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ABSTRACT

A computer-assisted, competency-based instructional model has been developed for a teacher education program. It is based on the assumptions that individuals should control their own lives and that technology should be used to expand the range of human choice. The model uses a systems approach to organize the human, curricular and environmental variables of instruction; in addition, students participate in decision-making, instruction is modular, mastery criteria are used, the affective side of learning is attended to, and an enhanced self-concept for the student is sought. Students join small groups, interact with an academic counselor, and have access to a Learning Center with varied resource personnel. They select educational experiences according to their interests and employ the computer to help put themselves through instructional modules whose components include the statement of objectives, pre-testing, the presentation of instructional material, reference to resources, and post-testing. Implementation strategies include, among others, seminars, small group instruction, laboratories, computer-assisted instruction and auto-tutorial sessions. (PB)

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COMPETENCY DESIGNS FOR A MORE HUMANE EDUCATION

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INTRODUCTION

Education is under attack from many quarters and those of us involved in instructional design and development are faced with many dilemmas if we seek to respond positively to the needs of students and the demands of society for better educational programs. We will certainly be side-tracked into profitless digressions, if we respond in a defensive posture to every attack aimed at our educational systems. But we also are faced with many difficulties which admit to no easy solution. One of the principal difficulties is the dilemma which arises when we take seriously the effort to provide more efficient and cost effective instructional systems while also responding to the demand for more humane educational strategies. We often seem torn between the niceties of instructional technology as an efficient approach to producing more effective learning systems and the charge that such instructional designs are dehumanizing to our students. How can we deal with such a "no-win" set of options? If we say the important thing is reducing the per student cost while increasing the instructional effectiveness of our systems then we are open to the criticism that we don't care about students. On the other hand, if we say the student's self-concept development has priority, then we are liable to the charge that we pamper students with a luxurious and fiscally wasteful instructional program.

Behind this dilemma are very real issues which cannot be disregarded. Both the economic stringencies and the humane aspirations of students are there in the real world. What we face as instructional developers is the task of matching our systemic efforts to achieve educational accountability

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with equally effective efforts to nurture the full human potential of individuals within our programs. It is in this task that we have found some promising uses of computer technology when designed with both short term and long range goals of increasing student competence and autonomy. The way we have approached the design of our program rests upon some assumptions about competency-based education, the nature of computer management technology and on what constitutes humane education. Before we present our model design these assumptions need at least a preliminary examination.

ASSUMPTIONS

Competency-Based Education

We are witnessing a shift toward tighter controls over the instructional process. This shift is examplified in the movement toward competency-based educational programs which seek greater precision in stating objectives, in choosing strategies and in evaluating results. Competency-based program designs call for systems planning, cost-benefit analysis and other management and delivery systems. The focus of such progrms is on the growth of the learner to levels of adequacy for particular tasks. Competencies are usually classified by criterion level, i.e. knowledge, performance or product outcomes. The principle of accountability may, thus, be applied to all phases of the instruction. We assume that instructional designers must pay attention to the need for accountability, no matter what source or motive may underlie pressure for accountable systems. Some, mostly property owners, look at the rising costs of education and demand greater efficiency for the educational dollar spent in the public domain. Some, mostly social and political leaders, look at the disproportion in student achievement reported for minority children as compared with middle-class white children and demand that educational systems produce equitable performances among all children. Still others, including educators, look at the appalling human waste which results when teachers are required to be omnibus experts, instructing in all academic domains and they call for a division of labor appropriate to the skills of teachers and needs of students.

While competency-based education is morally neutral in that it is not inherently positive or negative in contributing to a humane educational environment,* it does force instructional designers into asking certain questions about the intended learning: questions which are extremely useful in rethinking the purpose of the instructional activities planned. Who are we teaching? With what means and for what expected results? Do we know enough about the student population to be served? Do we have access to all the resources required? Can we operate within the limitations of the time, personnel and curricular constraints imposed upon us? What specific strategies can be employed to reach the goals, both short term and long range, of the program? And finally, how will we know what we have accomplished when the instruction is completed? If we have a sure grasp on the goals we seek and if we are satisfied that they are humane then it remains to attend to the question of means raised by competency designs. And this leads us to some assumptions about the uses of technology as a humane means of instruction.

* It has been observed that CBE program designs could be used by dictators for social control or by humanitarians with equal efficiency.

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Technology

There is probably some justice in the current attack by "humanists" on administrators and behavioral engineers who seek greater "productivity" out of our instructional systems. Behind the sweep of technological change there are specific value and conceptual problems to an educational model based on industrial patterns of administration. Reducing the variables of instruction makes for greater efficiency, but at a terrible cost, when it is considered that in education the diversity of learning is the result of the innate diversity of children and teachers. The most humane goals of education are precisely those which are based on increasing the range of variables which impinge upon the lives of fully functioning individuals. "Should these individuals be sacrificed to the demands of standardization and efficiency?", ask the humanists. Over ten years ago, Daniel Bell was asking similar questions about industrial work patterns:

> "Should work be organized so as to increase output and decrease costs -- assuming these benefits are passed on -- so that there is a larger product for society? Or should work be organized so as to benefit the individuals on the job?" (2, pp. 254-255)

Part of the difficulty arises from the misunderstanding of the role technology can play in precisely expanding the range of choices individuals can have. Many identify technology with mechanistic models of reality such as the industrial assembly line. Now the industrial plant is a poor analogy of our present capability, and perhaps this is the source of much confusion. The assembly line is designed to "track" the flow of material in a linear, sequential order, with the clock as the paradigm. That is, how many <u>things</u> can be produced in how much <u>time</u>, and at the most reasonable <u>cost</u>? Success on the assembly line depends on reducing resources, man hours (time) and thus cost. However the computer and its electronic speed permits the simultaneous processing of complex data thereby creating a whole new range of possibilities. With the use of the computer in the model we will describe, it is possible to build into our instructional programs those processes we would label humane values: flexibility, diversity and choice.

Humane Education

The central question raised here is whether educational programs can and will be developed which increase the power of individuals over their own lives. In other words, whether there will be programs which foster and support democratic institutions which allow individuals to make choices and sacrifices on a voluntary basis. Or will the new educational programs be founded on a new authoritarianism, distributing power (i.e. rewards) only to those individuals who conform to predetermined behavioral patterns? William Arrowsmith has put the proposition in these words:

> What we must have, unless we are prepared to abandon our fates to parochial technicians, is precisely the pluralism

> to which we are committed. We need options, choices, alternatives; we need to honor the diversity of human skills and needs. We simply cannot afford, except at the cost of everything, to permit the range of realization to be narrowed to one small mode of the mind, and that a mode, which seems, in fact, to have lost respect for humanity. (1,p.52)

We assume, therefore, that an educational design which maximizes student participation in the key decisions of the learning experiences is more humane than one which limits the range of participation. If we are to have fully functioning individuals who make choices, cope with stress and have compassion and respect for others, then we must have teachers and instructional programs that display these characteristics. Responsible people get to be responsible by being responsible. Truism though this statement is, it represents the principle of humane education we have sought to provide in the model design presented here.

THE MODEL

The conceptual framework of the instructional model presented here is an extension and adaptation of that used in Michigan State University's teacher education program. (4,pp.4-16) It presents a systematic organization of the variables of instruction -- human, curricular and environmental -- which affect the outcome of learning activities. An assumption is made about the symbiotic relationship between the instruction and the learner, one which is rarely recognized by instructional designers. The needs and abilities of students must be matched by the resources and competence of the instructors. In traditional designs the instructional focus is on the expertise of the teacher. It is presumed that his knowledge and skill is relevant and accessible to students. In the strictest of behavioral modification designs the instructional focus is on the behavioral indicators of learner change. Again it is presumed that the instructor (the behavioral modifier) knows what is best for students and this gives license to control the contingency schedule over student activities. Our design recognizes that there is a mutually beneficial relationship between the expertise of the instructional team and the needs of students. This symbiosis results in a design which focuses on the learner outcomes as mutually defined by learners and instructors. No relevance is presumed of the curriculum by virtue of the authority of the curriculum designer. Rather the curriculum planners are required to justify the competency goals by attention to the consequences of the knowledge, skills and performances in the repertoire of the learners. Instead of assuming that "students will thank us someday" for what is required of them, we would look to the demonstration of the consequence of making specific decisions today.

The key factor we are focusing on is the opportunity for students to make the majority of the decisions about what is learned, how it is learned and when it is learned. The decisions about what is learned should be determined by what Schwab (8,p.22) calls deliberation or what we call negotiation. The competencies and the strategies required of students should be determined by the joint planning of a parity team consisting of researchers, designers, instructors, classroom teachers, and administrative personnel. These competencies are always open to modification in the reality testing of the implementation.

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To give the student the widest latitude we provide a well-designed module of instruction which uses a mastery criterion for evaluation. As Bloom pointed out, "most students (perhaps over 90%) can master what we teach." (3,p.48) In our program there is a criterion for mastery for each unit (or module) toward which the student works until he achieves that level of performance. If after first trial a student fails to reach mastery level, the student and instructor determines the areas of need and possible reasons for failure. They may redefine the learning experience to optimize the possibility of success on the second trial.

The most crucial variable in the control of the student is "when" he learns. The mastery model assumes that time is a variable and performance, achievement is the constant. Working toward the achieving mastery develops a sense of success and accomplishment in students. The development of good self-concepts is an intrinsic aspect of the model. The affective impact of the learning experience is of equal priority to conceptual growth and skill acquisition. Students feel good about themselves when engaged in activities over which they have real negotiating power and in which they can measure their own success.

At this point we will illustrate our teaching-learning model both with actual elements already in existence at Michigan State University in one basic teacher education course and with simulated elements. The total system is a hypothetical teacher education program proposed by the authors, as one which could feasibly be implemented here. The authors have worked with teacher education students in individual and group settings, and with the curriculum planning team of our basic teacher education course. It is through the experience with this course's growing pains and through students' generous feedback, that the authors have projected the refinements illustrated in the following flow chart of student learning experiences.

THE FLOW CHART - ILLUSTRATED

This once popular poster which states, "I am human, please do not fold, spindle, or mutilate," undoubtedly appeared as a result of the feelings of being dehumanized. We start with it as a reminder that the top priority in our system is that students come out of our program possessing an increased sense of self-worth, accomplishment, self-direction, and purpose. If he/she doesn't, then we haven't met our goals. The student's growth is our ultimate reason for being.

When the student is enrolled in a learning program, it is very important for him/her to feel a sense of belonging. The first step is to join a small group (about 12-15) of other new enrollees. These small groups will provide a milieu for the student to ask serious personal questions: "Who am I? Where am I? Where am I going? Why?" The composition of these groups may change after a period of time or remain throughout the total program. There would be advantages to both -- variety of input and experience vs. a sense of lasting relationships. The importance of structured personal encounters in college has been pointed out by Morris, et al in their work with undergraduates at U. of California, Davis. (6,pp.1001-7)

The computer maintains a data file on each student as to where he is in his progress towards graduation. It notes competencies attained and interest areas and modules available to the student at any given time -- available by virtue of having mastered any prerequisite competencies deemed necessary. The interest areas could be spelled out, but perhaps modules given a letter notation to simplify the printout.

At this point the student looks at the interest areas and chooses one that seems most relevant to him.

He gives the computer the name and/or code number of that interest area -- for example, Algebra.

Computer lists modules under Algebra that the student can begin with. In this case it is limited because of the generally hierarchical nature of math.

Student is requesting the module on "Fundamental Set Theory".

Student is given a list of objectives. He decides they are interesting so requests them.

A complete module includes a pre-test of both prerequisite skills and the objectives of the module. It would be the student's responsibility to brush up on any prerequisite skills, but he could obtain help from the appropriate faculty, if needed. Mastery of any of the objectives would suggest that he could pass up those particular learning experiences. Also included -- a statement of the rationale for this particular module, a list of objectives, and a list of strategies to help master the objectives. These strategies would include a list of material resources (e.g. textbooks, Cuesenaire rods,) methods (e.g. instructional guides perhaps keyed for an inductive or deductive approach to be utilized at the student's option.) and the milieu (e.g. location of math lab, instructors available for assistance, structured group tutoring expriences.) Also given are instructions for alternate forms of evaluation and directions for arranging an evaluation session.

Student pursues steps in the module

The student takes a pre-test and works in math lab with equipment. He then takes a computer-designed evaluation.

Staff in charge of evaluation laboratory scores and/or records results of the exam. If mastered, the computer is given this data. Otherwise the student is given information as to which objectives he didn't master and goes back to the appropriate place in his learning schedule.

Note, however, that the preceding example applies only to the student who chooses to accept the learning module as written. The student who consistently accepts all programs without question would be as much concern as the student who can't accept any of the necessary limitations of a learning experience. We want the students to have the opportunities to negotiate the variables of the instructional program. The second illustration shows the operation of the decision loops built into the model program

which not only permits, but also encourages negotiation of the goals and strategies of the modules listed in the storage and retrieval index of the computer.

Our second student identifies himself and receives the list of interest areas available to him. There will be a wider range of selections for our more advanced student who now has a foundation of mastered skills on which to build.

Here is the point at which our system begins to respond to the student. Our student may be caught up in a personal problem or an academic rut. Nothing looks good to him now. He takes his frustration to his counselor-instructor and they discuss his lack of motivation. There is no pressure for the student to continue working on modules until he feels ready. At this point he may not opt out of the program completely or deal with the problems interfering with his learning. According to Maslow, a student with physical or socio-emotional problems experiences difficulty in intellectual achievement. (5) Thus, when the student feels ready to continue, he may do so. The significant aspect of this approach is the focus on affective learning -- the attitudinal facet -- in education. Coercion seldom provokes positive affect for learning.

Now our student is ready to tackle another module. He has looked over the interest areas again and decides he might be interested in Psychology of Personality, which he types on the computer.

The computer prints out the list of modules available to this student.

Our student looks over the list and selects the topic "Self-Assessment", which he types with the interest area code into the computer.

The student is given the printout of the objectives for the "Self-Assessment" module and the conditions for achieving them.

The student examines the objectives and decides that, because in his view the emphasis is much too Freudian, he isn't interested in that approach and goes back to the interest area list. He's heard that the approach used in the "Teacher Skills" area is much more utilitarian so he decides to check that out.

The student indicates to the computer his interest in the "Teacher Skills" area.

The computer feeds him back the interest area code number and the list of module topics in this area. Student looks this over and decides that he would like to focus on "Student Assessment".

Our student types the code and module name, receives the list of objectives. Looking them over he decides they are fairly close to what he wants.

Relatively satisfied with the objectives he now requests the complete module. Looking it over, he feels it covers about what he's interested in, but he also has some ideas of his own. So he decides he needs to discuss the module with the appropriate subject matter instructor.

Again the system responds to a need by providing the student with an opportunity for self-determination. He only needs accept the computer's output if it is agreeable to him. If not, there is freedom to deal with his reactions. It seems reasonable suggest that the computer could also handle appointments. If the instructors give the computer information as to available sign-up times, the computer can accept a student's request and process it.

This can be a learning experience for both instructor and student. As the student analyzes the objectives more thoroughly as to how they relate to him the instructor can help him discover their relevance. At the same time the student may propose a more useful and defensible objective which the instructor can perhaps consider incorporating into the module after the student tests its appropriateness. This is the element of freedom Rogers speaks of in learning -- both building upon real problems and contracting or negotiating with the student his learning goals. (7,pp.130-133)

Our student has written a modified objective in which he wants to assess himself as a student because he would like to assess a real person rather than a simulated in-basket student. The instructor suggests that that objective is included in the "Self-Growth for Teachers" module and is somewhat different from assessing others, but wonders if he could suggest another alternative. The student tutors in an inner-city school and suggests assessing one of his real students. This seems satisfactory to both and the instructor accepts it as a substitute for the simulation experience.

Our first inclination was to say that the learning experience now begins, but actually the student has been learning all along. He now takes a pre-test to learn where he needs to focus his attention during the strategy implementation phase. He receives immediate knowledge of results so that he can begin immediately to pursue his goals.

IMPLEMENTING STRATEGIES

The module listed a variety of strategies which could be used to meet the objectives -- including methods, materials, and milieu suggested. The student can utilize one or all of these strategies to help him master the objectives another proposal by Rogers for achieving humanistic education. There are a number of options.

Seminar - discussion oriented

Small group - experiential

Books - text and supplementary

Traditional and Programmed

Micro-lab; Video-tape

A hi-fidelity simulation w/feedback

Peer learning group - no instructor or structure

Informal, flexible

Computer-assisted instruction

(Simulation game)

Auto-tutorial

Individual, self-paced instructional carrels

Clinic Classroom

The real

Evaluation

The student, when he feels he is ready, arranges (perhaps with the computer) to take an evaluation. This evaluation may be a computer-run test, a pencil-paper test, a small group or individual oral exam, a micro-lab performance exam, or whatever else is most appropriate to the content of the objectives.

Assuming our student did not make mastery, several alternate routes are available to him. First he tries to decide why he didn't make mastery. If he is aware he just needs more preparation, he may study again and retake an alternate mastery exam. Then he is ready to move on to the beginning of the flow-chart for a new module. If he feels the problem is with the instructional program he goes to the instructor and makes suggestions for improvement. They modify the instructional design until both are satisfied and the student pursues his objectives again. He may recycle any number of times until mastery is attained, although each failure can be frustrating so attention should be given to real improvement of the curriculum at the earliest possible time.

When the student has mastered the objectives, the evaluation aide feeds the information into the computer and our student is ready to look again at new possibilities opened up by his mastery of this module.

The model presented here is designed to facilitate the development of self actualizing responsible people.

The diverse modes of instruction such as small groups of peers, counselor assistance, clinical experience and computer assisted instruction, encourages the student to look at himself and his relationships with other people and provides constant input, experience and feedback for students and staff. The student is invited to explore options, make decisions and evaluate

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his decisions. The ongoing process of trusting in his own decisions and coping with the outcomes of his choices will provide relevant experiences and the awareness that he the student is his own best problem solver. The power which results from the student and staff trusting in each other has a greater humanizing force than the isolated expertise of competitive individuals. These are the essentials. In our minds these are outcomes which are generalizable to any humane educational setting encompassing the whole of society -- from the world of the family to the business world and beyond that to the world of government.

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