1988

A Study to Determine the Effectiveness of a Traditional Teacher Directed Lecture-Demonstration Method Compared with a Computer Driven Tutorial Program for Students Enrolled in Woodworking Technology

Clifton Harrison
Old Dominion University

A Study to Determine The Effectiveness of a Traditional Teacher Directed Lecture-Demonstration Method Compared with a Computer Driven Tutorial Program for Students Enrolled in Woodworking Technology

---

A Research Project

Presented to

The Faculty of the Graduate School

Old Dominion University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science in Education

---

by

Clifton Harrison

1988

This research paper was prepared under the direction of the instructor in Problems in Vocational Education, VTE 636, Dr. John Ritz. It is submitted to the Graduate Program Director for Vocational and Technical Education in partial fulfillment of the requirements for the degree of Master of Science in Education.

Approved, July 1988

John C. Turner

John Turner, Ed.D.
Graduate Advisor

John M. Ritz

John M. Ritz, Ed.D.
Graduate Program Director
Vocational Education

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

Technology educators are constantly look for different teaching methods to improve instruction for student learning. Task, procedures, and objectives are primary tools of the classroom teacher in his/her efforts to present instruction. The public school system of the city of Norfolk is supportive of teachers in search of innovative ideas to achieve objectives for learning. One such innovation is the computer.

Microcomputers are playing an increasingly important role as an instructional aid in the classroom. The computer provides a new kind of interactive medium that helps teachers manage instruction in more individualized ways, thus facilitating students' learning of important concepts. Computers are being hailed today as one of the most significant advancements in the history of education

The following is a research study of students enrolled in woodworking technology classes and how they responded to being taught by a computer tutorial method as opposed to a teacher lecture/demonstration method.

STATEMENT OF THE PROBLEM

The problem of this study was to determine whether a computer directed tutorial is as effective as a traditional teacher directed lecture/demonstration method. To answer this problem the researcher compared the performance of students enrolled in woodworking technology (Bell 2) who were taught fundamentals of woodworking by the traditional teacher lecture/demonstration method with the performance of students enrolled in woodworking technology (Bell 6) taught by a computer directed tutorial program.

HYPOTHESES

There is a significant difference in the performance of students enrolled in Woodworking Technology who are taught woodworking with the use of a computer tutorial system compared to students who are taught by a traditional teacher lecture/demonstration method.

BACKGROUND AND SIGNIFICANCE

When one thinks of innovative ways of approaching a teaching situation, new technology is often in the forefront. This is true for educators who are teaching technology education with a concentration in the woodworking area. Technology teachers are exploring new avenues and procedures to produce the best product they possibly can, should it be in the form of workmanship or students. To obtain this goal the instructor must utilize a

variety of traditional methods and resources as well as any appropriate new or innovative technology.

Two of the traditional methods are lecture and demonstrations. Both of these are considered effective tools for helping students achieve learning objectives. Although these methods may be effective for the majority of students some students may still need different methods to help them achieve learning outcomes. The use of filmstrips, overhead projectors, and textbooks may also aid in the learning process, but the most recent tool has been the microcomputer.

Microcomputers are playing a increasingly important role as an instructional aid in the classroom(Watkins, M. and Webb, C., 1981, p. 24-27). To implement computers into the woods technology program the instructor must possess knowledge of computer terminology for both hardware and software. Hardware referers to the computer itself, the disk drive and printer are components of hardware. Software refers to the various programs of instruction which are entered into the computer to make it perform a specific task.

The implementation of computers in the woodworking classroom is currently being encouraged by the State Department of Education supervisory staff as well as local administrators and supervisors. It is suggested that since students learn in different ways, the computer tutorial would allow the student to learn at his or her pace. Jorde stated, that computers are being hailed as the most significant advance in the history of

civilization, an indispensable adjunct to daily life (1987 p. 36).

To date, most microcomputer research in Technology Education has focused on possible ways to use microcomputers in the classroom, however, limited information exists in terms of efficiency studies comparing computer utility with standard approaches.

This investigation was conducted with the prospect of determining the effectiveness of teaching woodworking technology by a tutorial compared with the more traditional teacher directed lecture/demonstration method.

LIMITATIONS

The following limitations apply to this study:

1. The population of the study is limited to two groups of students enrolled in woodworking technology at Maury High School, Norfolk, Virginia.
2. Students were selected for the control and experimental group only on the basis of this enrollment in two separate sections (Bells 2 and 6) of woodworking technology.
3. Students in the experimental group were taught using only one software package "Shopware" produced by Shopeware Instructional Systems.

ASSUMPTIONS

This study was based on the following assumptions:

1. The computer tutorial "Shopware", can teach students cooperative teamwork and problem solving skills equally as well as the lecture/demonstration method.

2. The ability to receive immediate feedback via the

- computer tutorial, stimulates the minds of students to do their best.

PROCEDURES

The group of students chosen for this study were selected from Maury High School's wookworking Technology classes. On group (Bell 2) was taught the fundamentals of woodworking by the teacher'directed lecture/demonstration method; the other (Bell 6) was taught the same materials by a computer tutorial method. Both groups were tested using the same test instrument.

DEFINITION OF TERMS

The following terms were used and found essential for understanding this study.

1. Computer Tutorial: Step by step guide providing student instructions for use of a computer driven instructional system.
2. Woods Technology: The study of basic woodworking as it relates to industry.

SUMMARY

This chapter includes a rationale for introducing computer tutorial/instruction into the woods technology classes at Maury High School, city of Norfolk, Virginia. This study is designed to determine if students enrolled in woodworking technology showed a significant difference in learning outcome when taught

with computer tutorial compared to the traditional teaching method of lecture/demonstration. This first chapter describes the importance of implementing computers into the educational process. Also explained is the procedure for collecting data from two different woods technology classes during the 1987-88 school year. Chapter II presents a review of relevant literature.

CHAPTER II

REVIEW OF LITERATURE

This research has been designed to determine the effectiveness of implementing computer tutorial instruction into the woodworking technology classes of Norfolk City Schools. Related literature on computers in education can be found in educational journals, libraries, private industries, and local businesses.

Professor Sidney Pressey as recorded in Microcomputers and the Pro Innovation Bias, hailed, "the coming industrial revolution in education," having described in 1926 a machine that "test and also teaches." (1987, p. 12). Mr. Pressey's theory is pretty much on target today with a society that depends on computers for everyday living (microwaves, remote control, instant banking, digital time, communication).

Trifiletti, Firth and Armstrong (1984, p. 69), conducted a study comparing a computerized instruction group which received instruction forty minutes per day, against a group of students that received traditional math instruction from experienced teachers for 40 minutes per day. Mid-year assessment produced significantly greater results for the computerized instruction group in terms of number of math skills mastered and fluency of problem solving.

The writings of B. F. Skinner as noted in Microcomputers and the Pro Innovation Bias; states that we learn when what we do has reinforcing consequences (1987, p. 14). The teachers of woodworking technology can achieve this reinforcement by implementing computers into their program. This would permit students to receive immediate response to questions and answers. Correct responses and signs of progress are the kinds of reinforcers teachers labor over in developing plans for learning. Barbara B. Levin states that computers can teach students cooperative teamwork as well as individual decision-making and problem-solving (1985, p. 40).

In contrast to the valuable assistance that computers bring into the educational process are myths and suspicions. Some educators may fear that they will become relics of a backward culture and viewed as old-fashioned if computers are implemented into the classroom. Others may feel that computers present certain health hazards after prolonged use. For these instructors this belief may contribute to an increased level of stress and job dissatisfaction. However, educators who fear that his or her job is on the line because of computers should feel just the opposite. Teachers will have more time to talk with their students, and students could learn to express themselves more effectively with the aid of microcomputers. B. F. Skinner as recorded in Microcomputers and the Pro Innovation Bias; states that "the computer is the ideal hardware for programmed

instruction..." (1987 p. 16).

This study will concentrate its efforts on Woodworking Technology and how effectively it can be taught with the use of a computer tutorial method as opposed to the traditional lecture/demonstration method. Woodworking Technology covers virtually all types of woodworking tools and equipment. Teachers in the technology field of study who are instructors in woodworking technology constantly emphasize the importance of operating equipment properly and safely. Without the use of computer tutorials students must depend on the instructor to present literature and instructions on the proper procedures for operating all equipment accurately and safely. The computer tutorial would provide an additional source of information for the student.

One of the many problems instructors are faced with is how to reach the slow learner and still satisfy the overall objectives for the entire class. McDermott, P., (1987, p. 81) conducted a study to assess the relative effectiveness of computerized instruction over conventional remedial methods with learning disabled children who were assigned to a mathematics class. Results indicated that the tutorial group exceeded the conventional group. With the use of computers and the tutorial system, students will have the opportunity to study the different types of woodworking equipment and procedures presented to them in the form of games, such as bingo, tic tac toe, and jeopardy. The computer allows the student to make responses,

have instant feedback, and also provide review of incorrect responses, all at the students individual rate of learning (pace). Joseph Junell states that students who are taught with the use of computers are strongly reinforced (1987, p. 8). When asked to rate the beliefs and attitudes of teachers seeking to become computer literate. Joyce E. Killian states that teachers were more positive about their perception of how computers would influence schools and teaching in general, they were more likely to project computers as "basic" in teaching and teacher education and even linked computers to innovative teaching (1984 - 85, p. 81).

SUMMARY

This review of related literature focuses on findings for implementing computers into the classroom as a teaching tool. It was found that computer tutorials provide the slow learner with additional help needed to achieve learning objectives. It was also noted that computer tutorial instructions provided the students with problem solving skills, and finally, the literature reinforces the idea that microcomputers in the classroom can enhance student learning and reinforce teacher instructions. In chapter III, methods and procedures for collecting research data are discussed.

CHAPTER III

METHODS AND PROCEDURES

INTRODUCTION

The problem of this study was to determine the effectiveness of implementing computer tutorials into the woodworking technology program of Maury High School, Norfolk City Schools. The software used in the study was selected from the Shopware Educational Systems.

POPULATION

The subjects chosen for this study were students enrolled in woodworking technology, Maury High School, city of Norfolk, Virginia. These classes are taught at various times of the day, extending from second period (8:35 - 9:25 A.M.) through sixth period (12:35 - 1:25 P.M.). One group (Bell 2) with an enrollment of 17 students was selected to be taught woodworking with the aid of the computer tutorial system. The second group (Bell 6) with an enrollment of 17 was taught the same information using traditional teacher directed lecture/demonstration methods.

INSTRUMENT DEVELOPMENT

The instrument used in the collection of data was taken from the Shopware Educational System's Computer-Assisted Instruction for Vocational Laboratories. The programs are teacher-designed and student-tested software for occupational versatility, e.g. general shop, technology education, and vocational classes for students from grade 7 through adult.

TREATMENT OF DATA

The subjects selected for this study were students enrolled in two woods technology classes. The first class totaled 17 in size, studied bandsaw safety and operational procedures with the aid of the Shopware Educational Systems. The system provided the subjects with step by step procedure for safe and proper operations for the use of the bandsaw. Upon completion of this program all students participated in taking the equipment safety quiz for the bandsaw.

The subjects in the second group (total of 17) were taught bandsaw safety and operation using the more traditional method of teaching by use of lecture/demonstrations by the same instructor. The students proceeded to take notes, complete reading assignments and view overheads. This group was then given the same quiz as the first group. The mean scores were then computed for both groups.

The mean scores were then subjected to a test of central tendency to determine the level of statistical significence.

SUMMARY

This chapter focused on the procedures utilized for setting up the control and experimental groups for the study. Also explained are the procedures utilized for administering the two types of instruction, the testing procedure and the resulting data. The results of the findings can be found in Chapter IV of this study.

CHAPTER IV

FINDINGS

The purpose of this study was to determine the effectiveness of a traditional teacher directed lecture/demonstration method compared with a computer driven tutorial program for students enrolled in woodworking technology, Maury High, Norfolk City Schools. The results of the data collected from test instruments are presented in this chapter. This data was used to determine if there is a significant difference in the performance of students enrolled in woodworking technology who are taught woodworking technology with the use of a computer tutorial system compared to students who are taught by a traditional teacher directed lecture/demonstration method.

To collect this data a test instrument was adapted from the Shopware Educational System to be given to both groups of students enrolled in woodworking technology. The test consisted of questions designed to measure students knowledge of proper procedures for operating the bandsaw. The number of questions completed by the students and the number of errors occurring in the completed test were recorded for comparison by the experimenter. The results of these comparison appear in Table I.

The scores of both groups of students were tabulated and the

means computed. The mean score for each group was placed in a T-test to determine if a statistically significant difference existed between the means. The means score of the computer directed tutorial group was 79.94 compared to that of the traditional group mean score of 64.64. The "T" comparison was 1.84 at the .05 level indicating statistical significance.

The students in the experimental group receiving computer tutorial instruction had achieved a significantly greater gain in learning outcome.

SUMMARY

Results of the test administered to gather data were recorded and noted. Chapter Five provides a summary of this study along with conclusions and recommendations that resulted from the interpretation of the collected data.

TABLE I

A COMPARISON OF THE RESULTS OF THE TEST STORY FOR THE CONTROL AND EXPERIMENTAL GROUPS

Variables	Programmed Instruction Group N = 17		Traditional Instruction Group N = 17		t
	Mean	Standard Deviation	Mean	Standard Deviation	
Equipment Safety Quiz Band Saw	79.94	.20	64.64	.36	1.84

Statiscally Significant, $P < .05$

The experimental group receiving the computer tutorial instruction consisted of 17 students. The control group receiving the traditional teacher directed lecture/demonstration method also consisted of 17 students.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter is a summary of the problem researched, the back-ground pertaining to the problem, the selection of the population, the test instrument, results, and the conclusion drawn from the study. Recommendations for further action follow the research study conclusions.

SUMMARY

The purpose of the study was to determine the effectiveness of implementing a microcomputer tutorial in woodworking technology.

Thirty-four students form two woodworking technology classes were selected to participate in this study. Seventeen from one class were taught by means of computer tutorial, the second group which also totaled 17 was taught using a traditional teacher directed lecture/demonstration method. Each group was given the same quiz. The results were listed in a table which showed the mean score of both groups (Table I).

CONCLUSIONS

The findings of this study indicated that the use of a computer tutorial resulted in a significant difference in student learning outcome. The experimental group showed a 15.3 mean score higher than the control group.

Using a test of central tendency (T-test) it was determined that this difference in learning outcome was significant at the .05 level.

RECOMMENDATIONS

Based on the research findings, the following recommendations were made:

1. That tutorials be implemented in woodworking technology classrooms.
2. That educational software "Shopware," be included with the present curriculum.
3. That in-service workshops be provided on computer technology for all technology instructors in the Norfolk City School System.
4. That a committee of technology teachers be appointed to provide input to the school system regarding the purchase of computer hardware and software systems for utilization in the technology education program.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Paula, Jorde, Microcomputers and the Pro Innovation Bias. Educational Digest. February, 1987.

2. Junell, Joseph, Computers in the Schools. Educational Digest. January, 1986.

3. Killiam, Joyce, Fostering Computer Competence in Schools. Educational Leadership. December 1984/January 1985.

4. Barbara B. Levin, A Dozen Ways to put your Classroom Computer to Work.....At Last. Curriculum Review Vol. 25, No 3, January/ February, 1986.

5. Phillip, McDermott, Computerized vs Conventional Instruction for Learning Disabled Pupils. Journal of Special Education, August, 1984, Vol. 7, No. 1.

6. B. F. Skinner as noted by Paula Jorde in, Microcomputers and the Pro Innovation Bias. Educational Digest. February, 1987.

7. Trifiletti, Firth, and Armstrong, Microcomputers vs Resource Rooms for LD Students. Learning Disability Quarterly, July 1984, Vol. 17, No. 1.

APPENDIX

EQUIPMENT SAFETY QUIZ
BANDSAW

WHAT SHOULD YOU DO IF THE CUT BEING MADE IS TOO SHARP?

A. USE A SKINNIER BANDSAW BLADE
B. GIVE UP
C. BACK THE STOCK OUT WITH THE MACHINE RUNNING
D. CUT IT WITH THE BANDSAW WHEN NO ONE IS LOOKING
E. USE THE RADIAL ARM SAW

(PRESS A, B, C, D, OR E)

HOW CLOSE IS THE CLOSEST YOUR FINGERS SHOULD BE TO THE BLADE WHEN THE BANDSAW IS RUNNING?

A. 1/8 INCH
B. 1/2 INCH
C. 1 INCH
D. 2 INCHES
E. 4 INCHES

(PRESS A, B, C, D, OR E)

WHEN CAN ADJUSTMENTS BE MADE WITH THE BANDSAW RUNNING?

A. ANY TIME
B. WHENEVER IT IS IMPORTANT
C. ONLY IF YOU HAVE TO
D. WHEN NO ONE ELSE SEES YOU]
E. NEVER

(PRESS A, B, C, D, OR E)

HOW CLOSE SHOULD THE SAW GUIDE BE TO THE TOP OF THE STOCK?

A. 8 INCHES
B. 4 INCHES
C. 1 INCH
D. 1/2 INCH
E. 1/8 INCH

(PRESS A, B, C, D, OR E)

IF THE BANDSAW BLADE SHOULD BREAK OR COME OFF OF THE WHEELS WHILE THE MACHINE IS RUNNING, WHAT SHOULD YOU DO?

A. TURN OFF THE POWER
B. BE SURE TO STAY OUT OF THE WAY OF THE BLADE
C. TELL YOUR INSTRUCTOR
D. ALL OF THE ABOVE
E. NONE OF THE ABOVE

(PRESS A, B, C, D, OR E)

HOW SHOULD CYLINDRICAL STOCK LIKE DOWELS BE CUT ON THE BANDSAW?

A. FREEHAND
B. WITH A V BLOCK
C. NEVER
D. WHEN BANDSAW IS AT SLOWEST SPEED
E. WHEN BANDSAW IS AT FASTEST SPEED

(PRESS A, B, C, D, OR E)

WHEN IS EYE PROTECTION REQUIRED WHEN USING THE BANDSAW?

A. NEVER
B. WHEN THE SAWDUST IS GETTING IN YOUR EYES
C. IF YOU HAVE SENSITIVE EYES
D. ALWAYS
E. NONE OF THE ABOVE'

(PRESS A, B, C, D, OR E)

THE PROPER PLACE TO STAND WHEN OPERATING THE BANDSAW IS WHERE?

A. TO THE LEFT OF THE BLADE
B. TO THE RIGHT OF THE BLADE
C. BEHIND THE BLADE
D. OPPOSITE THE ON AND OFF SWITCH
E. FACING THE CUTTING EDGE OF THE BLADE

(PRESS A, B, C, D,OR E)

HOW SHOULD THIN STOCK BE CUT ON EDGE

A. WITH A MILTER GAUGE
B. WITH A RE-SAW FENCE
C. FREEHAND, BUT WITH EXTREME CAUTION
D. WITH A DOWEL JIG
E. AS FAST AS POSSIBLE, TO AVOID DANGER

(PRESS A, B, C, D, OR E)

WHICH OF THE FOLLOWING IS NOT TRUE?

A. YOU SHOULD NOT STOP THE BLADE WITH THE STOCK
B. SLOW SPEEDS ARE FOR METAL CUTTING
C. FAST SPEEDS ARE FOR WOOD CUTTING
D. NOT ALL BANDSAWS HAVE VARIABLE SPEEDS
E. FEED STOCK INTO BLADE BEFORE REACHING FULL SPEED

(PRESS A, B, C, D, OR E)

WHICH OF THE FOLLOWING IS NOT TRUE?

A. BACKING OUT OF A CUT CAN MAKE THE BLADE COME OFF
B. THE FASTER YOU CUT THE BETTER
C. THERE ARE TWO GUARDS COVERING THE BLADE WHEELS
D. THE GUIDE POST CAN BE RAISED AND LOWERED
E. TWISTING THE BLADE CAN CAUSE A SERIOUS ACCIDENT

(PRESS A, B, C, D, OR E)