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Teaching elementary music reading skills using computer-assisted instruction and traditional teacher-learner methods

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TEACHING ELEMENTARY MUSIC READING SKILLS
USING COMPUTER-ASSISTED INSTRUCTION AND TRADITIONAL
TEACHER-LEARNER METHODS,

MASTER'S PROJECT

Submitted to the School of Education
University of Dayton, in Partial Fulfillment
of the Requirements for the Degree
Master of Science in Education

by

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CHAPTER I

INTRODUCTION TO THE PROBLEM

Purpose of the Study

During the past two decades, applications of computers have become a part of all areas of education, just as computers have invaded homes, offices, laboratories, and businesses. Educators, like everyone else, have had visions of using these machines for making their jobs easier and for improving this technological machine.

Computers have entered the classroom at an amazing rate due to the belief of both educators and the general public that computers will improve the instructional effectiveness of schools. As instructional applications have developed, numerous research studies have evolved in which attempts have been made to determine the effectiveness of computer-assisted instruction (CAI) upon student achievement.

Economic conditions of recent years have caused many schools to make spending cuts. Frequently, these cuts involve reducing teaching positions, combining some teaching positions, or by increasing the

pupil-to-teacher ratios. Many times these adjustments are made in the area of music. Because student exposure to music in schools is diminished when this occurs, it is vital to find more efficient methods of instruction so that students will be penalized as little as possible by staff cuts.

In examining the literature, the author discovered that the profession needs to find other ways to teach music. Numerous professionals believe CAI works because they see their students doing exciting musical things with the use of the computer (Bangert-Drowns and Kulik, 1985). Research findings concerning the effects of computers in general education indicate that different kinds of CAI produce different effects at different levels.

Statement of the Problem

The purpose of this study was to determine which of two methods of teaching basic music reading skills to fourth grade students was more effective, computer assisted instruction (CAI) or traditional teacher-learner instruction.

Hypothesis

There is no significant difference between the mean gain achievement scores of fourth grade students who were taught music reading skills using CAI as a supplemental teaching aid and those students who were taught music reading skills without using CAI.

Assumptions

It was assumed that the achievement tests correctly measured the fourth grade students' knowledge of basic music reading skills. It was also assumed that the participating students put forth a true effort during testing.

Limitations

With regard to the factors that jeopardize external validity, the confounding effects of pretesting are not controlled because a pretest was administered. Since both groups are exposed to a treatment, each treatment was observed.

Care must be taken so that the results are not generalized to populations outside the general population from which this study was formed. To generalize the results found from the sample population

to other populations could be misleading, unproven, or completely false.

Definition of Terms

Computer-Assisted Instruction (CAI) -

Computer-assisted instruction is a type of instruction that was organized by the teacher and was carried out by means of a computer.

Drill and Practice Program - Drill and practice is a computer program that assists students in the recall of factual information. It supplements the regular curriculum by providing additional practice in lower order learning.

Educational Games Program - Educational games are computer programs that encourage the development of strategy. In this program a student is able to apply processes that go to the heart of reasoning, thinking, and problem solving.

Lecture - "Lecture is a type of teacher-learner method that is used to give information, facts, opinions, ideas, or orientation to students." (Amidon, Flanders, and Casper, 1985)

Music Reading Skills - Music reading skills is the act of rendering by voice or instrument the musical sounds called for in printed notation.

Practice and Drill Teaching Method - Practice and drill teaching method is a teaching technique intended to bring about automatic accuracy and speed of performance in any subject.

Traditional Teacher-Learner Instruction - Traditional teacher-learner instruction is a method of teaching by utilizing lecture and use of the classroom chalkboard. The teacher attempts to teach a number of students the same thing at the same time.

Tutorial Program - Tutorial program is a type of a computer program that presents concepts to the student. It reinforces correct answers and provides assistance in correcting mistakes.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Types of CAI in Teaching Basic Music Skills

A computer can be used for drill and practice. According to Netusil and Willett (1989), drill and practice is currently the most used type of CAI. The purpose of drill and practice is to stabilize, reinforce, and maintain skills or memory facts. This type of instruction is usually modeled after workbooks.

Tutorial programs are another form of CAI (Niemic and Samson, 1987). In these types of programs the computer assumes the role of the teacher. Unlike drill and practice programs, tutorial programs present material in a programmed learning format that moves from one step to the next. The students are able to move at their own pace. The student is actively involved by making a response to each question which is followed by immediate feedback.

Instructional management is another method of CAI. In a study by Hunt (1986), he stated that this type helps develop creativity in the student. The computer provides an accompaniment while the student performs on

a piano keyboard. The computer instructs the student on the various musical concepts to be entered into the computer before the composition is performed. After the student performs the work, the composition is stored in the computer's memory, and it can be saved on the disk or played back with different instrumental sounds. This method also assists students in achieving accuracy in vocal pitch production and in developing graphic and charting skills as they apply to the staff and notational symbols. In addition, there are programs that build those skills necessary to translate visual symbols into tactile responses.

Another type of CAI is educational games (Hunt, 1986). The value of educational games is that they encourage the development of strategy. By interacting with the computer competitively, by discovering what effect an action or play has, and by working out a systematic strategic plan based on these observations, the students learn to apply the processes of reasoning and thinking.

As stated above, various types of CAI programs include drill and practice, tutorial, instructional management, and educational games. What positive effects does using CAI have upon student achievement? This is discussed below.

Positive Effects of Using CAI

One positive effect for using the computer is that it provides continuous feedback. Franklin (1983) stated that this was the best asset for using CAI. This feature prevented students from practicing a mistaken method of operation of basic reading skills in music. The computer allowed the slower students to practice as many times as needed to completely learn the music notation.

Another positive effect when using the computer is that CAI allowed the students to work at his or her own time and rate. This helped to meet the needs of each student by adapting the level of difficulty and varying the pace (Franklin, 1983).

Consistency is another positive effect for employing CAI. Netusil and Willett (1989) stated that computers provide consistency because, unlike people, they do not lose their patience. The student is able to work and not worry that the computer will become impatient with the repeated practice of the skills being drilled to the student.

Another positive effect for using the computer is motivation. A study by Rumery (1986) stated that students utilizing the computer showed a high motivation level on the students' learning. Today's

students are enthusiastic about electronic technology. A big dilemma for music educators has been the question of how to keep students in the music programs. Computers can serve as a major motivating force in encouraging students to join and remain in music programs. Even if CAI is not more effective than other instruction, it makes learning fun because positive attitudes facilitate learning.

Positive reinforcement is another positive effect for using CAI. The most effective moment in learning is when reinforcement is applied to the learning stimulus (Feldstein, 1988). The computer's sound is the reinforcement which allows a student to hear automatically what he has done musically. Programs can be written to guide the learning process step by step. This type of program would allow for individual instruction without the one-on-one interaction between teacher and student. CAI encourages this immediate response.

The positive effects of using CAI include feedback, allows students to work at their own pace, provide consistency, achieve a motivation level, and acquire positive reinforcement. Just as the positive effects of using CAI are varied, so, too, are the negative aspects of CAI.

Negative Effects of Using CAI

One negative effect is that software development is considerably behind hardware development. Scientists, engineers, and manufacturers have developed the microcomputer into an extremely powerful device. Franklin (1983) stated that computers educational uses are untapped because of low quality or insufficient quantity of educational programs. Creative applications for music instruction are necessary.

Another negative effect is that much of the current CAI is weak in continuity of learning because no diagnosis is available regarding the students' learning style. Hunt (1986) stated that the instructional objectives for CAI should include such matters as what concepts and information students have mastered and what patterns of thinking or learning style the student finds easy or difficult. Since it is also important to gauge a student's particular approach to learning, to problem solving, and to abstracting, the diagnostic task is particularly relevant for the training to have continuity in learning.

A lack of distribution centers for music software is another negative effect of using CAI. Program writing is currently a grass roots movement. Across the nation, hundreds of people are writing educational

computer programs, but it is difficult to locate a wide variety of music programs (Franklin, 1983).

As stated above, various negative effects of using CAI include a lack of software development, weakness in the continuity of learning, and the lack of distribution centers for music software. Because CAI has become a type of teaching method the author will discuss two types of traditional teacher-learner methods used in this study.

Types of Traditional Teacher-Learner Methods

One type of traditional teacher-learner method is lecture. Lecture is used to give information, facts, opinions, ideas, or orientation to students (Amidon, Flanders and Casper, 1985). This method was used in the study to introduce the musical concept of notation reading. This type of teacher-learner method only conveyed information valuable to the students' preparation for the posttest. As music has been called a form of nonverbal communication, so must the learning initially proceed through the musical experience rather than through descriptive labels and lectures.

Another type of teacher-learner method is practice and drill. McMullen (1986) stated that it is a type of teaching that ensures that basic knowledge has been learned. Most importantly, the emphasis on extensive

sensory experiences and learning-by-doing was a guidepost to music learning for many years to come. In a continuing effort to improve the music education of students in beginning stages, there is a need for the review of teaching techniques that motivate student learning behaviors. Musicianship has historically achieved a sequence of experiences that actively engages students in the music-making process. Practice and drill can be successfully used when the participation of the students include that music-making process.

Music education methods have naturally reinforced participatory experiences that demand an active student role for the maximum development of cognitive and effective responses. The key to effective instruction and consequent musicianship at all levels is the involvement of children in the music-making process. There are no universally acceptable methods in music, but rather a variety of adaptations as diversified as the skills and interests of the multitude of music educators. The method ultimately practiced by the teacher matters not, so long as it is compatible with the students and draws forth from children the sensitivity to respond intelligently to music.

CHAPTER III

PROCEDURE

The procedures used in the completion of this project are discussed in this chapter. It is divided into five sections. They are: subjects, setting, data collection, design, and treatment. This project involved a study conducted with two fourth grades within the same school system.

Subjects

Fourth grade. This group of caucasian students consisted of 13 fourth grade children. There were eight female and five male students. This group was instructed by the use of computer-assisted instruction.

Fourth grade. This group consisted of 13 fourth grade students. These students are also caucasian. There were seven female and six male students. This group was instructed using the traditional teacher-learner method without the use of computer-assisted instruction.

Setting

School. The school is located in the southeastern part of Ohio. The school system is divided into three groups: elementary, middle, and high school. The building used in this study contains five fourth grades, five sixth grades, five seventh grades, and five eighth grades. The fourth, fifth, and sixth grade classes are heterogeneously grouped. The seventh and eighth grade classes are homogeneously grouped. The total student enrollment for the middle school is approximately 650 students.

Community. Placed in a rural setting, the school district is located 12 miles north of Portsmouth, which is a city that lies near the banks of the Ohio River. The district has no industry and only a few small businesses. Although the land surrounding the village is used predominately for agriculture, most of the people in the district work at jobs in surrounding cities.

Data Collection

Construction of the Pretest-Posttest. Both fourth grade classes were given a pretest consisting of two 12-question parts. The pretest involved note reading for both the treble and bass clef staves. The test was

formed by using items from written materials including the textbook materials distributed in class. The posttest had the same format except items were in a rearranged order.

Administration of the Pretest-Posttest. All fourth grade students were given a pretest of two 12-question parts. No time limit was set. This was done in order to provide an opportunity for the slower students to complete the test. The tests were not returned to the students.

Because note reading implies both being able to name notes observed on a staff and being able to place given notes on a staff, the test consisted of two parts to determine if the students learned each skill. The first part of the test, referred to as the note names, required the students to observe notes on a staff and then name them. For the second part of the test, referred to as the note placement, the students were given note names and asked to draw those notes on a staff.

When all of the students had concluded either the computer drill sessions or the classroom drill sessions, they were given a posttest at the end of the six weeks. Since the students were never told the correct answers to the pretest, it seemed probable that

using the same test as a posttest could be justified. This posttest was given in the same manner as the pretest. Both tests were administered in a group setting. A copy of this pre and posttest can be found in Appendix A.

Design

The experimental design for the study of this project was:

R T1 Xa T2

R T1 Xb T2

with T1 and T2 indicating the pretest and posttest, respectively. The R represents that each of the groups were selected by using the process of random selection. The Xa represents the independent variable of traditional classroom teaching supplemented by computer-assisted instruction (CAI). The Xb represents the independent variable of traditional classroom teaching which was not supplemented by CAI.

Treatment

Before starting the project, the two fourth grade classes were randomly assigned to either experimental group A or experimental group B. Group A was instructed to use the computer to work on supplementary

material. Group B was not allowed to use the computer to do any supplemental work.

Both groups were taught treble and bass clef notes and the basic methodology for learning the notes. The students in both groups were shown the music alphabet on the bass and treble clef staves. The groups were given mnemonic devices for lines and spaces to help them remember the note names. The note name unit lasted a total of six weeks. Work on note names and note placement lasted approximately six class periods with one day being spent for a review of the music reading skills.

Experimental group (A), worked in groups of three with the computer program Clef Notes by G. David Peters (1983). This program showed the letter name of a note, and the student moved a note head to the correct position on a staff on the monitor screen. Each group worked with an Apple IIe computer for two ten-minute sessions a week.

Experimental group (B), was drilled using the practice and drill method of teaching during two ten-minute sessions, two times each week in the classroom (Shehan, 1986). The teacher used the usual method of drilling notes on the staff. Each of the students was given a slate that had a staff painted on it. The teacher either wrote letter names of notes on

the chalkboard and had the students draw the notes on the staff on the slates, or the teacher had the students spell words with the notes. After the notes were learned, the teacher had the students put notes on a staff on the chalkboard, and they responded by giving letter names. After the six weeks period, the posttest was administered and compared to the pretest.

CHAPTER IV

RESULTS

The results of the hypothesis of this project is presented in this chapter. A table was used to show the outcome of the hypothesis. The table consists of the number of students in each group (N), mean gain scores (\bar{x}), and standard deviations (s.d.). A discussion of the results follows the table.

In t tests for small samples, one condition needed to be met to justify the method of pool variances. This method is known as equality or homogeneity of variance. To determine whether the samples met the criterion of equality of variances, an F max test was used (Best and Kahn, 1986).

Presentation of Results

The fourth grade students in the CAI group had a lower mean pretest score on the achievement test than those students in the non-CAI group. After the independent variables were administered, the CAI group scored higher on the posttest than the non-CAI group. Both groups did show a very positive gain with the CAI gaining more than the non-CAI group. The mean gain

score on the twenty-four item test was 14.2 for the CAI group as compared to 19.7 for the non-CAI group (See Table 1). The t-value for this study was determined to be 2.19. Since the t-value for this study is greater than the critical value, the null hypothesis is rejected. The author concluded that there does appear to be a significant difference in the music reading achievement of those fourth graders who received CAI to supplement their regular classroom instruction and those who did not receive CAI.

TABLE 1

FOURTH GRADE MUSIC ACHIEVEMENT EXPRESSED AS
MEAN GAIN SCORES, STANDARD DEVIATIONS,
AND T VALUE FOR CAI AND NON-CAI GROUPS

GROUP	N	\bar{X}	s.d.
CAI	13	14.2	3.98
NON-CAI	13	10.7	4.29

degrees of freedom = 24
t = 2.19; p < .05

Discussion of Results

There appears to be a significant difference in music reading achievement between those fourth grade

students who are taught using CAI as a supplemental teaching aid and those students who do not receive CAI. These findings concur with two studies reviewed in this project. Specifically they correlated very closely to the results found by Netusil and Willett (1989) who found a significant difference with a two-tailed t-test at the .02 level. They also correlated very closely to the study done by Rumery (1986). That study showed a significant difference at the .05 level.

In speculating as to why the computer group scored higher than the classroom group on the posttest, the author theorized that the computer helps to hold a student's attention whereas activities in the classroom offer many distractions. The fact that some students from the non-CAI group scored fairly high shows that the classroom instruction was probably effective for those who were attentive. But such distractions as the presence of other students and the teacher's divided attention may have had a negative effect on the concentration of some of the students. This may have caused those students to be less attentive during classroom drill and therefore to score lower on the posttest. Because the computer requires students to give it their undivided attention, respond to every action, and allows the student to be in control, it might seem to be more personal to a student than a

teacher. A teacher with a classroom of students can never give this kind of individual attention to every student. Therefore, a teacher may seem more impersonal than a computer in a drill situation.

The significant difference of the CAI group may be attributed to the immediate feedback and self-pacing that was stated by Franklin (1983). This helped to meet the needs of each student by adapting the level of difficulty and varying the pace. This also allowed the slower students to practice as many times as needed to completely learn the music notation.

Another reason the CAI group did better could be the hands-on experience that the students achieved with the computer. The concept of the existence of defined spaces between lines, as on a musical staff, can be difficult for some people to understand. Also, the concept of the alphabet being associated with the lines and spaces is not always clear to some people. The computer program Clef Notes (Peters, 1983) probably provided that hands-on link that overcame possible learner difficulties in these areas. As the students manipulated staff notes on the monitor, they could grasp the concepts of lines and spaces and their relationships to the alphabet in a way that might have eluded them with a picture on a chalkboard or worksheet. The design of the computer program may have

overcome learner obstacles that otherwise may have differentiated the scores of the two groups. Because of this, the hands-on experience of instruction with CAI may have enhanced the initial learning experience, thereby creating a gain by the CAI group.

Another reasonable assumption for the high achievement of the CAI group could be the enthusiasm that the students showed while using the computer. Rumery (1986) stated that students utilizing the computer showed a high motivation level on the students' learning. It could be postulated that part of the enthusiasm was due to novelty effect. If so, such a learning strategy can and should be used to its fullest impact.

Finally, a positive attitude toward computers is generally desirable in a computer-oriented society. If the use of computers contributes to increased learner achievement and efficiency, as well as to learner enthusiasm toward using computers, then a great deal can be achieved with their use.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

In this project the author reviewed the literature and found that the researchers reported various teaching methods of determining the effectiveness of computer-assisted instruction (CAI).

The purpose of this study was to determine which of two methods of teaching basic music reading skills to fourth grade students was more effective, computer-assisted instruction (CAI) or traditional teacher-learner instruction.

There is no significant difference between the mean gain achievement scores of fourth grade students who were taught music reading skills using CAI as a supplemental teaching aid and those students who were taught music reading skills without using CAI.

Before starting the project, the two fourth grade classes were randomly assigned to either experimental Group A or experimental Group B. Group A was instructed to use the computer to work on supplementary material. Group B was not allowed to use the computer to do any supplemental work.

All fourth grade classes were given a pretest consisting of two-12 question parts. The pretest involved note reading for both the treble and bass clef staves. The first part of the test, referred to as the note names, required the students to observe notes on a staff and then name them. For the second part of the test, referred to as the note placement, the students were given note names and asked to draw those notes on a staff.

At the end of the six weeks all fourth grade students were given posttests to measure the students' music reading achievement.

Those students in Group A showed a mean gain score in achievement of 14.2 while those in Group B showed a mean gain score of 10.7. Based on the t-value, the null hypothesis was rejected. This indicated that there was a significant difference in the achievement of the fourth grade students using CAI and those who did not use CAI.

Conclusions

As a result of this project, there appears to be evidence that CAI is effective in improving achievement when used as a supplement to teaching fourth grade music reading skills.

This study indicates that the use of the Clef Notes computer program is likely to be an effective means whereby most students could individually learn the names of the notes on a musical staff. If students learn this skill individually with a computer, then classroom time can be used for teaching the more aesthetic aspects of music.

This study also demonstrated that the computer is practical for use in a typical public school, and that effects of its use were quite positive. Most schools have computers available, and their use is practical in most school situations.

In theory, it seems that CAI can be a useful tool in supplementing music programs. Before concluding this, more research will need to be done in this area.

Recommendations

As stated above, the author believes that further research will need to be done on the effectiveness of CAI.

Computers seem to have the potential for making a strong impact on music education. However, the development of a generally accepted philosophy about the best uses for computers in schools has lagged behind computer and music software development. CAI can be a vital aid in the learning process; however,

any determination of the potential effectiveness of CAI in a particular music classroom situation involves much more than just computer hardware and software. The outcome will be contingent very largely on the teacher, the educational goals of the music program, and the nature of the learning environment into which CAI is introduced.

This study was concerned with only a small area of computer use in music education. Finding effective ways of integrating computer use into music curricula is an area that will require considerable experimentation and study.

APPENDIX

APPENDIX A

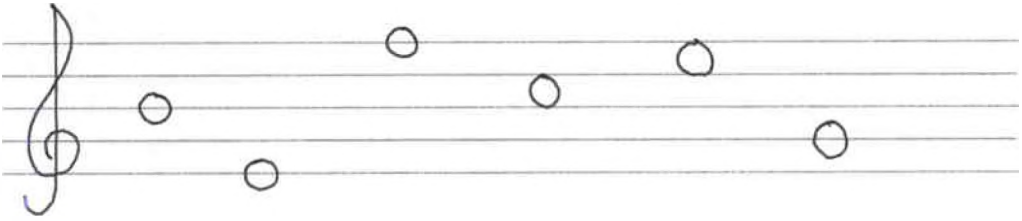
LET'S READ NOTES

Name _____

Date _____

THE NOTE SPELLDOWN

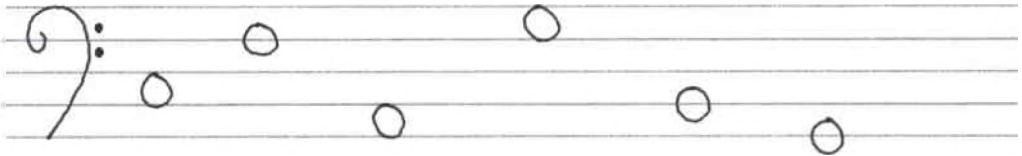
Write the letter names below the notes for the Treble Clef.



Draw the Treble Clef sign on the staff and draw whole notes above each letter.

G D B F A E

Write the letter names below the notes for the Bass Clef.



Draw the Bass Clef sign on the staff and draw whole notes above each letter.

G B D F C E

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