THE IMPACT OF INFORMATION TECHNOLOGIES ON TEACHER PREPARATION AND DISTANCE LEARNING SYSTEMS

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I am an Associate Professor in Educational Technology from Arizona State University in the United States. I am in Turkey this year as a Fulbright Lecturer/Researcher working at Anadolu University in the Açıköğretim Faculty. I am happy to be able to discuss with you the role of Educational Technology in distance learning systems, and how those concepts can be useful to teacher preparation programs.

We are living in exciting and challenging times. Never before have so many people in so many parts of the world demanded access to education. In Turkey alone there are 500,000 students competing for 50,000 university places. In lycees and secondary schools poor student achievement, burgeoning population, and high student teacher ratios have combined to make classroom teaching increasingly more difficult. At the university level programs such as Turkey's Distance Education Project are working hard to provide education in business and accounting for those students at a distance who are unable to attend universities. Through these efforts twice as many students now have access to some form of higher education.

These solutions to educational problems can only be successfull if they take into account the needs of the individual learner. Research has shown that the measure of success for a distance learning program is the number of students retained in that program. Students who remain in the program have been found to

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achieve as well or better than students in the classroom (1). It has been shown in numerous studies that motivated students of all ages will progress at their own speed without the need of a traditional classroom by using instructional technologies (2). In the United states, educators predict that the year 2000 will see a mastery-based learning model in which students use information technologies in non traditional classroom settings, often at home, to acquire knowledge at their own speed tailored to their individual learning needs (3). Distance education programs are not the onl/ ones interested in current methods and technologies. Both distance and face-to learning programs can benefit from using the techniques of educational technology by using current methods and developments in communication to systematically address the needs of today's students.

What is educational technology? How can it help teacher preparation? How can good teacher preparation programs improve the condition of education?

Educational Technology. Educational technology is a systematic appoach to learning which uses current methods, materials and technologies. Effective instruction is based on sound principles of instructional design and takes into consideration learning, communication and psychological theories, all in an effort to help people learn. With such a systematic approach we can easily design effective instruction, making the best use of information technologies.

For too long educators have failed to keep up with changes in society. This is a common problem. In many countries the prevailing practice of teaching large groups of students by rote learning methods in classroom situations has been criticized. These systems, while addressing pressing educational needs, result in a mediocre quality of education which can discourage both the best and worst students. The solution of imposing stricter discipline standards and more rigorous course content has not worked. The missing ingredient has been attention to individual student needs. Unless education meets the needs of the student, such problems will continue. Educational technology's greatest potential iles in its capacity to manage and deliver learning geared to the needs of each student. The goal of distance education is to provide such

individualized instruction using technology based materials. However, the benefits of educational technology are not limited to distance education.

Education at all levels can be made more cost effective and more relevant to student needs through technology based systems. In 1983 The United States Commission on Excellence in Education published its report «A Nation at Risk» which documented deteriorating educational conditions in the United States (4). The nation was at risk, it stated, because the demands of our society to offer equal educational opportunities to all was not being met. In our efforts to educate more and more people, students coming from our systems were ill prepared for productive and self-sufficient lives. By increasing quantity we were losing quality and our nation was «at risk». One of the many recommendations for reform in «A Nation at Risk» was to explore the promise of information technology to improve education. A subsequent report titled, «Transforming American Education; Reducing the Risk to the Nation» was completed in 1985 by the National Task Force on Educational Technology (5). The report, noting the rapid growth of information technology at all levels of education, examined how these technologies (primarily electronic information-age technologies) could meet the emerging needs of students. The report describes how information technologies improve quality of education, increase equality of oportunity for students, and offer cost effective alternatives to traditional methods of instruction. The report focuses on how technologies can meet the needs of students rather than on the technology itself. It is these applications of educational technology which can be of use to teacher preparation programs.

Teacher Preparation Programs. Teacher preparation programs can use the principles of educational technology by offering students a strong foundation in theories of learning, communication and psychology. In addition good preparation in both principles and procedures for instructional design should be given.

THEORIES

Learning Theories. Learning theories take into account how students learn and what they retain. Although you have probably heard of the following two theorists, I would like you to reconsider

their importance with me. Benjamin Bloom is a name well known to American educators. His taxonomy of educational objectives is recited regularly by students in teacher preparation. Yet few of us stop to consider in our daily teaching which levels of learning we are really expecting from our students. If our instruction is not well designed, that is if we have not considered the learner's abilities, defined our objectives adequately and decided on an appropriate instructional sequence in advance, we cannot expect students to progress past the rote memory state to that of synthesis and analysis or mastery of the subject. Education is not simply a case of memorizing and reciting facts. Those facts cannot be used intelligently unless they are carefully considered and analyzed. Much of our instruction falls short because we fail to provide students with models for synthesis and analysis which involve questioning, discussing and forming thoughtful opinions.

The second theorist, Robert Gagné, in his book «Principles of Instructional Design», describes nine events of instruction which result from what we know about learning theory (6). Any number of these events can be included in instruction. These events of instruction are designed to make it possible for a learner to proceed from «where he is» to full mastery of the learning objectives. The nine events of instruction are; GAINING THE LEARNER'S ATTENTION, INFORMING THE LEARNER OF THE OBJECTIVE, STIMULATING RECALL, PRESENTING THE LESSON, PROVIDING LEARNER GUIDANCE, ELICITING THE PERFORMANCE, PROVIDING FEEDBACK, ASSESSING THE PERFORMANCE, AND ENHANCING RETENTION AND TRANSFER. These events occur to one degree or another in most lessons, but unless they are systematically planned beforehand, they will have little positive effect on instruction.

Communication Theories. Theories of communication are important to teachers because without an audience and a message there is no one to hear and nothing to teach. Communication theories emphasize that the communicative process consists of a message, a sender, and a receiver. All three are of utmost importance in having one's message received and understood. Both single and multi-channel theories allow teachers to design appropriate instruction which will facilitate learning.

Psychological Theories. Principles of psychology are an essential part of teacher preparation in order for teachers to understand

interpersonal communications and the ways in which teacher and student interactions occur. Adolescent psychology is especially helpful in understanding how young people relate to their peers as well as to adults. without an understanding of psychology it is extremely difficult to make the most of instructional opportunities.

All three; learning theories, communication theories and psychological theories should form the backbone of any good educational program. Once these broad areas of social science have been explored by the prospective teacher, it is time to begin to look at the process of educational technology. You remember I said that Educational Technology is a systematic process for designing instruction. Let's look at the principles and procedures for designing good instruction.

PRINCIPLES OF INSTRUCTIONAL DESIGN

Questions. There are five questions to ask before beginning to design the lesson. WHAT, WHO, WHEN, WHERE AND WHY? **WHAT** ideas or concepts are important for the student to learn? Instructional objectives must be decided beforehand and are best stated in behavioral terms; that is what observable behaviors should a student exhibit as a result of the instruction? **Who** is the learner? Identify the type of background, age group, and previous education **When** will the instruction be delivered, and how long are the lessons? Designing one three hour lesson may require different activities than three one hour lessons. **Where** will the lessons to be given? If lessons are to be given to 500 students in a large lecture hall you wouldn't want much discussion, but you might want a lot of projected visuals. **Why** are you giving the instruction? This is probably the most important question of all. Does it meet a need the students have for this information? If not there may be other unanticipated instructional problems. We can summarize these points by asking ourselves «What information, to whom, for what reason, in what location, and for what purpose»? Once you have answered those five questions you are ready to follow the five procedures for designing good instruction.

Procedures for designing instruction.

- determine the instructional outcomes
- define the performance objectives

- design the instructional sequence
- select the appropriate technology
- test and revise

There is not time to elaborate on these procedures, but they are discussed completely in the Gagné and Briggs book. While instruction is being designed, the educator must consider which technologies will be used to teach the lesson whether it be printed material, film or other media.

CURRENT INSTRUCTIONAL TECHNOLOGIES

There are many visual and audio aids which enhance learning. Teachers should be instructed in how to incorporate these aids into good teaching. Such simple technologies as posters and flannelboards, which are not expensive, have been shown to help in gaining and maintaining the attention of the learner and can be very effective and valuable resources.

Teachers should also be instructed in the potential of electronic age information technologies to meet learner needs. Producing well designed instruction for simple technologies like books, radio, television, audio and viedo tapes can make existing face-to-face and distance education programs more effective. An adequate understanding of the potential of information technologies such as interactive video, computer teleconferencing, videotext and sattelite facilitated transmissions, will allow appropriate technologies to be used for specific education tasks. Such technologies are currently being used effectively worldwide in distance education programs, making it possible for a small number of teachers to reach a large number of students. Turkey is but one example of many countries needing to educate large masses of people. Technologies offer rapid transmission of large amount of information quicky and economically. The increa'sing availability of low cost communications networks such as EARN and BITNET which are now coming to Turkey give worldwide access to international data bases which can help faculties of education both in distance and face-to-face programs. In its final report, the United States Task Force on Educational Technology made two recommendations to higher education institutions.

1. Redesign pre-service teacher education programs to include the effective uses of technology, including its uses in teaching for subject matter mastery.
2. Ensure that teacher educators themselves are fully competent in applying technology to education.

The recommendations are designed to improve teacher education which, in turn, can improve the overall educational system.

Conclusion. Well prepared teachers are the best resource for improving education. Teachers must be trained to meet the needs of today's students. They must be trained in contemporary developments in education, as well as have the ability to design instruction and to understand new developments in information technologies. This is an information age and nowhere is it more evident than in countries like Turkey where students suddenly have access to television, video players and now computers. These technologies are becoming steadily more accessible and less expensive. It is the responsibility of the teaching profession to educate students to become critical consumers of these new technologies. Teachers well prepared in the social sciences, who in addition can design instruction and have a knowledge of contemporary technologies can radically change the position of teachers today in three key areas:

1. Increase the desireability of teaching as a profession.

Teaching has suffered from being an undervalued profession. It has typically attracted students with lower scores. As a result, people who go into teaching are not the country's most able students. This will continue as long as teaching is not viewed as a highly respected or desireable profession. Improving the quality of teacher training instruction will begin to attract better students.

2. Improve quality by raising standards of entering students.

An important corollary to improving instruction, is to raise the expectations for students entering teacher training programs. A rigorous educational program is needed to produce better teachers. Although teacher shortages are a very real issue, one must ask the question, «Is it in the country's best interests to have many underqualified teachers»?

3. Improve status and working conditions of teachers.

Teaching has been plagued with unsatisfactory compensation, lack of potential for advencement, little voice in management decisions, and frustrating working conditions. This ultimately results in teacher shortages or the recruitment of unqualilfied teachers. Teachers must be of high enough quality to be regarded as essential to the educational development of a country. Only in this way will status become commensurate with education. When this happens salaries will begin to reflect job expectations, and should reward the amount of education undertaken. Then teachers can afford to buy books, stay current in their fields, and be a positive resource in current educational practices and technologies. Although these events may not all occur, just as with Gagné's Events of Instruction, any combination of these events can begin to make a difference which will be felt throughout the educational system.

FOOTNOTES

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(2) Melmed, Arthur S. (1986). The technology of American education : problem and opportunity. **Technological Horizons in Education Journal, 14,** (2), September.

(3) National Task Force on Educational Technology (1985). **Transforming American Education : Reducing the Risk to the Nation.** A Report to the Secretary of Education, U.S. Department of Education, Washington, D.C.

(4) National Commission on Excellence in Education (1983). A nation at risk : The imperative for educational reform. **The Chronicle for Higher Education, 26,** (10), May.

(5) National Task Force on Educational Technology (1985). **Ibid.**

(6) Gagné, R. & Briggs, L. (1979). **Principles of Instructional Design** (2nd. Ed.) New York : Holt, Rinehart & Winston.