± 7
Public Schools over 100,000	0	1	12	4	6	23	± 4
Totals	183	1112	1600	784	568	4247	216

* Limit figure is 2 standard errors

CURRENT SUPPLY OF EDUCATIONAL SYSTEMS/COSTING ANALYSTS

The results of the sample of the NCATE approved educational institutions as given in Table 16, revealed a current production capacity of 60 for this type of personnel. This production capacity was found in three schools: The University of Iowa with 5; the University of Southern California at Los Angeles with 5; and the University of Florida at Tallahassee with 50.

Table 16. Number of Systems/Costing Personnel Produced by U.S. NCATE Approved Schools

School level	Number of Schools	Sampled	Returns	Number of Trainees	Projected Capacity	Stan. Dev.
Doctorate	84	84	68	60	74	6.1
Masters or less	364	40	34	0	0	0

The data in Table 16 shows that there currently exists no capacity to produce systems and costing personnel in the 364 NCATE approved schools at the Masters level. The total productive capacity found in 68 of the 84 NCATE doctoral institutions was 60. Assuming for worst case analysis that the non-replying schools produced a number of graduates equal to the average of the reporting schools, then the total estimated productive capacity of the U.S. for this

type of personnel would be increased to 74. Assuming further that in $2\frac{1}{2}$ cases in 100 the estimate could be as high as two standard deviations above this estimated mean, then the maximum current productive capacity for this type of personnel could be as high as 74 + 2 SD or 74 + 12 or 86.

SUPPLY/DEMAND COMPARISON

Supply/Demand Comparison of Educational Systems/Costing Personnel

Table 17 presents a best case/worse case analysis of the ratio of supply to demand for Educational Systems/Costing Analysts.

The data for Table 17 was derived from Table 15 and the preceding derivation of maximum probable supply for educational systems/costing analysts in the United States.

As can be seen in Table 17, the range of ratios from 47 to 1 to 74 to 1 are in favor of demand over supply. All ratios are "practical" differences in the sense that action taken on the basis of these figures should succeed the first time as opposed to some proportion of success such as six out of ten times. This was true even assuming the worst possible set of circumstances.

Table 17. The Educational Systems/Costing Personnel Production Capacity of NCATE Institutions of Higher Education Compared to the Demand for Such Personnel

Type of Analysis	Pro-rated Demand	Pro-rated Supply	Ratio
Best case	4463	60	74 to 1
Worst case	4031	86	47 to 1
Most probable case	4247	74	50 to 1

Anticipated Salaries of Systems and Costing Personnel

Question 7 of the "Employer" questionnaire solicited information not only on the number of personnel required but also on the salary that prospective trainees could anticipate at each level of training.

Table 18 presents salary levels that the responding administrators were willing to pay for appropriately trained personnel.

Table 18. Median of Administratively Proposed Salary Levels for Systems/Costing Analysts Classified by Educational Population Strata

Strata	AA	BA	MA	Spec.	Doctorate
4 year college	8,000	9,675	13,445	13,500	18,300
2 year college	7,250	--	14,000	13,000	18,000
State departments	7,000	11,720	14,300	15,388	17,750
P.S. 300-9,999	--	10,750	12,833	18,750	22,500
P.S. 10,000-25,999	6,000	11,000	15,000	15,750	19,000
P.S. 25,000-99,999	8,500	11,750	13,250	15,300	19,500
P.S. over 100,000	--	--	15,900	19,000	18,500
Median Value	7,125	11,000	14,000	15,388	18,500

The NEA Research Bulletin (1972:28-29) gives the average teacher's salary as $7,061 with a Bachelor's degree and $7,837 with a Master's degree. The maximum teacher's salary schedule for the doctorate degree was $13,805. The base population was public schools with over 6,000 students. It would seem that the salary differentials between the average teachers' salaries and the offered salaries for educational systems/costing specialists should draw an ample supply of candidates for training.

PRODUCTION FACILITIES FOR DEVELOPING A TRAINING PROGRAM FOR EDUCATIONAL SYSTEM/COST PERSONNEL

Background

A need (net demand) for educational systems/costing specialists has been established; a projected salary differential in favor of trained systems and costing personnel has been found which would insure a supply of candidates for training; but, who will create this program. Without people and institutions ready and willing to do the training and development, a developmental program is not possible.

The "Educator" questionnaire was designed to provide data to solve this question.

Production Personnel

The stem of the "Educator" questionnaire was:

Dear Educator:

As part of a dissertation project and part of a larger program to develop a training program for educational costing specialists, we need to develop a list of resource institutions and people to assist in the development and validation of the training program. If you have staff members who are interested in working with this project, list their names under RECOMMENDED SPECIALIST.

Table 19 gives the number of specialists recommended for each of the topics listed. Specialists for all topics were found with sufficient redundancy so that the task of finding one or two specialists for each area should not be difficult (Appendices I-LL, Pages 223-250).

Table 19. Number of Personnel Nominated as Developers in Each of 26 Selected Topic Means

Topic	Number
1. PERT and CPM	20
2. Operations analysis	18
3. Organizational simulation	15
4. Job analysis technique	12
5. Time and motion study	7
6. Computer programming training	21
7. Program planning and budgeting	21
8. Educational measurement and evaluation	36
9. Curriculum construction	33
10. Programmed learning process	17
11. Audio visual aids and teaching machines	29
12. Management information systems	21
13. Computer managed and assisted instruction	14

Table 19 (continued)

	Topic	Number
14.	Interview techniques for collecting systems data	6
15.	Forms analysis for systems study	6
16.	Accounting and record keeping	12
17.	Educational cost accounting	13
18.	School law	26
19.	Business law	9
20.	Organizational theory and analysis	27
21.	Communication theory and analysis	22
22.	Educational budgeting and finance	27
23.	Proposal writing	11
24.	Funding special projects	10
25.	Needs analysis	10
26.	Educational audit techniques	9
		453

Institutional Support

The final question on the "Educator" questionnaire was, "Would your institution be interested in having a part in the development or evaluation of a training program for educational system/cost analysts? (circle) Yes No Conditional".

The results of this question are given in Table 20, Page 183.

Table 20. Institutions Indicating an Interest in Participating in the Developmental Work

Classification	Number		Total	Percentage
	Yes	Conditional		
NCATE Doctorate	16	11	27	32%
NCATE Masters or less	3	8	11	28%
	19	19	38	

Twenty seven (32%) of the doctorate group indicated an interest in being a part of a developmental program to train systems/costing personnel. Eleven (28%) of the masters degree level institutions indicated an interest in being part of the developmental program.

CHARACTERISTICS OF THE REQUIRED TRAINING PROGRAM

Introduction

Question 6 of the "Employer" questionnaire was designed to ascertain the importance of twenty six areas of possible concern to educational administrators expressed in curricular terms. A duplicate of Question 6 on the "Employer" questionnaire was used on the basis of the "Educators" questionnaire. The intent was to obtain comparisons between the desires of administrators for training of systems and costing specialists and the offerings of our universities and

Table 21. Importance of Systems Topics to Educational Administrators Versus Estimates of the Subject Matter Available

Topic	Adm. Group Median	Doctoral	Masters
1. PERT or CPM	3.6**	2.1	1.6
2. Operations Analysis	3.7**	2.2	1.5
3. Organizational Simulation	3.1**	2.3	1.5
4. Job Analysis Technique	3.3**	1.5	1.2
5. Time and Motion Study	2.8**	1.0	1.0
6. Computer Programming	3.2	3.6	2.2
7. PPBS	3.6	2.8	1.4
8. Measurement and Evaluation	3.5	4.2	3.6
9. Curriculum Construction	2.5**	4.3	4.2
10. Programmed Learning Process	2.4	2.4	1.8
11. Audio Visual Aids	2.0**	3.8	3.8
12. Management Information Systems	3.9**	2.8	1.5
13. CAI and CMI	3.1**	2.3	1.5
14. Interview Technique for System Study	3.1**	2.3	1.0
15. Forms Analysis for System Study	3.3**	1.4	1.0
16. Accounting and Record Keeping	3.6**	2.3	1.2
17. Cost Accounting for Educational Inst.	3.8**	2.3	1.0
18. School Law	2.4**	3.4	3.2
19. Business Law	2.3**	2.2	1.3
20. Organizational Theory and Analysis	3.8**	3.9	3.0
21. Communication Theory and Analysis	3.0**	3.0	1.9
22. Funding Special Projects	2.5	2.4	1.0
23. Budgeting and Finance	3.9	3.4	3.0
24. Proposal Writing	2.9**	1.3	1.0
25. Educational Needs Analysis	3.4**	1.6	1.0
26. Educational Audit	3.6**	1.7	1.0

* The scale is:

1. Little or none
2. A minor course topic
3. A major course topic
4. One full course
5. More than one course

** .05 level = Chi Square 46.2 or greater

colleges. Table 21, Page 184, presents this comparison. The Chi Square test of relationships was used to isolate those subject areas where the targeted populations differed sufficiently to require separate training programs for each population.

Analysis Procedure

The curricular scale used in Question 6 was:

1. Little or none
2. A minor topic in a course
3. A major topic in a course
4. A full course
5. More than one course

Means were established for each sample "Employer" and "Educator" group. The data was interpreted on this basis:

1.00 to 1.50	Little or none
1.51 to 2.50	A minor course topic
2.51 to 3.50	A major topic in a course
3.51 to 4.50	A full course
4.51 to 5.00	More than one course

No group average rating fell into the "more than one course" required rating. Also, no average group rating fell into the "little or none" category. The remaining ratings are analyzed in the rest of this section.

Full Course Areas (Average Ratings of 3.51 to 4.50)

The administrators felt that the following topics were worthy of a full course:

1. Educational Budgeting and Finance (3.9)
2. Management Information Systems (3.9)
3. Cost Accounting for Educational Institutions (3.8)
4. Organizational Theory and Analysis (3.8)
5. Operations Analysis (3.7)
6. PERT and CPM (3.6)
7. PPBS (3.6)
8. Accounting and Record Keeping (3.6)
9. The Educational Audit (3.6)
10. Measurement and Evaluation (3.5)

The heads of education departments indicated that budgeting and finance courses on a marginal to a full course basis are currently available. Cost accounting for educational institutions is available only to the extent of being a minor to major course topic at doctoral institutions. Management information systems training is currently available as a major course topic only at doctoral level institutions.

Operations analysis. In the masters degree schools there seems to be very little work available to the students. The doctoral schools described their offerings as being between a minor course

topic and a major course topic.

PERT and CPM. The masters degree schools indicated that their use of PERT/CPM topics as little or nothing to use of this as a minor course topic. The doctoral institutions included PERT/CPM as a minor topic in their courses.

PPBS. The doctoral schools indicated that PPBS was being offered on a major topic basis to their students. The offerings in the doctoral schools approximates the need as defined by the sampled administrators. The masters degree institution by contrast described their offerings as being at best a minor course topic.

Accounting and record keeping. Both the doctoral and the masters degree institutions described their offerings as being on the low side of a major course offering. The administrators described their training needs as a full course. The data indicates a need for materials in this area.

Educational audit. This topic was also deemed worthy of a full course by the administrators. Both the doctoral and the masters degree institutions indicated little or nothing to minor course topic as the availability of training for this topic. The data would indicate a definite need for additional materials in this area.

Measurement and evaluation. Both the masters degree and doctoral schools indicated the availability of more than one course in this topic. The administrators indicated that measurement and evaluation could be taught as a major course topic to a full course at best. The data indicates usual NCATE doctoral and masters degree institutions have more than sufficient material to cover this topic. The question as to the need for a refinement of materials available into a shorter version for systems and costing personnel is left an open question for further study.

Major Topic Areas (Average Ratings of 2.51 to 3.50)

The administrators indicated that they felt that the following topics were worthy of "major topic" status in a training course for educational systems/costing personnel:

1. Educational Needs Analysis (3.4)
2. Job Analysis Technique (3.3)
3. Forms Analysis for Systems Study (3.3)
4. Computer Programming (3.2)
5. Organizational Simulation (3.1)
6. Computer Assisted and Managed Instruction (3.1)
7. Interview Techniques for Systems Study (3.1)
8. Communication Theory and Analysis (3.0)

9. Proposal Uniting (2.9)

10. Time and Motion Study (2.8)

Educational needs analysis. The administrators indicated that this subject was worthy of a major topic to full course status. Both the NCATE doctoral and masters degree schools indicated that there was little or at most a minor topic amount taught on this subject.

Job analysis technique. The administrator group indicated that job analysis technique should be at least a major course topic. The educator group indicated that the material available varied from a minor course topic to nothing at all.

Forms analysis for systems study. The administrators indicated that they felt that this technique of systems analysis was worthy of the weight of a major course topic. The doctoral and the masters degree schools indicated little to no capability in this area.

Computer programming. This topic was considered as worthy of major topic status by the school administrators. The doctoral institutions indicated a similar availability of courses. The masters degree institutions indicated the availability of only minor topics in this area.

Organizational simulation. This topic was considered worthy of major topic status by the administrators. The doctoral institutions indicated a minor course status for the topic. The masters degree institutions indicated little or no capability in this area.

Computer assisted and managed instruction. This subject was also deemed worthy of major topic status in the training program of educational system/costing analysts. Again the doctoral level institutions indicated minor topic capability and the masters degree institutions indicated little or no capability. The Chi Square test of group differences indicated that the strata cannot be considered as a single population (5% level of significance).

Interview technique for systems study. This systems topic was considered worthy of major topic status in a course of training for systems/cost analysts in education. The NCATE doctoral institutions indicated some capability in this type of training. The masters degree institutions indicated little or no capability.

Communication theory and analysis. This systems topic was also considered as being worth major topic status in a training course for systems/costing personnel. Again, doctoral institutions seem to have adequate materials available but masters degree institutions do not.

Proposal writing. Proposal writing was considered as being a worthwhile major topic in a training program for educational system/costing analysts. Surprisingly enough, most doctoral and masters degree NCATE approved institutions spend little or no time on the topic. According to the Chi Square value this topic would seem to be worthy of inclusion as a skill in any proposed training program for educational system/costing analysts.

Time and motion study. This area was considered as being just barely worth including as a major topic in a training program for educational system/cost analysts. The NCATE doctoral and masters degree institutions indicated little or no capability in this area, thus accounting for the 20% level Chi Square. The decision to develop or not develop a course topic in this area for systems/costing personnel should be left for further study.

Minor Course Topics (Average Ratings of 1.51 to 1.50)

The following subjects were considered by the school administrators as being of sufficient importance to educational systems/costing personnel to warrant inclusion in the training program as minor course topics:

1. Curriculum Construction (2.5)
2. Funding Special Projects (2.5)

3. Programmed Learning Process (2.4)

4. School Law (2.4)

5. Business Law (2.3)

6. Audio Visual Aids and Teaching Machines (2.0)

The heads of the education departments of the doctoral institutions indicated that their institutions currently teach more of the above topics than is required for the training of systems/costing analysts. The NCATE masters degree institutions would need supplementary materials for the programmed learning topics, business law topics, and the funding of special projects topics.

CHAPTER SUMMARY

Role of the Systems/Costing Analyst

The survey established that the educational systems and costing function is being done by various educational administrative personnel. Some 45 different position titles were found. Most of the systems and costing personnel were associated with the business functions of educational institutions. However, position titles indicating information retrieval and records functions, planning functions, computer functions, evaluation and curricular functions were also found.

Job Functions of Systems/Costing Analysts

Some 41 different job functions of educational systems/costing personnel were found. The most important of these seemed to be budget formulation and control, and special studies. These functions were closely followed by PPBS functions, MIS functions, and educational evaluation and research. Evidence was found to indicate that the functions of educational systems and costing personnel is not likely to change radically in the near future. The ideal functions listed by the administrators surveyed contained no great surprises except that they seemed to desire their analysts to do more of their own computer programming. They also wished for their analysts to do more in the way of cost analysis and cost benefit studies.

Training Required by Educational Systems/ Costing Analysts

The administrators felt that the most important requirement for educational systems/costing personnel was accounting. This was followed closely by PPBS; educational evaluation; cost benefit study training; statistical training; computer science training; systems training; management and administrative training; and human relations training. The masters degree was the most favored degree level. Teaching experience was deemed to be not necessary but helpful.

Demand for Educational Systems/
Costing Analysts

Evidence was found that the development of an appropriate training program would increase the demand for the number of such personnel hired by a factor of five. The current estimated training production of educational costing personnel was found to be 60, but estimated correction for non-respondents placed this number as high as 86 in one case in 95. One hundred and ninety three (193) positions for educational systems/costing personnel were actually found. When this number was projected in accordance with the sample proportion to the total population the estimated number of positions in the nation was 4,247. This indicates a current demand at least 50 times the estimated supply. Assuming a 30 year professional life from current graduates, the supply would be 2,580 or a factor of $1\frac{1}{2}$ below demand. In such a situation, supply never reaches demand.

Resources for the Development of a
Training Program

A list of 437 possible consultant developers was generated from the replies on the "Educator" questionnaire. In addition, 37 major educational institutions indicated some interest in being part of the development or evaluation of a training program for this type of personnel.

Characteristics of the Training Program

The training program as seen from the results of this study falls into seven major sections: Educational Planning, Budgeting and Finance; Educational Accountability; Management Information Systems; Educational Systems Analysis; Curricular Techniques; and Computer Programming.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Forward

It took me forty years on earth
to reach this sure conclusion;
There is no Heaven but clarity,
No Hell except confusion.

. . . Jan Struther, ALL CLEAR . . .

SUMMARY

Review of the Study

The educational problem which initiated the investigation had its basis in the problems that our formal educational institutions are having in maintaining economically viable operations. There are two ways to solve economic problems. The first is to make or raise money. The second way is to make the money available do the tasks necessary. The implicit assumption underlying the use of systems and costing technique is that the use of techniques of this type can make available resources go much further in meeting the true needs of any organization.

The term "true needs" was used because very often administrators, teachers, and students of educational institutions lose the perspective that comes from clearly defined goals and objectives. The

process of defining these goals tends to eliminate extraneous activity and sharpen the effectiveness of the organization. The primary function of systems analysts is to facilitate this process of goal definition. The tools they use may vary in accordance with the problem faced as indicated in Chapter 2. One set of tools they may use is the use of cost analysis to determine the actual or projected resources required to reach differing goals. When the resources required to reach these differing goals are thus objectified, administrators may utilize this as data in setting institutional priorities.

The systems concept and techniques are fairly universal administrative tools. The specific question asked by this study was whether or not the use of these tools had become sufficiently prevalent so as to require the use of specialists. If the answer to this question is "yes", then the demand for such specialists should be high. If the demand for such specialists is high, then the question arises as to the meeting of this demand. The work done in preparation for this study (Chapter 1) indicated that the demand for this type of personnel would probably be high. One function of the "Employer" questionnaire was to confirm or deny this premise. One function of the "Educator" questionnaire was to generate some data on the supply side of the supply/demand relationship. High demand may be high because of a small need and a smaller supply.

The remaining purposes of the "Employer" and "Educator" questionnaires were to identify those aspects of educational systems technique which could be utilized to develop a training program for such personnel.

Results of the Survey

Usable replies were received from 72 to 91% of the randomly selected members of the target groups. On the basis of these replies, a supply/demand analysis was made which indicated that the most probable supply of systems and costing personnel was 86 positions; the most probable demand for such personnel was 4247 positions. On the basis of this 4247/86 ratio, the conclusion was indicated that the development of a training program for educational systems/costing analysts is feasible from the standpoint of positions being available for the graduates of such programs.

The salary that the employing institutions were willing to pay was also collected. The median salaries ranged from $7,125 for the Associate of Arts level of personnel to $18,500 for Doctorates. The Masters degree was preferred by most educational administrators as the degree for their systems/costing analysts. The median salary for the Masters level was $14,000. This salary when compared to the $7,837 earned by the average teacher with a Masters degree last year indicated that the salary differential should attract candidates for

training.

Characteristics of the Required Training Program

The training program as revealed by the results of the survey indicated a need for a training program in the following topics:

1. Educational Planning, Budgeting and Finance
2. Educational Accountability
3. Management Information Systems
4. Educational Systems Analysis
5. Curricular Techniques
6. Organizational Theory and Analysis for Educational Institutions

Resources for the Development of a Training Program

A list of 437 possible consultant/developers was generated from the replies on the "Educator" questionnaire. In addition, 38 major educational institutions indicated some interest in being part of the development or evaluation of a training program for this type of personnel.

CONCLUSIONS

The Review of the Literature (Chapter 2), and the data developed as a result of the surveys designed in Chapter 3 and presented in Chapter 4, lead to the conclusions given in this section.

Organizational Role and Job Functions of the Systems/Costing Analyst

The review of the literature established that the systems/costing function is a staff function. As such, the analyst supplies data and does special studies which can be used for administrative decision-making.

The review of the literature established further that the systems and costing function in education can be applied to:

1. The establishment of educational objectives and goals
2. Varying educational organizational types
3. Plans for the use and evaluation of educational technology
4. The business functions of educational institutions
5. The evaluation of the teaching processes from the standpoint of the institution, the evaluation of teaching from the standpoint of the teacher, and the evaluation of student growth from the standpoint of the institution, the teacher, the student and his parents. This function is currently being carried out through the use of the educational audit.

Conclusion. The literature supports the contention that systems and evaluation personnel should be housed in a unit directly responsible to the chief executive.

Data. The data resulting from the Survey (Chapter 4) indicated that the organizational role of systems/costing personnel is closely associated with: (1) business and finance functions (29% of title mentions); (2) information retrieval functions (16% of title mentions); and (3) planning functions (16% of title mentions). These three title areas account for 61% of the titles given.

The administrative respondents described the job functions (Table 7, Page 164) of their educational systems/costing personnel as being: (1) budget formulation and control including PPBS (30% of total mentions); (2) special studies (15.7% of total mentions); (3) management information functions (12.1% of total mentions); (4) cost accounting and cost studies (10.9% of total mentions). These four functions account for 68% of the job functions mentioned.

Conclusion. The above data leads to the conclusion that current systems/costing personnel are concerned primarily with financial planning and budgeting and the problems attendant with the information retrieval necessary to support this function. In the process, such analysts become concerned with educational evaluation as it relates to the planning and costing functions of the institution.

Ideal functions. When the description of the functions of Educational Systems/Costing personnel is compared to the "ideal" functions mentioned in Table 10, Page 168, 47% of the total mentions referred to the financial and costing aspects of educational institutions. The largest single function mentioned was computer programming (10% of the total). Management information system functions mentioned comprised 5% of the total. Thus 62% of the "ideal" functions deal with aspects of the institution that are mostly financial, planning, or informational. The remaining 38% of the "ideal" functions are oriented toward the educational and organizational processes. They include such topics as curricular development, evaluation of the educational program, staffing studies, student flow, teaching effectiveness, etc.

Conclusion. The present functions of Educational Systems/Cost Analysts are sufficiently close to the ideal functions so that an Educational Systems/Cost Analyst may be defined as: A person filling a staff role in an educational institution that is primarily concerned with budgeting, business, and financial planning. This person has sufficient management information, computer programming, and educational evaluation skill to do required cost-benefit analyses.

Training Requirements for Educational Systems/Cost Analysts

Data. The data for the requirements for the hypothetical training program was derived from two sources. The first source was the list of skills supplied by the administrator respondents in questions 2.2 and 2.3. The second source was the list of twenty-six proposed training topics listed in Question 6 of the "Employer" questionnaire. Table 11, Page 170 summarizes this data by enumerating the training and skills the respondent administrators desired in their systems/costing personnel. If the ratio of each skill or training area to the total of all mentions by the respondents were multiplied by 45 quarter hours, which represents the Masters degree level they favored, the result is an idealized training program from the viewpoint of the respondents.

Conclusion. The general outlines of the "ideal" training program for Educational Systems/Cost Analysts results in a Masters degree and contains these elements:

1.	Accounting	4.5 quarter hours
2.	Computer Science	2.5 quarter hours
3.	Cost Benefit Analysis	2.5 quarter hours
4.	Educational Evaluation	2.5 quarter hours
5.	Management Theory	3.5 quarter hours

6.	Management Information Systems	1.0 quarter hours
7.	Office Politics and Organizational Theory	2.5 quarter hours
8.	Program Planning and Budgeting	4.0 quarter hours
9.	Statistics	2.5 quarter hours
10.	Systems Design and Analysis	2.0 quarter hours
11.	Miscellaneous and Elective (See Table 11)	17.5 quarter hours
	Total	45.0 quarter hours

Premise. In order to arrive at the developmental requirements for the courses that must be developed for the contemplated training program, the current capability of the NCATE schools must be deleted from the overall requirements.

Conclusion. Six courses of instruction properly developed could meet the need indicated by the supply/demand balance for this type of personnel and the training capability found. These courses might involve the following clusters of skills:

1. Educational Planning, Budgeting and Finance. This course would probably include the topics of PERT and CPM, PPBS, school and business law, educational needs analysis, and funding of special projects.

2. Educational Accountability. This course would probably include such topics as educational measurement and evaluation, cost

accounting for educational institutions, record keeping, the creation of behavioral objectives, and the educational audit.

3. Management Information Systems. This course could include both manual and computerized systems. The computerized system leads naturally to the development of CAI and CMI concepts.

4. Organizational Theory and Analysis for Educational Institutions. This course could include job analysis technique; operations analysis; office politics and human relations; organizational simulation; and communication theory, analysis, and practice.

5. Educational Systems Analysis. This course would contain interview technique, forms analysis, time and motion study, organizational simulation, and report and proposal writing. The essay data indicates a need for work in proposal presentation technique, which could be included here.

6. Curriculum Techniques for Educational Business and Systems Personnel. This course would include such topics as curriculum construction, programmed learning process, audio-visual aids and teaching machines.

7. Computer Programming. There are a sufficient number of training programs in computer programming so that the development of another would probably not be warranted unless specifically so requested by the NCATE Masters degree schools.

Characteristics of the Currently Available Training Programs

The training programs found (University of Iowa, Florida State University, and University of California at Los Angeles) are conventional graduate programs geared to some of the largest International Business Machine computer complexes in the nation. They are respectively: an IBM 360/75, an IBM 370/165, and an IBM 360/195. Training programs which required the use of equipment like this would need considerable tailoring before they could be used in NCATE Masters degree schools.

Conclusion. On the basis of the above, the conclusion is drawn that another training program for systems/costing analysts should be developed.

Conclusion: Feasibility of Developing a Training Program for Educational Systems/Costing Analysts

The development of a training program for educational personnel specializing in educational systems and educational costing technique is feasible. This conclusion is based upon a high demand; the need for specific courses in both Doctorate and Masters degree institutions; the availability of personnel and institutions interested in producing the training courses required.

RECOMMENDATIONS

The following recommendations are made on the basis of this study:

(1) A training program for educational systems/costing personnel should be developed. This program would consist of six clusters of skills in:

1.1 Educational Planning, Budgeting, and Finance

1.2 Educational Accountability

1.3 Management Information Systems

1.4 Organizational Theory and Analysis for Educational Institutions

1.5 Educational Systems Analysis

1.6 Curriculum Techniques for Educational Business and Systems Personnel

As a matter of practical concern, each topic in each course should be packaged in self-instructional modular form. The program would then be flexible enough to be used in any organizational pattern. Every institution has its own strengths and weaknesses. The development of these topics in semi-independent form would enable each institution to use as much of the material (or as little) as meets local need. This organization would also facilitate the use of special units in such topics as state school law, which will differ in each of the 55 states and territories. The self-instructional modular form would also facilitate the development of special sequences for those analysts that wish to specialize in senior college or community college

functions, state department functions, or small to large public school functions.

(2) Montana State University, through cooperation of the School of Education and the School of Commerce, should take steps to develop a program in school business management and educational systems technology. Many of the elements required for this type of program currently exist on this campus. The degree structure is adequate to this need and the course structure could be developed.

APPENDICES

Appendix A

EDUCATOR'S QUESTIONNAIRE

TO RETURN: FOLD, SEAL AND MAIL POSTAGE IS PREPAID

Dear Educator;

As part of a dissertation project and part of a larger program to develop a training program for educational costing specialists, we need to develop a list of resource institutions and people to assist in the development and validation of the training program. If you have staff members who are interested in working with this project, list their names under RECOMMENDED SPECIALIST.

We also need to know what training is currently available to students who might wish to specialize in this field. Accordingly, we would most appreciate the favor if you or one of your staff would indicate the amount of training that a student could receive at your institution in the following topics on the following scale:

1. little or none 2. a minor topic in a course 3. a major topic in a course 4. one full course 5. more than one course

	TOPIC	RATING	RECOMMENDED SPECIALIST *
1.	PERT or CPM training		
2.	Training in operations analysis		
3.	Training in organizational simulation		
4.	Training in job analysis technique		
5.	Training in time and motion study		
6.	Computer programming training		
7.	Training in programming, planning and budgeting (PPBS)		
8.	Training in educational measurement and evaluation		
9.	Training in curriculum construction		
10.	Training in the programmed learning process		
11.	Training in the use of audio visual aids and teaching machines		
12.	Training in the development of management information systems		
13.	Training in computer assisted and managed instructional methods		
14.	Training in interview techniques of collecting systems data		
15.	Training in forms analysis for systems study		
16.	Training in accounting and record keeping		
17.	Training in cost accounting for educational institutions		
18.	Training in school law		
19.	Training in business law		
20.	Training in organizational theory and analysis		
21.	Training in communication theory and analysis		
22.	Training in educational budgeting and finance procedures		
23.	Training in proposal writing		
24.	Training in the techniques of funding special projects		
25.	Training in educational/training needs analysis		
26.	Training in educational audit techniques		

Do you offer a degree with a specialization in educational systems? (circle) Yes No If so, what? _____ How many graduates? _____

Do you offer a degree with a specialization in educational costing? (circle) Yes No If so, what? _____ How many graduates? _____

Would your institution be interested in having a part in the development or evaluation of a training program for educational system/cost analysts? (circle) Yes No Conditional

* List name of your staff specialist

TO RETURN: FOLD, SEAL AND MAIL POSTAGE IS PREPAID

Appendix B

As a doctoral study and part of a larger project, we are attempting to ascertain the need for personnel specifically trained in cost studies of educational or training techniques in educational, governmental, and industrial institutions. Your opinions on this topic are vital to a proposed program to train such persons. We would, therefore, like to have your opinions on the following topics as they relate to your institution. (Please feel free to use any blank space for comments.)

1. To begin with, do you currently hire one or more persons with the function of an educational costing or systems analyst? (circle) Yes No If no, branch to question 2.
   - 1.1 How many do you currently hire? (full time equivalent) _____
   - 1.2 What are their titles? _____
   - 1.3 What are their duties? _____
   - 1.4 Will there be changes in their job functions in the immediate future? If so, what? _____
   - 1.5 What is their salary range by training level? AA _____ to _____; BA _____ to _____; MA _____ to _____; Sp _____ to _____; Phd _____ to _____

2. If you were to hire (more) educational costing specialists:
   - 2.1 Ideally, what functions (jobs) would you like for them to perform? _____
   - 2.2 What training would you like for them to have? Degrees _____ Subjects _____ Experience _____
   - 2.3 What specific skills would you want this specialist to have? _____
   - 2.4 Would teaching experience be required? Yes No Conditions _____

3. Doing or supervising cost benefit studies is a function of an educational costing analyst. Of the many types of cost benefit studies an analyst could do, how important are the following studies to your institution? Please use the following scale: 1. very low importance, 2. low importance, 3. of neutral importance, 4. high importance, and 5. very high importance
   - 3.1 Studies of additions and deletions from existing courses . . . . . _____
   - 3.2 Studies of techniques of teaching within existing courses . . . . . _____
   - 3.3 Studies of techniques of teaching within proposed courses . . . . . _____
   - 3.4 Studies of changes in the organizational standards of evaluation . . . . . _____
   - 3.5 Studies of the cost-effectiveness of equipment changes . . . . . _____
   - 3.6 Studies of changes in management and administrative job functions . . . . . _____
   - 3.7 Cost benefit studies of land and building acquisitions . . . . . _____
   - 3.8 Cost benefit studies of changes in manpower accounting procedures . . . . . _____
   - 3.9 Cost benefit studies of record keeping systems . . . . . _____
   - 3.10 Cost benefit studies of changes in budgeting procedures . . . . . _____
   - 3.11 Cost benefit studies of changes in cost estimation procedures . . . . . _____
   - 3.12 Other: _____
   - 3.13 Other: _____
   - 3.14 Other: _____
   - 3.15 Other: _____

4. Determining the degree of usage of educational facilities is another function of an educational cost analyst. On the same five point scale, how important would the following types of usage studies be to your organization?
   - 4.1 Building utilization studies . . . . . _____
   - 4.2 Equipment utilization studies . . . . . _____
   - 4.3 Time and motion studies of instructors . . . . . _____
   - 4.4 Time and motion studies of students (trainees) . . . . . _____
   - 4.5 Time and motion studies of middle management . . . . . _____

5. How useful (5 point scale) would it be to have the educational cost analyst in charge of educational audits for your organization? . . . . . _____

Appendix B (continued)

6. How much training in the following topics should an educational costing analyst have? (The scale is: 1—none necessary, 2—a minor course topic, 3—a major course topic, 4—a full course, and 5—more than 1 course)

6.1	PERT or CPM training	_____
6.2	Training in operations analysis	_____
6.3	Training in organizational simulation and modeling	_____
6.4	Training in job analysis technique	_____
6.5	Training in time and motion study	_____
6.6	Computer programming training	_____
6.7	Training in PPBS (Program Planning and Budgeting System)	_____
6.8	Training in educational measurement and evaluation	_____
6.9	Training in curriculum construction	_____
6.10	Training in the programmed learning process	_____
6.11	Training in the use of audio visual aids and teaching machines	_____
6.12	Training in the development of management information systems	_____
6.13	Training in computer assisted and managed instructional techniques	_____
6.14	Training in interview techniques of collecting systems data	_____
6.15	Training in forms analysis for systems study	_____
6.16	Training in accounting and record keeping	_____
6.17	Training in cost accounting for educational institutions	_____
6.18	Training in school law	_____
6.19	Training in business law	_____
6.20	Training in organizational theory and analysis	_____
6.21	Training in communication theory and analysis	_____
6.22	Training in techniques of funding special projects	_____
6.23	Training in educational budgeting and finance procedures	_____
6.24	Training in proposal writing	_____
6.25	Training in educational needs analysis techniques	_____
6.26	Training in educational audit techniques	_____

Other: _____

7. If you could hire persons trained as you described in question 6, how many would you hire, and how much would they be paid at each of the following levels:

LEVEL	NUMBER	SALARY PER YEAR
Associate of Arts	_____	_____ to _____
Bachelor of Arts	_____	_____ to _____
Master of Arts	_____	_____ to _____
Specialist	_____	_____ to _____
Doctorate	_____	_____ to _____

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_____
_____
_____
_____
_____
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_____
_____

Educational Cost Analyst Study
c/o Clifford E. Winkler
Department of Educational Services
Montana State University
Bozeman, Montana 59715

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Appendix C

DATA: EMPLOYER: COLLEGE AND UNIVERSITY

	QUESTION			WILL EMPLOY					
	Q 3.X	Q 4.X	Q 6.X	# AA	# BA	# MA	# SP	# DOC	
10101	3445551485158545254543254523153111411431413 1			0000000000115180000000000					
10102	3333333333343222345455543353444423433533 3			0000000000114169000000000					
10103	4443434333454423005424243434343454512434443			0000000000000000000011314					
10104	53521555251500110000000000000000000000000 0			0000000000000000000000000					
10105	1122344464443112333541454443544445324435444			0000000000115200000000000					
10106	1114432441112111215342341111311131111513152			0000020211110121121500000					
10107	4411444111155004425442525522b3555541434333			0000000000112140000000000					
10108	4233344444544223444434243323243434533435233			0000000000000000000000000					
10110	0000000000000000000000000000000000000000000			0000000000000000000000000					
10111	0000000000000000000000000000000000000000000			0000000000000000000000000					
10112	0000000000000000000000000000000000000000000			0000000000000000000000000					
10113	4442241233342334324442334454332221133233 4			0000000000000001121500000					
10114	2235555435555333535553533332555335335225			0000000000000000000022225					
10115	4334454444444334424423444222434334224423443			0000010812110150000000000					
10116	4435432334333333000000000000000000000000 0			0000000000000000000000000					
10117	3453455444323124322213311113222331122233 3			0000000000108100000000000					
10118	5543245324442111434422144221323233113322232			0000000000000000000000000					
10119	0000000000000000000000000000000000000000000			0000000000000000000000000					
10120	0000000000000000000000000000000000000000000			0000000000000000000000000					
10121	3113443333443113103321111115112551551121 11			0000010810000000000000000					
10122	3445355522543334333454333211222222111222222			0000000000000000000000000					
10123	0000000000000000000000000000000000000000000			0000000000000000000000000					
10124	0000000000000000000000000000000000000000000			0000000000000000000000000					
10125	0000000000000000000000000000000000000000000			0000000000000000000000000					
10126	5434344454454333312322213311322233112213122			0000030812211140000011620					
10127	0000000000000000000000000000000000000000000			0000000000000000000000000					
10128	4543232454552143245224443335343453344435344			0000000000000000000000000					
10129	5335535555554333443334443333443444332224333			0000000000112160000000000					
10130	4443444555555545443233143315122442233535353			0000000000000000000000000					
10131	4325151365354000224211254121524135112314145			1070910811112140000000000					
10132	NO REPLY AFTER 5 QUESTIONNAIRES								
10133	NO REPLY AFTER 5 QUESTIONNAIRES								
10134	NO REPLY AFTER 5 QUESTIONNAIRES								
10135	NO REPLY AFTER 5 QUESTIONNAIRES								
10136	NO REPLY AFTER 5 QUESTIONNAIRES								
10137	NO REPLY AFTER 5 QUESTIONNAIRES								
10138	NO REPLY AFTER 5 QUESTIONNAIRES								
10139	NO REPLY AFTER 5 QUESTIONNAIRES								
10140	0000000000000000000000000000000000000000000			0000000000000000000000000					

Appendix D

DATA: EMPLOYER: TWO YEAR COLLEGES

02 PRESIDENTS OF 40 TWO YEAR COLLEGES

	QUESTION			WILL EMPLOY				
	Q 3.X	Q 4.X	Q 6.X	# AA	# BA	# MA	# SP	# DO
0201	3444433344534444344322442231422255243345422			000000000000000000000000				
0202	000000000000000000000000000000000000000000000			000000000000000000000000				
0203	135435225553343450000000000000000000000000000			000000000000000010910000				
0204	000000000000000000000000000000000000000000000			000000000000000000000000				
0205	544443453545423342222234444445222321443534 5			206090000011216000001152				
0206	000000000000000000000000000000000000000000000			000000000000000000000000				
0207	000000000000000000000000000000000000000000000			000000000000000000000000				
0208	000044344344454544423334333254432422224345 5			000000000000000115180000				
0209	000000000000000000000000000000000000000000000			000000000000000000000000				
0210	111144555554411334444433111144445555554454 3			000000000011215000000000				
0211	444444444444334400000000000000000000000000			000000000000000000000000				
0212	000000000000000000000000000000000000000000000			000000000000000000000000				
0213	000000000000000000000000000000000000000000000			000000000000000000000000				
0214	000000000000000000000000000000000000000000000			000000000000000000000000				
0215	545445144555533450000000000000000000000000			000000000000000000000000				
0216	000000000000000000000000000000000000000000000			000000000000000000000000				
0217	000000000000000000000000000000000000000000000			000000000000000000000000				
0218	000000000000000000000000000000000000000000000			000000000000000000000000				
0219	000000000000000000000000000000000000000000000			000000000000000000000000				
0220	000000000000000000000000000000000000000000000			000000000000000000000000				
0221	000000000000000000000000000000000000000000000			000000000000000000000000				
0222	534455555445541344342223222242225513225223			107090000011217000000000				
0223	000000000000000000000000000000000000000000000			000000000000000000000000				
0224	000000000000000000000000000000000000000000000			000000000000000000000000				
0225	000000000000000000000000000000000000000000000			000000000000000000000000				
0226	000000000000000000000000000000000000000000000			000000000000000000000000				
0227	000000000000000000000000000000000000000000000			000000000000000000000000				
0228	000000000000000000000000000000000000000000000			000000000000000000000000				
0229	000000000000000000000000000000000000000000000			000000000000000000000000				
0230	NO REPLY AFTER 5 QUESTIONNAIRES							
0231	NO REPLY AFTER 5 QUESTIONNAIRES							
0232	5452532222444414200000000000000000000000000			000000000000000000000000				
0233	NO REPLY AFTER 5 QUESTIONNAIRES							
0234	NO REPLY AFTER 5 QUESTIONNAIRES							
0235	NO REPLY AFTER 5 QUESTIONNAIRES							
0236	NO REPLY AFTER 5 QUESTIONNAIRES							
0237	NO REPLY AFTER 5 QUESTIONNAIRES							
0238	NO REPLY AFTER 5 QUESTIONNAIRES							
0239	NO REPLY AFTER 5 QUESTIONNAIRES							
0240	000000000000000000000000000000000000000000000			000000000000000000000000				

	QUESTION			WILL EMPLOY				
	Q 3•X	Q 4•X	Q 6•X	# AA	# BA	# MA	# SP	# DOC
0301	0000000000000000000000000000000000000000000000			0000041119511160000021423				
0302	0004514453435 5333454435111534544214414144			0000000000112140000011416				
0303	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0304	4345342345444000534442144111525545335425 24			2091100000000011820122225				
0305	1111341445500000133233142221422355223335135			0000010509000000000000000				
0306	44352523354222222344232554324222221122231 34			0000000000000000000011518				
0307	3335353545544335334445245311523344445224345			0000000000000031319000000				
0308	1210221134011333022323433221312353223524 24			0000000000110130000000000				
0309	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0310	2333343443433245554442242222432444434524344			0000000000313191142011522				
0311	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0312	1114453444300000412221244111414454111114113			0000000000000011418000000				
0313	4445454424224004343232454442334334223333444			0000000000000000000000000				
0314	1111242232112113244444533221515533235534445			0000000000216180000000000				
0315	4335443444444545543332453322232322433225			1060820810209132121431316				
0316	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0317	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0318	5555555555550003244323444333324444322343 4			0000000000000000000000000				
0319	5444343434343444433443435432444444443334233			0000000000113170000000000				
0320	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0321	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0322	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0323	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0324	3334454545444444345424333422533534333423432			0000000001131500000215=0				
0325	4445453335554213422544235221324435122345254			0000000000115150000000000				
0326	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0327	0000000000000000000000000000000000000000000000			0000000000030000000000000				
0328	0004122333201000425221131111315444113313435			0000000031217000000000				
0329	3335454542544335300000000000000000000000000			0000000000000000000000000				
0330	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0331	4434555454325005223433241121313344112213114			0000020915000000000000000				
0332	3333451555333515232233145532524234224345543			0000000000114160000000000				
0333	4444453445554444444444444433544434445455455			0000000000000000000041520				
0334	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0335	1555451532134515435355245211514424122412134			0000011215000000000000000				
0336	5555555555545333554444543112524432124412112			0000021012111130000000000				
0337	2344444454444334433443454334544455554445445			0000000001151600000000000				
0338	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0339	0000000000000000000000000000000000000000000000			0000010911410131141812027				
0340	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0341	1225353545454333443321234332423344223314254			0000000000000041523000000				
0342	1114453134444111123111125111414444114114144			0000000003121400000000000				
0343	NO REPLY AFTER 5 QUESTIONNAIRES							
0344	1111553555551155251211451111122555132451 55			0000011215000000000000000				
0345	1214333343354223425433433222422244322234323			0000000001151700000000000				
0346	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0347	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0348	NO REPLY AFTER 5 QUESTIONNAIRES							
0349	4455244545555442423423344332443333224434333			0000011015214191141900000				
0350	NO REPLY AFTER 5 QUESTIONNAIRES							
0351	NO REPLY AFTER 5 QUESTIONNAIRES							
0352	3422343335433444323222232222323334332233222			0000000000000000000000000				
0353	0000000000000000000000000000000000000000000000			0000000000000000000000000				
0354	3555444415444555433335444433343343222224455			0000000002121511215115200				
0355	1115453544444113235332322?213222342354242 33			0000000003121421418116211				

Appendix F

DATA: EMPLOYER: PUBLIC SCHOOLS, SIZE 300 TO 9,999

40 OF 11,047 PUBLIC SCHOOLS OF 300 TO 9,999 STUDENTS

	QUESTION			WILL EMPLOY				
	Q 3.X	Q 4.X	Q 6.X	# AA	# BA	# MA	# SP	# DOC
1001	3332554444354330334345554334444354433334344			0000000001101500000000000				
1002	1543441252115451344343224443112255113322445			0000000000116180000000000				
1003	2445453222244334544443254443544333444445445			0000000000000011815110021				
1004	4443434334334433004444434444444444433444444			0000000000000000000000000				
1005	3333334445544333400000000000000000000000000			0000010913000000000000000				
1006	0000000000000000000000000000000000000000000			0000000000000000000000000				
1007	4211455555533133300000000000000000000000000			0000000000000000000000000				
1008	0000000000000000000000000000000000000000000			0000000000000000000000000				
1009	0000000000000000000000000000000000000000000			0000000000000000000000000				
1010	0000000000000000000000000000000000000000000			0000000000000000000000000				
1011	3113443343344333341434533221113333111121111			0000010912000000000000000				
1012	1111431454455313403233551211555555543345555			0000000001081000000000000				
1013	0000000000000000000000000000000000000000000			0000000000000000000000000				
1014	0000000000000000000000000000000000000000000			0000000000000000000000000				
1015	0000000000000000000000000000000000000000000			0000000000000000000000000				
1016	0000000000000000000000000000000000000000000			0000000000000000000000000				
1017	5444444433344222244443224422444333334423333			0000000000000011820000000				
1018	0000000000000000000000000000000000000000000			0000000000000000000000000				
1019	0000000000000000000000000000000000000000000			0000000000000000000000000				
1020	4344344455455444444445444444445444443344455444			0000000000000000000000000				
1021	0000000000000000000000000000000000000000000			0000000000000000000000000				
1022	0000000000000000000000000000000000000000000			0000000000000000000000000				
1023	0000000000000000000000000000000000000000000			0000000000000000000000000				
1024	0000000000000000000000000000000000000000000			0000000000000000000000000				
1025	0000000000000000000000000000000000000000000			0000000000000000000000000				
1026	0000000000034555000000000000000000000000000			0000000000000000000000000				
1027	1514511433114333000000000000000000000000000			0000000000000000000000000				
1028	0000000000000000000000000000000000000000000			0000000000000000000000000				
1029	0000000000000000000000000000000000000000000			0000000000000000000000000				
1030	NO REPLY AFTER 5 QUESTIONNAIRES							
1031	NO REPLY AFTER 5 QUESTIONNAIRES							
1032	NO REPLY AFTER 5 QUESTIONNAIRES							
1033	NO REPLY AFTER 5 QUESTIONNAIRES							
1034	NO REPLY AFTER 5 QUESTIONNAIRES							
1035	NO REPLY AFTER 5 QUESTIONNAIRES							
1036	NO REPLY AFTER 5 QUESTIONNAIRES							
1037	NO REPLY AFTER 5 QUESTIONNAIRES							
1038	NO REPLY AFTER 5 QUESTIONNAIRES							
1039	NO REPLY AFTER 5 QUESTIONNAIRES							
1040	NO REPLY AFTER 5 QUESTIONNAIRES							

Appendix G

EMPLOYER: PUBLIC SCHOOLS, SIZE 10,000 TO 24,999

11 40 OF 538 PUBLIC SCHOOLS OF 10K TO 24.9K STUDENTS

	QUESTION		WILL EMPLOY	
	Q 3.X	Q 4.X	Q 6.X	# AA # BA # MA # SP # DOC
1101	1111545545555115255453553212435555224445555	0000010612000000000000000		
1102	2311453555444314300000000000000000000000000	0000000000000000000000000		
1103	4443431145411111444422344111541233113235314	0000000000000000000000000		
1104	0000000000000000000000000000000000000000000	0000000000000000000000000		
1105	0000000000000000000000000000000000000000000	0000000000000000000000000		
1106	0000000000000000000000000000000000000000000	0000000000006000000000000		
1107	3445445555554534443234255332323445453435354	0000000000000011822000000		
1108	0000000000000000000000000000000000000000000	0000000000000000000000000		
1109	0000000000000000000000000000000000000000000	0000000000000000000000000		
1110	0000000000000000000000000000000000000000000	0000000000000000000000000		
1111	0000000000000000000000000000000000000000000	0000000000000000000000000		
1112	0000000000000000000000000000000000000000000	0000000000000000000000000		
1113	5555544445555445335355255555354344433335344	0000000000000000000000000		
1114	5111433443444113345341334222434444223344354	0000000001131600000000000		
1115	0000000000000000000000000000000000000000000	0000000000000000000000000		
1117	0000000000000000000000000000000000000000000	0000000000000000000000000		
1118	4424553454455444323233344222222233222223222	0000000000114170000000000		
1119	0000000000000000000000000000000000000000000	0000000000000000000000000		
1120	0000000000000000000000000000000000000000000	0000000000000000000000000		
1121	3333454444455555352122532342253555432355325	0000010708000000000000000		
1122	4544554544455335423333333332333322113323233	0000021218000000000000000		
1123	3112445554455334005354454211543354233345433	0000011217000000000000000		
1124	0000000000000000000000000000000000000000000	0000000000000000000000000		
1125	0000000000000000000000000000000000000000000	0000000000000000000000000		
1126	3244433333244223554222455221434234324324455	2050710705000011115000000		
1127	0000000000000000000000000000000000000000000	0000000000000000000000000		
1128	0000000000000000000000000000000000000000000	0000000000000000000000000		
1129	5555555555555333422222253212324323323335253	0000000000000000000011526		
1130	4213423334434234345443333221223343223323333	0000000000000000000000000		
1131	0000000000000000000000000000000000000000000	0000000000000000000000000		
1132	0000000000000000000000000000000000000000000	0000000000000000000000000		
1133	NO REPLY AFTER 5 QUESTIONNAIRES			
1134	NO REPLY AFTER 5 QUESTIONNAIRES			
1135	NO REPLY AFTER 5 QUESTIONNAIRES			
1136	NO REPLY AFTER 5 QUESTIONNAIRES			
1137	NO REPLY AFTER 5 QUESTIONNAIRES			
1138	NO REPLY AFTER 5 QUESTIONNAIRES			
1139	NO REPLY AFTER 5 QUESTIONNAIRES			
1140	NO REPLY AFTER 5 QUESTIONNAIRES			

Appendix H

DATA: EMPLOYER: PUBLIC SCHOOLS, SIZE 25,000 TO 99,999

```
 10  40 PUBLIC SCHOOLS 25K TO 99.9K
                        QUESTION                                  WILL EMPLOY
      Q 3.X  Q 4.X                  Q 6.X                       # AA # BA # MA # SP # DOC
 1201 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1202 2334453445555445354444455222554455444443543300000000000000011214000000
 1203 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1204 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1205 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1206 5553451125122112125442434534441112214423444000021217000000000000000000
 1207 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1208 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1209 2335455534434434200000000500000000000505550000000000111151111500000
 1210 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1211 5555555555555555550500000000000000000000000000000000000000000000000000000000000
 1212 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 213 5154151525513115413211451111521155111415551000010913110150000000000
 1214 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1215 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1216 4544352524224515331415314154322111221114100001171800000000000
 1217 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1218 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1219 4444534533344323333434443323433443233343330000111140000000000000000
 1220 4132435321543322323243121212324433212112222308094081020911112161121616
 1221 5433445324355222355554554121525455115415155000000000000011520220300
 1222 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1223 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1224 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1225 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1226 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1227 4334421454344222124542234342544443334423233000000000000011820000000
 1228 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1229 0000000000000000000000000000000000000000000000000000000000000000000000000000000
 1230 NO REPLY AFTER 5 QUESTIONNAIRES
 1231 NO REPLY AFTER 5 QUESTIONNAIRES
 1232 NO REPLY AFTER 5 QUESTIONNAIRES
 1233 NO REPLY AFTER 5 QUESTIONNAIRES
 1234 NO REPLY AFTER 5 QUESTIONNAIRES
 1235 NO REPLY AFTER 5 QUESTIONNAIRES
 1236 NO REPLY AFTER 5 QUESTIONNAIRES
 1237 NO REPLY AFTER 5 QUESTIONNAIRES
 1238 NO REPLY AFTER 5 QUESTIONNAIRES
 1239 NO REPLY AFTER 5 QUESTIONNAIRES
 1240 NO REPLY AFTER 5 QUESTIONNAIRES
```

13 26 OF 26 SCHOOLS WITH OVER 100,000 STUDENTS

	QUESTION			WILL EMPLOY				
	Q 3.X	Q 4.X	Q 6.X	# AA	# BA	# MA	# SP	# DOC
1301	211144	33434442434223324412232232323323134		0000000000118210000000000				
1302	12454524454453245124413441225123454253251 34			0000000000213200000000000				
1303	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1304	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1305	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1306	22514455554551 11 45533445433323444242242 34			0000000000010130000000000				
1307	11134434444441143302424341114233221132141 11			0000000000114200000021725				
1308	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1309	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1310	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1311	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1312	22243333333222223222223453325244333244442 53			0000000000000000000021220				
1313	12253535454543334433212343324233442233142 54			0000000000000004152300000				
1314	11142322344221111000000000000000000000000000			0000000000000000000000000				
1315	43343444344333344332223443223222222233242 44			0000000000513170000021720				
1316	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1317	41135241111551112234114454124213232224133 23			0000000000115170000000000				
1318	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1319	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1320	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1321	0000000000000000000000000000000000000000000000			0000000000000000000000000000				
1322	43524415454343152244334455334433445233345344			0000011418216200000000000				
1323	NO REPLY AFTER 5 QUESTIONNAIRES							
1324	NO REPLY AFTER 5 QUESTIONNAIRES							
1325	NO REPLY AFTER 5 QUESTIONNAIRES							
1326	NO REPLY AFTER 5 QUESTIONNAIRES							

Appendix J

HEADS OF 84 NCATE EDUCATION DEPARTMENTS

	QUESTION 0 0 1 1 2 22 1 5 0 5 0 56	GRADUATES
2001	2212152553522311141524322 2	CO
2002	0002102244021111112155210C0	00
2003	0223115345251322 1 151443412	CO
2004	0000000400C8000000004000000	CO
2005	0553055555333533333550535033	05
2006	0556405555533310 1 4 5341122	CC
2007	0321113345453321224141511 1	CO
20080	0222324345554534034544430C2	00
2009	0554445455555465554445545333	00
2010	0212315255452221415432154 1 1	CO
2011	0134115455114411115455411 1 1	CO
2012	0454115345355231511455411 3 1	00
2013	0133135555353433554355533233	CO
2014	0344000455304002004554543CC	CC
2015	022121445525 1223251 533	CO
2016	0000000000000000000000000C0	00
2017	0111112155551311112122111 1	00
2018	0114112255112111124353511 2 1	00
2019	0553335555555555555553333	00
2020	0000000000000000000000000C0	CO
2021	0331215555155C0055515551151	00
2022	0213112345152111324141442 2 1	00
2023	0000000000000000000000000C0	CC
2024	000000000000 00000 000 00	00
2025	0223224244343222344444422 3 3	00
2026	0000000000000000000000000C0	00
2027	0322311355443311455544421 1 2	00
2028	0000000000000000000000000C0	CO
2029	0335304345343033034C 4 33	00
2030	0000000000000000000000000C0	00
2031	0555355554335332534455522 2 2	00
2032	0111111111111111111111111 1	00
2033	0351115555334535234143511 2 2	05
2034	0111111111111111111111111 1	CO
2035	0123313345333132214143411 2 3	00
2036	0111111111111111111111111 1	CO
2037	3431135543343511141544111 1	CO
2039	0122315155352221124144422 3 3	00

```
12040                    033211535545453144444345132   00
12044                    011111115534311152445441111   00
12042                    023311425555311111111111113   00
12038                    011211235424112211414444222   00
12041                    044333454433444454334345454   00
12043                    000000000000000000000000000   00
12045                    044333544222234454533434333   00
12046                    055555255544555544334525255   00
12047                    054221545222425445511324323   00
12048                    033532535555555415445554452   50
12049                    000000000000000000      00000   00
12050                    045541343525534245113225345   00
12051                    033342443433443445445435344   00
12052                    011211225534323221414142122   00
12053                    033123142211512355123235211   00
12054                    011111111111111111111111111   00
12055                    000000000000000000000000000   00
12056  NO REPLY AFTER 5 QUESTIONNAIRES
12057                    025434544332433334334324333   00
12058 NO REPLY AFTER 5 QUESTIONNAIRES
12059 NO REPLY AFTER 5 QUESTIONNAIRES
12060 NO REPLY AFTER 5 QUESTIONNAIRES
12061                     515311155 514111 1            0
12062                     333335355555333505555501330   0
12063 NO REPLY AFTER 5 QUESTIONNAIREO
12064 NO REPLY AFTER 5 QUESTIONNAIRES
12065 NO REPLY AFTER 5 QUESTIONNAIRES
12066                    032221235535323344434342223   00
12067 NO REPLY AFTER 5 QUESTIONNAIRES
12068 NO REPLY AFTER 5 QUESTIONNAIRES
12069 NO REPLY AFTER 5 QUESTIONNAIRES
10069 NO REPLY AFTER 5 QUESTIONNAIRES
12070                    053232555545545153555552323   00
12071 NO REPLY AFTER 5 QUESTIONNAIRES
12072                    022321535533441313411341111   00
12073 NO REPLY AFTER 5 QUESTIONNAIRES
12074                    033433544435433332525453332   00
12075                     233233355343333335535353333  00
12076                    032211545535223111444343312   00
12077                    025434544332433334334324333   00
12078 NO REPLY AFTER 5 QUESTIONNAIRES
12079                    011111123534121121414411111   00
12080                    022311325525233124444344211   00
12081 NO REPLY AFTER 5 QUESTIONNAIRES
12082 NO REPLY AFTER 5 QUESTIONNAIRES
12083 NO REPLY AFTER 5 QUESTIONNAIRES
12084                    043421444555455344455453324   00
```

130 40 NCATE MASTERATE OR LESS INSTITUTIONS

	QUESTION 01 05 10 15 20 56	GRAD
3001	1111151555515215114435113 1	00
3002	2122212451511111141425111 1	00
3003	0000000220200000000000000 0	00
3004	1111111422412111124112112 1	00
3005	0030000440030000002000000	00
3006	0000043550400002551324220 2	00
3007	0000000000000000000000000	00
3008	3333243444433322245555333	00
3009	2212121454544111111154433 3	00
3010	2432244454533005045554314 4	00
3011	1221112343311111141144111 1	00
3012	1110030553522113135223111 1	00
3013	1111111451411111141111111 1	00
3014	0000002440400005030003300 0	00
3015	0000000000000000000000000	00
3016	0000000000000000000000000	00
3017	2111151451433331134443222 2	00
3018	0000000552502000000020004 0	00
3019	2112132443522123244114321 1	00
3020	0000000400400000000000000	00
3021	1111112422231111121112111 1	00
3022	1111111551512115155111111 1	00
3023	0000000443530300040400330 3	00
3024	2323134453422113151323123 4	00
3025	1111151551513111141534211 1	00
3026	1132114452421114344434323 3	00
3027	2222113453532111144444311 1	00
3028	2333251111151115115541111 1	00
3029	0000000000000000000000000	00
3030	0000000000000000000000000	00
3031	4544333453453353255511111 1	00
3032	3454113552232111241324212 1	00
3033	1111111551511111141411111 1	00
3034	1111151412411115125111111 1	00
3035	0000000440004000044400000 0	00
3036	NO REPLY AFTER 5 QUESTIONNAIRES	
3037	NO REPLY AFTER 5 QUESTIONNAIRES	
3038	NO REPLY AFTER 5 QUESTIONNAIRES	
3039	NO REPLY AFTER 5 QUESTIONNAIRES	
3040	NO REPLY AFTER 5 QUESTIONNAIRES	

Appendix L

INSTITUTIONS WHICH INDICATED AN INTEREST IN DEVELOPING A TRAINING PROGRAM FOR SYSTEM/COSTING ANALYSTS

1. University of West Virginia
2. University of Mississippi
3. University of New York: Buffalo
4. University of Missouri
5. North Texas State University
6. University of Montana
7. University of Oregon
8. Shippenburg State, Pennsylvania
9. Western Illinois University
10. Our Lady of the Lake College, San Antonio
11. University of Bridgeport
12. Southeastern Louisiana College
13. Syracuse University
14. Eastern Montana
15. De Paul University
16. Hofstra University
17. Kansas State University
18. Central Missouri State College
19. Mt. Marty College
20. Ball State University
21. University of Nevada
22. University of Miami
23. Duke University
24. University of Connecticut
25. Edinboro State
26. Kent State
27. Florida State University
28. Southern Illinois University
29. University of Wyoming
30. University of Denver
31. Purdue
32. UCLA
33. George Washington University
34. University of Tennessee
35. University of New Mexico
36. Michigan State at Lansing
37. University of Wisconsin
38. Ohio State University - Columbus

Appendix M

PROSPECTIVE CONSULTANTS FOR TOPIC 1 (QUESTION 1)

	NAME	SCHOOL
1.	Dr. Walter Matthews	University of Mississippi
2.	Dr. Paul Devore, Dr. John Patterson	University of West Virginia
3.	Dr. Ralph Van Deusseldorp	University of Iowa
4.	Dr. Ralph Hocking, Dr. William Rassin	Shippenburg State
5.	Dr. William Holloway	University of Kansas
6.	Dr. Mills Wilber	Western Illinois University
7.	Dr. Lowell Dunlop	Eastern Montana
8.	Dr. Ellington	Oregon College of Education
9.	Dr. Wilson	Kansas State University
10.	Dr. Ezra Krendol	University of Pennsylvania
11.	Dr. Don Patton	Ball State University
12.	Dr. E.E. Loveless	University of Nevada
13.	Dr. James Andrews	University of Cincinnati
14.	Dr. J. LaPlant	University of Cincinnati
15.	Dr. Desmond Cook	Ohio State University
16.	Dr. William Slaichert	University of Denver
17.	Dr. Bruno	UCLA
18.	Dr. Kenneth K. Tannic	University of Tennessee
19.	Dr. Don McIssac	University of Wisconsin

Appendix N

PROSPECTIVE CONSULTANTS FOR TOPIC 2 (QUESTION 2)

	NAME	SCHOOL
1.	Dr. Walter Matthews	University of Mississippi
2.	Dr. Robert Masson, Dr. Tom Bennan	University of West Virginia
3.	Dr. Walter Foley	University of Iowa
4.	Dr. Ralph Hocking	Shippenburg State
5.	Dr. William Holloway	University of Kansas
6.	Dr. Norman Krang	Western Illinois University
7.	Dr. Veraldi	Eastern Montana
8.	Dr. Ellington	OCE
9.	Dr. Wilson	Kansas State University
10.	Dr. L.R. Olsen	Central Missouri State
11.	Dr. Ezra Krendal	University of Pennsylvania
12.	Dr. James Andrews	University of Cincinnati
13.	Dr. William Slaichert	University of Denver
14.	Dr. Bruno	UCLA
15.	Dr. Kenneth K. Tannic	University of Tennessee
16.	Dr. Lidham	University of Wisconsin
17.	Dr. Donald L. Walters	Temple University
18.	Dr. Richard Wynn	University of Pittsburg

Appendix O

PROSPECTIVE CONSULTANTS FOR TOPIC 3 (QUESTION 3)

	NAME	SCHOOL
1.	Dr. Harold Goodwin	University of West Virginia
2.	Dr. Ralph Hocking, Dr. William Bassin	Shippenburg State
3.	Dr. William Holloway	University of Kansas
4.	Dr. Norman Krang	Western Illinois University
5.	Dr. Vernaldi	Eastern Montana
6.	Dr. Albricton	OCE
7.	Dr. Van Meter	Kansas State University
8.	Dr. Don Lyon, Dr. Jack Riegle	Ball State University
9.	Dr. E.S. Dodson	University of Nevada
10.	Dr. James LaPlant	University of Cincinnati
11.	Dr. Desmond Cook	Ohio State University
12.	Dr. Irwin Johns	Florida State University
13.	Ralph Forsythe	University of Denver
14.	Dr. Larry Hughes	University of Tennessee
15.	Dr. Lidham	University of Wisconsin

Appendix P

PROSPECTIVE CONSULTANTS FOR TOPIC 4 (QUESTION 4)

	NAME	SCHOOL
1.	Dr. Duane Brown	University of West Virginia
2.	Dr. Jon Muczyh	Shippenburg State
3.	Dr. Veraldi	Eastern Montana
4.	Dr. Arnold Salisbury	Western Illinois
5.	Dr. B. Young	Oregon College of Education
6.	Dr. Wilson	Kansas State University
7.	William B. Costetter	University of Pennsylvania
8.	Dr. E.E. Loveless	University of Nevada
9.	Dr. Faust Orebaugh	University of Cincinnati
10.	Dr. R.E. Wilson	Kent State
11.	Dr. Ralph Forsythe	University of Denver
12.	Dr. Kenneth Tannic	University of Tennessee

Appendix Q

PROSPECTIVE CONSULTANTS FOR TOPIC 5 (QUESTION 5)

NAME	SCHOOL
1. Dr. John Alspaugh	University of Missouri
2. Dr. Jon Muczyk	Shippenburg State
3. Dr. Mills Wilber	Western Illinois University
4. Dr. Vernaldi	Eastern Montana
5. Dr. Holen	Kansas State University
6. Dr. E.E. Loveless	University of Nevada
7. Dr. Kenneth Tannic	University of Tennessee

Appendix R

PROSPECTIVE CONSULTANTS FOR TOPIC 6 (QUESTION 6)

	NAME	SCHOOL
1.	Dr. Walter Matthews	University of Mississippi
2.	Dr. Thomas Blaskovics	University of West Virginia
3.	Dr. Paul Smith	University of North Texas
4.	Dr. Frank Greenwood	University of Montana
5.	Dr. Ralph Hocking	Shippenburg State
6.	Dr. Donald Halm	Western Illinois University
7.	Dr. Richard Thornton	University of Bridgeport
8.	Dr. William Standard	Eastern Montana
9.	Dr. Keesey	Oregon College of Education
10.	Dr. Holen	Kansas State University
11.	Dr. Ezra Krendal	University of Pennsylvania
12.	Dr. Don Patton	Ball State
13.	Dr. E.S. Dodson	University of Nevada
14.	Dr. Richard Williams	University of Miami
15.	Dr. William Katzmeyer	Duke University
16.	Dr. M. Vellkey	Kent State
17.	Dr. Ralph Forsythe	University of Denver
18.	Dr. Bruno	UCLA
19.	Dr. John Skelton	University of Denver
20.	Dr. Kenneth Tannic	University of Tennessee
21.	Dr. Don McIssac	University of Wisconsin

Appendix S

PROSPECTIVE CONSULTANTS FOR TOPIC 7 (QUESTION 7)

	NAME	SCHOOL
1.	Dr. Walter Matthews	University of Mississippi
2.	Dr. James Martin	University of West Virginia
3.	Dr. Harry J. Hartley	University of Connecticut
4.	Dr. Paul Smith	University of North Texas
5.	Dr. Richard V. Hatley	University of Kansas
6.	Dr. Mills Wilber	Western Illinois University
7.	Dr. W.A. Atkins	University of Dayton
8.	Dr. Wilson	Kansas State University
9.	Dr. Ezra Krendal	University of Pennsylvania
10.	Dr. Don Patton	Ball State University
11.	Dr. E.S. Dodson	University of Nevada
12.	Dr. James Andrews	University of Cincinnati
13.	Dr. R.E. Wilson	Kent State
14.	Dr. Ralph Forsythe	University of Denver
15.	Dr. Lindman	UCLA
16.	Dr. Kenneth Tannic	University of Tennessee
17.	Dr. Jim Hale	University of New Mexico
18.	Dr. Karezevich	University of Wisconsin
19.	Dr. Donald W. Walters	Temple University
20.	Dr. Alex Duncan	University of Pittsburg

Appendix T

PROSPECTIVE CONSULTANTS FOR TOPIC 8 (QUESTION 8)

	NAME	SCHOOL
1.	Dr. Mark Reckase	University of Missouri
2.	Dr. Walter Matthews	University of Mississippi
3.	Dr. John Patterson	University of West Virginia
4.	Dr. Fred L. Thomas	University of North Texas
5.	Dr. Forrest Morrison	Claremont
6.	Dr. William Stoner	University of Montana
7.	Dr. Gerald Halpin	University of Montana
8.	Dr. Dale P. Scannell	University of Kansas
9.	Dr. Wayne Wiggins	Western Illinois University
10.	Dr. Louise Sears	University of Bridge
11.	Dr. Thomas Tedder	Southeast Louisiana
12.	Dr. Bonnie Pride	Marshall
13.	Dr. Richard Gruber	Eastern Montana
14.	Dr. Homer Dietmeir	Massachusetts State at Salem
15.	Dr. Audrey Bourgbois	University of Dayton
16.	Dr. Keesey	Oregon College of Education
17.	Dr. Holen	Kansas State University
18.	Dr. L.R. Olsen	Central Missouri State
19.	Dr. James Diamond	University of Pennsylvania
20.	Dr. James McElhinney	Ball State
21.	Dr. F.E. Meyers	University of Nevada
22.	Dr. George Marly	University of Miami
23.	Dr. Robert Cohen	Duke University
24.	Dr. Alfred Carver	University of Cincinnati
25.	Dr. Edward Masonbrink	Edinburg State
26.	Dr. Robert Laing	Ohio State University
27.	Dr. Barbara Jensen	Springfield College
28.	Dr. Howard Stoher	Florida State University
29.	Dr. Robert Eicher	University of Wyoming
30.	Dr. William Slaichert	University of Denver
31.	Dr. Alkin	UCLA
32.	Dr. Ed Kelley	University of Idaho
33.	Dr. Shylee Hack	University of Tennessee
34.	Dr. Paul Pohland	University of New Mexico
35.	Dr. Knezevich	University of Wisconsin
36.	Dr. C.H. Lindsvall	University of Pittsburg

Appendix U

PROSPECTIVE CONSULTANTS FOR TOPIC 9 (QUESTION 9)

1.	Dr. Kenneth Bender	University of Mississippi
2.	Dr. John Carline	University of West Virginia
3.	Dr. Jack Cross	University of North Texas
4.	Dr. Jack Elder	University of North Texas
5.	Dr. Malcolm Douglas	Claremont
6.	Dr. Caroline Ellner	Claremont
7.	Dr. J.J. Hunt	University of Montana
8.	Dr. R.L. Anderson	University of Montana
9.	Dr. Robert Ridgeway	University of Kansas
10.	Dr. Dan Coy	Western Illinois University
11.	Dr. Gerhart Rast	University of Bridgeport
12.	Dr. Bryan Schisler	Southeast Louisiana
13.	Dr. Roscoe Hale	Marshall
14.	Dr. Denny Fulks	Marshall
15.	Dr. R. Bath	Massachusetts State at Salem
16.	Dr. R.W. Sagedy	Massachusetts State at Salem
17.	Dr. Madden	Eastern Montana
18.	Dr. Dodd	Eastern Montana
19.	Dr. Alterowitz	Eastern Montana
20.	Dr. John R. O'Donnell	University of Dayton
21.	Dr. Keesey	Oregon College of Education
22.	Dr. Davis	Oregon College of Education
23.	Dr. Latrell	Kansas State University
24.	Dr. L.R. Olsen	Central Missouri State
25.	Dr. Richard Gibboney	University of Pennsylvania
26.	Dr. McElhinney	Ball State University
27.	Dr. Jay Thompson	Ball State University
28.	Dr. A.T. Phelps	University of Nevada
29.	Dr. E. John Kleinert	University of Miami
30.	Dr. H.L. Sublett, Jr.	Duke University
31.	Dr. John Hill	University of Cincinnati
32.	Dr. Audrey Norris	University of Cincinnati
33.	Dr. Robert McClure	Edinburg State
34.	Dr. Jack Frymier	Ohio State University
35.	Dr. J.A. Phillips	Kent State University
36.	Dr. Herman Frick	Florida State University
37.	Dr. Russel Hammond	University of Wyoming
38.	Dr. Doris Molbert	University of Denver
39.	Dr. Popham	UCLA
40.	Dr. Larry Wriggle	University of Idaho

Appendix U (continued)

	NAME	SCHOOL
41.	Dr. Garry Ubbem	University of Tennessee
42.	Dr. Spuck	University of Wisconsin
43.	Dr. Dolores Silva	Temple University

Appendix V

PROSPECTIVE CONSULTANTS FOR TOPIC 10 (QUESTION 10)

	NAME	SCHOOL
1.	Dr. Roscoe Boyer	University of Mississippi
2.	Dr. Larry Fraley	University of West Virginia
3.	Dr. Ernest Vargas	University of West Virginia
4.	Dr. Robert Milkman	Western Illinois University
5.	Dr. Carl Wells	Southeast Louisiana
6.	Mr. Louis E. Harris	Massachusetts State at Salem
7.	Dr. Walter C. Felty	Marshall
8.	Dr. Dunlop	Eastern Montana
9.	Dr. Dietmeier	Massachusetts State at Salem
10.	Dr. Yost	Oregon College of Education
11.	Dr. Holen	Kansas State University
12.	Dr. A.T. Phelps	University of Nevada
13.	Dr. E.H. Hopkins	Duke University
14.	Dr. A.S. Hurtlem	Duke University
15.	Dr. Keith Tyler	Ohio State University
16.	Dr. Roland Lausen	University of Denver
17.	Dr. Popham	UCLA
18.	Dr. Terry Armaton	University of Idaho
19.	Dr. Bob Williams	University of Tennessee

Appendix W

PROSPECTIVE CONSULTANTS FOR TOPIC 11 (QUESTION 11)

NAME	SCHOOL
1. Dr. Arni Dunathon	University of Missouri
2. Dr. Burl Hunt	University of Mississippi
3. Dr. Phillip Gleeman	University of Connecticut
4. Dr. Devon Chandler	University of Montana
5. Dr. Hans Moll	Western Illinois University
6. Dr. George Ingham	University of Bridgeport
7. Dr. Thomas Tedder	Southeast Louisiana
8. Dr. Virginia Plumley	Marshall
9. Mr. Harold Bantly	Massachusetts State at Salem
10. Dr. Hopkins	Eastern Montana
11. Dr. Nixon	Eastern Montana
12. Dr. L. Garfinkel	Hofstra University
13. Dr. Jost	Oregon College of Education
14. Dr. Wilson	Kansas State University
15. Dr. Van Meter	Kansas State University
16. Dr. Hugh Schafer	University of Pennsylvania
17. Dr. Willard Harkin	Ball State
18. Dr. C.H. Reed	University of Nevada
19. Dr. Marilyn McClure	University of Cincinnati
20. Mr. Don Rudy	Edinburg State
21. Dr. Keith Tyler	Ohio State University
22. Mr. Leon Dolera	Springfield College
23. Dr. J. Mitchell	Kent State University
24. Mr. William Quinley	Florida State University
25. Dr. Jack Alford	University of Wyoming
26. Dr. John Wilcox	University of Denver
27. Dr. Popham	UCLA
28. Dr. Larry Wriggle	University of Idaho
29. Dr. Al Grant	University of Tennessee
30. Several	University of Wisconsin
31. Dr. William Grady	Temple University

Appendix X

PROSPECTIVE CONSULTANTS FOR TOPIC 12 (QUESTION 12)

	NAME	SCHOOL
1.	Dr. Walter Matthews	University of Mississippi
2.	Dr. Jerome Rodgers	University of North Texas
3.	Dr. Ralph Hocking	Shippenburg State
4.	Karl Kaufman	Western Illinois University
5.	Dr. Warren Fortenberry	Southeast Louisiana
6.	Dr. Vernaldi	Eastern Montana
7.	Dr. L. Browder	Hofstra University
8.	Dr. Yost	Oregon College of Education
9.	Dr. Holen	Kansas State University
10.	Dr. Hanara	Kansas State University
11.	Dr. L.R. Olsen	Central Missouri State
12.	Dr. Ezra Krendal	University of Pennsylvania
13.	Dr. Don Patton	Ball State University
14.	Dr. James Andrews	University of Cincinnati
15.	Dr. Frank Bangheart	Florida State University
16.	Dr. Ralph Forsythe	University of Denver
17.	Dr. Bruno	UCLA
18.	Dr. Tom Bell	University of Idaho
19.	Dr. Kenneth Tannic	University of Tennessee
20.	Several	University of Wisconsin
21.	Dr. Robert Cox	University of Pittsburg

Appendix Y

PROSPECTIVE CONSULTANTS FOR TOPIC 13 (QUESTION 13)

	NAME	SCHOOL
1.	Dr. Walter Matthews	University of Mississippi
2.	Mr. Hassan	Western Illinois University
3.	Dr. Richard Thornton	University of Bridgeport
4.	Dr. William Stannard	Eastern Montana
5.	Mr. Harold Bartly	Massachusetts State at Salem
6.	Dr. James E. Gay	University of Dayton
7.	Dr. Helen B. Frye	University of Dayton
8.	Dr. E. Kaya	Hofstra University
9.	Dr. Yost	Oregon College of Education
10.	Dr. Tom Stephens	Ohio State University
11.	Dr. Robert Morgan	Florida State University
12.	Dr. Roland Lanzer	University of Denver
13.	Dr. Bruno	UCLA
14.	Dr. Silberman	UCLA
15.	Dr. John Roy	University of Tennessee
16.	Dr. Knezevich	University of Wisconsin

Appendix Z

PROSPECTIVE CONSULTANTS FOR TOPIC 14 (QUESTION 14)

	NAME	SCHOOL
1.	Dr. Mills Wilber	Western Illinois University
2.	Dr. Cyril Landry	
3.	Dr. Vernaldi	Eastern Montana
4.	Dr. Ezra Krandal	University of Pennsylvania
5.	Dr. Oisheu	UCLA
6.	Dr. Kenneth Tannic	University of Tennessee
7.	Several	University of Wisconsin

Appendix AA

PROSPECTIVE CONSULTANTS FOR TOPIC 15 (QUESTION 15)

	NAME	SCHOOL
1.	Dr. William Holloway	University of Kansas
2.	Dr. Mills Wilber	Western Illinois University
3.	Dr. Vernaldi	Eastern Montana
4.	Dr. Ezra Krendal	University of Pennsylvania
5.	Dr. Bruno	UCLA
6.	Dr. Denny Stollak	University of Tennessee
7.	Several	University of Wisconsin

Appendix BB

PROSPECTIVE CONSULTANTS FOR TOPIC 16 (QUESTION 16)

	NAME	SCHOOL
1.	Dr. Joe Blackston	University of Mississippi
2.	Dr. Stan Kratchman	Shippenburg State
3.	Dr. Arnold Salisbury	Western Illinois University
4.	Dr. Vernaldi	Eastern Montana
5.	Dr. H. Wattel	Hofstra University
6.	Dr. Ezra Krendal	University of Pennsylvania
7.	Dr. Don Patton	Ball State University
8.	Dr. R.E. Wilson	Kent State University
9.	Dr. Chester Nolte	University of Denver
10.	Dr. Lindman	UCLA
11.	Dr. John Lovall	University of Tennessee
12.	Dr. Frohreich	University of Wisconsin

Appendix CC

PROSPECTIVE CONSULTANTS FOR TOPIC 17 (QUESTION 17)

	NAME	SCHOOL
1.	Dr. Mills Wilber	Western Illinois University
2.	Dr. Don Fox	Eastern Montana
3.	Dr. Ezra Krendal	University of Pennsylvania
4.	Dr. Don Patton	Ball State University
5.	Dr. James Andrews	University of Cincinnati
6.	Dr. Richard Kraft	Florida State University
7.	Dr. Chester Nolte	University of Denver
8.	Dr. Lindman	UCLA
9.	Dr. Archenbout	University of Idaho
10.	Dr. Forsythe	University of Denver
11.	Dr. Ken Tannib	University of Tennessee
12.	Dr. Frohreich	University of Wisconsin
13.	Dr. Richard Wynn	University of Pittsburg

Appendix DD

PROSPECTIVE CONSULTANTS FOR TOPIC 18 (QUESTION 18)

	NAME	SCHOOL
1.	Dr. Floyd Delon	University of Missouri
2.	Dr. William Show	University of Mississippi
3.	Dr. James Martin	University of West Virginia
4.	Dr. Paul Smith	University of North Texas
5.	Dr. Ogden Glason	Western Illinois University
6.	Dr. Ralph Schmid	University of Bridgeport
7.	Dr. Walter Batten	Southeast Louisiana
8.	Dr. George Madden	Eastern Montana
9.	Dr. M.B. Morton	University of Dayton
10.	Dr. L. Browder	Hofstra University
11.	Dr. Richard Mantel	University of Pennsylvania
12.	Dr. Merle Strom	Ball State University
13.	Dr. George MarConnit	Ball State University
14.	Dr. E.S. Dodson	University of Nevada
15.	Dr. Robert Simpson	University of Miami
16.	Dr. David Martin	Duke University
17.	Dr. James LaPlant	University of Cincinnati
18.	Dr. Tom Richey	Edinburg State
19.	Dr. Fred Staub	Ohio State University
20.	Dr. R. Shaw	Kent State University
21.	Dr. C. Forman	Kent State University
22.	Dr. Chester Nolte	University of Denver
23.	Dr. Layton	UCLA
24.	Prof. Cliff Sobler	University of Idaho
25.	Dr. Denny Stollak	University of Tennessee
26.	Dr. Rossmiller	University of Wisconsin
27.	Dr. H.C. Hudgins	Temple University
28.	Dr. Samuel Francis	University of Pittsburg

Appendix EE

PROSPECTIVE CONSULTANTS FOR TOPIC 19 (QUESTION 19)

	NAME	SCHOOL
1.	Dr. James Martin	University of West Virginia
2.	Dr. Jerry Weigle	Shippenburg State
3.	Dr. Oden Glasow	Western Illinois University
4.	Dr. Vernaldi	Eastern Montana
5.	Dr. Robert Kriegbaur	University of Dayton
6.	Dr. M. Mahan	Hofstra University
7.	Dr. John Ramos	University of Wyoming
8.	Dr. Ben Bozeman	University of Denver
9.	Dr. Denny Stollak	University of Tennessee

Appendix FF

PROSPECTIVE CONSULTANTS FOR TOPIC 20 (QUESTION 20)

	NAME	SCHOOL
1.	Dr. Jerry Dobbins	University of Mississippi
2.	Dr. W.G. Monahan	University of West Virginia
3.	Dr. Mark Shibler	University of West Virginia
4.	Dr. Paul Smith	University of North Texas
5.	Dr. J.J. Hunt	University of Montana
6.	Dr. L. Berg	University of Montana
7.	Dr. Jan Muczyk	Shippenburg State
8.	Dr. Cecil G. Miskel	University of Kansas
9.	Dr. Norman Krang	Western Illinois University
10.	Dr. Ralph Schmid	University of Bridgeport
11.	Dr. Walter Butler	Southeast Louisiana
12.	Dr. Varnaldi	Eastern Montana
13.	Dr. Raymond Fitz	University of Dayton
14.	Dr. L. Browder	Hofstra University
15.	Dr. Wilson	Kansas State University
16.	Dr. Ken Meter	Kansas State University
17.	Dr. L.R. Olsen	Central Missouri State
18.	Dr. Bruce Cooper	University of Pennsylvania
19.	Dr. Merle Strom	Ball State University
20.	Dr. George Marconnit	Ball State University
21.	Dr. E.S. Dodson	University of Nevada
22.	Dr. John Croghair	University of Miami
23.	Dr. James Andrews	University of Cincinnati
24.	Dr. Tom Richey	Edinburgh State
25.	Dr. Robert Silverman	Ohio State University
26.	Dr. Chester Nolte	University of Denver
27.	Dr. Lucio	UCLA
28.	Dr. Archambout	University of Idaho
29.	Dr. Peter Hanson	University of Tennessee
30.	Dr. Lipman	University of Wisconsin

Appendix GG

PROSPECTIVE CONSULTANTS FOR TOPIC 21 (QUESTION 21)

	NAME	SCHOOL
1.	Dr. D.M. Beck	University of North Texas
2.	Dr. John Regan	Claremont
3.	Dr. Henry Wilkins	Shippenburg State
4.	Dr. Hans Moll	Western Illinois University
5.	Dr. Moulton	Eastern Montana
6.	Mr. Harold Bantly	Massachusetts State at Salem
7.	Dr. L. Garfinfel	Hofstra University
8.	Dr. Satterwhite	Oregon College of Education
9.	Dr. McKrana	Kansas State University
10.	Dr. L.R. Olsen	Central Missouri State
11.	Dr. Bralley	Kansas State University
12.	Dr. Sol Worth	University of Pennsylvania
13.	Dr. Riegle	Ball State University
14.	Dr. Marconnit	Ball State University
15.	Dr. Patton	Ball State University
16.	Dr. E.S. Dodson	University of Nevada
17.	Dr. Keith Tyler	Ohio State University
18.	Mr. McMahan	Kent State University
19.	Dr. Grieg Pliffen	Florida State University
20.	Dr. Ralph Forsyth	University of Denver
21.	Dr. Fawcett	UCLA
22.	Dr. Paul Miller	University of Idaho
23.	Dr. Charles Achilles	University of Tennessee
24.	Dr. Leon Ovsiew	Temple University
25.	Dr. Robert Cox	University of Pittsburg

Appendix HH

PROSPECTIVE CONSULTANTS FOR TOPIC 22 (QUESTION 22)

	NAME	SCHOOL
1.	Dr. James Hart	University of Missouri
2.	Dr. Joe Blackston	University of Mississippi
3.	Dr. James Martin	University of West Virginia
4.	Dr. Paul Smith	University of North Texas
5.	Dr. V. Sletten	University of Montana
6.	Dr. Richard V. Hatley	University of Kansas
7.	Dr. Arnold Salisbury	Western Illinois University
8.	Dr. Marvin Yalfee	University of Bridgeport
9.	Dr. Leo Mann	University of Bridgeport
10.	Dr. Warren Fortenberry	Southeast Louisiana
11.	Mr. Ken Heiker	Eastern Montana
12.	Dr. W. Atkins	Hofstra University
13.	Dr. Myers	Oregon College of Education
14.	Dr. Costetter	University of Pennsylvania
15.	Dr. Don Patton	Ball State University
16.	Dr. E.S. Dodson	University of Nevada
17.	Dr. Gordon Fostor	University of Miami
18.	Dr. James Andrews	University of Cincinnati
19.	Dr. Walter Hack	Ohio State University
20.	Dr. Ivan Willey	University of Wyoming
21.	Dr. William Slaichert	University of Denver
22.	Dr. Lindman	UCLA
23.	Dr. Archenboult	University of Idaho
24.	Dr. Forsythe	University of Denver
25.	Dr. Denny Stollak	University of Tennessee
26.	Dr. Frohreich	University of Wisconsin
27.	Dr. C.J. Salisbury	Temple University
28.	Dr. Richard Wynn	University of Pittsburg

Appendix II

PROSPECTIVE CONSULTANTS FOR TOPIC 23 (QUESTION 23)

	NAME	SCHOOL
1.	Dr. Nicolas Adams	University of Missouri
2.	Dr. John Curry	University of North Texas
3.	Dr. Robert Osman	Western Illinois University
4.	Dr. John Greene	University of Bridgeport
5.	Dr. Warren Fortenberry	Southeast Louisiana
6.	Mr. Erickson	Eastern Montana
7.	Dr. Davis	Oregon College of Education
8.	Dr. Paul Nesper	Ball State University
9.	Dr. Strom	Ball State University
10.	Dr. Patten	Ball State University
11.	Dr. Reigle	Ball State University
12.	Mr. John Wilson	Springfield College
13.	Dr. Tom Bell	University of Idaho
14.	Dr. Charles Achilles	University of Tennessee
15.	Dr. Charles Peccolo	University of Tennessee

Appendix JJ

PROSPECTIVE CONSULTANTS FOR TOPIC 24 (QUESTION 24)

	NAME	SCHOOL
1.	Dr. Ralph Bedell	University of Missouri
2.	Dr. Billy Pope	University of North Texas
3.	Dr. Norman Krang	Western Illinois University
4.	Mr. Billedeaux	Eastern Montana
5.	Dr. Davis	Oregon College of Education
6.	Dr. Costetter	University of Pennsylvania
7.	Dr. Don Patton	Ball State University
8.	Dr. Wayne Schroeder	Florida State University
9.	Dr. Tom Bell	University of Idaho
10.	Dr. Charles Achilles	University of Tennessee
11.	Dr. Charles Peccolo	University of Tennessee

Appendix KK

PROSPECTIVE CONSULTANTS FOR TOPIC 25 (QUESTION 25)

	NAME	SCHOOL
1.	Dr. Earl McCallen	University of North Texas
2.	Dr. Wayne Wiggins	Western Illinois University
3.	Dr. Madden	Eastern Montana
4.	Mr. A.S. Comimito	Massachusetts State at Salem
5.	Dr. E. Kaya	Hofstra University
6.	Dr. Ellingram	Oregon College of Education
7.	Dr. Don Patton	Ball State University
8.	Dr. William Wayson	Ohio State University
9.	Dr. Tom Bell	University of Idaho
10.	Dr. Charles Achilles	University of Tennessee
11.	Dr. Charles Peccolo	University of Tennessee

Appendix LL

PROSPECTIVE CONSULTANTS FOR TOPIC 26 (QUESTION 26)

	NAME	SCHOOL
1.	Dr. R.L. Frye	Southeast Louisiana
2.	Dr. Wayne Wiggins	Western Illinois University
3.	Dr. Madden	Eastern Montana
4.	Dr. Ellingram	Oregon College of Education
5.	Dr. Desmond Cook	Ohio State University
6.	Dr. Chester Nolte	University of Denver
7.	Dr. Tom Bell	University of Idaho
8.	Dr. Denny Stollak	University of Tennessee
9.	Dr. Eye	University of Wisconsin

Appendix MM

STEWART AND MISKOW'S SCHOOL TRANSPORTATION SYSTEMS CRITERIA

A. Buy the right bus
   1. Comply with existing Federal and State Standards
   2. Accommodate the addition of new and/or safety and performance features to meet existing school system needs
   3. Include the latest and best innovations in safety equipment (auxiliary brake systems, for examplt)
   4. Provide special vehicles for the handicapped
   5. Provide special vehicles for activity and special trips
   6. Emphasize such items as defrosting and defogging systems to assure maximum possible visibility for drivers at all times

B. Keep the bus in top shape
   1. Have trained and experienced supervisory personnel in direct charge
   2. Facilities and equipment necessary to accomplish a comprehensive maintenance program
   3. Competent personnel to inspect and maintain vehicles
   4. Complete bus inspections at regular specified intervals (detailed forms should be completed and filed for each inspection)
   5. Spot bus inspections (unannounced) of both vehicles and facilities

C. School bus route should make sense
   1. Examine all bus routes and bus stop locations for minimal interference at side traffic
   2. Arrange for pice-up and discharge of pupils on the "house" side of the street
   3. Schedule stops so that youngsters need to cross streets only at traffic controlled corners
   4. Avoid personal privilege abuses in scheduling stops
   5. Plan routes to avoid crossing railroad tracks at grades--when this is impossible, route buses to use crossings with automatic signals and good visibility

7. No substantial or convincing evidence of contributing to delinquency of minors, etc.
8. No record of repeated traffic violations or preventable accidents

E. Train your drivers - through indoctrination in:
1. Factors that affect the task of school bus operation
2. Federal laws, regulations and standards that relate to SBO
3. State and local laws, regulations, policies and procedures relating to school buses and their complete operation
4. The vehicle, its components, equipment and operation
5. Care of the bus to avoid abuse, and requesting maintenance service as needed
6. Proper completion of all reports--including accident reports
7. Handling emergency situations, including care of injured
8. Techniques of defensive driving
9. Traffic courtesies, school, parent and PR
10. Pupil control and rules for pupil behavior

F. Give your program real supervision

G. Make students safety conscious

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