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AUTHOR Milheim, William D.
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ABSTRACT

Student attitudes were investigated in an attempt to determine systematic attitudinal differences among various types of instructional control. Ninety-nine undergraduate students from a basic educational media course volunteered for this study. Six interactive video lessons--covering basic technical aspects of 35 millimeter photography--were designed; they combined visuals and sound from the videodisc and text from the computer. The design of these materials allowed for either program or learner control of pacing, as well as program or learner control of sequence, thereby establishing four treatment groups: learner control of pacing and sequence; learner control of pacing/program control of sequence; program control of pacing/learner control of sequence; and program control of pacing and sequence. The attitudinal instrument--composed of nine Likert-scale items and an open-ended question asking for additional comments about the instructional program--was given to all subjects. In general, attitudes toward learner control revealed in this study support earlier research and demonstrate positive effects for both types of learner control and no change as compared to program control. Student attitudes toward the use of interactive video systems were consistently high across all groups, with students giving high ratings to the use of videodisc and generally to the text from the computer. This support was reflected both in the Likert items and the open-ended question. However, there were no statistical differences between the different types of instructional control for the interactive video system. (19 references) (CGD)

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Author:

William D. Milheim

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William D. Milheim

Instructional Design Specialist

Mailing Address:

220 White Hall

College of Education

Kent State University

Kent, Ohio 44242

Tel. 216/672-2256

Perceived Attitudinal Effects of Various Types of Learner Control in an Interactive Video Lesson

Introduction

Areas of Past Learner Control Research

Learner control is traditionally defined as allowing the learner to have some control over the pacing, sequence, or content of an individualized lesson. This type of control is often contrasted with program control, where the flow of a lesson is typically controlled by a computer program. This distinction has also been described as the locus of instructional control (Hannafin, 1984), with the control of instruction being either external (program control) or internal (learner control).

While a number of different research questions are possible within this overall framework, most studies have dealt with differences in achievement based on the availability of instructional control. Such studies have showed both positive results for learner control groups (e.g., Campanizzi, 1978; Fernald, Chiseri, & Lawson, 1975) as well as equal results for learner and program control (e.g., Balson, Manning, Ebner, & Brooks, 1984/85; Mayer, 1976; Reiser & Sullivan, 1977).

Additional research has focused on other factors that relate to achievement for various learner control groups. Studies in this area have included adaptive learner control (e.g., Ross & Rakow, 1981; Tennyson, Park, & Christensen, 1985), learner characteristics that relate to achievement (e.g., Fry, 1972; Gay, 1986), and learner control with advisement (e.g., Hannafin, Garhart, Rieber, & Phillips, 1985; Johansen & Tennyson, 1983). Each of these studies has further defined those factors that can vary the effectiveness of learner or program control.

Finally, student attitudes have been investigated in an attempt to determine systematic attitudinal differences between various types of instructional control. This research emphasis is the focus of the present study.

Past Attitudinal Research with Learner Control

While there have been a number of studies investigating the achievement effects associated with various types of learner control, attitudinal studies have been somewhat limited. The available research in

this area can essentially be divided into studies supporting the use of learner control and those studies showing no attitudinal differences between learner control and program (or instructor) control.

Studies supporting learner control. A number of studies supporting the use of learner control have been described by researchers in a variety of content areas. For example, Lahey, Hurlock, and McCann (1973) showed that students preferred student controlled training over programmed controlled by a ratio of 4 to 1 in a basic Naval electronics course. Lahey et. al. (1973) also described the advantages of student control with its active student participation and its simpler lesson design.

In a similar way, Fernald et. al. (1975) found attitudinal results supporting the use of learner control during instruction. In their study, introductory psychology students with control of pacing gave higher course ratings for one out of two courses compared to students following a teacher pace.

Fry (1972) also described college students learning under a high degree of student control as forming the most favorable attitudes toward the method of instruction. Similar results were reported by Newkirk (1973), who showed slightly more favorable attitudes by students with control of sequence. The students with learner control also rated their sequence as less restricting, more sensitive, and more interesting.

Studies not supporting learner control. While the above research showed learner control to be related to more positive attitudes toward learning, other research has not shown such positive ratings. This group of studies has shown learner control to be rated equally with program control of instruction.

For example, Reiser and Sullivan (1977) found no significant attitudinal differences between a group taking quizzes at their own pace and a group using an instructor controlled pace, with pacing procedures well-liked by both groups. Similar results were reported by Judd, Bunderson, and Bessent (1970), who showed a lack of improvement in student attitudes based on increased student control.

In a later synthesis of learner control research, Judd (1972) described finding only a few studies with attitudinal differences supporting learner control

although many authors expected this type of control to result in more positive student motivation and attitudes. In another synthesis of earlier research, Merrill (1979) described no consistent increase in attitude toward instruction for groups with learner control.

Method

Design of the Study

The present study used a 2 x 2 factorial design with control of pacing and control of sequence as the two independent variables. The dependent variable was attitude as measured by a post-instruction questionnaire.

The first independent variable, pacing, had two levels -- control by the student or control by the instructional program. The second variable, sequence, also had two levels -- control by the student or control by the instructional program.

The dependent variable (attitude) was measured on an attitudinal instrument developed by the researcher. This instrument was composed of nine Likert-type items and one open-ended request for additional comments.

Subjects

Subjects for the present study included 99 undergraduate volunteers from a Principles of Educational Media course. Participation in this study was one option within the course and involved approximately 75 minutes of each student's time. Each subject received complete oral and written instructions before the instructional program and a written debriefing after their participation ended.

Instructional Materials

Design of the instructional materials. The interactive video lessons designed and produced for this study covered basic 35mm photography knowledge and skills. Specifically, these materials consisted of The Creative Camera optical videodisc (1981) and a computer program written by the researcher entitled "35mm Photography: It's Easier Than You Think."

The overall interactive video program combined visuals and sound from the videodisc and text from the computer. The program was divided into six lessons covering the technical aspects of a 35mm camera, the lenses that may be used with this type of camera, types

of available film, effective lighting techniques, proper exposure methods, and photographic accessories.

All instructional materials were pilot tested by subject matter experts in instructional design, photography, and educational software. Additional pilot testing consisted of presenting the instructional materials to twelve undergraduate students of approximately the same age and grade level as the final learners to assess the appropriateness of the materials for these learners, the readability of directions, overall time considerations, and other relevant details.

Learner control options in the materials. The design of these interactive video materials allowed for either program or learner control of pacing as well as program or learner control of sequence. The four treatment groups therefore included: learner control of pacing and sequence, learner control of pacing/ program control of sequence, program control of pacing/learner control of sequence, and program control of pacing and sequence.

Learner control of pacing and sequence allowed learners to control the instructional program as it was viewed. Students in the learner control of pacing groups were able to control pacing by pressing a computer key when finished with each text page. Learner control of sequence was accomplished by allowing students to choose the order of the six lessons to be presented.

Program control of pacing and sequence was carried out by the instructional system without input from the learner. Subjects under program control of pacing saw text screens only for a short period of time, as determined by the amount of text on a given screen. Partially based on the work of Belland, Taylor, Canelos, Dwyer, and Baker (1985), each subject was allowed one second for each line of text on a screen plus thirteen seconds of mental processing time for the passage. All subjects under program control of sequence saw the instructional lessons in a predetermined order (as originally determined by the researcher) and had no control over the sequence of their presentation.

Attitudinal Instrument

Design of the attitudinal instrument. The instrument was composed of nine Likert-scale items and

one open-ended question. The same form of this questionnaire was given to all subjects, regardless of treatment group. Questions on the instrument included attitude toward the instructional program, student enjoyment, and beliefs about pacing and sequence. Table 1 shows a list of the Likert items included on this survey. The open-ended question allowed subjects to add any additional comments concerning the instructional program.

Pilot testing of the instrument. Pilot testing of the attitudinal questionnaire was carried out by subject matter experts and learners similar in age to the final subjects. Specific topics in this testing included question readability and content, directions for use, and appropriateness of all questions for each treatment group.

Procedure

All six modules were viewed individually by each student in an area easily accessible by all subjects. Each session included the instructional materials given through the interactive video system and the attitudinal survey instrument.

After the instruction segments had been viewed in their entirety, the subjects were instructed to fill in the attitude questionnaire that they had been given earlier. The data from the questionnaire helped determine students' perceptions of each learner control option and overall attitudes toward the use of interactive video for this instruction.

Results

Results Pertaining to the Likert Items

Table 2 provides the means and standard deviations for all items on the attitudinal survey. For each item, the Likert scale ranged from 1 for strongly disagree to 6 for strongly agree. As can be seen from this table, the data generally showed increased positive attitudes for those groups with learner control.

Table 3 shows the results of a multivariate analysis of variance comparing differences across all items for pacing, sequence, and the interaction between these variables. This table shows sequence to be the only significant factor for this analysis.

Table 4 shows the univariate analyses of variance for each treatment group and their interaction effects. For these analyses, control of pacing was shown to be related to the subjects' perception of the pace of the materials (See Figure 4), with subjects under learner control rating the pace of the program significantly more positively (F=5.64, p=.020, effect size = .48).

Control of sequence was also shown to be a significant factor, related to students' ideas concerning whether this type of control should generally be available in instructional segments (F=13.44, p=.000, effect size = .72) (See Figure 5). This significant relationship indicates that subjects with control of sequence tended to agree with the statement that students overall should be given this type of control.

Results Pertaining to the Open-Ended Question

As part of the attitudinal questionnaire, each subject was also asked for additional comments concerning the instructional program. Of the 99 subjects who completed the survey, 44 answered this additional question, with answers obtained from subjects in all treatment groups. Overall, these comments included comments about the availability of pacing control, concerns about the availability of sequence control, and statements about the effectiveness of the instructional system.

For this open-ended question, students under program control of pacing (where the computer set the pace for the materials), often described the computer screens as too long or the entire program as too slow. Other subjects under program control of pacing described the program as boring or expressed a desire to be able to control the presentation speed. Answers from subjects in the learner control of pacing groups did not include comments about the pace of the program.

In general, subjects made little mention of sequence control in their answers. The comments generally concerned the difficulty of making sequence choices (subjects in learner control groups) and the desire to be able to return to a section for review (learners under program control).

Positive comments concerning the use of interactive video for teaching photography included statements about the high interest level of the materials, the informative nature of the program, and the effective combination of the computer material and

the videodisc. Negative comments, however, included a description of the abrupt transitions between the computer and video scenes, a preference for the motion or sound of the videodisc over the textual materials from the computer, and a concern that too much information was presented during the program.

Discussion

Attitudes Toward Learner Control

Overall, the above results support earlier research which has demonstrated mixed effects from attitudinal studies, showing both positive effects from learner control and no change as compared to program control. This combination of effects was shown for both types of learner control (pacing and sequence) investigated in the present study.

Specifically, control of pacing was shown to be significantly associated with students' perceptions concerning the pacing of the materials in the instructional program. This relationship showed higher attitudinal ratings for the pace of the program from those students with pacing control. Answers to the open-ended question also supported this relationship, with a number of negative comments concerning the pace of the instruction from those subjects under program control of pacing.

Control of sequence was also significantly related to one item on the survey, with a relationship shown between this type of control and the students' perceptions that learners should, in general, be able to control the sequence of an instructional segment. For this analysis, the importance of sequence control was rated higher by subjects who had control of sequence in the present study. Analysis of the open-ended question, however, showed little difference between the groups with different types of sequence control.

Specific learner control options were therefore well-liked (or were thought to be important overall) by the subjects in this study. However, this increased positive attitude was not shown by subjects' attitudes toward the overall program, where no statistical differences were shown between the learner and program control groups. Thus, while subjects liked the learner control or thought it to be important, these results were not reflected in more positive perceptions of the overall program by those subjects with learner control.

One reason for this lack of significant differences concerning the overall learning process may have been the previous history of these learners who might have had little opportunity in the past for taking control of their own learning. Learner control might have been threatening to these students since such control typically is not available in most learning situations.

Attitudes Toward the Interactive Video System

Student attitudes toward the use of the interactive video system were consistently high across all groups, with students giving high ratings to the use of the videodisc and generally to the text from the computer. This support was reflected both in the Likert items and the open-ended question.

However, there were no statistical differences concerning the interactive video system based on the type of instructional control. This lack of significance may have been due to potential overriding positive effects from the use of interactive video, which was seen by subjects in all groups as a very effective, pleasing learning environment. In this respect, the use of this medium may have masked any true differences simply because interactive video was significantly different from other types of learning systems previously used by these learners.

Summary

The above results have shown the attitudinal effects of various types of learner control in an interactive video lesson. While general effects were not found, the study did show differences in attitudes toward specific types of instructional control. Further research should identify additional attitudinal items that can be used to better understand differences between learner and program control and the overall use of interactive video.

References

Balson, P. M., Manning, D. T., Ebner, D. G., & Brooks, F. R. (1984/85). Instructor-controlled versus student-controlled training in a videodisc-based paramedical program. Journal of Educational Technology Systems, 13(2), 123-130.

Belland, J. C., Taylor, W. D., Canelos, J., Dwyer, F., & Baker, P. (1985). Is the self-paced instructional program, via microcomputer-based instruction, the most effective method of addressing individual learning differences? Educational Communication and Technology Journal, 33(3), 185-198.

Campanizzi, J. A. (1978). Effects of locus of control and provision of overviews in a computer-assisted instruction sequence. AEDS Journal, 12(1), 21-30.

Creative camera. (1981). Pioneer Electronic Corporation and Valley Isle Productions.

Fernald, P. S., Chiseri, M. J., & Lawson, D. W. (1975). Systematic manipulation of student pacing, the perfection requirement, and contact with a teaching assistant in an introductory psychology course. Teaching of Psychology, 2(4), 147-151.

Fry, J. P. (1972). Interactive relationship between inquisitiveness and student control of instruction. Journal of Educational Psychology, 63(5), 459-465.

Gay, G. (1986). Interaction of learner control and prior understanding in computer-assisted video instruction. Journal of Educational Psychology, 78(3), 225-227.

Hannafin, M. J. (1984). Guidelines for using locus of instructional control in the design of computer-assisted instruction. Journal of Instructional Development, 7(3), 6-10.

Hannafin, M. J., Garhart, C., Rieber, L. P., & Phillips, T. L. (1985). Keeping interactive video in perspective: Tentative guidelines and cautions in the design of interactive video. In E. E.

Miller & M. L. Mosley, Educational media and technology yearbook (pp. 13-25). Littleton, CO: Libraries Unlimited, Inc.

Johansen, K. J., & Tennyson, R. D. (1983). Effect of adaptive advisement on perception in learner-controlled, computer-based instruction using a rule-learning task. Educational and Communication Technology Journal, 31(4), 226-236.

Judd, W. A. (1972, July). Learner-controlled computer-assisted instruction. Paper presented at the meeting of the International School on Computer In Education, Pugnochiuso, Italy. (ERIC Reproduction Service No. ED 072 635)

Judd, W. A., Bunderson, C. V., & Bessent, E. W. (1970). An investigation of the effects of learner control in computer-assisted instruction prerequisite mathematics (MATHS) (Technical Report No. 5). Austin, TX: Computer-Assisted Instruction Laboratory, The University of Texas at Austin. (ERIC Reproduction Service No. ED 053 532)

Lahey, G. F., Hurlock, R. E., & McCann, P. H. (1973). Post lesson remediation and student control of branching in computer based training (Research Report No. SRR 73-19). Navy Training Research Laboratory, Naval Personnel and Training Research Laboratory. (ERIC Reproduction Service No. ED 083 797)

Mayer, R. E. (1976). Some conditions of meaningful learning for computer programming: Advance organizers and subject control of frame order. Journal of Educational Psychology, 68(2), 143-150.

Merrill, M. D. (1979). Final report - learner-controlled instructional strategies: An empirical investigation (Working Paper No. 107).

Newkirk, R. L. (1973). A comparison of learner control and machine control strategies for computer-assisted instruction. Programmed Learning and Educational Technology, 10(2), 82-91.

Reiser, R. A., & Sullivan, H. J. (1977). Effects of self-pacing and instructor-pacing in a PSI co... Journal of Educational Research, 71(1), 8-12.

Ross, S. M., & Rakow, E. A. (1981). Learner control versus program control as adaptive strategies for selection of instructional support on math rules. Journal of Educational Psychology, 73(5), 745-753.

Tennyson, R. D., Park, O., & Christensen, D. L. (1985). Adaptive control of learning time and content sequence in concept learning using computer-based instruction. Journal of Educational Psychology, 77(4), 481-491.

Table 1

Attitudinal Questions Answered by Research Subjects

1. I enjoyed learning about 35mm photography with this program.
2. I learned a great deal about 35mm photography with this program.
3. I liked the sequence of the materials in this lesson on 35mm photography.
4. I liked the pacing of the materials in this lesson on 35mm photography.
5. I think students should be able to select the sequence of the materials they are studying.
6. I think students should be able to control the presentation speed of the materials they are studying.
7. I liked the motion segments from the videodisc.
8. I liked the text segments from the computer.
9. I would like to use this interactive video system again if other materials were available.

Likert Scale:

1 = Strongly Disagree 6 = Strongly Agree

Table 2

Means and Standard Deviations of Attitude Survey Items

	Learner Control		Program Control	
Item Number	Pacing	Sequence	Pacing	Sequence
Item 1	4.78 (1.17)	4.80 (1.00)	4.66 (1.14)	4.64 (1.29)
Item 2	4.50 (1.26)	4.51 (1.04)	4.47 (1.10)	4.46 (1.30)
Item 3	4.83 (1.12)	4.63 (1.15)	4.57 (1.12)	4.74 (1.10)
Item 4	4.65 (1.14)	4.45 (1.16)	4.08 (1.21)	4.24 (1.25)
Item 5	4.30 (1.43)	4.73 (1.50)	4.13 (1.59)	3.70 (1.36)
Item 6	5.09 (1.17)	5.04 (1.37)	4.94 (1.29)	4.98 (1.10)
Item 7	5.22 (1.21)	5.22 (1.21)	5.21 (1.12)	5.20 (1.11)
Item 8	4.52 (1.33)	4.47 (1.19)	4.38 (1.13)	4.42 (1.26)
Item 9	5.04 (1.26)	5.00 (1.26)	4.77 (1.22)	4.80 (1.23)

Item 1 = Enjoyed Learning
Item 2 = Learned a Great Deal
Item 3 = Liked the Sequence
Item 4 = Liked the Pace
Item 5 = Students Should Control Sequence
Item 6 = Students Should Control Pace
Item 7 = Liked Motion Segments
Item 8 = Liked Text Segments
Item 9 = Would Like to Use Again

1 = Strongly Disagree

6 = Strongly Agree

Table 3

Multivariate Analyses of Variance of Attitude Survey Items for Type of Pacing and Type of Sequence

Multivariate Tests Using Pillais Criterion

Effect	Value	Exact F	Hypoth. DF	Error DF	Signif
Pacing	.108	1.18	9.00	87.00	.320
Sequence	.175	2.05	9.00	87.00	.043
Pacing by Sequence	.092	.98	9.00	87.00	.461

Table 4

Univariate Analyses of Variance of Attitude Survey

Univariate Tests of Significance for Pacing

Variable	Hyp. SS	Err. SS	Hyp. MS	Err. MS	F	Signif
Item 1	.33	127.17	.33	1.34	.25	.622
Item 2	.02	134.31	.02	1.41	.01	.913
Item 3	1.75	120.20	1.75	1.27	1.38	.243
Item 4	7.91	133.24	7.91	1.40	5.64	.020
Item 5	.37	193.80	.37	2.04	.18	.673
Item 6	.50	143.84	.50	1.51	.33	.568
Item 7	.00	130.49	.00	1.37	.00	.971
Item 8	.50	145.89	.50	1.54	.32	.571
Item 9	1.67	148.23	1.67	1.56	1.07	.304

Univariate Tests of Significance for Sequence

Variable	Hyp. SS	Err. SS	Hyp. MS	Err. MS	F	Signif
Item 1	.71	127.17	.71	1.34	.53	.468
Item 2	.08	134.31	.08	1.41	.06	.812
Item 3	.28	120.20	.28	1.27	.22	.642
Item 4	.77	133.24	.77	1.40	.55	.462
Item 5	27.42	193.80	27.42	2.04	13.44	.000
Item 6	.17	143.84	.17	1.51	.11	.736
Item 7	.02	130.49	.02	1.37	.01	.910
Item 8	.04	145.89	.04	1.54	.03	.866
Item 9	.90	148.23	.90	1.56	.58	.449

Univariate Tests of Significance for Pacing by Sequence

Variable	Hyp. SS	Err. SS	Hyp. MS	Err. MS	F	Signif
Item 1	1.99	127.17	1.99	1.34	1.48	.226
Item 2	.34	134.31	.34	1.41	.24	.627
Item 3	1.07	120.20	1.07	1.27	.84	.361
Item 4	.09	133.24	.09	1.40	.06	.805
Item 5	3.89	193.80	3.89	2.04	1.91	.171
Item 6	4.57	143.84	4.57	3.02	2.46	.086
Item 7	.04	130.49	.04	1.37	.03	.862
Item 8	.00	145.89	.00	1.54	.00	.998
Item 9	.11	148.23	.11	1.56	.07	.794

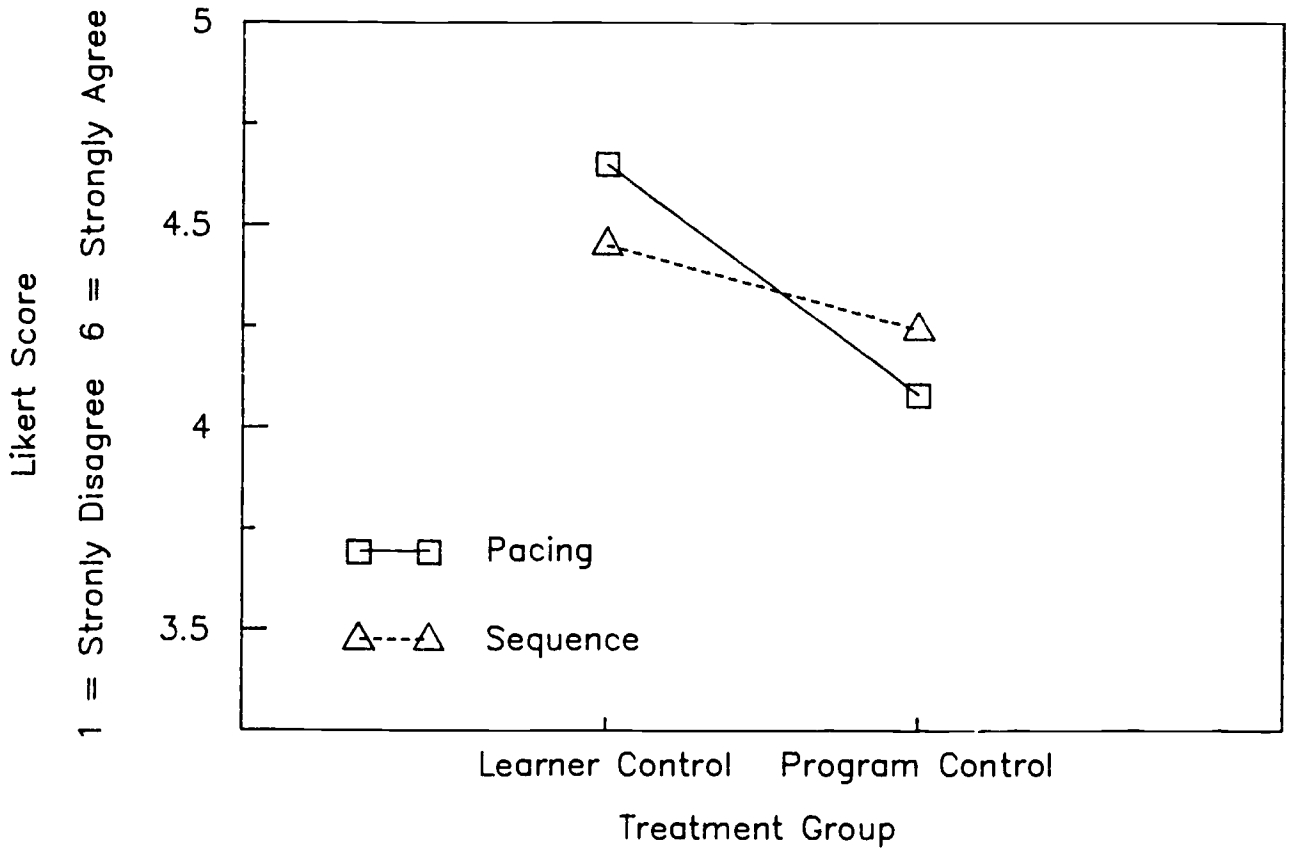

Figure 1. Means on item #4 by treatment group. "I liked the pacing of the materials in this lesson on 35mm photography."

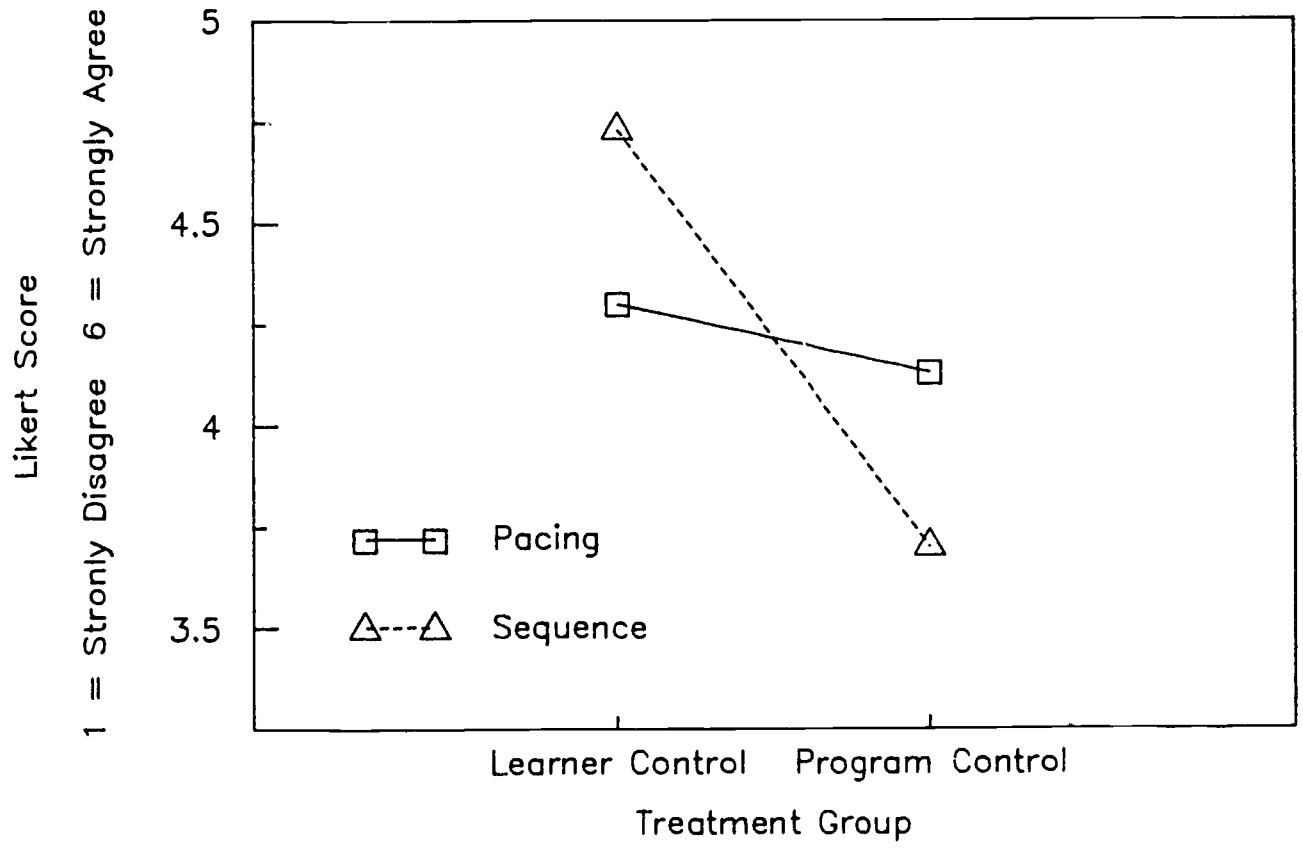

Figure 2. Means on item #5 by treatment group. "I think students should be able to select the sequence of the materials they are studying."