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The following postulates provide the basis for development of an innovative student-centered curriculum: (1) A curriculum must be defined in terms of the students' educational needs; (2) for the majority of students, occupational goals require less than a bachelor's degree; (3) a curriculum must be defined in terms of the psychological structure and educational experiences of students; (4) learning of the concrete must precede learning of the abstract; (5) learning can be maximized by controlling the sequence towards some goal, locating the student in that sequence, and combining sequences that are psychologically similar; and (6) learning is most meaningful when a person learns through interaction with his environment. To construct a student-centered curriculum, the curriculum must be vocationalized, it must be developed and analyzed sequentially on the basis of behavioral objectives and psychological characteristics, individuals should be simultaneously instructed when they are at the same point in the same sequence, and the learning environment should be structured to maximize the probability of learning through participation. (JH)

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THE STUDENT-CENTERED CURRICULUM:

A CONCEPT IN CURRICULUM INNOVATION

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The purpose of this paper is to describe a concept known as the student-centered curriculum. This curriculum concept is an emerging one, and this paper must be considered a working paper or draft of developing ideas all of which are subject to continual refinement and revision. The student-centered curriculum concept will be described in terms of a series of postulates which provide a basic definition of what the student-centered curriculum is to be. From these postulates propositions are then derived which describe the way the student-centered curriculum must be constructed and how it must operate. No attempt will be made to site large amounts of literature in support of the postulates that are made. Some of the postulates can be supported empirically. Others of the postulates represent some very basic assumptions about the nature of curriculum.

Postulates

Postulate #1. A curriculum must be defined in terms of its goals as they apply to students.

A curriculum must have a purpose. Its purpose ostensibly is to provide students with experiences that will lead them to attain certain desired end states. Pre-specification of these end states provides a guide for the direction of the instructional process as well as a basis for determining if the instructional process has been a success. Thus, a curriculum must be defined in terms of the educational goals of students. This is synonymous with saying that it must be defined in terms of the educational needs of students, for the goal of the curriculum is to meet the educational needs of the students.

It is considered reasonable to further assume that educational goals may be broken down into three broad areas, i.e., (a) occupational, (b) civic - citizenship, and (c) personal - social. In the occupational area, the concern is with the skills and competencies that will be required to obtain and maintain meaningful employment throughout one's life. Since one functions as part of a societal system, civic and citizenship behaviors are also seen as necessary and thus providing for them becomes a goal of education. Finally, an individual must develop a self-concept which is adequate for him, must have sufficient ego development in order to function, and must be able to relate to individuals on a personal and inter-

personal basis. To this end, personal and social skill development would seem to be appropriate as a goal of the curriculum.

Of maximum importance is the point that desired goals or end states are here posited as part of the basis for defining the curriculum.

Postulate #2. Occupational goals are, for a large majority of students, those requiring less than a bachelor's degree.

This statement is more than a postulate. It is, in fact, a fact. At the present moment, approximately 20% of our young people in the United States obtain a bachelor's degree. The remaining 80% fall into one of the following categories: high school dropout, terminal high school graduate, two-year college dropout, two-year college terminal graduate, or four-year college dropout. Thus, for this large proportion of youth, approximately 80%, their ultimate goals in the occupational area must focus on occupations which require less than a bachelor's degree for entry.

Postulate #3. A curriculum must be defined in terms of the psychological structure (i.e., learning style), and

educational experiences (i.e., what has already been learned) of students.

Since the curriculum is intended to serve as a means by which students learn, it is necessary that the curriculum be defined and developed in such a way that the psychological structure of students is considered. That is to say, the curriculum must be structured in such a way as to be consistent with and meaningful in terms of the way that people learn. We often talk about learning style as a way of describing broad individual differences in the way people learn. For a curriculum to provide learning opportunities, it must be developed in a way which is consistent with the learner's learning style.

Secondly, learners do not come to any particular learning situation without having had prior experiences. In defining a curriculum which centers on students, it is necessary to consider the relevant prior learning experiences that students have had as they relate to the curriculum at every point. To this end, one must be sensitive to the issue of transfer of training.

Thus, the student-centered curriculum is partially defined in terms of the educational needs of students (Postulate #1) and partially defined in terms of the prior experiences and learning styles of students.

Postulate #4. In terms of learning style, learning of the concrete must precede learning of the abstract.

Jean Piaget, the eminent European developmental psychologist, has in the course of a 40 year career shown that children learn concrete operations before they learn abstract operations and that, moreover, abstract operations cannot be learned unless concrete operations are learned first. Thus, the concrete learning style and materials which appeal to it must precede that of the abstract. Before the student can be expected to master some of the representational intricacies of subjects like algebra, he must in terms of Piaget's work first have mastered some very concrete principles such as those dealing with conservation of area and volume.

In general, younger children function more successfully in the concrete realm than in the abstract, with tendencies toward the abstract increasing with age. However, as a function of the experiences that a young person has had, it is entirely likely that he may develop into and through adolescence without every completely reaching the stage of abstract operations. The extent to which development occurs beyond the concrete into the abstract is a function of the learning experiences that the youngster has already had.

Postulate #5. Learning can be maximized by controlling the sequence towards some goal and locating the student in that sequence.

This postulate contends that learning is an experience which requires that the conditions under which it is likely to occur be controlled. The contention is that learning is not a haphazard occurrence; rather it is an occurrence which occurs reliably and predictably under certain conditions, with different kinds of learning and learning by different kinds of people, occurring under different conditions. To the extent that one can associate the conditions of learning with those that are relevant for a specific person, one should be able to produce learning. This position has been well documented by Dr. Robert M. Gagne, in his book The Conditions of Learning.

From this position, one can argue that learning experiences can be sequenced in such a way as to maximize the likelihood that students will be able to go through them en route to some predictable goal. Thus, after one has predetermined the goal, one can determine the learning experiences and the sequence in which they are to occur in order to increase the likelihood that students will achieve the prespecified goal. Once this has been done, the experiences in that sequence that the student has already had can be

determined, and the student can be placed at a point in the sequence where he can begin having those additional experiences which will lead him to the goal.

Thus, one attempts to manipulate the conditions of learning in such a way to maximize the likelihood that learning will occur. This is a prescription for the imposition of structure on the learning process, since the learning process appears to be one which is a highly structured one. As the kind of learning varies and the learner varies, the structural requirements of the situation may very well vary. Nevertheless, one should be able to determine by some sort of analytic process what the ideal conditions for learning are, and establish them in an optimal sequence. Individual differences will influence whether the student is given the sequence at all, if so, where he begins it, and how rapidly he progresses through it.

Postulate #6. Learning can be made efficient by combining sequences that are psychologically similar.

Any curriculum is going to include a multiplicity of goals. Following Postulate #5, any curriculum will also include a multiplicity of sequences. One can further

structure the curriculum by grouping these sequences in some manner. Postulate #6 contends that the most efficient way to group them is in a way which takes into account the psychological characteristics of human beings. If one can identify a model which identifies the qualities of human behavior and human functioning across all domains of human activity, it is likely that such a model can be used to efficiently combine learning sequences.

Postulate #7. Learning is most meaningful when a person learns through interaction with his environment.

Work such as that of Harvey, Hunt, and Schroder, and Anderson and Moore, provides strong evidence for the fact that interdependent conditions for learning are the most efficacious. In the interdependent learning model the individual learns through interaction with his environment. This is in contradistinction to a unilateral model where some agent establishes external criteria and affects the behavior of individuals in terms of these criteria through the use of rewards and punishments. In the interdependent model any rewards and punishments forthcoming would be a product of the interaction between the learner and the environment and would be intrinsic rather than extrinsic.

Learning on this basis, however, requires that the environment be of such a nature as to result in the learning which is desired. The environment must be structured or "programmed" to maximize the occurrence of the desired outcomes.

Propositions

Proposition #1. The curriculum must be vocationalized in order to: (a) meet a student's future employment needs, and (b) provide a concrete context for learning.

Since as many as 80% of today's young people will enter the work force with educational experiences at less than the bachelor's level, it is necessary that instructional activity be provided to help students master the skills and competencies that they will need for entry into the occupational world. To some extent, these experiences will be provided through industrial training programs, but to a large extent, responsibility for this will fall to the schools. Thus, the curriculum centered on student's needs must have a liberal sprinkling of educational experiences specifically relevant to the occupational needs of the large majority of youth. These experiences may revolve around a cluster concept of vocational education in order to provide students with the broadest possible experience.

A second reason for vocationalizing the curriculum is

in order to take advantage of the postulate that concrete learning must precede abstract learning. The vocational context is a highly concrete one, within which previously considered abstract concepts may be more easily mastered by students, particularly those students whose experiences heretofore have not provided a great opportunity for the mastery of concrete concepts. Individuals from somewhat disadvantaged backgrounds in particular will, by virtue of their biological need state and limited prior experience, be much more likely to learn in a concrete context even during their adolescent years than an abstract one. Thus, the vocational milieu is a way to make all education relevant in the sense of giving it the kind of referent that is meaningful to the learner. Teaching physics principles in an electronics laboratory or mathematic principles in a business course is a way to provide hitherto abstract notions with a highly concrete context, thus increasing the likelihood that mastery will occur.

Proposition #2. Behavioral objective identification must precede curriculum development in order to identify goals and facilitate evaluation.

If the curriculum is to proceed from a delineation of

goals, then the identification of goals must be the first step in the curriculum development process. Moreover, these goals must be identified and specified in behavioral terms in order to give them meaning to all who must follow in the process and contribute to the development of the curriculum. The place to begin is with goals, and behavioral objectives are a form of goal statement with enough specificity to make them usable by curriculum developers and evaluators alike.

Proposition #3. Behavioral objectives must be sequentially analyzed to provide sequences of learning experiences.

The behavioral objective is a good place to begin the process of identifying sequences of experience that will ultimately constitute the curriculum. Such sequences of experience are meaningful only in terms of what they add up to, that is, where they end up. In order to guarantee that such sequences end up where you want them to end up, one begins at the end point and works backwards. In another paper dealing with the concept of structural analysis, I have described in detail the process by which one analyzes behavioral objectives into sequences of skills and competencies. Having done this, one increases the likelihood that by placing a student into such a sequence, the goal

objectives from which the sequences have been analyzed will be reached.

Proposition #4. A model for combining sequences and thus students in sequences must be developed which is consistent with the psychology of human function and the three classes of goals.

A curriculum cannot consist of an infinite or near infinite series of disconnected sequences. Each sequence can take on additional meaning by being grouped and connected to other sequences which relate to it not only in terms of the goal object, but in terms of the nature of skill or competency or knowledge which the sequence is an attempt to facilitate. The practical requirements of a learning situation necessitate some form of packaging of the sequences. The form the packaging has taken thus far in our educational history has been by subject-matter. However, subject-matter is not inherent to the learning experiences nor to the learner. Perhaps it would be more meaningful to use some characteristics which are inherent in both the subject-matter and the students who are to learn them as a basis of clustering learning experiences. Characteristics which are descriptive of human function and equally consistent with the three

classes of goals, i.e., occupational, civic - citizenship, personal - social, should be maximally effective, since the curriculum is to be defined in terms of both of these kinds of characteristics.

We are presently engaged in building and validating a domain-process-object model which will serve to cluster and combine learning objectives and thus sequences of learning experiences.

Proposition #5. "Individualized" instruction can be approximated in groups, but these groups will be shifting rapidly in membership over time.

Individuals will be simultaneously instructed when they are at the same point in the same sequence. This proposition argues against individualized instruction in the sense which we have come to think of it, namely, students working by themselves with relatively impersonal presentation devices or books, often linked to a computer to provide them, with again, equally impersonal feedback. Many have argued against individualized instruction and opted for a major role for the teacher who can provide the "human element." If a curriculum were to be built around learning sequences, there is no necessary reason why each student should go through a sequence in isolation from all other students. Not

only would isolation eliminate the opportunity for important social interaction, which is a desirable experience in its own right, but it would also reduce the efficiency with which learning sequences can be used in educational programming. At any point in time, it is entirely likely that within the large secondary school a number of students greater than one will be at roughly similar points in some of the same learning sequences. In other learning sequences, they may be at different points, but in some sequences they may be in the same point. Thus, it is possible to present learning experiences to a group of students in order that all students may move through a particular learning experience toward a particular goal.

However, these students will not constitute a group in the static and rigidified manner in which that term is presently used within the educational establishment. While they may exist as a group for a particular learning experience or sequence of experiences, for the following learning experience they may each find themselves as parts of other groups. Each individual will be individualized at the same time that each other individual is individualized. However, taking advantage of enrollment and the generalized nature of the sequence, it should be possible to find more than one student ready for any particular experience at

any point in time.

A computer will be useful for scheduling this kind of curriculum in that it requires the ultimate in modular scheduling. This curriculum would also necessitate the creation of an ungraded school, since gradedness is not necessarily consistent with the sequences and learning experience that will be contained in the curriculum.

Proposition #6. Learning must be propagated through learning experiences, i.e., "hands on" experiences, rather than lecturing by the teacher.

Materials must be prepared to allow students to learn through their environment. The environment must be structured to maximize the probability that the desired learning will take place. Based on the postulate that learning is maximized when one interacts with one's environment, it follows that in order to maximize learning, one would want to structure the environment in such a way that the probability of learning particular concepts or particular skills and competencies from interaction with a particular environment will be maximized. To this end, one concentrates not on writing lesson plans, but on writing experiential units, i.e., participation exercises which provide a vehicle for learning experiences to occur.

One thinks of experiences in conjunction with particular participations which in turn produce desired and pre-specified learning. The learner need not be told what the purposes of the participation are in the eyes of the developer, but given a skillfull participatory exercise and a teacher who has been skillfully trained and instructed in maximizing the value of that exercise, it is often possible to very closely approach attainment of pre-specified goals.

The student-centered curriculum will be ultimately built on the basis of the postulates and propositions described above. It will be a goal-oriented curriculum in that it will begin by a specification of goals broken down into the three goal areas identified. It will reflect the progression from concrete to abstract, using the vocationalizing experience as a context for concrete learning as well as a way of providing young people with occupationally-relevant experiences. It will be made up of a series of sequences which are analyzed from specified goals. These sequences will then be combined in terms of a psychological model which is in the process of being constructed.

Once the goals and the sequences are identified and

combined according to the model which is being developed, the next step undertaken will be to develop specific learning materials to achieve the goals that have been set forth. These materials will primarily be of a participatory nature, where the teacher's role will be to guide the participation so that desired end points may be reached.

At the same time that the curriculum is being constructed, it will be valuable for individuals to examine the physical and administrative structure of the educational system as we now know it. Any curriculum which is built based on the propositions and postulates described in this paper, that is, any truly student-centered curriculum, will require an administrative structure and perhaps a physical one which differs in many respects from that presently in existence in the majority of school districts in the United States. The student-centered curriculum would appear of necessity to require a non-graded school. It would do away with the traditional concept of ability grouping and tracking as it is presently practiced in most American secondary schools. It would require modular scheduling of the finest degree and it would require a computer system for record keeping and sequence coordination. Teachers would have to be trained to function out of a framework other than the traditional subject-matter framework, and to play a role

in the classroom which is different from the instructional role the teacher presently plays. Rather than being the provider of information, the teacher will function within a student-centered curriculum as a guide and interactor providing additional instruction or direction as needed in conjunction with the discovery processes which are implicit in participation as a basis for learning.

A student-centered curriculum will make great use of multiple instructional strategies, allowing students to learn through interaction with their environment, utilizing all sensory modalities. Visual aids, as well as participation aids of all sorts will be utilized, and multiple means of instruction will be built into the same sequence for the same students at the same time. Thus, a technology will have to be adapted to the purposes of facilitating the use of this kind of curriculum.

Additional demands different from those presently in existence will be placed upon the guidance systems of the schools, whose guidance activities will have to be closely coordinated with the student-centered curriculum. Guidance will no longer have the simple option of placing students in tracks and thus considering their development process in good hands. Guidance will be continually needed as students proceed through a student-centered curriculum in order to

help students to maximize themselves in terms of the choice process. At many steps along the way students will have to make choices between different sequences of activities. These choices will be aided by the use of a guidance system utilizing tests and interviews. However, the purpose of these tests and interviews will have to be to maximize the students' opportunities to learn and succeed in a student-centered curriculum rather than to try to predict the degree to which the student can succeed — thus creating a self- and teacher-expectation, and irrevocably locking the student into a particular curriculum or program of study.

In conclusion, the advent of a student-centered curriculum, should it ever come to pass, would require some basic changes in the instructional system. Before one were to do something as dramatic as this, one would want to have great confidence in the postulates and propositions about which a curriculum is based, primarily by giving such a curriculum adequate tests on an experimental basis. At this point in time, it is necessary to discuss and consider what a student-centered curriculum is, what assumptions it makes, how it would be constructed, and how it would be implemented.

In thinking through these questions, it is necessary to challenge many of the existing practices in the schools

today. This challenge is carried out not as a way of catharting the writer's existing hostility, should any exist, but is an exercise in working through and thinking through ideas which may have some possible merit. It is hoped that the reader will react to the challenges that are presented not in a negative sense, but in terms of the spirit in which they are presented.

As Dr. James Evans concluded in a speech to the American Educational Research Association, and I quote, "We know how to produce astronauts. Let's see if we can produce 'astrotots'."