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# Instructional Systems and Curriculum Development

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INSTRUCTIONAL SYSTEMS

AND

CURRICULUM DEVELOPMENT

(TITLE)

BY

ROBERT A. CONROY

B.S. ED. Eastern Illinois University

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF

MASTER OF SCIENCE IN EDUCATION

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY  
CHARLESTON, ILLINOIS

1978  
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING  
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DEPARTMENT HEAD

INSTRUCTIONAL SYSTEMS  
AND  
CURRICULUM DEVELOPMENT

by

ROBERT A. CONROY

B.S. ED. Eastern Illinois University, 1978

ABSTRACT OF A THESIS

Submitted in partial fulfillment of the requirements  
for the Master of Science in Education at the Graduate  
School of Eastern Illinois University

CHARLESTON, ILLINOIS

1978

The field of curriculum development is one of vital significance with respect to the field of education as a whole. This field represents a complex and sometimes worrisome aspect of educational administration. Many of the problems of today's system stem from inadequacies in the curriculum.

This thesis is presented as a possible aid in the correcting of three of curriculum development's most significant concerns: relevancy, accountability, and individualization. The statement of the thesis problem is: How can the integration of instructional systems aid in making curriculum more relevant, accountable, and individual?

It is the proposal of this thesis to answer this question by presenting content material in two specific areas: curriculum development and instructional systems. Background material is presented in both areas to acquaint the reader the basic principles and, drawing from this material, develops the rationale that will answer the thesis question.

Information is provided that will be of value to all who are interested in this area. It assumes a rather modest entry level with respect to instructional systems and is, therefore, beneficial to those who are un-acquainted with this topic.

## TABLE OF CONTENTS

### Introduction

William Van Til ..... iii

### Chapter I. Today's Educational System

Statement of thesis problem ..... 1

Objectives of thesis ..... 3

### Chapter II. Curriculum Development

Definitions ..... 4

Societal influences on curriculum development ..... 6

The designers of curriculum ..... 9

The goals of education ..... 11

Summary ..... 14

### Chapter III. Instructional Systems

Definitions ..... 15

The basic systems model ..... 17

Behavioral Objectives ..... 18

Developing instruction ..... 22

Developing content ..... 23

Validation and Feedback ..... 29

Summary ..... 32

### Chapter IV. Instructional Systems and Curriculum Development

Introduction ..... 35

Applications ..... 36

Chapter V.	Summary	
	Thesis problem re-stated .....	38
	Relevancy .....	39
	Accountability .....	41
	Individualizing instruction .....	43
	In closing... ..	45
Bibliography .....		46

"Today the major criticisms of the American school curriculum stem from those dissatisfied with 'the way it is.' They regard the standard curriculum as sterile, lifeless, coercive, indifferent to the actual lives of children and youth, and blind to the problems of the times. The failure of American education is reported under such titles as: The Way It Spozed To Be, How Children Fail, Compulsory Miseducation, Education Contra Naturam, The Underachieving School, The Vanishing Adolescent, The High School Revolutionaries, Growing Up Absurd, The Naked Children, The Angel Inside Went Sour. The smell of death pervades some titles: Our Children Are Dying, Murder in the Classroom, Death at an Early Age, School is Dead, How to Survive in Your Native Land."<sup>1</sup>

<sup>1</sup>William Van Til, ed. Curriculum: Quest for Relevance (Boston: Houghton Mifflin Co., 1974) p. 1.



## 1. Today's Educational System

The meaning of Mr. Van Til's message is clear: today's schools are in trouble. And in fact, the list of critics and criticisms is virtually endless. The evidence is staggering. Vandalism for example, and the costs incurred to the system in it's prevention and repair thereof, cost the nation's tax payers an amount in dollars equivalent to 50,000 to 60,000 teachers' salaries annually.<sup>2</sup> Absenteeism is roughly 10 - 12% on the average. The dropout rate is currently 2 %.<sup>3</sup> The list goes on and on.

It is the stand of this paper that these are but a few of the many problems facing today's educational system. This thesis is presented in the spirit of addressing itself to one area of the public educational system: the curriculum. Curriculum is often accused of at best tolerating these conditions and at worst acting as a causal factor in their perpetuation.

This paper will deal with curriculum development and it's facilitation through the implementation of instructional design, often referred to as systems design or the systematic approach to education. The specific topics involved, as stated in the traditional thesis problem format: How can the integration of a systematic instructional design aid in making curricula

<sup>2</sup>Robert J. Havinghurst and Bernice L. Neugarten, Society and Education 4th ed. (Boston: Allyn and Bacon Inc., 1975) p. 202.

<sup>3</sup>John Meyers ed. "High Schools Under Fire" Time Magazine November 14, 1977) p. 61.

more relevant, individual, and accountable?

It will be shown that sound systematic design can aid curriculum development in planning curricula that will be more individual, relevant, and accountable. By doing this, it could be argued that some of the symptoms discussed earlier will vanish. Although not within the scope of this paper, the argument that such ills as vandalism and absenteeism could be corrected with a more relevant, individual curriculum has much support from various parties concerned with education. If one agrees with the idea that a possible cause of any behavior that constitutes a counterproductive attitude towards education could be remediated with a sensitive, articulate curriculum tailored to the students for which it's designed, then it can rationally be concluded that any means of performing this task, such as instructional systems, will be of value.

To use the system this paper proposes, these are the objectives to be fulfilled as a result of reading the material to follow:

1. Upon completion of this study, the reader will demonstrate a working knowledge of the curriculum development process by being able to:
  - A. Describe the factors that influence curriculum development decisions and priorities;
  - B. Name the parties involved in the curriculum development process;
  - C. List the primary goals and objectives all curricula have in common.
2. With a basic understanding of the curriculum development process, it's needs, goals, and problems, the reader will demonstrate an understanding of the processes that propose to meet these needs, fulfill these goals, and help solve these problems by:

- A. Defining the instructional systems approach to education as evidenced, in part, by the knowledge of the meaning of such terms as validation, system, feedback, interactive instruction, etc. and their relationships as appropriate;
- B. Rationalizing the importance and significance of the basic beliefs and concepts concerned with the components of a systematic design such as the importance of behaviorally oriented objectives, or the necessity for validation processes.

The organization of this paper can then be determined from the objectives. The chapter divisions are made so as to provide the necessary content material to aid in the fulfillment of the stated objectives. A chapter, for instance, will be devoted to the curriculum development process. By no means a definitive treatment of the topic, it will serve to acquaint the reader with this field. By the same token, a chapter will be devoted to the instructional systems concept. Once the ground work has been laid, it will then be possible for this paper to draw the logical conclusions which will serve to answer the questions raised in the thesis problem stated earlier.

## 11. Curriculum Development

Traditional learning theory establishes that any discussion of a given topic begins with a clear definition of the key concepts in question. In order to deal effectively with the topic of curriculum development, therefore, it would be best to oblige. Curriculum development is rather nebulous, making a clear-cut explanation of the field impossible.

To state the actual definition is quite straight forward. Curriculum is considered by many as all the learning activities planned or otherwise implemented in any educational setting. The curriculum development process then is the attainment of the learning activities mentioned above as a consequence of decisional processes made by various parties involved with the management and operation of these educational settings. This definition is deceptively simple, as this concept has a dimension that complicates the issue. The decisional processes mentioned above are of a "values-judgement" nature, bringing cultural and societal influences into play.

Much literature has been devoted to the study of this field, most all of which deals with opinion and values. However, any responsible effort to enlighten and inform usually will align with the sentiments presented by Mr. Bruce Joyce in a recent article:

"The task of reform is the creation of learning environments which permit greater fulfillment of individuals, a fuller actualization of the possibilities of community,

and an involvement of citizens in the process of revitalizing and humanizing the society. This task is the core of the moral mission of education, the mission which reaches beyond the place of education as a reaction to the other dimensions of societal life to the imperative need for an education which has a positive role in the improvement of human social life."<sup>4</sup>

Mr. Joyce's usage of the term "reform" in this article is synonymous with the essence of the curriculum development process. This paper takes the stand that a systematic approach to curriculum development (as it will be detailed later) must include some reform mechanism or more appropriately, some means for self-adjustment and self-correction.

In order to better understand this multi-faceted concept, it would be appropriate to deal with the factors that influence the process. Moreover, we must investigate the means through which these influences filter down to the various personnel involved as well as the roles these personnel play in the processes' implementation. As well as understanding the parties involved and the nature and extent of their involvement, curriculum development and the understanding thereof, requires that some attention be paid to the objects of curricula; the students. The remainder of this chapter will then deal with these three topics: who influences curriculum development, who is involved in the actual development of curricula, and finally, the goals of curriculum development.

<sup>4</sup>Bruce R. Joyce 'Model for an Alternative Approach to Curriculum Development' School Media Quarterly (Spring, 1976) p. 219

The school system is a social/cultural institution whose roots are firmly planted in the very heart of the community.<sup>5</sup> The school acts as a common ground for all the children it serves. Very little goes on in the school that doesn't draw the attention of the community. The key factor to realize is that every school deals with two "commodities" that are very dear to the hearts of nearly every member of the community: their children and their money. If any wrong doing or mis-handling of either or both is even suspected, then serious accusations and in some cases disciplinary actions are in store.

In accord with the treatment the school can expect, the school curriculum is constantly scrutinized by members of the community. Whether or not any given course of instruction is appropriate is a decision that always has some input from the community. Please understand that the term community is used here in a general sense. Some would prefer the term "society". However, the meaning is identical in the context of this presentation. The community could be local, state, nation, or even world; at every level the concerns are identical, only the magnitude varies.

The specific parties that historically have been most vocal in the educational priorities of the school in general and the curriculum in particular have had a profound impact on the system. Civil litigations, petitions, defeated referenda, and

<sup>5</sup>Havinghurst, Society, p. 217.

demonstrations are but a few of the many means by which community members let their thoughts and beliefs be known. Any individual or group of individuals has the potential to exert some influence on the public institution of education. The chief reason for this influence hinges on the fact that the school is a public institution, it is run by elected members of the community (school board), it is supported by public monies (taxes) and populated primarily by the children of the members of the community. There's no escape from the "glass-cage" which hides nothing and magnifies everything.

There are three primary influence groups in American education. The first of these have a strong moral rationale supporting their viewpoints. Religious organizations and educational alliances would be examples of this as well as parents' organizations. Another motivator for school-community involvement is that of the vested interest group. Special interest groups have exerted pressures countless times. Mandatory driver's education was supported to a large degree by federal lobbyists for the insurance industry. Agriculture programs have been shaped and maintained in many cases by local farming organizations. If any group could benefit (or be harmed) from a given policy or course of instruction, then it is certain that all will be done to see the necessary actions be taken. The third group of this triad of influence is the strongest, and perhaps most reluctant. Governmental organizations are involved in education out of necessity. One might argue that

they too are a special interest group. Their interest is primarily in saving money. After all, the main service of many governmental agencies is to spend money and to justify these expenditures.

To summarize, the three influential parties and their relationship to the school are depicted below:

## MORAL-PROFESSIONAL INTERESTS



In keeping with the nature of this topic, the people who make the decisions concerning curriculum development are not readily identifiable. At the risk of oversimplifying, the parties involved in this process can be categorized into five groups. According to Mr. Roger Worner in his book Designing Curriculum for Educational Accountability, curriculum designers, as he puts it, are comprised of:<sup>6</sup>

<sup>6</sup>Roger B. Worner, Designing Curriculum for Educational Accountability (New York: Random House Inc., 1973) p. 7.



### 1. Design by Textbook Publishers

Mr. Worner feels this is the most common curriculum designer. Its popularity is particularly common in smaller school districts where personnel restrictions may impose barriers preventing competent design. He feels that although the quality of the work is often very high (sometimes not, dramatically so) the very fact that the designer has no particular community or school district in mind when the work is done makes the likelihood of the goals of the work coinciding with the goals of any school district very problematical.

### 2. Design by a Curriculum Director

Curriculum directors are commonly found in larger or more affluent school districts. Their responsibility is to organize and write the curricula for the school district. It is doubtful, according to Worner, that the "average" curriculum director is knowledgeable or competent enough to do an adequate job for all the programs today's schools need. In addition, the curriculum director faces a "credibility problem" in that he is usually not required to teach the curricula he develops. Teachers may be reluctant to abide willingly with programs from this source.

### 3. Design by a Subject Matter Specialist

The subject matter specialist is in the position of designing curricula that is perhaps the most precise in that he is considered to be an expert in his field. This situation can cause problems in that this specialist is somewhat separated from the classroom teacher. The teachers initiative (as with the curriculum director as well) is not challenged, they are merely to follow the plan of another. This situation also serves to dichotomize the relationships and roles of the administration and the teaching staff.

### 4. Design by an Outside Consultant

The outside consultant possesses characteristics of the three designers already mentioned. As with numbers two and three above, he is primarily viewed as a success model for all to follow. One of the major problems Mr. Worner sees with the outside consultant is his probable lack of insight and understanding of the

school district's needs and goals. To this end, the outside consultant rarely has the time or desire to pursue and supervise the implementation of a curriculum plan.

##### 5. The Decentralized Curriculum Development Team

This plan is utilized by a large number of school districts. It embodies the practice of using the instructional staff as a team with other personnel in the school to design curricula as a committee. Mr. Worner believes that this method could prove to be "most fruitful" if administered properly.

It would be virtually impossible to determine the actual usage of any of these methods. In reality, there is much "hybridization" of these plans. For instance, a curriculum developed by a publisher is often revised and augmented by the classroom teacher or the administration. Suffice it to say that all of the designers with the possible exception of the last, have limitations and short-comings. It will be the stand of this paper that for reasons that will be discussed later, the decentralized curriculum development team offers the greatest potential for success. This arrangement lends itself to the concept of instructional design incorporating a systematic approach.

Now that the "who's" of curriculum development have been discussed, it is necessary to look at the curriculum itself. Much has been said about curriculum insofar as uniqueness is concerned. For example, curriculum directors are usually ill-equipped to deal with comprehensive curriculum demands because

of lack of background. Other factors also come into play which together orchestrate the belief that any given curriculum is unique and distinct with respect to any other curriculum. This is not entirely the case. Even though there is much individuality and uniqueness, there is a side to curriculum and its development thereof, that serves as a common denominator binding all curricula, no matter how diverse.

What constitutes this common framework is based in educational philosophy. Regardless of the subject matter or grade level, all curricula attempt to fulfill the common goals of education. As early as 1918, the Commission on the Reorganizing of Secondary Education listed the goals of education (which serves vicariously here as curriculum). In their publication, The Cardinal Principles of Secondary Education they reported the goals of education to be:<sup>7</sup>

1. Health
2. Command of fundamental processes
3. Worthy home membership
4. Vocation
5. Citizenship
6. Worthy use of leisure time
7. Ethical character

In a separate report by the National Education Association in 1944,

<sup>7</sup>Cardinal Principles of Secondary Education a report to the NEA Commission on The Reorganization of Secondary Education cited by William E. Hug Instructional Design and the Media Program (Chicago: American Library Association 1975) p. 9.

They proposed that all schools construct their curriculum so as to relate their programs to ten imperative needs of youths:<sup>8</sup>

1. Acquire salable skills.
2. Develop good health.
3. Understand and fulfill obligations to the community, state, nation, and world.
4. Understand and appreciate successful family life.
5. Become wise consumers.
6. Understand methods and influences of science on human life.
7. Appreciate literature, art, music, and nature.
8. Use leisure time wisely.
9. Develop respect, cooperation, and ethical behavior.
10. Think rationally, communicate effectively, and read and listen with understanding.

Regardless of the source or the timeliness of these reports, the message is identical; all of the studies and reports, no matter how recent, echo the ideas presented in the report made in 1918 to the NEA by the CRSE (see previous page).

Under the Kennedy administration, a council was established, The President's Commission on National Goals, which had as its task to establish the goals of education on a nationwide basis. Their findings stressed very highly the direct relationship between the quality of educational opportunities and the power and potential of society. This report went on to charge that

<sup>8</sup> Ibid., p. 9.

the current educational system was "mediocre and impersonal" and recommended that provisions be made to account for individual differences.<sup>9</sup>

<sup>9</sup> *Ibid.*, p. 10.

Hopefully, it has been shown that the field of curriculum development is a complex, living organism that requires attention and care to keep operating effectively. The notions presented throughout this chapter have touched on the concerns raised in the first chapter. It is the opinion of many that curriculum in today's schools is not doing the job. Government is reluctantly involved in education because of accountability concerns. Mr. Worner accuses over 99% of today's schools with operating without any notion or recognition of the goals towards which it's curricula are to strive.<sup>10</sup> The President's council in 1960 accused curricula of being impersonal. The meaning is clear, curriculum must strive to be more relevant, accountable, and individualistic.

<sup>10</sup>Worner Designing Curriculum, p. 9.

### III. Instructional Systems

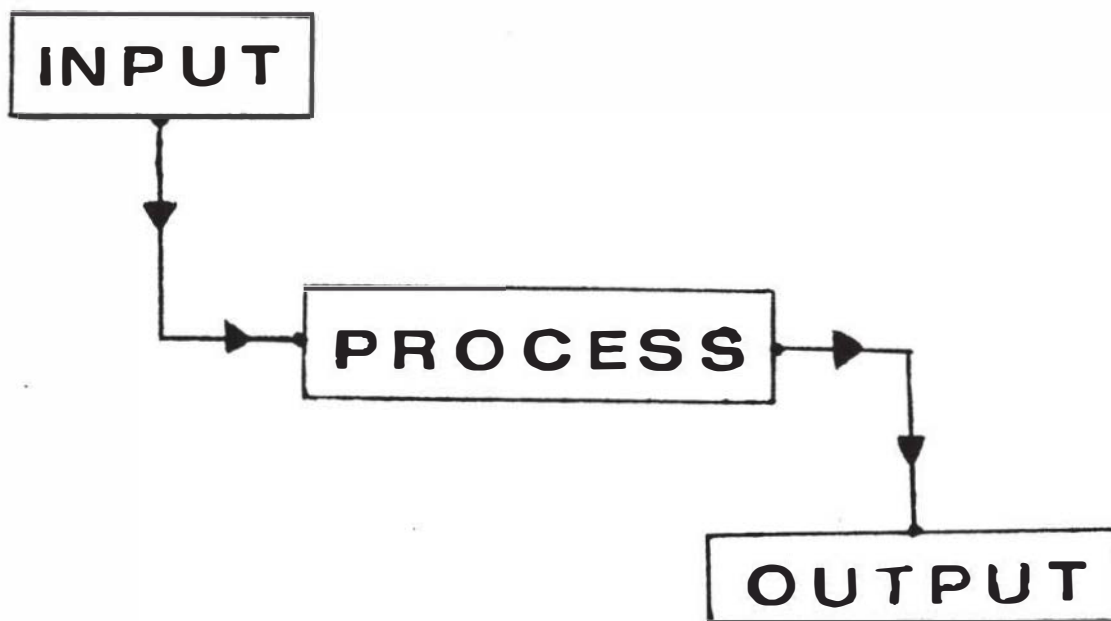
"A system is defined in the dictionary as an assemblage of objects united by some form of regular interaction or interdependence; an organic or organized whole; as, the solar system or a new telegraph system." According to this definition, a system can either be natural or man-made. Insofar as this presentation is concerned, man-made systems will be discussed.

There is nothing magical about a systematic approach to education. What this concept embodies is a logical, rational, precise approach to instructional design so as to facilitate learning. When an approach such as this is used, it is possible to determine exactly what is to be accomplished and provide a mechanism to assure it's attainment. This approach can be applied to most any task or job. As with curriculum development, there exists much literature concerning a systems approach to education. This field is plagued with much (too much) technical jargon that all essentially expresses the same thoughts. This paper will attempt to decipher this jargon into simple, plain-language terms.

In order to understand a systems approach we need to have a firm understanding of a system as it relates to education. As stated earlier, a system "is an assemblage of objects;" as

<sup>11</sup>Bela H. Banathy Instructional Systems (Belmont, California: Fearon Publishers 1968) p. 1.

far as education is concerned, this is insufficient. Modifying this definition; a system is an orderly, precise means of identifying, implementing, and insuring all the learning experiences in any educational setting. A viable systems model is presented by the computer programmer. In dealing with a very complicated system, the computer, he must have some precise means of depicting this "system" and its components (usually called sub-systems). The flow chart is a means of showing a system and its related sub-systems in an understandable manner. A flow chart is nothing more than a "road map" showing the position of the sub-systems and their inter-connecting "roadways" which serve to illustrate important relationships.

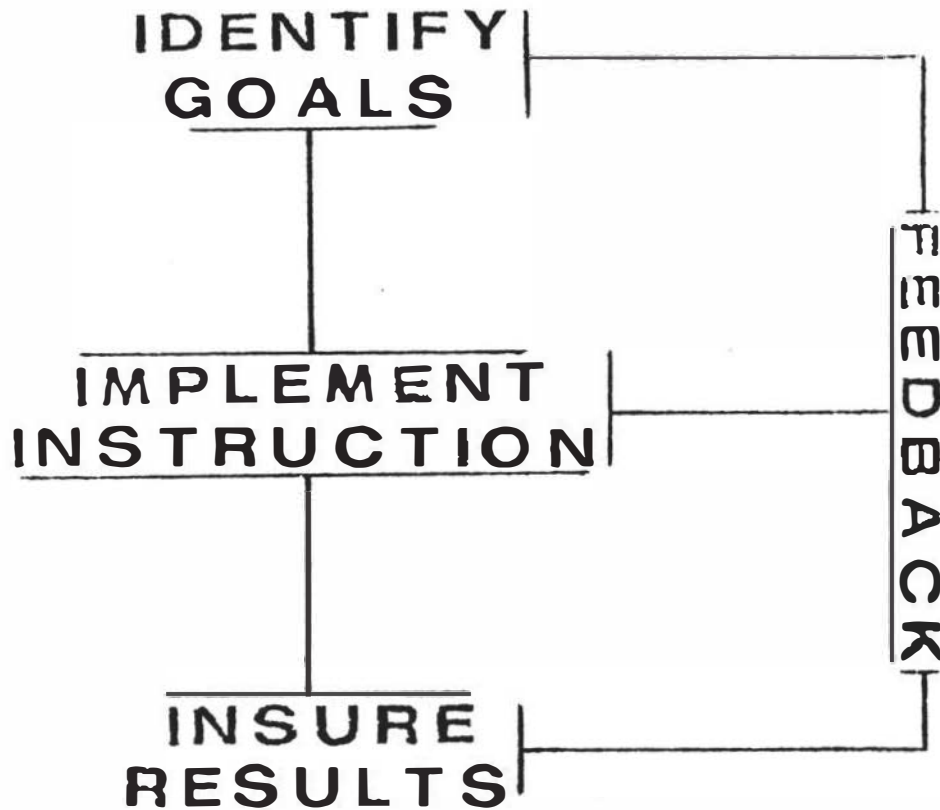


In the interest of clarity, it would be appropriate to depict a system as it relates to education in a flow-chart form. Remember that our definition consisted of three concepts with



respect to education: identifying, implementing, and insuring. Any description therefore must include these notions.

A possible instructional systems format is:



Notice that the system includes a fourth component, feedback. Feedback is necessary to insure the success of the system by providing a means of self correction. For instance, if this system were to be found in error as a result of the validation processes, it is only logical to assume that these errors be corrected, otherwise, why validate in the first place? This mechanism is generally referred to as a "closed-loop". Many systems are of a closed loop nature.

Taking a closer look at the sub-systems of our system model,

Let's investigate first the "box" labeled "Identify goals".

A goal is a broad, general description of instructional intent. For instance, a goal for an art class may be: The student will appreciate impressionist art as a result of this course. This is a perfectly valid goal, but how do you reach this goal? What do you teach? How do you know if and when the students attain this goal?

### Behavioral Objectives

It is obvious that a simple statement of educational goals is of questionable value as far as a systematic approach is concerned. For this reason, a more precise, measurable means of identifying the goals of education needs to be devised. To be effective, these identifiers must be precise, measurable, and able to point out the proper teaching strategies. These identifiers are commonly known as Behavioral Objectives. A behavioral objective is a precise statement of what the student must do in terms of overt, measurable behavior as a result of the course of instruction designed to fulfill this objective. In addition, behavioral objectives also include the conditions under which the student must perform and the standards of performance requirements he must meet in order to satisfactorily demonstrate his competencies.

Behavioral objectives therefore, describe the desired behaviors in terms of overt actions, (or overtly manifested, covert behavior) to a set performance level under specified conditions.

A few examples of behavioral objectives may be:

1. The student will know the primary causes of the civil war.

This objective is not as clear as it could be; the standards or conditions are not listed (they need not always be included if it is obvious what they are). To be effective, a behavioral objective must be precise and measurable. Perhaps a better representation of this objective could be:

2. Upon completion of chapter 4 in the text, the student will, without reference materials, list the 9 primary causes of the civil war in 20 minutes with 100% accuracy.

This objective is more desirable in that it specifies the desired behavior in behavioral terms--list--other such terms might be: explain, define, order, solve, etc. It goes on to specify the conditions under which the objective is to be evaluated--upon completion of chapter 4...without reference materials--this gives the student the knowledge necessary to perform adequately. Finally, this objective specifies the standards by which the student will be evaluated--9 primary causes...in 20 minutes...with 100% accuracy--there can be no doubt as to the requirements for successful completion.

Behavioral objectives are often difficult to write correctly. The stipulation that they be precise, and behaviorally oriented often lead to the criticism that they are valuable only in the training of skills. This criticism is generated because objectives in this area are often easier to write. Behavioral

objectives can be written for virtually every learning situation.<sup>12</sup>

All learning can be divided into three domains: the cognitive, affective, and psychomotor. The cognitive domain deals with concrete knowledge such as memorizing, reciting, solving, deducing, etc. Much of today's learning falls within this domain. The affective domain deals with attitudes and feelings, art appreciation, music appreciation, enjoyment of sports or science or mathematics are a few of the areas in which the affective domain is involved. Educators are just beginning to realize the importance of the affective domain in the teaching of such topics as civics, ethics, worthy home membership, and so on. The last domain is that of the psychomotor, the teaching of skills such as manipulative actions, manual dexterity, or linguistic skills.

The following represents objectives, written in precise, behavioral terms for each of the three domains:

#### Cognitive Domain

Upon completion of the handout material, the student will, without reference materials, define the meaning of the terms: Cognitive, Affective, and Psychomotor in 20 minutes with 100% accuracy.

#### Affective Domain

The student will demonstrate a positive feeling towards impressionist art by voluntarily discussing the work of Monet in class.

--This is the most difficult area to write objectives, in

<sup>12</sup>Derek Rowntree Educational Technology in Curriculum Development (New York: Harper and Row Publishers 1974) p. 29.

that the performance indicators are generally covert and exact indicators are not always present. Generally speaking, if the behavior is demonstrated voluntarily, then the objective is considered valid--

### Psychomotor Domain

The student will demonstrate the knowledge of carpentry techniques by joining two pine 1 X 8's at an angle of 90° with a standard dovetail joint as demonstrated in class. This project is to be turned in on the date specified.

Although all learning experiences can be classified into these categories, behavioral objectives are necessarily restricted to behavioral terminology. Re-classifying all learning experiences into behavioral terms we find that these three categories can adequately describe all learning activities:<sup>13</sup>

### Motor Performance

This behavior can be typified by some of the following terms: Manipulate, operate, adjust, assemble, and construct.

### Verbal

Some terms that typify this behavior are: list, name, cite, recite, state, define, and write.

### Discrimination

Behavioral indicators that represent discrimination behavior are: choose, select, compare, identify, and differentiate, amongst others.

In summary, behavioral objectives specify the desired behaviors to be learned as a result of the course of instruction in precise, behavioral terms. Included with this statement is a

<sup>13</sup>General Programmed Teaching Designing Effective Instruction (Palo Alto, California: General Programmed Teaching 1970) p. 17.

specification of the conditions under which the performance will be evaluated and the standards of performance the student must meet to satisfactorily fulfill the objective. Behavioral objectives can be developed for all three domains of educational activities; the cognitive, psychomotor, and affective. In behavioral terms, an objective can specify performance as motor performance, verbal performance, or discrimination performance. In specifying any behavior, the activities can represent any one of these behaviors. Very often, the behavior specified will overlap into any two or all three areas.

#### Developing Instruction

We now move on to the second sub-system of our systems model, the "box" labeled "develop instruction". Developing instruction is a means of developing and presenting the content material that will allow the teacher to continually monitor the progress of the student and the performance of the program.

According to Dr. David Cram in the workshop: Designing Effective Instruction this process can best be implemented by usage of interactive instruction.<sup>14</sup> Interactive instruction relies heavily on two-way communication and interaction between the teacher and student. Interactive instruction is also manifested by a large degree of active interaction between the student and: 1) his fellow students and 2) the program itself. The rationale here, Cram believes, is in the great deal of data available

<sup>14</sup>ibid., p. 3.

when interactive instruction is employed. Progress is continually monitored and the student's performance can be closely examined. If a student doesn't understand or is bored, then it becomes immediately apparent.

A central concern of this sub-system is the development of the content material. This is comprised of a two step procedure. First, the general content for the course of instruction is developed. Then, the specific learning activities are prescribed for each student to guide each of them in the fulfillment of the course requirements.

We will deal with the considerations for general content development here. The development of content for a course of instruction can be thought of as a system itself. Vernon Gerlach and Donald Ely in their book, Teaching and Media: A Systematic Approach, have developed such a system to determine the general content for a course of instruction:<sup>15</sup>

#### Steps to developing content

1. Determine teaching strategy.

This step involves the investigation of the specific objectives individually and determining the best teaching strategy to satisfy that particular objective. Decisions are made as to the nature of the instruction, such as lecture, laboratory work, or independent study.

2. Organize Groups.

Once the proper teaching strategy has been determined,

the students can be organized into the proper groups so as to comply with the requirements of the teaching strategy requirements.

3. Allocate time.

Remembering that the students are involved in other coursework, it is imperative that the time limitations be taken into account. After all, the best plan is useless if the student's other activities conflict with the program.

4. Allocate space.

Again, physical limitations must be accounted for in any responsible plan.

5. Select resources.

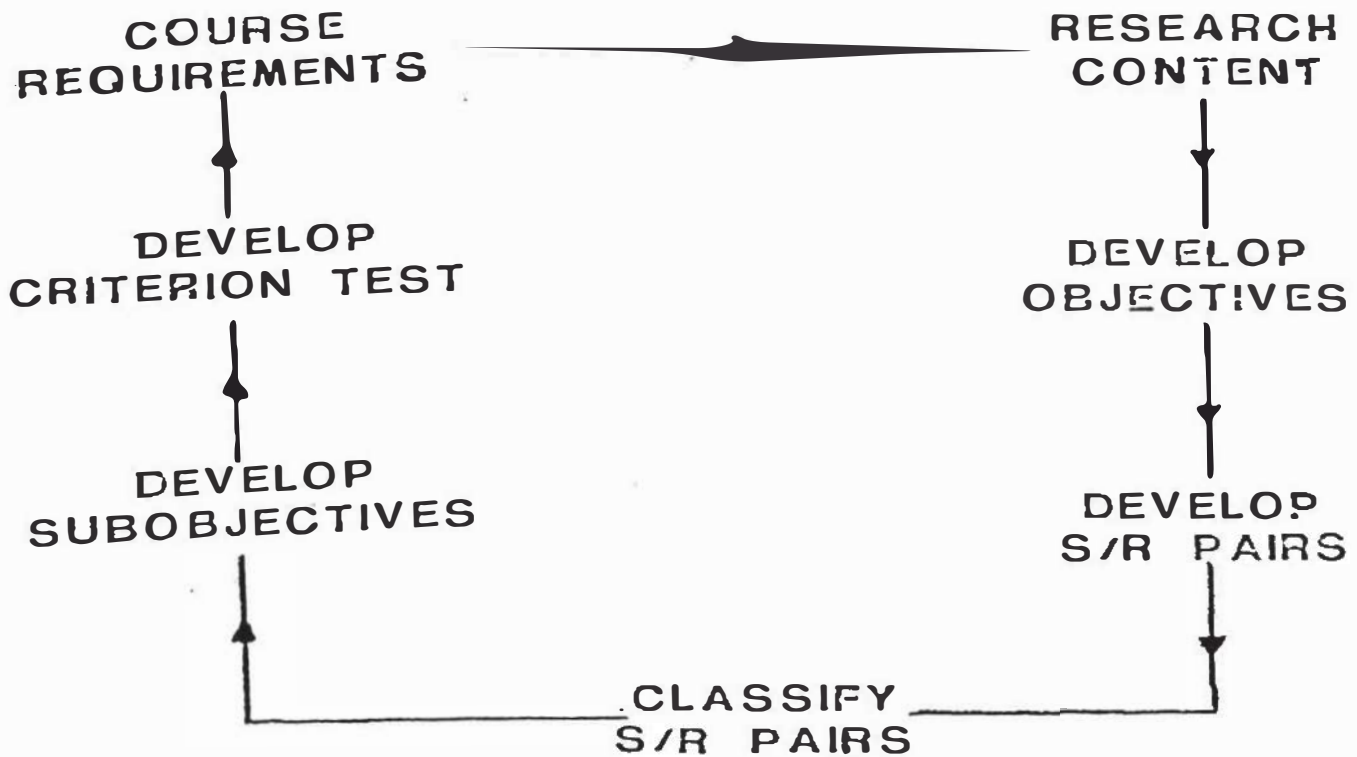
Here the proper support equipment and software are selected to maximize the potential learning experiences.

Gerlach and Ely's plan for content development is but one plan to accomplish this task. It is important to note that there are probably as many plans as there are planners. Many fall victim to the overuse of jargon that complicates the picture. Very few include much for which this plan doesn't allow. They may use different terminology but the meaning is the same.

Looking at the task of content development from a slightly different perspective, Cram in his presentation of what he calls content analysis has developed a sub-system that addresses itself to the task of developing the proper content:<sup>16</sup>

<sup>16</sup>General Programmed Teaching, p. 7.





Taking a closer look at the individual components:

1. Develop Course Requirements.

These are the required terminal behaviors that are to result as a consequence of the successful completion of the course.

2. Consider Existing Material Pertaining to Course Requirements.

Here a survey is made of the resource material available and applicable to the course requirements.

3. Develop Course Objectives.

The specific indicators of desired terminal performance are specified. These, however, are somewhat general.

4. Develop Stimulus-Response Pairs.

As far as this presentation is concerned, a stimulus-response pair is the specific activity the student is to be involved in. This pertains to the specific motivator (the stimulus) and the desired behavior (the

response). These stimulus-response pairs should be as detailed as the designer deems necessary. This is by no means an adequate description of stimulus-response pairs and their relationship to the system, however, the complexity of this material places any detailed description beyond the scope of this paper.

#### 5. Classify Stimulus-Response Pairs.

With the S-R pairs identified they can now be classified as to the type of performance they represent. They can represent verbal, discrimination, or motor performance behaviors.

#### 6. Develop Subobjectives.

Now that the desired behaviors have been identified, the subobjectives (which are just behavioral objectives that specify a performance that is a component of the behavior specified in the objective) can be determined. Subobjectives tend therefore, to be very specific.

#### 7. Develop Criterion Test Items.

A criterion test item is an evaluator of the achievement of an objective. Criterion tests items are designed so as to measure the success with which the behaviors specified by the objectives are assimilated. It is necessary therefore, that the criterion test item test for the exact behavior specified in the objective for which it's written. For every objective there must be a criterion test item to determine if that objective has been met.

Cram goes on to suggest yet a different system for content development. This system serves to summarize the work of many educators in this field:<sup>17</sup>

#### Eight Steps in Determining Content From Objectives

1. Read available material on the topic.
2. Divide material into large coherent units.
3. Develop broad, general goals.

<sup>17</sup> Ibid., p. 95.

4. Develop course objectives, behaviorally stated and including conditions and standards where necessary.
5. Identify general content areas that must be covered to insure the students ability to perform each objective.
6. Develop subobjectives for the course objectives.
7. Analyze the subobjectives for specific content material to be covered so that the students can achieve the performance requirements.
8. Develop content.

This system embodies a rational, deliberate effort to develop the specific learning experiences to be covered. Perhaps a word of explanation here could help clarify; Cram's usage of the term "subobjectives" refers to objectives written for the exact, specific behaviors to be taught. For example, given the objective: the student will describe the functions of the simple machine called the lever, a subobjective for this general objective could be: the student will define the fulcrum as it relates to a first class lever. The subobjectives are very specific and reflect exact learning activities and dictate specific content.

Now that the content material for the course has been developed, our attention will turn to the student. One of the criticisms made of the present curriculum is its inability to account for students' individual differences. The systematic approach offers a solution to the problem. If we assume that every student enters a course of instruction with a varying level of behavior as it relates to the content material then we can

deduce that these students all have differing educational needs. That is, if the behaviors they exhibit upon entering the class vary, then the program they will be involved in should vary accordingly. The process of fitting the program to the individual student's needs is usually referred to as entry level determination. Entry level determinations can be made in various ways. Records of course work in previous classes or pre-testing (literally; testing before any instruction) are both employed extensively to aid the teacher in determining entry level behaviors. Once the entry levels have been determined, the teacher can go back to his "inventory" of objectives he has established for the course. He may then choose the appropriate objectives to involve the student in only those areas he needs to fulfill course requirements. Bela Banathy in his book Instructional Systems summarizes the results of entry level determination.<sup>18</sup>

**INVENTORY  
OF LEARNING  
ACTIVITIES**      —      **INPUT  
COMPETENCE**      —      **ACTUAL  
LEARNING**

Entry level determinations can be used in other applications. At Oakland Community College in Michigan, they use entry level determinations in a more comprehensive, provocative manner.<sup>19</sup>

<sup>18</sup>Banathy Instructional Systems, p. 49.

<sup>19</sup>"Personalized Education Programs Utilizing Cognitive Style Mapping" Oakland Community College 2480 Updyke Rd., Bloomfield Hills, Michigan. 16mm Film, Eastern Illinois University Film Library M-1362

Each student entering Oakland is administered a battery of tests. These tests not only determine entry level behavior as we have described it here, but actually measure the ways that student learns best. They refer to this as "cognitive style"; they believe every student has his own unique cognitive style. In their opinion, if the individual cognitive style can be determined, then not only can they teach him what he needs to know, but do so in a manner that will allow him to learn the way he learns best. Determining entry level behaviors is the focus of the system's abilities to tailor the course of instruction to the individual differences each student possesses. By doing this, a systematic design can truly offer the student the benefits of individualized instruction.

#### Validation Processes and Feedback

Since feedback and validation are very closely related they will be treated together. Validation/feedback processes represent the last sub-system of our systems model.

Validation processes refer to the evaluation of the performance and validity of the activities of the entire system as a whole. Validation is useful to a systems design in two separate capacities. Early in the design of a system, validation is used to validate the program itself. In the development stage of content material designing, validation is used to test each of the objectives under "laboratory" conditions. This type of testing is usually called developmental testing. After the program has been assembled but before it is placed into general use, it

is tested under general classroom conditions. This type of testing is referred to as validation testing. Validation and developmental testing represent a complex and involved procedure that requires much careful thought on the part of the designer. This is one area of the system where the designer's professional skills are put to the test; he must decide on the basis of the testing results whether the scores reflect deficiencies in the program, the students, or both.

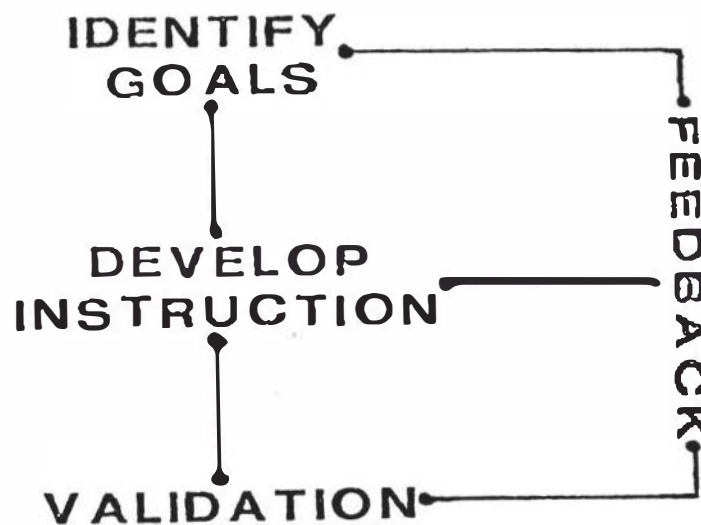
Once these decisions have been made, the necessary changes can be effected. Programs often require re-validation after a period of time to keep pace with the ever changing school environment.

Now that the validity of the program has been assured, validation processes are employed to monitor the student's progress. This type of testing is generally called criterion testing because the test measures the degree with which the student learns the criteria established in the objectives. Criterion tests consist of test items that determine whether the student has learned the material as outlined in the objectives. For each objective (or subobjective) there should be a criterion test item. This test item must test for the exact behavior taught in the objective. Otherwise, the test item is invalid. If the objective teaches verbal performance, then the test item must test for this verbal performance.

Feedback is the logical extension of the validation process.

Feedback mechanisms carry out the recommendations of the validation process. This mechanism serves to close the loop to create a process that continually monitors the whole system and keeps it "on course". As with validation, feedback processes constitute a great deal of active involvement on the part of the designer. The system here does little more than guide the designer's thoughts; most of the work is outside the realm of the system itself and relies on the expertise of the designer.

In summary, a systematic design comprises the following subsystems:



Behavioral objectives are precise, measurable statements that prescribe what the student must do in terms of desired terminal behaviors as a result of a given course of instruction. These objectives tend to eliminate ambiguity from compromising the effectiveness of a program. Both the teacher and student understand the tasks at hand. The student knows exactly what to expect and the teacher knows exactly what must be covered to fulfill the objectives.

In developing content it is recommended that the plan be centered around a method of instruction that will allow for the greatest possible interaction between all the parties concerned with the instructional process. This is necessary as these interactions allow for the monitoring of student progress and instructional program performance.



Content material is best produced as a result of a careful analysis of the desired learning behaviors as evidenced from the behavioral objectives. The eight steps of developing content from objectives are: 1. Read available material on topic. 2. Divide material into large coherent units. 3. Develop broad, general goals. 4. Develop course objectives, behaviorally stated and including conditions and standards where necessary. 5. Identify general content areas that must be covered to insure the student's ability to perform each objective. 6. Develop subobjectives for the course objectives. 7. Analyze the subobjectives for specific content material to be covered so that the student can achieve the performance requirements. 8. Develop content.

Entry level determinations allow the teacher to select the necessary learning experiences so that the student may learn only the material needed to fulfill course requirements. He need not be bored with material he has already mastered or confused with material he's not ready to learn. This process allows the teacher to tailor the course to the individual needs of each student.

Validation and feedback provide for the precise monitoring and improvement of the system during it's design, and the students' interactions with the system after it has been installed into use.

Perhaps there is one component of our system that has not been

discussed yet. The most important component of this (or any) system is the designer. A worthwhile educational program could very possibly be designed and implemented without one formal thought of a systems approach. Some of the best teachers this world has ever seen may never even have heard of such a thing as a "systems approach" or "instructional design", yet if these teachers were to investigate a systematic approach, they would probably notice many similarities between their "informal" design processes and the formalized conceptualization of systems theory. Many of the best teachers would call all of this "common knowledge." But for those who aren't exceptional educational designers, a systems approach can aid the teacher to maximize all the benefits the curriculum can offer it's students. No, there can be no substitute for good teachers; no machine could be fed a systems design and alone plan an exceptional program (or any program at all). People make any system work. Systematic approaches don't replace teachers but rather, they aid in making every teacher a true educator in the most positive sense.

#### IV. Instructional Systems and Curriculum Development.

With the necessary background material covered it is now possible to investigate the means in which system design can aid in curriculum development.

It has been shown that the curriculum development process is a complex, involved task that is never complete; all curricula need to be revised continually to keep pace with ever-changing society and the environment in which it functions.<sup>20</sup> The curriculum is a concern of tremendous magnitude. Many of the ills plaguing schools today are traceable in part to the curriculum.<sup>21</sup>

This paper does not propose to offer any solution that will solve all or even any of the great problems facing the curriculum of today singlehandedly. There are rarely simple answers to such complex problems. Humanity has relied on the powers of logic, reasoning, and empirical investigations to deal with all of its problems since the dawn of history (and before, as well). This paper humbly suggests that educators take the example, and look at the problems in a rational, logical way. Interestingly enough, the principles of a systematic design follow these lines of thought. If nothing else, a systematic design represents orderly, logical thought patterns

<sup>20</sup> Joyce "Model for alternative..." p. 220.

<sup>21</sup> Van Til Curriculum: Quest... p. 4.

orchestrated into a plan for educational advancement that is sensitive to the needs of the individual, precise in terms of what it is to accomplish and readily adaptable to the changing tide of societal influences, while maintaining a firm educational goal that no amount of interference can disturb. This point can't be stressed enough: there is nothing magical about a systems approach. It merely represents a formalization of all the thought processes that comprise educational programs which excel in performing their task.

How does the average school go about implementing a systems approach? A full answer to this question is quite beyond the scope of this text. The programs that employ a systems approach vary from one course to one subject area, one division, one college, or even an entire educational program. Systems approaches to developing curricula are not new. The military and industry have been employing a total systems commitment for years. At Oakland Community College, 30% of their entire curriculum uses a systems approach to education.<sup>22</sup> Many schools use individualized instructional packages, either home produced or commercially prepared. And in many cases, teachers are using at least parts of a systems approach, as many parts as their school district allows. A systems approach, when truly thought of in the educational sense, fits in very

<sup>22</sup>"Personalized Education..." Oakland, 16mm film.

comfortably. A rather new and provocative approach to incorporating systems and curriculum is that suggested by Roger Horner in his description of "The De-centralized Curriculum Development Team". This team would be comprised of at least two parties. One party would represent the content experts, this could be classroom teachers, department heads, or even administrators. The second party would represent a systems expert, which could be instructional designers, or media specialists (audio-visual directors), classroom teachers with a background in systems theory could even qualify. The function of this team would be to pour into their design all of their knowledge and expertise, in order to design instruction as a group function. Together, this team will produce a package that is both systematically designed (well mediated, too) and academically correct. This is perhaps one of the areas in education where it can be dramatically shown that the product is worth more than just a sum of the constituent parts.

## V. Summary

Re-stating the thesis problem:

How can the integration of a systematic instructional design aid in making curricula more relevant, individual, and accountable?

To answer this question will require some careful preparation. In order to believe an answer to this question, one must believe the question. Whether or not today's curriculum is relevant, accountable, or individual is a matter that is best left up to the philosophers. It makes little sense to deal in absolute terms when dealing with values. All arguments on one side or the other of this controversy would necessarily need to confine themselves to matters of degree and not existence. Logically, if we can't deny these charges, they must exist to some degree in all curricula. The point here is that no matter how perfect a curriculum is, it could probably stand some improvement. Obviously, there can be no clear-cut black-and-white answer. This topic, as with all other values oriented concepts, limits our decision making processes to a shades-of-gray continuum. There are no clear answers, just difficult choices.

## Relevancy

Assuming our present curriculum to be irrelevant (to varying degrees) just how can a systematic approach help to make said curriculum more relevant?

Perhaps, for the sake of this paper the non-existence of a good, clear-cut, definition of relevance, is unfortunate. When dealing with relevancy, the old "values-monkey-wrench" is thrown in the works. Generally speaking though, relevancy deals with what is needed and desired by the students. In today's micro-computer society there is little relevance to teaching the art of adding on an abacus. Similarly, the relevance of teaching concrete mixing by hand to a piano virtuoso would be of questionable value. However, the historical significance of the abacus would be very relevant to a Far Eastern History class. Similarly, concrete mixing by hand would be valuable in an art class. The key to understanding the concept of relevancy is to be actively and continuously interested in the student. The teacher must be sensitive to their needs and cognizant of their abilities. Relevancy can be thought of as providing the student with what he needs and wants (not necessarily the same thing) at a rate he can understand and work with.

It is the stand of this paper that relevance can be achieved through the use of a systematic design. A system, properly used will provide the teacher with all the necessary data to determine whether or not any given course or presentation is

working. He immediately knows when the students are lost or bored. The preparation of interactive instructional designs of education allow the teacher to continuously monitor the students' progress. Much of the work of deciding exactly what is and is not relevant is up to the teacher and his students. A systematic design of instruction assures that every student is involved in only those learning experiences that are necessary to fulfill course requirements. He won't be bored with material he's already mastered (one possible definition of irrelevance) or hopelessly lost in a class that is way over his head (another possible definition of irrelevance).

To generalize, irrelevance can be caused by not paying close attention to the students and their relationship to the content material. If the preparation of the learning activities is not made carefully enough, the chance of including irrelevant material is present. Perhaps there is no assurance of maintaining relevancy in any program, but with a constant, sincere effort to truly understand the students' needs and learning activities a relevant, worthwhile education is sure to result.



## Accountability

As much as relevancy is nebulous, accountability is crystal clear. The birth of accountability is a result of the marriage of the "tight money" situation and the uneasy feeling about the lack of knowledge the public has about education. These two areas of concern unite to give the accountability movement meaning. For a curriculum to be accountable, it must teach the things it proposes to at a level of performance that is acceptable to the public and school alike. It must accomplish this task at a reasonable cost as well.

Since accountability is an issue of a dollars and cents nature, the justification of any programming must be equally precise. The operative word here is precise. Some means must be developed to accurately tabulate the performance of the students, which serves to vicariously evaluate the school and its curriculum. This tabulation should be concrete, precise, and sufficiently detailed so as to forestall any possible doubt.

Here, again, a systematic approach to education could be of value. The careful, continuous monitoring of a student's progress throughout his involvement in the program provides the proper justification of the success (or failure) of that program. Not only does the school have grades but they have at their disposal, a listing of the competencies, skills, and specific knowledge the student has acquired.

Another potential benefit a good systems design can offer is in the saving of money by not having to be confined to the lockstep constant class size restrictions. For example, a typing class may be effectively taught by one teacher virtually regardless of class size. Many programs could be implemented in this manner. This is not to say that the professional staff could be cut in size as a result of the institution of a systematic design, but the talents and abilities of the existing staff could be maximized and good educational programs could be instituted in a very cost-effective way.

Whether the educator likes it or not, the accountability movement is here to stay. Taxpayers have a right to know where their tax dollars go. A systems design offers the educator one way to oblige at no detriment to the student (not to mention the benefits of a systems design, educationally!).

## Individualizing Instruction

In the context of this presentation, the meaning of individualized instruction is as follows: Individualized instruction is facilitated any time the objectives established for a student are met to the degree of performance specified regardless of factors such as class size or teacher-student ratio. The meaning of this is simple; if a student is individually evaluated as to his educational needs for any given learning situation, and some course of instruction is prescribed to meet these needs, and these needs are met as a result of this instructional activity, then the student's individual educational needs have been satisfied and he can be considered the product of an individualized instructional experience.

Traditionally, individualized instruction mandated that there be a one-to-one correspondence between teacher and student. Yes, this is individualized instruction, but it is virtually as useless as it is impossible to implement in today's educational system. If however, as suggested above, the student's individual learning needs be assessed and an instructional package tailored to meet these needs, have not all the requirements been satisfied? Has he not been a product of an individualized instructional plan?

The systems approach can accomplish this very task. It provides the mechanism by which the individual needs can be assessed. In addition it allows the prescription of the exact

learning activities that will best fulfill the requirements of the learning activity in question. The necessary content material is then presented and the student is tested in a precise manner to determine his success. And the process continues until the material is mastered. No more is the slow student passed along even if he doesn't have the required capabilities or the brilliant student held back, stifled because he must progress with the others. Remember, individualized instruction is giving the student exactly what he needs and wants exactly when he's ready for it.

### In Closing...

Emphasizing this fact again, there is nothing magical about a systematic approach to curriculum development. What is actually involved here is an orderly, rational, precise approach to dealing with the social institution of education. Hopefully it has been shown that a systematic approach is not a de-humanizing automaton that "gobbles up" our children or some cumbersome, bureaucratic menace that ties them up in all that red tape bureaucracies are famous for. Rather, a system is a well thought out intellectualization of the necessary and prudent activities that can achieve the highest possible goals of education within the framework and constraints of society's present educational structure.

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