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Interactive Video: Educational Use

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Abstract

This paper discusses the potential of interactive video as an aid for instruction and learning. It is also an attempt to answer the question raised by some scholars as to the effectiveness of this new instructional medium. Suggestions are made for the improvement of the instructional design of interactive video lessons.

It is evident that the use of technology for instructional purposes is widespread and growing. Efforts have been made to introduce technologies such as film, radio, television computer, and videocassette into schools and with tremendous success (Ravitch, 1987). Interactive video has emerged, among these, as an exciting new instructional medium. Claims of its effectiveness have been abundant. However, others have found these unproven. Is interactive video a promising new medium or is it merely an alternative form of media for instruction?

The term "interactive video" refers to the use of a microcomputer combined with a videodisc player as an aid for teaching and learning. The capabilities of the microcomputer blend with the vast information storage of the videodisc resulting in a medium which includes the following attributes: text, graphics, color, animation, highlighting techniques, audio, video motion and still frames (Ehrlich, 1985). The computer-based instruction and the videodisc player also render the following two main characteristics for interactive video: interactivity and random access. With interactivity learners are active participants in the instruction/learning process. Learners are required at a decision point (e.g. from a menu or a test) to branch to any of a given number of video still frames. This branching may be under the control of a predetermined program or under the control of the user. It is also possible to retrieve any random piece of information easily and rapidly regardless of its location in a computer or video program, using frame numbers, and the access time is very short. Usually this random access is less than two seconds (Bijlstra & Jelsma, 1988).

From the point of view of many educators, videodiscs have a lot of advantages over other mediums of instruction such as videotapes and 16-mm films. This is not only because of the characteristics mentioned above but also because of their durability, capacity to store a vast amount of information and lower equipment and maintenance costs.

The advantages of interactive video are also numerous from the learners' point of view (Sherwood, 1987). First of all, with appropriate branching instructions, learners can proceed at their own pace. They see the medium as useful since it accommodates their individual needs and style of learning. Second, they can study different parts repeatedly. Third, the combination of excellent video quality, rapid access and computer control makes it easy to simulate realistic experiences. Some of them may be potentially dangerous in real life (e.g. doing a security check in a dark hallway). Response time is fast enough to give the learners a feeling that a conversation is taking place. They also find the features attributed to interactive video appealing and these help increase their motivation. As a result, the medium is for them invaluable, non-threatening and it is also an effective instruction.

Research has indicated that interactive video can be used effectively with different types of learning and learners' characteristics, for example, in Science and Special Education (Sherwood, 1987; Elting & Eisenbarth, 1988).

The development of a videodisc-based environment to facilitate science instruction, according to Sherwood (1987), has proved to be successful. He used two movies to teach problem-solving : *Swiss Family Robinson* and *Raiders of the Lost Ark*. The former provided many problem-solving contexts. The learners must help the family solve problems associated with survival. The latter is also an excellent context for discussing scientific experimentation, averages and variability in performance etc. since the learners have to assist Indiana Jones in solving a lot of mathematical and scientific problems that are encountered in his quest to retrieve a golden idol. Sherwood found that the use of video segments, text, audio, and graphic feedback facilitated and increased comprehension and learning. This is because the learners were prompted until they were able to solve the problems.

The California School of the Deaf at Riverside also developed an interactive videodisc for teaching language and reading skills to hearing impaired students. The purpose of the program was to increase exposure to language and reading experiences. A program was used which provided ten interactive formats. Students were branched through the instructional sequences on grammar, syntax, categorization, capitalization, spelling and punctuation. With individualized instruction and interactive learning, users were required to participate actively in the program and were motivated to continue their learning without supervision. The findings revealed that the students' progress and levels of achievement were far greater than those in conventional classroom instruction (Elting & Eisenbarth, 1988).

These are only two of the numerous experiments carried out to evaluate the effectiveness of interactive video. They reported higher levels of achievement, less training time and more positive feelings and attitudes amongst the users. In spite of these, Hannafin, Phillips and Tripp (1986) wrote: "The effectiveness and uniqueness of interactive video are unproven. The rationale for design of interactive video lessons appears to have evolved largely through intuitive beliefs paired with the trial and error experiences of designers." Bijlstra and Jelsma (1988) also reported that the

weakness of interactive video programs is poor instructional design. They proposed that models should be developed for the design of interactive video instruction. Instructional designers are encouraged to pattern instruction around the learners. The problems involved here are: How does the learner process information (i.e. what internal cognitive processes are used), and how do they relate to the use of an interactive videodisc?

At present, our existing knowledge of important concepts about internal cognitive processes is: "Memory consists of a sensory area, short-term storage, and long-term storage. The learner must actively process information in order for it to be shifted first from sensory to short-term memory and again to long-term memory. The memory consists of an extensive networking of prior knowledge. For more permanent learning to take place, these existing networks need to be tapped. For deeper information processing, new networks need to be formed from old ones through analogical thought" (Lewis, 1988).

With these in mind, instructional designers should try to provide learners with the following cognitive processing experiences.

1. Sensory Processing: Learners are provided with an environment in which they can observe critical features, without internal or external disturbance. Information should be presented serially to make it easier to process (e.g. arrangement from left to right and top to bottom). Pieces of information displayed in close proximity will also be processed together as related.

2. Chunking: This means breaking down concepts and arranging instruction into logical groups. For example, if students need to learn the names of the 50 states of the United States, the list may be broken down into geographical regions. A photograph of the United States could appear on the screen, followed by a second photograph highlighting one region.

3. Rehearsal: It requires the student to repeat the information exactly as written. Drills and practice as well as immediate feedback will be helpful for this purpose.

4. Paraphrasing: Paraphrased versions may be available to the learner through direct request or preliminary diagnosis.

5. Mnemonic: Learners can also tie learning to their own network by creating mnemonics. For example, students learning the colours of a rainbow may be asked to form their own mnemonics. They could be asked to form a sentence using the initial letters of each colour--red, orange, yellow, green, blue, indigo and violet--as the initial letter of each word, while showing the colours on the screen. If the students have difficulty forming their own mnemonic, the computer can help them form one such as 'Rain on your green beans is valuable'.

6. Imaging: Interactive video has potential for this learning strategy. For instance, students may be asked to touch key points on a visual image drawn from the videodisc. The computer program will connect the dots as they are touched and then slowly dissolve the real image, leaving the line drawing.

7. Assimilation and Analogical Reasoning: This is the integration of the new information and related existing knowledge. The content to be learned can be tied to prior knowledge. For example, the learners may be tested on word associations. A pool of associated concepts may be created with

individual feedback based on a free choice (Grabowski & Aggen, 1988).

A lot of researchers have also dealt with the effects of orienting activities on learning. These orienting activities are designed to prepare learners for instruction. Advance organisers, pre-questions and behavioural objectives can be used in the design of computer-based interactive video (Hannafin & Hughes, 1986).

With advance organisers, a learner will be provided with a vehicle through which new information can be included meaningfully within his cognitive structures. Advance organisers may be in the form of brief paragraphs, thematic titles or title sentences, and lists of performance objectives.

Pre-questions are orienting questions which help differentiate relevant information from other information. They motivate learners by making them feel less concerned about the difficulty of forthcoming instruction.

The statement of performance expectations is another method to orient learners to specific instructional content by focusing attention to specific information which is central to the lesson.

Evidence suggests that these orienting activities affect both the amount and type of learning from interactive video. With orienting information, less time will be required to process information effectively.

Appropriate feedback should be offered all through a program development. For example, if an inappropriate procedure or request is chosen, the student should receive instructional feedback signalling the bad choice. The feedback could inform students of possible branching in the lesson and, therefore, allow the student to reconsider the decision, or it may present a remedial instruction.

Smith (1987) also makes the following suggestions for the design of interactive video. Since the medium is visual, interactive video must have a high video quality. Principles of good visual design should be used for both motion and still frames. Organisation and pace are two other important factors. A program must be well-organised and rapid enough to hold viewers' attention. In addition, interactive video has a potential affective influence. As a result, style must be considered in the design.

If more attention is given to the instructional design of an interactive video program by considering learners' cognitive processes together with commonsense strategies such as orienting activities, clear video, sequencing, pacing and feedback, there may be more evidence to prove that interactive video is a superior method of instructional delivery, not a new medium with exciting but useless features.

The Author

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