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Using interactive video in vocational training of mildly retarded students

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Abstract

This paper is a literature review of studies and articles done in both fields in order to expose the characteristics of interactive video and the learning characteristics of mentally retarded students to the reader. This paper will also address the instructional design process. There are some special considerations that need to be made when designing instruction for the handicapped learner. A selection model has been included to further aid the reader in the decision to use interactive video by bringing some alternatives to light. Interactive video is but a single component in the larger instructional program. Therefore, other elements of the instructional design will affect the decision to use interactive video or not.

Using Interactive Video in Vocational Training of Mildly Retarded Students

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Chapter 1

Introduction

Interactive video has been the focus of much attention, both industrial and educational, since the early 1980's. Vocational education of handicapped students is constantly being reviewed to find ways of improving the quality of life that these individuals lead.

The problem facing a special education instructor who might be considering the use of interactive video in his/her classroom is the lack of literary resources. Studies have been done with interactive video and on learning characteristics of mentally retarded students, but very few studies have combined the two.

Purpose

This paper is a literature review of studies and articles done in both fields in order to expose the characteristics of interactive video and the learning characteristics of mentally retarded students to the reader.

This paper will also address the instructional design process. There are some special considerations that need to be made when designing instruction for the handicapped learner. A selection model has been included to further aid the reader in the decision to

use interactive video by bringing some alternatives to light. Interactive video is but a single component in the larger instructional program. Therefore, other elements of the instructional design will affect the decision to use interactive video or not.

Research Area

Many of the reviews cited have been written to sway the reader's opinion in one direction or the other. Reading such reviews is unfortunate, not to mention confusing, for the instructor trying to determine if interactive video is the right media for his/her classroom. This paper will attempt to present interactive video in an objective way and expose some of the propaganda of some of the reviews.

Traditionally, proponents of educational technology have been non-teachers. Instructional radio, film and instructional television were each touted by educational technologists as the panacea of education. This technology, they said, will revolutionize teaching forever. Unfortunately these theorists failed to realize one very important fact, the final authority on whether or not a technology is used in the classroom, or whether it is used properly is still the classroom teacher.

This paper will not take the point of view previously endorsed by these theorists. The technology should supplement, not replace the classroom teacher. A new instructional technology is nothing more than an expensive gimmick unless it does a better job of teaching or enables something to be taught that could not have been presented before (Schaefer, 1975). Humans are social beings and removing the social or the human element from learning would be detrimental to the student's development. The issue of teacher involvement becomes especially sensitive when considering the concept of mainstreaming and vocational training of the mentally handicapped learner. The concept of "mainstreaming"' for students with specific learning disabilities is based on the premise that all students need many kinds of human interaction (Washburn, 1979). Teachers are still the best educators. The use of instructional aids can help to improve a teacher's performance. Media can be used to illustrate subjects that are difficult to explain. Teachers who work with mentally retarded students can use interactive video to help them with remedial and tutorial aspects of their work (Iuppa and Anderson, 1988).

Definitions

There are many different terms included in this manuscript that may or may not be familiar to the reader. Even if the reader is familiar with the terms, some guidelines must be laid. In order to remove any ambiguity, a definition of terms is in order.

Interactive Video. The specific hardware used to deliver interactive video is not so much the issue as the concept of interactive video. The design of interactive video is the one element that transfers across all the interactive media (Iuppa and Anderson, 1988). In an interactive video system, "video data can be accessed and analyzed in the same fashion as symbolic data. .... It also is possible to organize and access video data in non-linear ways for instruction" (Martorella, 1989, p. 7).

The ability to pick and choose the information allows students to review and learn subjects that present difficulty and pass over or through material that has been mastered.

Multimedia. Multimedia is a term being used to refer to the grouping of various media into one product. Text, graphics, video and audio are being combined with computers to create presentations unlike any other. Interactivity may be written into the program to allow

the end user to explore different topics. Some of the multimedia products that are beginning to emerge include video notebooks, simulations, games, tutorials and teacher lecture aids (Ambron, 1988).

Instructional Design. The instructional design process is a systematic approach for for creating instructional programs or presentations. The process takes into consideration the goals and objectives, user analysis and provides a mechanism for revising the program to obtain the most effective lesson.

Selection Model. Using a selection model is a good way for instructors to identify the most appropriate media for the learning task at hand. Questions are asked concerning the characteristics of the learner and the task, and are compared with the attributes of the various media, identifying the best supplement to the instruction.

Mentally Retarded. The American Association on Mental Deficiency (AAMD) recognizes two characteristics before classifying someone as being mentally retarded. The first is that the individual has an intelligence quotient of more than two standard deviations below the mean of 100. The second characteristic deals with a deficiency in adaptive behavior (Clark and Kolstoe, 1990). The AAMD defines mental retardation as

"significantly subaverage general intellectual functioning existing concurrently with deficient adaptive behavior and manifested during the development period" (Clark and Kolstoe, 1990, p.74).

Vocational Education. "Vocational education is a local, state, or federal endeavor focusing on occupational preparation of individuals at less than a baccalaureate level. It's primary concern is with preparation for employment. It maintains a close relationship to actual jobs in order to understand that process of developing skill that are related to obtaining and maintaining employment. this it concerns itself with work, the work process, and work skills." (Brolin, 1982, pp. 7-8)

This definition of vocational education, however, does not elaborate on what is involved in vocational education. Vocational education could be described as being a single component of many in the career education process. Preparing a student for employment also means preparing the student for independent living. In addition to work specific skills other skills, or daily living skills, such as managing money, personal hygiene, preparing food and transportation are a few among the many tasks that need to be mastered by the handicapped learner.

Daily living skill are essential if the mentally retarded citizen is to survive in society.

Chapter 2

Literature Review

Interactive Video

> "... audio visual no longer means bombarding a passive audience with sight and sound. Instead, the child learns through active participation with is the way most true learning occurs" (Schaefer, 1975, p. xii).

Active participation through interaction is what separates interactive video from other mediums. A definition of interactive video must include two parts. The first describing the actual hardware involved and the second describing of the interactive video concept.

History

Optical video discs began appearing on the market in the late 1970's and early 1980's as an alternative audio visual storage medium. Early users included the CIA and the military, the medical profession and video game manufactures. By the mid 1980's, videodiscs began seeing widespread use in training and point of sales kiosks for business and industry. Executives saw the cost effectiveness of using videodisc to train large numbers of employees in a lesser amount of time. (Perlmutter, 1991)

Education began officially recognizing the benefits of interactive video by around 1983. Interactive video discs were mentioned in the Educational Media Yearbook as "Videodiscs; with computers" (Brown and Brown, 1983) and getting full billing as interactive video in 1984. Early educational theorists predicted that although interactive video is attractive, it will probably not meet wide spread acceptance until at least 1990 due to the fact that the learning institutions are putting most of their money into microcomputers (Brown and Brown, 1984). In 1991, video disc technologies are beginning to emerge in the educational mainstream. Iowa Area Education Agency 7 (AEA 7), located in Cedar Falls, recently spent 10% of their film and video budget for the purchase of laser discs. AEA 7 currently has approximately 75 videodisc titles dealing mostly with science and social studies. Over the course of the 1990-91 school year, AEA 7 has also invested time in teaching hundreds of teachers and students throughout Northeast Iowa how to use interactive video. During the summer of 1991, a workshop is being held once a week, teaching twelve third and fourth graders how to use the interactive video technology with the hope that these kids will take this knowledge and pass it on to the other students (Young, 1991).

What does this all mean to the vocational education for the mentally retarded? As technology becomes more advanced, and interactive video becomes more prominent in schools, the price of producing interactive video will decrease and quality titles will become more readily available to the special education teacher.

Hardware

The term interactive video is currently being used to describe several technologies and some clarification is needed. New technologies such as Compact Disc Interactive (CD-I) and Digital Video Interactive (DVI) are also being called "interactive video." These technologies can be called interactive video by definition of the concept. The hardware configuration used as reference for this paper consists of a laser disc player linked with a personal computer. This configuration combines the processing power of the personal computer with the image and audio capabilities of the optical laser disc. This technology has the ability to overly computer generated text or graphics up on a video image. This gives the ability to highlight information to better explain items that would not have been possible with ordinary television or some other medium (Deshler and Gay, 1989). The personal computer may be a Macintosh or IBM/IBM clone running any one of a

variety of authoring software programs. The audio, motion video, still images and the animation are contained on a 12" laser videodisc. The video disc can hold up to 54,000 still or full motion visual images or frames per side. This capacity is equal to 54,000 stills, 30 minutes of full screen, full motion video or any combination of the two. Most laser disc players also have the capability to support two audio channels and some may support four (Perlmutter, 1991). The computer, or in actuality the software, tells the laser disc player which video segments to play based on responses made by the user. Laser disc players, once they have been staged, can locate and play any one of the 54,000 frames in less than two seconds. It is these capabilities that make the concept of interactive video so unique.

Concept

Moving visuals have been used as educational tools for nearly 70 years. Instructional films, and more recently instructional videotapes, have been used to illustrate difficult concepts to students. However, these films and videos were usually watched with a certain degree of passivity (Cuban, 1986). The students sat through an entire 30 minute film only to be told that they should have taken good notes in order to

prepare for the impending quiz. If the student did not get all the pertinent information the first time, he/she was generally out of luck because the first viewing was usually the last. To review the film or video on the spot would require the instructor to rethread the film or rewind the video tape which would take too much class time. With interactive video, however, the student sits down with a list of main topics on the computer screen, picks the one he/she wants and then "branches" to the part he/she is looking for, much like climbing a very large tree to get just the right apple. This is the concept that constitutes interactive video. The user can control the pace of the lesson and dictate trough responses, which video segments are viewed.

User Interface

The learner sits at an interactive video workstation that consists of a personal computer, a video disc player and usually two monitors, one for the computer display and one for the video display. Apple has introduced system software with System Version 7 called Quick Time which allows the management of data over time, specifically video. This software coupled with a host of low cost video cards being offered by third party vendors may make a separate monitor for the video no longer necessary (Littman and Moran, 1991).

Through the use of interactive software such as HyperCard, MacroMind Director or Linkway, the student negotiates his/her way through the instruction by activating "buttons" on the computer screen. Activated by either a mouse, keyboard, touch screen, or any other user input device, these preprogrammed buttons carry out specific functions such as transporting the learner to the next concept, playing the video segments and providing immediate feedback to the learner. The immediate and positive feedback becomes increasingly important in the instruction of mentally retarded students (Brolin, 1982). Because the learner must activate these buttons in response to questions asked by the computer or the video, s/he can move along at his/her own pace. The capacity of the laser disc allows for several different learning modules to be included on one disc. Therefore, learners who achieve mastery at one level may move on to the next, while learners still trying of achieve mastery can do so without feeling rushed. Not only does this type of system benefit the learner, the personal computer can benefit the teacher by tracking the students progress and indicate where the student may need some additional tutoring.

Even though interactive video has great potential, it is not without its constraints. Interactive video is

just what the name implies, video, and to produce interactive video requires professional help.

Pitfalls

Most companies that master video discs require the master video tape be sent to them in 1" format and at the very least, 3/4" U-Matic format. Because of the strict production requirements, the master tape from which the laser disc is mastered, must be completed by a professional video production house. Professional video can be as expensive as $1,000 a minute. Added to that is the over $300 to master the laser disc. This does not include the hardware needed to run the program. Another drawback is the fact that optical laser discs are read-only devices. Unlike video tape which can be recorded, edited and rerecorded, once a video disc is mastered it is permanent. At the time of this writing , electronics companies are working towards a recordable optical disc. If and when this technology becomes available, the cost of producing interactive video will decrease dramatically.

Vocational Education

Vocational preparation of mentally retarded students presents unique educational situations. The theme of this paper is how interactive video might be used in the vocational training of the nation's mentally

retarded citizens. In order to see how interactive video may assist in vocational education, an understanding of vocational education and a definition of mentally retarded must be established. This section will look at what is meant by vocational education, a definition of mentally retarded and present some common learning characteristics of the mentally retarded student.

Importance of Vocational Training

The importance of vocational training to the mentally retarded citizen, parallels that of any other person. Job satisfaction and realizing one's potential is a significant factor in determining a person's feelings of self-worth and overall happiness with life. Integration into society has always been difficult for the mentally retarded citizen because being labeled as mentally retarded can mean being humiliated, frustrated and discredited unless this stigma is erased. For many retarded citizens, this stigma is erased when they become successfully employed and productive members of society (Brolin and Kokaska, 1979). Although great strides have been taken to help persons with handicaps realize their full potential, by becoming productive and responsible citizens, many of the nation's handicapped are still unemployed or underemployed. The Education

for All Handicapped Children Act of 1975 required schools to integrate or mainstream handicapped students into regular classrooms. However, a 1980 study by an Educational Advocates Coalition showed that "Thousands of children remain on waiting lists for evaluations and placement.

- Institutionalized children are routinely excluded from any kind of schooling or are denied appropriate services.
- Many children are denied related services.
- Handicapped children are unnecessarily segregated in to special schools." (Brolin, 1982, p. 5)

As was stated earlier, interactive video is far from being the answer to all the problems faced in implementing vocational training. but a need for proper technological integration is clearly visible.

Mentally Retarded

There are almost as many definitions for classifying someone as mentally retarded as there are causes for mental retardation. Some school systems prefer to put more emphasis on the IQ test as the single criteria for considering a person to be mentally retarded. To classify a person as being mentally retarded on the basis of a single criteria is unfortunate. Students are not evaluated for academic

course grades based on a single test. In fact, some instructors at the college level even allow a student to "throw out" their lowest test score in a series of exams. Students and faculty alike would be more than a little skeptical to learn that an instructor was using a single test as the only means of evaluating a student's knowledge and performance. In defining mental retardation, the American Association for Mentally Retardation (AAMD) considers a factor called "adaptive behavior" before determining whether or not an individual should need an Individualized Educational Program. Brolin and Kokaska (1979) stated that mental retardation refers to significantly subaverage general intellectual functioning in addition to deficits in adaptive behavior. Adaptive behavior is a series of assessment instruments used to determine how competent students are as far as life-career skills, communication and social skills, independent living skills and emotional and personal adjustment. These are just a few of the extensive battery of assessments that may be used to evaluate a student. (Clarke and Kolstoe, 1989)

Characteristics of the Mentally Retarded Learner

If an instructor was analyzing a vocational training situation to determine if interactive video should be used, a look at the characteristics of the

learner would be essential. Gary M. Clarke of the University of Kansas and Oliver P. Kolstoe of the University of Northern Colorado have listed several characteristics that are associated with students classified as mildly, moderately or educable mentally retarded.

"1. Establishing a learning set or frame of reference to novel problems or new learning is difficult.

2. Language deficiencies are common.

3. Abstract reasoning is limited.

4. Reading skills are at a low level.

5. Reaction time is slow to stimuli.

6. Incidental learning is limited.

7. Short term memory is in efficient.

8. Transfer of learning and generalization is difficult.

9. Social skills vary widely but are frequently not commensurate with chronological age.

10. Motor development and motor skills are diminished when retardations is not based on psychosocial factors.

11. Physical impairments or health related problems are more frequent" (Clarke, Kolstoe, 1989, pp. 75-76).

Instructional Design

The instructional design process is an integral part of any instructional program. Although different authors look at the instructional design in different ways, the basic structure remains unchanged.

The design process for creating instructional programs for mentally retarded students retains this basic structure, however some special considerations need to be made. Walter Dick and Lou Carey (1990) have been involved in the instructional design process for many years and have cited several steps in their instructional design model. These steps could be broken down into three phases, the analysis, the design, and the evaluation.

The Analysis Phase

David Baine (1982) has identified several areas of the instructional development process that warrant special attention: identifying the goal, writing the objectives, the learner analysis and developing an instructional strategy and selection of materials.

The first step in the instructional design process is to identify the overall instructional goal. Even though the goal is the broadest statement concerning a particular lesson, it is likely that the instructional goal will be an objective or sub objective of the

student's Individualized Educational Program (IEP). The IEP is a set of long and short term objectives set for a particular student to accomplish annually.

Objectives must be written for the lesson. Specific guidelines that state the exit behavior in terms of what observable behavior is to be exhibited, under what conditions and against what criteria. In special education, learners sometimes have difficulty maintaining new skills. When writing the objectives for special education students it may be specified that successful trials be distributed over several days or weeks (Baine, 1982). This would help insure that retention has occurred and that the learned behavior will be exhibited on a regular basis. Baine (1982) went on to say that by also specifying a percentage of consecutive trials, newly acquired skills that may not need to be mastered right away, will be used in a more consistently acceptable manner.

The learner analysis falls in the initial phase of the instructional design process and it is probably one of the most important factors when deciding on an instructional strategy. The purpose of the learner analysis is to determine what the abilities of the learner are and what the learner's strongest mode of learning is. Some learners are tactile and learn best

when they can touch or hold something, whereas others are visually or auditorily oriented. Baine has listed several things that should be considered and evaluated not only at the beginning but throughout the instruction:

> "1. Determine which if any student behaviors interfere with learning. ....
>
> 2. Evaluate learner's response to various instructional strategies: verbal instructions, models, prompts, and correction procedures.
>
> 3. Determine what (instructional and motivational) techniques best facilitate acquisition, generalization and maintenance of skills. What type of repetition and massed and distributed practice are required?
>
> 4. Assess student's response to individual and group instruction in terms of behavior management, and rate and style of learning.
>
> 5. Record learner's response to various management strategies such as reinforcement, extinction and time out.
>
> 6. Examine the learner's physical sensory and communication skills. ....
>
> 7. Describe the learner's problem solving skills." (Baine, 1982, p.15).

The Design Phase

Developing an Instructional Strategy and Selection of Materials. The second part of the instructional design process is the design phase. In this phase the instructional strategy is developed and the selection/production of materials is completed. Using a selection model is a good way for instructors to identify the most appropriate media. Characteristics of the learner and the task are compared with the attributes of the various media and the best supplement to the instruction is chosen. The model described in this paper was developed by Robert Reiser and Robert Gagne (1983). This model is based on learning and research theories and take into account several elements. These elements include learning outcomes, events of instruction, and characteristics of the learner.

Intellectual skills are skill that help the learner "deal with his or her environment symbolically" (Reiser and Gagne, 1983, p. 7). These conceptual skills can either be concrete or abstract. By helping the learner, deal with symbols, s/he is in effect establishing relationships or rules. One concern is that this type of learning requires precise corrective feedback. This can be as simple as informing the student of the

correctness of a response to a mathematical question or as elaborate as showing the consequences of an inappropriate mixture in a chemistry lab simulation.

Verbal information consists of general knowledge that the student must possess. This knowledge is usually broad in nature and less precise than intellectual skills. This opens the door for a wider range of media possibilities.

Problem solving or cognitive skills are also skills that require precise feedback. It is for this reason that Reiser and Gagne have cited interactive media as being the best disseminator of this particular learning outcome.

Media can aid in the instruction of motor skills by allowing the student to visualize the skill. As with most of the other skills, precise feedback is necessary to increase the instructional effectiveness of the lesson. This feedback should exercise the muscle or muscle groups involved, helping the learner to practice the movements.

The fifth type of learning outcome is the attitude. "Attitudes are learned internal states that influence choices of personal action" (Reiser and Gagne, 1983, p. 40). Research has shown that learners adopt attitudes through acting acting out the desired behavior. Ideally

the media for this type of learning would be that of motion media. Not only should the lesson illustrate the desired behavior, but also the consequences of the undesired behavior.

The events of instruction also play a role in the selection model. Gagne and Briggs identified nine events of instruction, based on cognitive learning theory. In developing their model of selection, Reiser and Gagne reiterated these events.

"1) Gaining attention;
2) informing the learner of the objectives;
3) stimulating recall of prerequisite learning;
4) presenting the stimulus material;
5) providing 'learner guidance';
6) eliciting the performance;
7) providing corrective feedback
8) assessing performance; and
9) enhancing retention and transfer" (Reiser and Gagne, 1983, p. 41).

Different media can enhance different items in this list in varying ways. Interactive media offers a corrective feedback mechanism whereas slides do not.

The characteristics of the learner plays a major role in the selection model (Reiser and Gagne, 1983). Certain types of media are better suited for certain

learners. For example, the ability to read is one of the major divisions in the selection model we have been discussing.

In short, the media selection model developed by Reiser and Gagne (1983) takes into consideration:

- the instructional setting, whether it be by instructor or self paced
- the scope of the instruction for which the media is being selected
- the objectives
- intended learning outcomes
- pertinent events of instruction (Reiser and Gagne, 1983).

How This Model Works. The Reiser and Gagne model is set up as a flow chart that asks such questions as "Are the consequences of the task error serious?, Is the instruction for individuals or groups? and Are the students readers?" The user of the model follows each path by answering questions until they reach the end which lists the possible media for that particular instructional situation. These results are then marked on a chart and when completed the scores are tallied and the media with the highest marks is the best choice.

The Evaluation Phase

How the Model Relates to Vocational Education of Mentally Retarded Students. Instructors of special education could use this model for selection based the type of learning needed. For instance, a special education teacher is teaching basic woodworking to the class. The instructor wants to teach the students about the proper handling and safety precautions of the bandsaw. The educator looks to the selection model to help find the media that will illustrate the subject the best. The first question in the model is whether or not the outcome is serious or dangerous. In other words will the consequences of a wrong response cause serious injury to the student or damage to the equipment. If the answer is yes, then the educator is advised to use a simulator (Reiser and Gagne, 1983).

It is also during the selection process where the questions of instructional effectiveness and cost effectiveness of interactive video would be answered. When designing instruction for the handicapped learners, special attention needs to be paid to the self-esteem of the student. The handicapped student in vocational training is a vulnerable creature. S/he needs to be inundated with "can-do", success oriented attention which must be repeated, and emphasized until the student

begins to trust the instructor and him/herself (Washburn, 1979). Baine (1982) echoed this sentiment with the concept of "errorless learning." Errorless learning is a technique that can be used to insure that the student will answer questions correctly. Answering questions correctly builds self-esteem and confidence in the mentally retarded student. Errorless learning incorporates prompting, fading and reinforcement. Prompting is a technique that uses external cues to guide a learners response to the correct answer. The idea is to get the discriminating factors of the problem to gain control over the learner's responses. Fading is the technique used to wean the learner from the external cues or prompts. This is where the transfer occurs, from using the external cues to using the discriminating factors of the stimulus to guide the learner's response.

Each aspect of this process is important when designing any type of instruction, but the use of interactive video puts added urgency to the use of instructional design.

Instructional Effectiveness of Interactive Video

There has been some debate over the instructional effectiveness of interactive video. Some studies have shown significant increases in speed of learning and in retention of learning. Some projections have been as

much as a third less instruction time with as much or increased retention. Other studies have shown slight improvement over current or traditional practices and some studies have shown no significant increase in learning efficiency at all. What is the controlling factor in each of these studies? Is it the learner, the implementation of the instruction, the content of the disc, the instructional design or some other unknown factor? One study used interactive video as a component in an entirely new math curriculum and tested this against the old curriculum (Kelly, Carnine, Gersten, & Grossen, 1986). Of course the new curriculum showed substantial improvement; however, that improvement was attributed to the redesign of the instruction using the instructional development process and not the medium used.

A study done at General Motors did a very thorough job of isolating the interactive video component from two other teaching strategies (Bosco, & Wagner, 1988). Over 200 workers at the Detroit assembly plant were used to test the effectiveness of interactive video instruction over a videotape based lesson and a lecture. The employees were broken down into groups of 10-28 workers and each group took the training on a different day. Each group was then broken down into 3 smaller

work groups and subjected to each type of training in order to give the learners something specific with which to compare interactive video. This was done to avoid ambiguous questions like, "How does interactive video training compare with other training you have had?" on the attitude tests. The findings showed that workers who used interactive video learned more than the videotape group. The worker attitude towards the interactive video was also highly positive. One of the biggest advantages singled out by the workers was the ability of interactive video to review something they did not understand. One negative concern of the workers concerning interactive video was that there was no group interaction after the instruction.

A different study on Mastering Fractions was done in two remedial math classes to determine if any of the instructional design features incorporated in a curriculum had an effect on student performance (Kelly, Carnine, Gersten, & Grossen, 1986). Each of the classes included both learning disabled and non learning disabled students. The contention was that the instructional design and not the medium improved performance. The students were broken down into three groups, Group A was received the new instruction along with the videodisc. Group B received the same

instruction as Group A only their material was presented on an overhead projector. The third group Group C was given the current or traditional lesson. The results showed no significant advantage between the video disc and the overhead projector, however both groups that received the "new instruction" scored significantly better on criterion referenced posttests. This study indicates that it is not the medium that improves instruction but rather the design of the instruction. Again, the question of which variable or combination of variables holds the key.

Even though interactive video is multimedia, it may not offer something different or special when displaying text or computer generated graphics. Unless the instruction involves an activity that is shown best in full motion video, interactive video is probably not the most efficient answer. The issue at hand is cost. Interactive video is expensive. And, when the same lesson can be given with the same results with an overhead projector, then interactive video becomes the "expensive gimmick."

Cost Effectiveness

No doubt about it, interactive video is not cheap. On a recent survey of market prices, an interactive workstation from scratch would cost approximately $5,500. Cost of the videodisc not included.

There have been some studies done on the cost effectiveness of interactive video as opposed to more conventional media. A study of an eighth grade science class compared interactive video using videotape with 16mm film. After doing an instructional effectiveness study, the instructors calculated the costs of each. Even though the interactive video was much more expensive, the mean gain scores on criterion based tests were much higher for the interactive group. The costs for each were spread out over a five year period and an average per student was figured. This figure was calculated with the mean gain scores to find the instructional efficiency of each. The results showed the interactive video group to be 158% more efficient than the group that used 16mm film. Keep in mind, however, that this group used interactive videotape which is much cheaper to produce than videodisc. The use of videodisc would have brought the efficiency rating of the interactive video group down considerably.

In order for instructors to reach the optimum in cost effectiveness, Roberts A. Braden (1986) has two suggestions:

1). Restrict the use of interactive video to those applications where there has been proven instructional advantages.

2). Produce instructionally efficient programs or produce none at all.

If the students learning task is not made easier, or the instructor's teaching task is not made easier, it would be difficult to justify spending the amount of money needed to support interactive video. The question arises again, Is video essential to the accomplishment of the goals.

Chapter 3

Conclusion

This paper has examined literature concerning both interactive video and vocational education of mentally retarded students. There has been a considerable number of studies done on both on an individual basis, however very few combined the two. The mission of this paper was to expose the parallels of each so that the instructor or reader may draw some inferences and think of new ways to use interactive video in the special education classroom.

Interactive video as a mode of instruction can encompass all forms of media. Hence the term, multimedia. But the research has shown that multimedia may not be the best way to project everything. Most of this can be attributed to the cost compared to the outcome. If interactive video and multimedia can be produced as cheaply, and with as much versatility as some of the other media with the same results, then there should be no reason it should not be used. Currently that is not the case, although technology is moving in that direction. Interactive video and multimedia are still in their infancies. Many of the studies reviewed seemed predestined. In other words, the experimenters knew the outcomes before the studies

began. Others took great pains to present interactive video in an objective light. As the use of interactive video grows more common, and the need for widespread acceptance wanes, more objective studies will be conducted to determine the best possible instructional settings for interactive video. When this is accomplished, handicapped students, as well as non-handicapped learners, will be able to experience interactive video at its optimal effectiveness.

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