A Comparison of Video Disc-Presented to Teacher-Presented Direct Instruction

Charles P. Schira

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A COMPARISON OF VIDEO DISC-PRESENTED TO
TEACHER-PRESENTED DIRECT INSTRUCTION

by

Charles P. Schira

A Project
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Specialist in Education
Department of Psychology

Western Michigan University
Kalamazoo, Michigan
December 1988

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A COMPARISON OF VIDEO DISC-PRESENTED TO TEACHER-PRESENTED DIRECT INSTRUCTION

Charles P. Schira, Ed.S.
Western Michigan University, 1988

The video disc Mastering Fractions by Systems Impact (1984) was investigated for effects on student on-task behavior. The video disc uses basic principles of Direct Instruction and was compared to teacher-presented Direct Instruction. The study used a reversal design in a Special Education classroom where the classroom teacher normally used Direct Instruction. Three Special Education students at the junior high school level were used as subjects. The results of the study indicate a slight increase in student attending behavior with the use of the video disc. Subjects were also evaluated for the novelty effect of the video disc on attending behavior. Each class session was divided into three segments to determine if on-task behavior remained constant over the class session. Results indicate that on-task behavior remained constant over class sessions.
ACKNOWLEDGEMENTS

I wish to express my sincere thanks to Dr. Howard Farris for his help and guidance in the development of this project. I would also like to thank Nancy Lindahl for the accommodations she made in her classroom to make this project possible. Finally, I would like to thank Mary Jo for her support and understanding during the development of this project.

Charles P. Schira
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CHAPTER I
INTRODUCTION

"Teaching is the teacher's intentional arranging or manipulating of the environment so that the child will learn more efficiently than if he were to learn incidentally from the world at large" (Carnine & Silbert, 1979, p. 3). Few educators would disagree with the intent of the above statement, yet there is widespread disagreement on how this "learning" is to take place. Both curriculum design and teacher performance have been areas of debate for years. Fortunately, over the last 20 years, there have been numerous studies to guide curriculum developers and teachers with many of the decisions they must make regarding teaching and learning. Since the 1970s, teacher behaviors have been the focus of a great deal of educational research. Certain teacher behaviors were consistently related to learning in the classroom while others produced little or no learning effect. From this growing body of knowledge a new technology of teaching has been fashioned based on the work of many research-educators (Carnine & Silbert, 1979; Engelmann, 1969; Skinner, 1968).

Farris (1976), in Characteristics of Effective Instruction, found that certain characteristics maximize success for students in the learning process. These "characteristics" are easily defined and readily translated into instructional practice. For example, one characteristic of effective teaching is to determine the
prerequisite skills necessary for learning, then to determine if those prerequisite skills are present in the students repertoires prior to beginning instruction. The use of instructional objectives that state clearly and in measurable terms what the learner is to accomplish has also been demonstrated to greatly affect learner and teacher success. Objectives which include performance standards may be used for determining when the student may advance to the next instructional level. If a student fails to meet the established performance standard, then remediation for the unlearned skill is critical. Remediation allows the learner to master needed skills prior to moving on in the instructional sequence. Remedial activity has been found to greatly enhance the chances for learners to be successful when presented with new instructional material that builds on things previously taught. Sequencing of skills and information is another factor which contributes to student success. This sequencing can be accomplished by breaking the learning task down into small component parts which allows the student to learn complex skills in small easy-to-understand steps. It has also been shown that the extent to which students learn is greatly dependent upon attending behavior. Students to whom lessons are presented at a fast pace demonstrate high levels of attending behavior and motivation. This "fast pace" during teacher presentation keeps the learner involved and less likely to exhibit off-task behaviors. A characteristic at the foundation of learning is active responding on the part of the student. Responses are most effective in the form of overt verbal or written responses and may either be emitted
individually or in groups. By requiring the learner to make overt responses, the teacher can monitor the correctness of the student behavior while maintaining students actively involved in the classroom instruction. This key to learning success was effectively summarized by Farris (1976): "Active responding requires the learner to practice the responses necessary for learning and provides feedback which reduces uncertainty about the correctness to the learner's response" (p. 2). It should be noted that teacher feedback to students may be accomplished either orally or by frequent written evaluations. These evaluations not only provide the student with important information, but also allow the teacher to determining if the student is mastering material at the desired rate. While frequent evaluations accomplish the latter, they also support appropriate behaviors and aid in development of good study habits while serving as prompts to persistence and hard work (Farris, 1976).

The developers of Direct Instruction have incorporated these characteristics of effective instruction into their teaching methodology. Direct Instruction presentations often differ in many ways, but they do share seven important features. These features stem from the need to communicate unambiguously with students (Engelmann, 1980). First, presentations are scripted; second, the teacher's pace is quick; third, all children respond in unison; fourth, the teacher uses signals to indicate when the group is to respond; fifth, individuals take turns for individual responding; sixth, a correction procedure for correcting student errors is available; and
seventh, the student is reinforced for good performance (Engelmann, 1980).

Throughout the presentation of a Direct Instruction lesson, the teacher must consistently follow the outlined procedures of the lesson. An argument some teachers make against using Direct Instruction is the amount of effort it takes to follow the Direct Instruction procedures. The teacher needs to be very active during all phases of the presentation, whether presenting a lesson, checking students’ progress, or supervising seatwork.

A video disc presentation based on principles of Direct Instruction offers an alternative to teacher-presented Direct Instruction. The video disc program presents the lesson for the classroom teacher. This removes the sometimes aversive task of presenting a lesson from the teacher while still allowing the teacher to monitor student on-going learning and correct errors and deficiencies as they occur. This use of the video disc could make Direct Instruction more appealing to teachers who would normally not use the highly effective but work-intensive Direct Instruction programming.

Over the last ten years a large number of studies have been conducted on interactive video. In particular, the past five years have been a very productive period. Interactive video is an instructional system that actively involves the learner in his/her educational task. An interactive video system consists of a video player, micro-computer, video monitor, and a videodisc.

Supporters of interactive video believe it to be superior to traditional teacher-delivered instruction by making the learner an
active participant. It is their contention through active participation the learner will stay on-task longer and achieve higher levels of achievement and performance (Lloyd & Loper, 1986, p. 339). The interactive video software used for this study has been developed with the same learning principles that are found in a Direct Instruction program (developed by Engelmann, 1969).

Research needs to compare the on-task behavior of students currently being instructed with teacher-presented Direct Instruction to that of students being instructed by video disc-presented Direct Instruction. If it can be shown that video disc controlled Direct Instruction leads to higher levels of on-task behavior than teacher-delivered Direct Instruction, the idea of using interactive video with students failing to respond optimally to traditional instruction or students who have attention deficits should be further explored.

Prior Research

The effectiveness of interactive video as a method of instruction has been investigated by a number of researchers. Studies have compared user achievement, attitude, training time, and performance to that of a traditional education or training setting (Bosco, 1986). Almost an equal number of studies have been conducted in the private sector (business) as well as the military. These studies have clearly shown the effectiveness of interactive video and suggested that the view expressed by Young (1984) may be very plausible. "Videodisc technology may well revolutionize education by the
end of the decade. This technology has the potential to provide the most complete and effective automated education yet developed" (p. 49).

One of the overriding concerns any educator has when first contemplating the use of interactive video is the initial cost of equipment. One study compared the cost of an interactive video system to that of a traditional instructional system (Young, 1984). The research found the cost of interactive video to be comparable to that of a traditional teacher-delivered presentation. "Compared to the cost of training and salaries of school personnel, videodisc educational systems are very reasonable (Young, 1984, p. 54).

Unfortunately, few studies have evaluated the effects of interactive video on user on-task behavior. Only one, Hull (1984), evaluated user-perceived attention. This is an unpublished report that showed no "reported benefit" of on-task behavior for military persons who were trained with interactive video (Bosco, 1986, p. 12).

One area of education in which the future of interactive video seems bright is special education. One study of interactive video software in the special education classroom concluded that the instructional characteristics of "interactivity, individualization, immediacy of feedback, and motivational design," have already been established as desirable instructional practices for special education programming, and will no doubt contribute to the success of interactive video in this area (Powers, 1987, p. 41). Unfortunately, this study did not address the issue of increased effectiveness in
student performance such as in on-task behavior with interactive video users.

Powers also cautions that the potential success of interactive video with special education students depends on the availability of high-quality software (Powers, 1987, p. 48).

Another study indicates the danger of selecting software which appears to be "fun to use" but lacks good basic instructional techniques (Gore & Shelberg, 1987). The use of "little gremlins hopping across the screen for 5 to 10 seconds may delight the students the first time, but the novelty is short lived" (Gore & Shelberg, 1987, p. 32). The authors argue that research on interactive video is both limited and contradictory, and should be used only as a supplement to teacher-delivered instruction until more is known about interactive video's effectiveness.

Summary of Research

Prior research has demonstrated that through the use of interactive video disc programming, a learner can be effectively taught a variety of skills. This has also proven to be an effective way to motivate and teach learners individually or in groups. The "interactive" component of the video is designed to keep students actively involved in the learning task as they are acquiring new skills.

Research has also shown that to look at all interactive video software programs as equal is a mistake. Each software package needs to be evaluated for its effectiveness before it is introduced into an educational setting.
An area of concern with prior research is the lack of evaluations on interactive video programs to that of student on-task behavior. It has been shown that an increase in a student's on-task behavior will lead to greater achievement and performance (Lloyd & Loper, 1976). This increase of students' on-task behavior is one of the main objectives of Direct Instruction (Carnine & Silbert, 1979).

Improvement on Prior Research

The goal of an interactive video presentation based on principles of Direct Instruction is to keep students on-task for longer periods. Research needs to be conducted on students' on-task behavior with the use of interactive video to determine if this is actually occurring. Also, the particular interactive video program that will be used has the potential of being implemented in special education classrooms (in place of teacher-presented Direct Instruction), a comparison needs to be drawn between teacher-presented and video disc-presented Direct Instruction in order to determine its usefulness with that population.
CHAPTER II

METHOD

Subjects

The study used a modified reversal design within subjects. The subjects used for the study were from a special education classroom of a junior high school in the Kalamazoo, Michigan area. The subjects included one female and two male 7th grade students who had been identified as having a Specific Learning Disability in math.

The students were chosen for the study on the basis of being in a classroom where the teacher used Direct Instruction for the teaching of math. The classroom contained six students. The three selected for inclusion in the study were chosen because of previous patterns of good school attendance.

Setting

The junior high school used for this study was an inner city school comprised of a mixed ethnic group of students. The classroom teacher reviewed the prerequisite skills of addition, subtraction, multiplication, and divisions before presenting lessons on fractions. The classroom teacher was interested in determining the relative effectiveness of the new interactive video disc program compared to her mode of Direct Instruction. She discussed the activity
with the principal of the school, who was supportive of the instructional development/validation project.

Students were presented with 25 of the lessons of the mastering fractions program. Time did not permit the completion of all the lessons before the end of the school year. Mastering Fractions by Systems Impact (1984) used basic principles of Direct Instruction. They include: keeping the student actively involved, fast pacing, oral responding and reinforcement for learning. The classroom teacher also used self-made reinforcers to keep student motivation at a high level.

Apparatus/Materials

The laser disc Mastering Fractions by Systems Impact (1984) was used for this study. A laser disc player, remote control pad, and a video monitor were used for the classroom presentation. Each student used a workbook that coincided with the video disc presentation.

A videotape camera, tripod, and VCR were used for the recording of classroom sessions. A tape recorder was used to signal observers when to observe a particular student.

Dependent Variable

The dependent variable used for this study was student on-task behavior. On-task behavior was recorded when the student was engaged in one of the following activities:

1. Eyes on the video monitor.
2. Oral responding to questions asked by the video presentation or the classroom teacher.

3. Written responses to the stimuli presented by video or the classroom teacher.

Observation and Scoring Procedures

Students were videotaped during the entire 50-minute class period. The classroom contained six students but only three of the six students were used for the study due to a lack of an adequate baseline on three of the students. The tape machine was in the front of the classroom to allow recording of students' attending behaviors. The students were observed for a baseline of nine days in their 5th hour math class before the introduction of the interactive video. After the students were videotaped, the tape was reviewed and student on-task behavior recorded.

Momentary time-sampling was used with two seconds of observation rotated sequentially across the students. The scorers observed one student for two seconds. If a student displayed any of the afore-mentioned on-task behaviors during this time, it was recorded as a "+" (occurrence). If the student did not demonstrate on-task behavior, it was recorded as a "0" (non-occurrence). While observing the videotape, the scorers listened to a tape recorder. At the end of each two-second interval, the tape announced a number from 1 to 3. This number corresponded to a student in the class and informed the scorer to move on to that student and record his/her behavior.
Selection and Training of Observers

The observers were students of School Psychology at Western Michigan University. The training procedure included a handout describing what was and what was not on-task behavior (as defined for this study). After a discussion of the handout, each observer watched a videotape of students and recorded attending behaviors. The results were reviewed and more discussion and instruction took place until interobserver agreement reached 98%.

Reliability

Reliability was assessed by a second observer on the second, fourth, seventh, tenth, fifteenth, and eighteenth session for each subject. Altogether, reliability was assessed on six of the 21 sessions observed. The reliability coefficient of agreement was calculated as a percentage by dividing the number of agreements by the number of agreements plus disagreements, and then multiplying the fraction by 100.

Independent Variable

The independent variable was the video disc presentation Mastering Fractions by Systems Impact (1984). The mastering fractions program consisted of 30 individual lessons for teaching fractions to naive learners. Each lesson took approximately one 50-minute class session to complete. The video disc and video monitor
was placed in the front of the classroom while the entire class went through the program simultaneously.

During the video disc presentation (independent variable), students were observed for the amount of time they spent on-task (dependent variable). The observation and measurement techniques were identical in the baseline and intervention phases (see Dependent Variable--Assessment Techniques above). The dependent variable was observed during intervention when the teacher started the video disc (the daily attendance and record-keeping chores were not used for this experiment) and stopped when the teacher turned off the video disc at the end of the period.

The experimental condition was easy to differentiate from the baseline condition. When the teacher used Direct Instruction to teacher, it was the baseline conditions; when the video disc was used for instruction, it was the experimental condition. If the teacher was using a form of instruction other than Direct Instruction and the video disc was not being used, then it was neither the experimental nor the baseline condition and no observations were recorded.

Before the introduction of the video disc, all students were informed that they would be using a "new" program to learn fractions. They were told they would be watching a video monitor (television) for instructions and that the teacher would only be there to insure that proper procedures were followed. They were told to follow all instructions and requests which came from the video disc presentation just as if their teacher was telling them to do
something. Failure of students to perform work or follow instructions was dealt with in the same manner that was already being used in the classroom.

To insure the independent variable contacted the students behavior properly, the teacher of the class was instructed precisely how the video disc was to be used. The manufacturers have an excellent "Teachers' Guide" that instructs a teacher on what procedures need to be followed and exactly what to do and say for situations that may arise. Along with this, a workshop was conducted on the proper techniques and procedures for using the video disc. There was also a student from Western Michigan University in the classroom to observe the intervention and note any discrepancies that might have occurred.

The length of the experimental condition was dependent on the amount of time left in the school year. Of the 30 lessons of the mastering fractions program, the class completed approximately 25 before the end of the school year. Each lesson took about one class period to complete (50 minutes), but was dependent on students mastering and meeting criterion for each section. If 1/5 of the students failed to meet criterion for a particular lesson, a remedial loop was completed before moving on to the next lesson.

Experimental Design

A reversal design was used. It consisted of a baseline, intervention, modified baseline, and an intervention (ABCB). Students were observed during teacher-presented Direct Instruction
(baseline); the video disc was presented (intervention); there was a return to teacher-presented Direct Instruction (modified baseline); then, the video disc presentation was again used (intervention).

For this experiment, all students in the classroom were included. One problem of concern was that not all students were at the exact same skill level in math and did not learn at the same rate. Thus, a faster learner became distracted during a remedial loop and exhibited off-task behavior. To deal with this problem, on-task behavior was observed for each student individually. A student who became distracted during the remedial loop of the video disc was the same student who became distracted when the teacher reviewed for the students who had not mastered the material.

The length of the first baseline condition was determined by the amount of time it took to obtain a stable baseline. Since the students were unaccustomed to being videotaped, it was necessary to assure they were not distracted by the apparatus or taping process. The length of the interventions were also dependent on student behavior demonstrating stable patterns of attending behavior.
CHAPTER III

RESULTS

This chapter reports the findings of the study. The purpose of this study was to compare attending behavior of three subjects instructed by teacher-presented Direct Instruction to that of an interactive video disc presentation based on basic principles of Direct Instruction.

Data were obtained for the baseline and intervention phases during the beginning five minutes, the middle five minutes, and the last five minutes of the classroom presentation. Each of the five-minute segments is referred to as an interval. The percentage on-task for each interval was reported in hopes of determining if the novelty of the video disc presentation created fluctuations in students' attending behavior. It was felt that students may demonstrate higher levels of attending behavior during the beginning of each class session. Then, as the "novelty" of the video disc wore off, the students' on-task behavior would drop at the end of each class session.

Results of the study indicated on-task behavior with the use of the video disc to be slightly higher than with teacher-presented Direct Instruction. Also, the data indicated that the on-task behavior of subjects remained consistent over intervals. Thus, there was no "novelty effect" with the use of the video disc.
Table 1
Results for Subject 1

<table>
<thead>
<tr>
<th>Days</th>
<th>Baseline</th>
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<th>Intervention</th>
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<td>3.</td>
<td>Mean</td>
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<td>92%</td>
<td>100%</td>
<td>96%</td>
<td>100%</td>
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<td>4.</td>
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<td>81%</td>
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<td>83%</td>
<td>89%</td>
<td>100%</td>
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</table>

Total | 86% | 90% | 91% | 88% | 81% | 94% | 90% | 92% |
Figure 1. On-Task Behavior Over Class Sessions for Subject 1.
Figure 2. Intervals - Subject 1 (Baseline).
Figure 3. Intervals - Subject 1 (Intervention).
Table 2
Results for Subject 2

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<th>Days</th>
<th>Baseline</th>
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<th>Intervention</th>
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<td>Mean</td>
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<td>90%</td>
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<td>73%</td>
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<td>82%</td>
<td>85%</td>
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<td>Total</td>
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<td>85%</td>
<td>83%</td>
<td>87%</td>
<td>85%</td>
<td>88%</td>
<td>92%</td>
<td>90%</td>
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</table>
Figure 4. On-Task Behavior Over Class Sessions for Subject 2.
Figure 5. Intervals - Subject 2 (Baseline).
Figure 6. Intervals - Subject 2 (Intervention).
Table 3
Results for Subject 3

| Days | Baseline | | | | | Intervention | | | | | |
|------|----------|---|---|---|---|---|---|---|---|---|---|---|---|---|
|      | 1.       | 2. | 3. | Mean | 1. | 2. | 3. | Mean |
| 1.   | 85%      | 96%| -- | 90%  | 87%| 91%| 96%| 93%  |
| 2.   | 89%      | -- | -- | 89%  | 85%| 96%| -- | 90%  |
| 3.   | 77%      | 96%| 89%| 87%  | 100%| 89%| 78%| 89%  |
| 4.   | 89%      | 96%| -- | 94%  | 88%| 89%| 89%| 88%  |
| 5.   | 85%      | 81%| 92%| 86%  | 88%| 92%| 100%| 93%  |
| 6.   | 96%      | 77%| -- | 87%  | 96%| 100%| 91%| 94%  |
| 7.   | 100%     | 83%| -- | 92%  | 92%| -- | -- | 92%  |
| 8.   | 77%      | -- | -- | 77%  | 92%| 92%| 92%| 92%  |
| 9.   | 90%      | -- | -- | 90%  | 92%| -- | -- | 92%  |
| Total| 87%      | 88%| 90%| 88%  | 91%| 92%| 91%| 91%  |
Figure 7. On-Task Behavior Over Class Sessions for Subject 3.
Figure 8. Intervals - Subject 3 (Baseline).
Figure 9. Intervals - Subject 3 (Intervention).
Table 4
Results of All Subjects Combined

<table>
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<tr>
<th>Days</th>
<th>Baseline</th>
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<th></th>
<th></th>
<th>Intervention</th>
<th></th>
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<th></th>
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<td></td>
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<td>2.</td>
<td>3.</td>
<td>Mean</td>
<td>1.</td>
<td>2.</td>
<td>3.</td>
<td>Mean</td>
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<tr>
<td>1.</td>
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<td>91%</td>
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<tr>
<td>2.</td>
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<td>--</td>
<td>--</td>
<td>76%</td>
<td>91%</td>
<td>96%</td>
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<tr>
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<td>92%</td>
<td>88%</td>
</tr>
<tr>
<td>6.</td>
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<tr>
<td>7.</td>
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<tr>
<td>8.</td>
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<td>91%</td>
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<tr>
<td>9.</td>
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<td>--</td>
<td>--</td>
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<td>87%</td>
<td>87%</td>
<td>90%</td>
<td>88%</td>
</tr>
<tr>
<td>Total</td>
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<td>89%</td>
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<td>92%</td>
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<td>91%</td>
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</tbody>
</table>

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Figure 10. Combined Subjects' On-Task Behavior Over Class Sessions.
Figure 11. Intervals - Combined Subjects (Baseline).
Figure 12. Intervals - Combined Subjects (Intervention).
Reliability

The overall reliability coefficient for on-task behavior across all six sessions checked was .96. The range of the reliability coefficient was from .90 to 1.00 (see Table 5).

Table 5
Interobserver Agreement

<table>
<thead>
<tr>
<th>Session</th>
<th>Reliability</th>
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</thead>
<tbody>
<tr>
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<td>Subject 2</td>
<td>Subject 3</td>
</tr>
<tr>
<td>1</td>
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</tr>
<tr>
<td>6</td>
<td>.93</td>
<td>.97</td>
<td>.98</td>
</tr>
<tr>
<td>Total</td>
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<td>.955</td>
<td>.976</td>
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</table>
CHAPTER IV

DISCUSSION

The results of the study indicate a slight increase in student on-task behavior with the use of the interactive video disc Mastering Fractions by Systems Impact (1984), as compared to teacher-presented Direct Instruction. The data show an increase of on-task behavior in all three subjects (from 3% to 5% from the initial baseline condition) with the use of the video disc.

The data also indicate a reduction in the amount of variability of student on-task behavior with the use of the video disc. This reduction in the variability of student on-task behavior is unmistakably apparent with Subject 3. The tendency of the student to fluctuate between on-task and off-task behavior was greatly reduced with the introduction of the video disc. Subjects 1 and 2 also demonstrated a reduction in the variability of their behavior, but not to the extent of Subject 3.

The data indicate there may have been a ceiling effect on student on-task behavior. The classroom teacher used for this study has experience teaching with Direct Instruction and demonstrated an ability not to drift from scripts while keeping the pacing of the lesson at a desired rate. Gains in percentage of student on-task behavior, with the use of the video disc, may have been reduced due to the fact student on-task behavior was reaching, or had reached,
the limit of what is to be expected in a classroom (during the baseline condition).

An initial concern with the use of the interactive video was the fear that students would obtain high levels of on-task behavior during the initial phases of the presentation but lose interest with the presentation and demonstrate higher levels of off-task behavior as the novelty of the program wore off. This study used a design that addressed this question. Each observation period was divided into three parts: a beginning (first five minutes of the presentation), a middle (between 15 and 20 minutes of the presentation), and an end (last five minutes of the presentation).

The data do not indicate that the novelty of the video disc presentation had any effect on students' attending behavior. The difference in on-task behavior between the three segments of the class period indicate a consistency of student attending behavior. Also, students' on-task behavior between the first few sessions of the intervention were commensurate with their on-task behavior in the last few days of the intervention.

The data indicate higher levels of student off-task behavior during times when the classroom teacher was either uncertain with the proper use of the video disc, or uncertain as to which lesson to cover next with students. (Fortunately, during this study the number of times this occurred were few.) The technology used with the video disc can be confusing at times and may lead to uncertainty on the part of the classroom teacher. It is recommended that the teacher thoroughly review all operating instructions before use in
the classroom. It is also recommended that the classroom teacher either observe another teacher using the program or have a qualified individual demonstrate proper operating procedures. For this study, an inservice was held to demonstrate to teachers the proper use of the video disc. It is felt this leads to a smoother transition to the video disc in the classroom and reduces levels of frustration both on the part of the classroom teacher and the students.

The data do not offer an explanation for the increase in user on-task behavior, or offer an explanation for the reduction in the variability of user attention (during the video disc presentation). Factors attributed directly to the design of the video disc and extraneous factors need to be considered when determining why the video disc was effective.

Software design is the first contributing factor to the increase of student on-task behavior with the use of the video disc. The number of software designers is numerous. Each software designer carries his/her own particular bias as to the most effective method of instruction for use in the classroom. The particular software used for this study was designed following basic principles of Direct Instruction. High levels of student on-task behavior found in this study can be directly attributed to the unison responding, review of previously taught material, remediation of material not mastered, and fast pacing that is found in the Mastering Fractions instructional design.

The scope and sequence of the Mastering Fractions program also contributed to the high levels of student on-task behavior. The
designers of the program were careful to develop a program that built on skills the learner had already mastered. New skills were then presented in such a way not to confuse the learner or make the mistaken assumption that learners had mastered skills previously un-taught to them. A pretest was administered to each student to aid the teacher in the proper placement of students. Once optimal placement was achieved, the video disc presentation taught new skills in a hierarchy to insure all learners had adequate prerequisite skills to achieve mastery of new material. An interesting follow-up study would be to use an interactive video disc that did not use basic principles of Direct Instruction and observe the effect of that video disc on user on-task behavior.

An attractive feature of the video disc is the ability to keep students’ attention through pleasing sounds and graphics. During the course of the video disc presentation, the monitor presents the learner with numerous visual prompts that keep the presentation interesting. In addition to the visual stimulation, the learner also receives auditory signals that coincide with the visual effects. Together they present the learners with a presentation that is equal in video production to their favorite television show.

A factor not directly tied to software design which contributed to higher levels of student on-task behavior was teacher proximity to students. The video disc allows the teacher to move away from the front of the classroom during the presentation of a lesson. The teacher is free to walk around the classroom and interact with individual students. It was observed many times during the study.
that the classroom teacher would move closer to a student who was behaving inappropriately. This allowed the teacher to deal with minor behavior problems on an individual basis before they escalated to the point of becoming a classroom disruption. Student behavior was noted to improve as the teacher moved closer to the disruptive student or placed her hand on the shoulder of the student. This "teacher proximity" to the learner, alone, may be responsible for the increase of student on-task behavior during the video disc presentation (as compared to the baseline condition).

Another contributing factor to the success of the video disc presentation is the consistency of the presentation. The video disc does not "drift" from scripts as teachers who use teacher-presented Direct Instruction may have a tendency to do. (The word "drift" as used in Direct Instruction terminology indicates the teacher saying words, inserting materials, or leaving out important information from the Direct Instruction scripts. For example, a teacher might leave out important instructions when demonstrating to students how to perform a subtraction problem.) This "drift" is a major concern for both the developers of Direct Instruction material and for classroom teachers. This consistency of the presentation may be the one contributing factor for the reduction of on-task behavior variability with Subject 3. Direct Instruction is designed to present students with a highly structured program that uses progressive steps to teach a lesson. Each time the classroom teacher drifts from the script, it disrupts the required presentation. With the use of the video disc, there will be less drift, leading to a more...
consistent presentation and thus, less variability in student behavior.

Current educational practices demonstrate the benefits of using Direct Instruction with instructionally naive learners. Students who have been identified as having a Specific Learning Disability or an Emotional Impairment benefit from a curriculum that is highly structured and fast-paced. Due to a lack of knowledge of Direct Instruction, or a professional disagreement on philosophical grounds, many teachers of special education do not use Direct Instruction in their classrooms. The Mastering Fractions (Systems Impact, 1984) video disc has a bright future for expanding the usage of Direct Instruction with teachers who traditionally would not use Direct Instruction in their classrooms. The video disc is a way to introduce teachers to Direct Instruction while not requiring them to be responsible for the presentation of the lesson. It is a means of exposing teachers to the benefits of Direct Instruction without having the aversive side effects of being overtaxed with learning new teaching techniques.

There are many advantages for the use of the interactive video disc with teachers who traditionally use teacher-presented Direct Instruction in their classrooms. First, by removing the teacher from the role of presenter of a lesson, it removes a labor-intensive task for the teacher. One criticism of teacher-presented Direct Instruction is the need of the teacher to always be "up" when presenting a lesson. With the video disc, the teacher is not responsible for the presentation of the lesson. This allows the teacher to put
more time and effort in the diagnosis and correction of individual student errors.

A second advantage for the use of the video disc, *Mastering Fractions* (Systems Impact, 1984), with teachers who traditionally use Direct Instruction is the ability of the video disc to maintain the proper pacing and scripts of the presentation. As has been previously noted, many teachers who use Direct Instruction have a tendency to drift from the scripts and, at times, lose the proper pace of the lesson. The video disc is a consistent presentation that maintains proper pacing and does not wander from scripts. This allows the learner to benefit from a presentation that is highly structured and consistent in the manner of the presentation.

A third advantage of the *Mastering Fractions* (Systems Impact, 1984) video disc for teachers who traditionally use Direct Instruction is the advantage of allowing the teacher to move freely among students during a presentation. This allows the teacher to answer student questions and deal with behavior problems on an individual basis while the rest of the class proceeds with the video disc presentation. An area of concern for many professionals in the field of education, both with the use of computers in the classroom and with the use of Direct Instruction, is the feeling that the rapport between teacher and learner will be adversely affected. Many feel with the use of computers for instruction, the "personal touch" of the teacher will be less of a factor and students will not develop proper bonds with the teacher. Many also feel that the "parrot" responding of students and the scripts used with Direct
Instruction make the teacher respond like robot to the prompts of the learner. This was not found to be the case during this study. The learning environment in the classroom is still under the control of the classroom teacher. Interactions between teacher and student during a video disc presentation can either be positive or negative depending on the behavior of the teacher.

Observations during this study demonstrated the importance of the teacher in developing the proper learning environment. The classroom teacher made positive comments concerning the use of the video disc in the classroom. Students picked up on the prompts and models of the teacher and also demonstrated behaviors that reflected their positive feelings toward the "new technology" in their classroom. "Traditional" interactions between teacher and student were changed, but, in many instances, it was a change for the better! An example is the ability of the classroom teacher to walk among the students during the video disc presentation and reinforce correct responses with a touch on the shoulder or an encouraging word.

To ensure high levels of student motivation during the video disc presentation, the classroom teacher developed an incentive program for the students. The incentive plan used short-term, long-term, group, and individual incentives. Each day students were given points. The number of points awarded depended on their behavior for that day. The number of points a student received each day was dependent on the following: coming to class on time, being prepared to work, classroom disruptions, and on-task behavior. If the student earned enough points for the week, he/she was allowed
optional time each Friday. Also, built into the incentive plan was an opportunity for the whole class to earn a party. If all members of the class worked appropriately for an entire class period, the whole class was awarded a point toward a group party. The incentives developed by the classroom teacher were an important contributing factor in the success of the video disc presentation. This also demonstrated the need for positive interactions between teacher and learner in a classroom which uses both computers and Direct Instruction.

An area of concern with this study was the inability to fully return back to the initial baseline condition. The classroom teacher did not have enough time remaining in the school year to return to the initial baseline condition. To remedy this problem, a modified baseline condition was used. The classroom teacher was videotaped during another class in which a subject for this study was a member. The results of his on-task behavior during the second baseline condition closely mirrored his performance during the initial baseline condition. For this reason, an argument can be made that the second baseline is a true indication of student attending behavior, if the initial baseline could have been repeated.

Another factor of concern with the design of the study was the fact that only three sessions of the second baseline were used. Time allowed for only three sessions of the second baseline to be recorded before the end of the school year. It is not felt this detracts from the findings of this study due to the fact that the
results of the second baseline closely reflect the results of the first baseline condition.

A factor which may have lowered the on-task behavior of students during the intervention stage was the introduction of a new student into the classroom. The "new" student had tendencies to be disruptive to others in the classroom and at times he created off-task behavior of other students. As a result, the findings of this study may be a conservative estimate of on-task behavior with the use of the video disc.

An area not addressed in this study was user achievement. It was felt this was not a critical area with the use of the video disc since the video disc presentation is built on student mastery of the material. If more than one-fifth of the students failed to pass a "check student progress," then the teacher was instructed to use a remedial loop. Student mastery was evaluated and reviewed on each section before moving on with the lesson.

An area of video disc use that needs future research is the effectiveness of the video disc with an individual learner. The video disc offers an opportunity for a learner to review or remediate lessons on an individual basis. Research needs to be conducted to evaluate the ability of a junior high school student to operate the video disc hardware. Is it feasible to remove a student from the class and use the video disc? If research indicates a student can successfully operate the video disc him/herself, then individual usage of the video disc should be considered as a review and remediation tool.
Another follow-up study would be introducing the video disc into a classroom which had lower levels of student on-task behavior during the baseline condition. Would the introduction of the Mastering Fractions video disc have the same effect on student on-task behavior? Would the gains be equivalent to this study? It would also be interesting to introduce the Mastering Fractions video disc into a classroom where the teacher does not use Direct Instruction and observe the effects of the video disc on student attending behavior.

Finally, an additional study for investigating the use of the video disc on long-term learner retention should be conducted. As has been previously stated, progress through the video disc lesson is built on user mastery of material. What is not known is the effect on long-term recall of mastered material with the use of the video disc as compared to other forms of instruction.
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