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ABSTRACT

This paper presents a decision making model that uses a systematic approach to design; has as a driving force the needs and goals of a particular learning situation; is derived from traditional instructional system design models such as Kemp, Dick & Carey, and Romiszowski; and in addition addresses the potential impact of multimedia as a delivery system/learning tool. Presented in the form of a puzzle, the model is a series of eight interlocking pieces representing: (1) learner characteristics; (2) topics and tasks--content or task analysis; (3) objectives; (4) performance assessment--occurring in four levels of reaction, learning, changes, and long term results; (5) instructional activities; (6) media/delivery systems--integration of instructional design and media/delivery systems; (7) resources; (8) the central piece, the analysis phase, which defines the needs and goals of the situation. The entire process represented in the model is connected by continuous revision and evaluation, for which an instrument called Checklist for Multimedia Design has been developed suggesting questions that the instructional design team should ask. A Project Task Timeline has also been developed that defines the roles and responsibilities of team members and lists tasks that should be completed in the design phase. Figure 1 illustrates the model. (Contains 11 references.) (ALF)

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Multimedia in Industry and Education: A Decision Model for Design

by
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The need to develop life-long learners has become increasingly urgent as we move into the twenty-first century. Technology and the move toward a global society demand continuous adaptation and change. Schools are under pressure from society to create a quality curriculum with additional components which go far beyond that which was expected fifteen or twenty years ago. In order to remain competitive industry is required to train individuals to work in particular environments and to upgrade skills and knowledge as new developments unfold. Fortune Magazine states that the most successful corporation of the 1990's "will be something called a learning organization, a consummately adaptive enterprise."

Traditional methods of delivering training and education have had limited success in meeting the fast-paced and high-quality demands of learning environments today. Attracting and retaining culturally and academically diverse learners in schools today will be strongly influenced by the effectiveness of instructional delivery systems and whether or not learners can both relate to the material presented and see an almost immediate application for their learning. Multimedia can change the look and feel of learning by providing an opportunity to reach people with different learning styles, different skill levels, and in different geographical areas; multimedia offers the potential to reduce the learning curve and accelerate the learning process. Rather than being seen as expensive and frivolous, multimedia approaches may then be seen as an economic necessity both in industry and education. To be sure, there are situations where traditional approaches may actually be the preferred delivery system. It is also possible to become so enamored of a particular technology that the equipment itself becomes more important than the need for learning. In order to make an informed decision about the use of multimedia, a systematic approach to design should be firmly in place and it should have as its driving force the needs and goals of a particular learning situation.

Figure 1 is a graphic representation of the design process in a puzzle form comprised of a series of interlocking pieces. The depiction of the process is not linear because of the reiterative nature of the process which may begin at almost any point. However, to be effective the process must be driven by clearly identified needs and goals, as with any good design model. This does not mean that the needs and goals may not shift as different pieces of the process are introduced, such as rapidly developing technology or budgetary constraints. The design model described here is derived from traditional instructional system design models (Kemp, Dick & Carey, Romiszowski); however, the potential impact of multimedia as a delivery system/learning tool was not often addressed as part of this process.

It is apparent when looking at the possibilities multimedia has to offer that communication with experts in other disciplines will be vital to the success of a project. The very nature of multimedia creates a need for interdisciplinary dialogue and a blurring of discipline lines. It is not only educators, trainers, performance technologists, and instructional designers who are interested, but computer programmers, video and audio production specialists, and marketing professionals who are actively involved. Members of this diverse team must have a common understanding of the instructional design process to make the best use of each unique orientation to multimedia. As each element in the model is addressed it is important to note that previously developed elements may need to be evaluated and then revised in light of new input.

In the analysis phase of design a consideration of the problems that need to be solved through instruction should be systematically developed. The needs and goals may change as a project takes shape because the primary concern in this phase is client-centered. In both school and organizational settings, the client's expectations are key to

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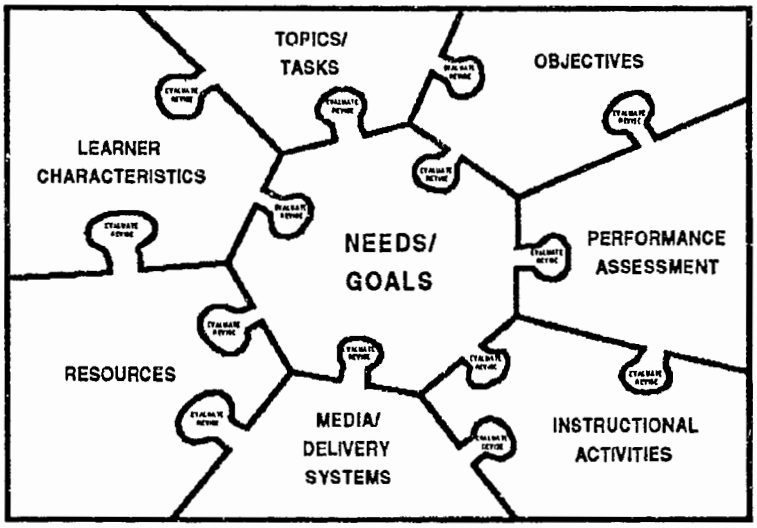

Figure 1
Decision Model for Multimedia Design

the success of the end product. Although correct analysis is basic to effective instructional design, many clients by-pass this stage and assume that they know the solution. With the high costs of developing technological instruction, it is imperative to conduct an analysis of the organization, the task, and the learners before any action is taken.

Learner characteristics reflect the demographic attributes, learning styles, readiness, and motivation to learn of the target audience. Variables such as learners' expectations affect the amount of time is needed for instruction, the level of instruction, and the varied approaches that are required.

Topics and tasks are identified by performing a content or task analysis to determine what components should be included in instruction. Subject matter specialists or exemplary performers can provide the specific areas to be incorporated. At this stage of the design process, heavy emphasis is placed on researching items to include in the content and finding a sufficient number of sources to support the level of detail to provide the foundation for instruction.

Objectives are directly related to the goals and reflect the intent of instruction, and should focus on learning outcomes and should be stated in measurable terms. While all members of the team should be consulted and involved in the development of project objectives the refinement of those objectives may best be left to the team members who have this expertise.

The methods of ***performance assessment*** should match the desired outcomes of instruction. They may range from simple pencil and paper tests to working through complex case studies. Media may be incorporated in assessing performance so that the learner may measure his/her own performance and/or review it at a later date. According to Kirkpatrick (1976) performance assessment should occur on several levels: 1) reaction; 2) learning; 3) changes in behavior; and 4) long-term results, taking place immediately following instruction and also several months after instruction. Multimedia can play an important role in post-instructional assessment through teleconferencing, distance learning activities, etc.

Instructional activities are the learning experiences developed to present instruction and to allow the learners to demonstrate their ability to meet the desired performance level. Activities may range from delivering instruction via an instructor dominated mode (such as lecture) to delivering instruction through a vehicle such as multimedia where many methods may be woven together. Activities need to be carefully planned and controlled by

the allotted time which will determine the depth of the content and the number of activities which can be designed to support learning.

The choices for ***media/delivery systems*** for instruction are extensive. If one is limited to a traditional classroom model, then lecture may be the primary mode of delivery. However, with the range of media available to entice, enhance, and reinforce learning, the selection of media/delivery systems may be one of the most important elements in designing instruction. The integration of instructional design and multimedia will be a key factor in the learning process of students in educational systems today because of the many changes in the instructional process.

Resources impact all stages of the design cycle. Limited resources may lead to the conclusion that the use of multimedia is not a viable option. However, the use of technology is cost-effective when it is selected based on strategic considerations. Many instructional designers are hesitant to work with technology because of a lack of knowledge and experience. For this reason many companies are using teams comprised of project managers and administrators, graphic artists, instructional designers, instructors/teachers, media specialists, writers, subject matter experts, and performance technologists whose combined expertise produces a more integrated learning experience. Many specialists are used to working in isolation or have only been involved at certain points during the developmental process with other types of projects. Instructional multimedia requires a different approach. Team members may be unaware of the tasks for which other members are responsible and lack appreciation for the amount of time these tasks realistically take. This necessitates that time be spent on building a psychological support structure to ensure the success of the team. Project management skills are crucial so that one member of a team is not wasting time while another fails to meet a deadline. All team members should be aware of budgetary limitations, completion dates, and the most effective distribution of resources. A Project Task Timeline has been developed and lists a number of tasks that should be completed as part of the design process, the most important being the development of clearly defined instructional goals which leads to clearly defined roles and responsibilities for team members.

The entire process goes through continuous ***revision and evaluation***. Each decision made influences many others so that the various elements are constantly being reviewed. A Checklist for Multimedia Design has also been developed which suggests questions that the instructional design team should ask. The form follows the pieces of the multimedia decision model and provides a series of items which to discuss so that all members of the team become aware of the broad scope of the project and the variety of decisions which are made during the stages of the design process. The questions are designed to encourage a sharing of ideas and reservations and also to provide team members with a common vocabulary. Specific tasks should be assigned to team members as the questions on the checklist are discussed, or at a later date. When the team invests the needed time up-front to systemically research the pertinent issues, team members acquire a wider perspective.

The increased number of participants attending international conferences demonstrates that as we move to a global economy, nations of the world share many common problems. An assessment of the educational system in the United States is documented in two reports: America 2000 and the Secretary's Commission on Necessary Skills (SCANS) report. The latter report ties together the importance of instructional design, multimedia and the need to change the way education is structured. Central to the development of an agenda for the use of technology is a systematic assessment of needs and goals. This requires the development of teams to ensure a comprehensive understanding of what technology and multimedia can bring to the educational process rather than being seduced by its impressive capabilities. The impact of technology on instruction cannot be denied. However, the message and not the media/delivery system is the central issue. The design model encourages a total integration of both the message and the media/delivery system.

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