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ABSTRACT

This study compared the effects of interactive video instruction on learner performance and attitude with the effects of conventional computer assisted instruction (CAI) and stand-alone video. Based on pretest scores, 134 junior high industrial arts students designated as relatively high or low in prior achievement were randomly assigned to one of the three treatment groups. At the conclusion of a lesson on general shop safety rules, students were given a print-based posttest and a survey to assess their attitudes toward the instruction. Analysis consisted of a completely crossed 3X2X2 treatment by achievement by sex factorial design, featuring three levels of prior achievement (high, average, and low). The means for the treatment groups on the performance measure were 64.98%, 73.54%, and 70.48% for the video, CAI, and interactive video treatments respectively; attitude scale means measured 75.07%, 74.26%, and 82.87%. Results indicate that CAI alone tends to be the most effective instructional delivery system where the additional capabilities provided by interactive video are not required. However, interactive video instruction did produce significant improvements in the attitudes of low ability learners when compared with CAI and video. A list of references is provided. (JB)

The Effects of Video-only, CAI only, and Interactive Video Instructional Systems on Learner Performance and Attitude: An Exploratory Study

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Running head: INTERACTIVE VIDEO

The Effects of Video-only, CAI only, and Interactive Video Instructional Systems on Learner Performance and Attitude: An Exploratory Study

Computer-assisted instruction (CAI) has had beneficial effects on learner achievement in a wide variety of instructional settings. Research has shown that CAI not only improves learner achievement, at times by as much as 50%, but can also reduce the amount of time necessary to accomplish the same amount of learning (Kulik, 1983).

CAI has been effective with a wide variety of learners and in many different types of instructional settings (Charp, 1981). In addition, CAI has had positive effects on improving the affective outcomes of instruction, such as learner attitude and self-esteem (Dalton & Hannafin, 1985; Clement, 1981). The favorable attitudes of learners who participate in computer-assisted instructional programs have been attributed to the fact that the computer had infinite patience, never showed signs of anger or frustration, and left the learners with a general feeling of having learned "better."

Yet, despite the many instructional benefits associated with the use of CAI, there are many instructional situations in which CAI simply is not adequate (Martorella, 1983). For example, computer generated graphics are generally not capable of depicting intricate, visually-oriented instructional sequences, such as surgical

procedures or flight training, with the realism that is required.

On the other hand, video images can present instruction with a realism that is not possible in CAI. However, although video-based instruction has been effective in many situations, the many instructional benefits of the typical CAI ar lost (Russell, 1984). Since video-based instruction is generally non-interactive, the possibilities for individualized pacing, feedback, and reinforcement are greatly diminished.

Many authors note that video often becomes a passive instructional medium where learners do not actively participate in the learning and hence, simply "turn-off" to the instruction (Gendele & Gendele, 1984).

In the past decade, computer and video technologies have been merged to form a new promising media known as "interactive video." With this new technology, the learners are shown a segment of video instruction and asked questions about that segment by the computer. The computer can then perform the same functions as it does in more conventional CAI: inputting and judging the learners' responses, providing feedback and reinforcement, and record keeping.

The possibilities for improving CAI with video images through interactive video instruction seem very promising. Current research indicates that the variety of visual and auditory learning stimuli present in interactive video can dramatically improve learning (Clark,

1984).

In addition, a recent study noted that the interactive nature of interactive video can not only improve short-range recall, but can also aide in retention (Schaffer & Hannafin, 1984). However, this study also demonstrated that excessive amounts of interactivity in interactive video do not appreciably effect performance or retention, but drastically impact the efficiency of the instruction presented.

Although the many assumptions made about interactive video make it seem ideally suited for many educational and training settings, there are many questions concerning the use of interactive video technology that have yet to be answered. This study compared the effects of interactive video instruction on learner performance and attitude, with conventional CAI and stand-alone video, in order to determine exactly what types of learning tasks best lend themselves to interactive video instruction

Materials and Methods

The 134 subjects for this study were selected from six introductory level junior high Industrial Arts Exploration classes. The basic learning consisted of a set of 27 General Shop Safety Rules. In general, each of the rules involved a visually-oriented task or behavior required of the learners. Three parallel forms of instruction were employed: Video-only, CAI only, and Interactive Video. The

video-only lesson consisted of a 15 minute video presentation on the safe use of tools. Learners were shown a short narrated segment that depicted both an example and non-example of the correct behavior. The CAI-only lesson used the narrator's script as the basis of a tutorial lesson. The interactive video lesson combined the video segments from the video lesson with the tutorial from the CAI lesson.

Prior to the beginning of the study, the learners were designated as relatively high or low in prior achievement based on their sixth grade total Comprehensive Test of Basic Skills scores. They were then randomly assigned to one of the three treatment groups described. At the conclusion of the lesson, the learners were given a print-based posttest, covering the rules that had been presented in the three treatments, and a survey to address their attitudes towards the instruction

Design and Procedures

This study employed a completely crossed 3 x 2 x 2 treatment by achievement by sex factorial design, featuring 3 levels of treatment (video only, CAI only, and interactive video), and three levels of prior achievement (high, average, and low) based on CTBS scores. Dependent measures included one measure of performance and one measure of attitude toward instruction.

Posttest performance scores were analyzed with ANCOVA

procedures, using prior achievement as the covariate. Attitude scores were analyzed with ANOVA procedures.

Findings

The means for the treatment groups on the performance measure were 64.98%, 73.54%, and 70.48% for the Video, CAI, and Interactive Video treatments, respectively. The means of all three groups were significantly different at the alpha = .05 level.

In order, the attitude scale means of the Video, CAI, and Interactive Video treatment groups were 75.07%, 74.26%, and 82.87%. The mean of the Interactive Video group was significantly higher than both the CAI and Video only groups at the alpha = .005 level. However, the means of the Video group and the CAI group were not statistically different.

In addition to the treatment main effect on the attitude scale, there was also a significant Achievement by Treatment Interaction.

Implications of the Study

There are three major findings from this study that warrant discussion: a) CAI alone tends to the the most effective instructional delivery system for the type of learning task chosen for this study, b) interactive video instruction produced significant improvements in learner attitudes when compared with CAI and Video alone, and c) the attitude effects observed in this study were not constant across prior

achievement level.

It might be assumed that the interactive video treatment, by virtue of its video enhancements and individualization, would be the most effective in producing high levels of performance. However, this assumption was not supported by this study for two principal reasons. First, the interactive video equipment was very new to these students. Observations made during the lessons indicate that these learners were somewhat distracted by the various noises and indicator lights produced by the videotape players in this treatment. Second, the delays caused by long tape access times may have given the learners the opportunity to drift and not actively participate in the instruction. On the other hand, these learners were familiar with CAI lessons, so this media provided no such distractions and its more direct nature seemed to keep these learners more "on task."

Although the learners using the CAI lesson performed best, the interactive video lesson was successful in improving learner attitudes towards the instruction. This improvement in learner attitude may be the result of the more motivating nature of the "natural" video images or the immediate reinforcement provided by the computer (Bejar, 1982). Unfortunately, as noted earlier, the learners involved in this study had never used this kind of delivery system before. Therefore, the differences in observed attitudes may, in part, be attributable to a novelty effect.

However, the most important finding of this study is that the attitude differences observed varied across prior achievement level. Specifically, low ability students scored dispropotionately lower on the CAI lesson than low learners in the other treatment groups. What, then, could account for this strongly negative reaction to the CAI treatment by low ability learners?

In the school chosen to participate in this study, CAI has been used for approximately four years, primarily for remediating the basic skills deficiencies of low-ability learners. Perhaps CAI, when used only in a remedial capacity, can have the same stigmatizing effects often observed with low ability learners are placed in conventional "special" programs. The results of this study support the notion that a great deal of care is warranted in the use of CAI, and remedial programs in general, if these detrimetal effect are to be avoided.

In summary, the results of this study indicate that CAI can be a highly effective mode of instruction where the additional capabilities provided by interactive video are not required. In addition, both interactive video and CAI are more effective in producing high levels of performance than video only, substantially due to their ability to keep learners more actively participating in the learning. Finally, althougn CAI can be used to effectively improve learner attitude, like other types of instructional media, CAI can have deliterious effects

on learner attitude if used in a manner where low ability learners feel demeaned or isolated because of their additional needs.

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Author notes

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