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ABSTRACT

Student attitudes about learning were assessed in association with usage of MicroWorlds, a multimedia learner-based software program, as a publishing tool. A language arts class of 19 sixth graders was divided into cooperative groups following a small group investigation model. After implementing a two-week unit which incorporated MicroWorlds as part of an author study, the investigators assessed students' attitudes and motivation. Student affect was measured by three surveys which questioned students' feelings toward computers, using MicroWorlds, publishing on computers, and working in cooperative groups. Findings suggest that students enjoy using MicroWorlds as a publishing tool; however, some were dissatisfied with the cooperative grouping. When asked what was most satisfying about the unit, students reported the freedom to design their own presentations and the opportunity to incorporate a variety of media into their projects. Reproductions of the following are provided: background information survey form; computer affect survey; student survey; student affect survey; open-ended questions; group member evaluation form; and audience evaluation form. Two figures illustrate findings. A lesson plan for MicroWorlds and author study is included. (Contains 38 references.) (author/MAS)

MicroWorlds as a Publishing Tool for Cooperative Groups:

An Affective Study

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Running Head: MICROWORLDS IMPLEMENTED IN UNIT ON AUTHOR STUDY

Abstract

Student attitudes about learning were assessed in association with usage of MicroWorlds, a Multimedia Learner-Based software program, as a publishing tool. A sixth grade Language Arts class was divided into cooperative groups following the small group investigation model. After implementing a two-week unit which incorporated MicroWorlds as part of an Author Study, the investigators assessed students' attitudes and motivation. Student affect was measured by three surveys which questioned students' feelings toward computers, using MicroWorlds, publishing on computers, and working in cooperative groups. The findings suggest that students enjoy using MicroWorlds as a publishing tool; however, some were dissatisfied with the cooperative grouping. When asked what was most satisfying about the unit, students reported the freedom to design their own presentations and the opportunity to incorporate a variety of media into their projects. These results are congruent to Seymore Papert's theory that students enjoy using Learner Based Tools, and that learning is enhanced.

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Introduction

Today, technology is being used in classrooms in a variety of ways. Multimedia is a particular type of software that has been shown to have value in extending the learning process in interesting ways. Multimedia refers to any computer application that capitalizes on the combined elements of graphics, text and sound to present information. This study involved an investigation of how MicroWorlds, a new multimedia package, enhances student attitudes toward their work in a 6th grade Language Arts classroom.

Use of computers in instruction, have been found in many instances to promote positive attitudes toward learning. Weinstein and Mignano (1993, p.88) suggest using new elements in the classroom, such as a computer, to keep student interest high and motivate learning. Students usually love using the computer; one teacher said, "my students are eager to use the computer" (Mathison and Brown, 1986, p.37). This enthusiasm transcends genders (Shamai, 1993). Davidson and Ritchie (1994, p.11-12) found that elementary school students "liked to experiment on computers", "liked to learn using a computer", and "thought learning is more exciting with computers". Piele (1981) reported that sixth grade students were overwhelmingly enthusiastic whe

working with computers. According to Magidson (1977) students consider programming highly motivating even after prolonged use.

Due to this intrinsic interest, students who use a computer in education will also be more interested in learning, and will, therefore, learn more. Student affect, described as the motivation to learn (Bloom, 1976), is measured through an awareness of feelings or attitudes, but can also reflect motivation and confidence that students hold in relation to computers (Freiberg and Driscoll, 1992). According to Bloom, the quality of student attitudes and motivation help to determine the learning outcomes. In other words, if a student holds a positive attitude about computers and how they are used, then he or she will learn more by using the computer. Kinzer and his colleagues (1986, p.15) believe that this is one way the microcomputer will alter the course of education.

In the past decade, computers have become more prevalent in the United States public schools and are being integrated into instruction. In 1981, 18% of schools had computers; in 1991, 98% had them (Cuban, 1994). In 1981, the student to computer ratio was 125:1; in 1991, the ratio was reduced to 18:1 (Cuban). In 1981, 16% of the schools used computers for instruction; in 1991, that number rose to 98% (Cuban). Although there are increasing numbers of computers in schools, often students do not have access to the machines or the best software.

If educators are serious about motivating learners, they must alter how computers are used in schools. Cuban believes that many schools are not using the computers available to them;

in fact, the computer is used far less on a daily basis in classrooms than in businesses (Cuban, p.50). From a survey of a nationally representative sample of 3,000 11th grade students, 97% had taken at least one math and science class last year. Only 44% of the students had used a computer in either of these classes, and, surprisingly, only 23% had used a computer more than once in math or science class (Anderson, 1993, p.72-3). (Aside: Math and science classes were the subjects chosen because, traditionally, these are the first two subjects in which schools implement new technologies.)

Educators use two working models to describe how they implement computers in instruction: Computer-Assisted Instruction and Learner-Based Tools. Until recently, most educational programs employed in the classroom had been of the drill-and-practice variety (otherwise known as Computer-Assisted Instruction) (Armstrong and Yang, 1994, p.80-88). Only in the last few years have educators begun to use technology as a Learner-Based Tool: something that the student can use to create and develop his or her own product. Both methods of technological applications have advantages and disadvantages, but Learner-Based Tools have been cited as motivating and correlated with positive attitudes.

Computer-Assisted Instruction

Most schools in the early 1980's used computers for simple drill or as games. In a drill program, the computer would pose a question to which the student would choose answer "a", "b", or "c". At the end of the session, the student would be given a

final score. In this instance, the computer served as an alternative "tutor" by quizzing the child on certain skills or facts (Howie, 1989, p.72). Sometimes the computer would be used to play games, such as an interactive adventure story. Here, the student would decide where a character would venture to next while reading text on the screen.

This type of computer-instruction may not be motivational or the most effective for learning. In the Six-Year Technology Plan for Virginia (Virginia Department of Education, 1989, p.42) administrators agreed that the Computer-Assisted Instruction model is effective only when used with one or two pupils at a time. In this situation, the interaction is limited to student and computer, the teacher does not have an active role in instruction. Computer-Assisted Instruction may serve a purpose within the classroom; however, it may not be the most effective way to stimulate the learning process. Rather than stimulating the learning process, Computer-Assisted Instruction merely reinforces what is already learned.

Critics attack Computer-Assisted Instruction for ignoring the learner's affective side. Howie argues that the programs do not address or support the learner's "personal values, self-worth, and personality" (p.151). In addition, they do not encourage communication or social interaction due to the direct nature of the model (Bull, et. al., 1988, p.62). By ignoring the more emotional side of a student, these programs may not motivate children to learn. At times, this individualized instruction can

be useful; however, other models for computer application may be more effective for creating a positive learning environment.

Learner-Based Tools

Learner-Based Tools offer a more student-centered model for instructional computing. This model looks at the student as a programmer and the computer as his or her tool. Whether the student is using a word processor to type a paper or using a language to program a computer, the student is actively inventing and the computer is used as a machine to enable the learner. Rather than having "the computer teach the child"...the child is teaching the computer (Papert, 1980, p.5).

Many programs of this kind are being used in classrooms throughout the United States. For example, paint programs like KidPix help pre-schoolers through second graders make pictures and identify letters; it can be applied to many grade levels and abilities. Word-processors are being used as a publishing tool for students' writings, helping the editing and revision phases of the writing process, and providing students with a polished and professional finished product.

They are motivating because they are interactive. These software packages encourage a three-way interaction involving the student, computer, and teacher equally and actively throughout the instructional process. Bull (1988, p.62) describes this as a "conversation". Teachers roles change from the "disseminator of knowledge" to a "guide" or "mentor" (Dwyer, 1994). Such dialogue provides students with a more comfortable learning environment,

thus addressing the students' affective side more so than Computer-Assisted Instruction.

Learner-Based Tools are motivating to learners because they provide ample problem-solving opportunities, giving students control of their learning (Costanzo, 1985, p.523). Through programming, the student learns logic, sequence, organization, and problem-solving (Olson, 1988, p.60). "The computer offers problem-solving opportunities for students to develop skills they can use in processes that require clear, logical thinking" (Howie, p.34). Students receive immediate feedback when they program because the program will not run unless written correctly. They must trouble-shoot their errors and "develop strategies for learning and finding out" (Chandler, 1984). Through Learner-Based Tools, a student can attain expert status by interpreting, organizing, and storing knowledge (Reiber, p.94). Children become more motivated when using Learner-Based Tools because they are learning in a meaningful way (Reiber, p.98). Bull and his colleagues (p.67) described these programs as motivational because students become more interested in their own programs.

Seymore Papert, the developer of a Learner-Based language called Logo, has championed the theory that Learner-Based Tools create meaningful learning experiences. His book Mindstorms: Children, Computers, and Powerful Ideas (1980) suggests that students have too little control over their own learning environments in most schools and supports the idea that computers will eventually change the model of learning from

classroom instruction. New technologies will alter how and what students think; therefore, they will also alter the learning styles and intellectual resources available to students (Costanzo, p.516). Papert calls this "'teaching without curriculum' [by] supporting children as they build their own intellectual structures with materials drawn from the surrounding culture" (p.32). In turn, this alters the role of the teacher to that of an anthropologist because he or she must know what tools are available within the culture that can add to intellectual development (Papert, p.32). Olson (p.110) sums up this idea by stating that effective computer usage depends on having a suitable theme with certain instructional objectives; the computer is simply a tool for achieving these objectives. Use of a Learner-Based Tool to reach such objectives allows students to define how they will meet these expectations and motivates their learning.

Multimedia Tools

Multimedia provides a way in which Learner-Based Tools can reach children and can allow for more creativity. Multimedia is not a tool in itself, but a feature of many Learner-Based Tools. These features consist of video, sound, text, animation, and graphics. Students and teachers can use these features to create an exciting and effective learning environment. Bull stated that the "special effects (i.e., movement, color, and sound) facilitate learning and foster intrinsic motivation". Logo provided teachers with one of the first animated moving icons. A

variety of multimedia software programs are now in schools throughout the United States.

A multimedia classroom supports multi-sensory learning. It addresses the various learning-styles of students. As students explore multimedia programs, they may develop projects of their own, thus exploring and validating creative self-expression. As advocated by Papert, this learning process lies in the hands of the learner--they have more control over what information is presented and how they will present it. The advanced technologies available to students make computers and learning more exciting and fun because they provide active, meaningful experiences. It creates an active rather than passive atmosphere because it forces students to participate and think about what they are learning.

In the early 1980's, Papert developed the Logo language as one of the first Constructivist, Multimedia tools. Programming w th Logo not only supports constructivist learning, but it also provides intrinsic motivation within programmers because the activities are so varied that each program can be original, new and exciting (Papert, p.179). When students use Logo as part of a core subject, they view the computing activities as "fun", rather than "work" (Shamai). Geva-May (1993) suggested that the accessibility of Logo makes students comfortable and enthusiastic about computing as well as about the subject content for which it is used. "Students have been found to increase their originality, fluency, and divergent thinking with the use of Logo....Also, they are more willing to take risks and experiment

(reported in Norton, 1985)" (Good and Brophy, 1994, p.60). In The Second Self, by Sherry Turkle (p.139), a young programmer explains, "when I program, I like to make a mess and I like to clean it up." Papert (p.114) designed the language to make mistakes less frustrating by enabling the programmer to completely erase mistakes without a trace. In this sense, the programming process can be seen as a natural, exploratory process similar to writing (Costanzo, p.520). With fewer frustrations of revision, students will feel more motivated to explore, enabling the learner to build his or her own intellectual structure as the programming takes place (Papert, p.19).

Students may also enjoy Logo because it provides an excellent opportunity for social interaction. Bull (1988) identified the reason why Logo lends itself to group work by stating that its content and ability level varies according to each user and the possible outcomes can be infinite. In addition, Howie (p.223) believes that Logo-type (based) problem-solving activities, such as Logo activities, enable more social interchange because students have to ask questions, give answers, and provide explanations and feedback to each other.

The newest Logo program, MicroWorlds, combines a multimedia component with the programming component for exploration and product creation. It is made as a user-friendly, simplistic application of Logo and has control panels and pallets for easy-access. The program combines the best characteristics of HyperCard, KidPix, and Logo (Yoder). It supports text, digitized images, sound, and animation (Bull, Bull, and Joyce, in press,

p.1), yet, like Logo, it supports various learning paths. In this environment, a child can either explore with the Logo language (Watson, Calvert, and Popkin, p.126), or it can be used as a medium for organizing and presenting information.

MicroWorlds should support positive student affect for all the same reasons that Learner-Based Tools, Logo, and Multimedia packages do. As a Multimedia tool, MicroWorlds provides an excellent opportunity for social interaction as it is a creative and problem-solving tool. Also, the applications can relate directly to the subject being studied, thus enhancing and motivating the learning process.

Ways to Implement MicroWorlds and Support Positive Affect

MicroWorlds as a Publishing Tool

MicroWorlds can be used as a publishing tool; however, most of the research on publishing tools concentrates on the advantages of word processing in Language Arts (Seawel, et. al.,). These studies have shown that word processing can positively influence students' writing (Fisher, 1983; Phenix and Hannan, 1984) by eliminating the tediousness of rewriting drafts and providing easily revisable drafts. This, in itself, is motivating to students. In Seawel's study, third and fourth graders overwhelmingly enjoyed writing on the computer rather than handwriting; however, significant differences in attitude toward word processing were found between students with and without previous computing experience. Students who had not

previously worked with computers were less enthusiastic. Overall, students who use a word processor make more changes (revisions and edits) and felt that the computer aided their writing (Seawel). Papert advocated word processing for elementary school students in order to make drafting less tedious so that students would enjoy "rapid movement of quality" (p.30).

Language Arts students are using more Learner-Based, multimedia programs in addition to word processors to create book reports, present in-depth research projects, design slide shows, publish prose and poetry, and much more. Although MicroWorlds is not a word processor, it fills the criteria defined by Hoot and Kilmer (p.1) as essentials for an effective writing tool:

-having visual, motor, and auditory support'

-minimizing mechanical drudgery;

-encouraging focus on content, not form;

-increasing chances for revision;

-providing a quality product;

-making writing easy for special needs students;

-encouraging positive attitudes toward learning.

MicroWorlds and software like it can provide new, exciting ways for students to "publish" on disk, in the Internet (Downes and Hingerty, 1988, p.7), or into a class database or disk library (Howie, p.47). Students still have to use various strategies of prewriting, editing, and revision (Downes and Hingerty, p.2); however, these processes become less cumbersome. MicroWorlds provides all of the benefits of word processing as well as integrated multimedia.

MicroWorlds and Cooperative Learning

Due to the problem-solving nature of MicroWorlds, researchers advocate using a cooperative learning instructional method during implementation. Cox and Berger (1985) found that students work best on problem-solving computer activities when placed in teams of 2, 3, or 4. Cooperative groups performed higher in achievement then individuals in computer activities (Johnson, Johnson, and Stanne, 1986). Johnston (1987) reported that by organizing computer activities through cooperative learning, teachers can make computing easier and more fun for students.

The Small Group Investigation model of Cooperative Learning compliments the philosophy behind Learner-Based and Multimedia Tools, such as MicroWorlds. Sharan and Sharan (1989-90, p.20) describe Group Investigation as a way for "students to gain control of their learning, to inquire about topics that interest them, and to raise questions that reflect their particular interests." These ideals are similar to those of Papert's Constructivist Tools. Also, like Logo and MicroWorlds, Group Investigation centers around intrinsic motivation and supports positive social interactions, better communication, and higher level thinking than the traditional whole-class instructional model (Sharan and Shachar, 1988).

Methods

Hypothesis

Multimedia software such as MicroWorlds support positive attitudes when used as a publishing tool by cooperative groups.

Subjects

The instructional unit was implemented in a language arts class of nineteen sixth graders and a teacher. Three students were identified as gifted; four were identified as having special needs. About half (57.9%) of the subjects reported having a computer at home. Six students claimed to have seen MicroWorlds prior to the unit; three claimed to have used the software. They had been placed in groups of six prior to the unit. They were asked to split into groups of three and were allowed to choose their teammates. Once in cooperative groups, they followed the Small-Group Investigation model.

Materials

Samples already within the MicroWorld software package were used to introduce the capabilities of MicroWorld. A two page project about Judy Blume was shown as an additional sample.

The students worked in groups using paper and pencils to organize their ideas. The paper used was designed to look like a computer screen. The school computer lab (with twenty-one Macintosh computers) was utilized for the development of the students' projects using MicroWorlds software, already licensed to the school. Student projects were copied to disks and saved on their individual student-files on the school network for

storage. The entire unit implementation was recorded on VHS video-tape using a cam-corder.

Data Collection

Background information (see Appendix A) was assessed in a questionnaire about student familiarity with computers, computer software, and MicroWorlds software.

Three surveys were used to assess student affect. The investigators chose to use a survey method of data collection because it seemed the most effective way to elicit honest student feedback. The "Computer Affect Survey" ("Computer Attitude Measure" (adapted), Kay, 1989) (see Appendix B) was used to assess student feelings about computing in general. Students rated the computer activity on a seven-point Lichert scale for seven items. The "Student Survey" (see Appendix C) was designed and used to assess student attitudes in relation to: the unit, cooperative learning groups, using a computer as a publishing tool, MicroWorlds software, and the Logo language. In the survey, there were one to two questions that addressed each dimension. Based on their feelings, students rated nine statements on a scale of "Strongly Agree" (SA = +2) to "Strongly Disagree" (SD = -2). The "Student Affect Survey" (see Appendix D) was designed and used to measure students' attitudes about computer usage in education. The questions addressed whether students value computers as a creative tool, an educational necessity, a user-friendly tool, and a motivational tool. Students rated ten statements on a seven-point Lichert scale. Upon completion of the project, students responded in writing to

ten Open-Ended Questions (see Appendix E) regarding their feelings about the unit. Students were asked to list what they liked most and least about the unit, in which other subjects they would like to use MicroWorlds, and how they felt about this unit.

Each group presentation was evaluated by the group members who authored the project using the "Group Member Evaluation Form" (see Appendix F), and by the audience (classmates and the teacher) using the "Audience Evaluation Form" (see Appendix G).

Design and Procedure

It was necessary to create a meaningful context in which cooperative groups could use MicroWorlds as a publishing tool; therefore, the investigators designed an instructional unit in conjunction with the classroom teacher to integrate Multimedia software into the curriculum.

The MicroWorlds project spanned a two-week period during an Author Study unit already in progress within the class. In this unit, students were required to read several novels by the same author and a biography about the writer in order to draw connections between the author's life and works. The students, in groups of six, discussed the connections they saw prior to the beginning of this study. The student groups divided themselves into teams of three. On the first day, we discussed the objectives of the unit and modelled the capabilities of MicroWorlds using "Samples" from within the software package as well as a brief model of an author project designed by Kim Finkelman. On the second day, the whole-class brainstormed for subtopics of interest about authors, and the small groups began

to organize their ideas on paper. For the next four and a half days, students worked on the computers in the lab to develop their projects. During the last three days, each group presented their project to their classmates. The group members evaluated their own project on the "Individual Project Evaluation" form and all other presentations on the "Evaluation of MicroWorld Projects" form. Teachers also used the latter form. Grades were assigned by the classroom teacher based on the evaluations. Video-taping aided observations of student affect throughout the unit.

Following creation of the projects, all students completed the three forementioned surveys and answered various questions regarding their previous familiarity with computers and software and their feelings about the MicroWorlds unit.

Results

In the Computer Affect Survey, students described their feelings about the unit as more "liking", "happy", and "comfortable".

In the Student Affect Survey, students rated the computer on a scale of 1-7 (7 being the best). On average, they rated the computer as a "creative tool" with a score of 6.21; as a "user-friendly tool" with a score of 5.72; and as a "motivational tool" with a score of 6.05. Students rated the computer as an "essential for quality education" with a lower score of 4.15.

Insert figure 1 about here

Through the Student Survey regarding the five dimensions of computer integration, students reported positive attitudes this project. The terms "strongly agree" and "strongly disagree" have been translated to numerical values: SA = +2; SD = -2. On average, they rated usage of computers as a publishing tool highest with a score of 1.46. They rated MicroWorlds with a score of 1.31. The unit was rated with a score of 0.86. And Logo was rated 0.43. All of these scores fell into the Agree range (0-2). However, students did not report as positively toward cooperative learning. They rated it with a score of -0.50.

Insert figure 2 about here

When answering the ten open-ended questions, students revealed that they enjoyed the unit. One student wrote, "this project was fun because there were so many different things to choose from, so many options." By using MicroWorlds as a tool within the unit, some students were eluded, thinking that they were "not really working"; "it's better than sitting in class trying to understand."

When asked whether they enjoyed working with MicroWorlds, one student said "yes, I really did. There are no limitations to what you do, besides that it had to tie in with your author, and

that was easy. But most importantly, you could be as creative as you wanted." Another stated, "Yes! Because 90% of what you learn, you teach. And I think through setting up a program of our own, we taught ourselves."

Students also wrote about the multimedia aspect of MicroWorlds. "When we read a book we can only think and try to picture it, but when we drew it, we could get a better idea because we could see it." "MicroWorlds is easy to work with, and I was able to put my project in ways people can understand it." One students summed it up by stating, "there were no limitations, and I work better this way. I like being creative. I liked using MicroWorlds because it was colorful and like a game."

When asked whether they enjoyed using MicroWorlds as a publishing tool, one student wrote, "yes, because we got to use the computer instead of writing our project." The students still had to go through the writing process, yet MicroWorlds provided a template for organization. "Once we had it all out on paper with pictures...I began to understand Dahl's life and writing better."

In the open-ended questionnaire, six of fifteen students identified the group cooperation as the most difficult part of the project. "My partner sometimes didn't cooperate...and sometimes I didn't," one honest student reported. Another stated, "my group had a tough time. There was one kid who liked to either have it his way or not at all." "One person was acting like the boss of the project," a classmate wrote. Likewise, "some people hogged the computer and [others] didn't do enough

work." When asked what did you like least, one student replied, "groups! The people sucked."

The others identified physical restrictions of the software as problematic. They cited the limited supply of icons or the need for memory space on the disk, and time restraints as obstacles for their projects. One student stated, "my group and I recorded too many sounds, so we had to erase them all in order to put in more important things." "I think we should have had two weeks [in the lab] than just one." One student claimed to "need more time and create more".

Discussion

Summary of Results

Multimedia Tools: MicroWorlds

The MicroWorlds program allowed for creative expression with minimal preparation and instruction. All of the students reported to have enjoyed the unit and were extremely interested when asked if they would like to continue using MicroWorlds as part of their classroom instruction. This supports the idea that a Learner-Based Tool, like MicroWorlds, will actively involve students in learning (Bull (1988); Papert). The findings of this study concur with the hypothesis that multimedia will foster positive attitudes and motivation towards learning (Bull, 1988).

MicroWorlds as a Publishing Tool

In support of Seawel's findings, these students revised their project often and found that the computer aided writing. All of the students reported that they learned more about their

author and learned how to better organize their thoughts through use of MicroWorlds. All of the students followed the traditional steps in the writing process: planning, prewriting, drafting, editing, revising, and publishing. Students reported that this project provided a stimulating learning atmosphere, making the process more enjoyable.

MicroWorlds and Cooperative Learning

Contrary to Cox and Berger, who advocated cooperative groups of 2-4 when working with computers, some students in this class indicated that they would have rather worked individually on the project. About half of the groups either had a boss emerge or a member who did not contribute to the group's presentation. While some dissatisfaction is represented in the "Student Survey" data, it is not representative of the groups that worked together successfully. In other words, approximately half of the groups worked poorly together while the other half cooperated well.

In the groups that had difficulty working together, the students felt that they sometimes had to give up ownership of their ideas because their group members did not readily accept them. These findings do not support the Small Group Investigation theory, which purports that students will gain more control through this model (Sharan and Sharan). Some students did not enjoy sharing the work and responsibility on their own project. These students wanted to control their presentation and master the skills and ideas without interference from others. They had a difficult time agreeing on the connections they found and how to present them.

Confounding Factors

As indicated in the student background survey, about half of these students have computers at home; therefore, these students may have had better computer skills than those without computers at home. In some instances, differing computer-skill levels or learning abilities lended to unequal participation. Competitiveness within groups may have also emerged because of this discrepancy. Videotaped footage shows group members bickering over issues such as who types the fastest and who has the best artistic skills. Similar evidence was also documented in one of the investigator's journals. In addition, students became so excited about impressing their classmates with their presentations that they sometimes neglected to accept other group members' ideas. In future applications of this unit, the teacher may provide some basic instruction about computers in order to provide at least a minimum level of competency throughout the class. This may include lessons on how to maneuver the mouse, how to select and manipulate icons in MicroWorlds, and perhaps a short session for students to explore MicroWorlds.

The Small Group Investigation model could have influenced the negative feelings because students were not given time to acquire the social skills necessary. These students had not used this model of cooperative learning prior to the unit. Also, they had never been asked to create a computer project in a group before. Perhaps a short workshop prior to beginning the unit would have relieved anxieties and smoothed group relations.

While some students had difficulty working cooperatively

within their own groups, all enjoyed working cooperatively between groups. They enjoyed sharing their projects and ideas as well as giving and receiving suggestions. As noted in our observations, students often aided nearby groups, helping them with specific tasks such as scanning, creating text bubbles, animation, etc. While discussing the projects, students said they appreciated the help and suggestions others gave while developing their presentation. During the presentations, students took the time to provide detailed comments for each group on the evaluation forms. Overall, the students enjoyed working together as a whole class. Teachers employing this unit could have students work independently on their own projects while encouraging collaboration among classmates.

Use of Multimedia, Learner-Based software in the classroom motivates students and improves their attitudes toward learning, thereby, increasing the quality of learning. Computers have the capability of altering the course of education, much like writing did centuries ago. "In Plato's time, the art and teaching of oratory skills was the 'Language Art' of the day. They too were threatened with the advent of a new technology--the technology of writing" (Rose and Meyer, 1994). The technologies of writing, and later, print, became powerful enough to change the fabric of the culture and the concepts underlying education. "Just as print constituted an entirely new medium for recording and transmitting ideas, so do digital media in the environment of the computer" (Rose and Meyer, p.290). Multimedia and Learner-Based Tools are bound to change Language Arts; therefore, educators

must reevaluate this evolving learning process and adapt their teaching styles.

Ideas for Further Research and Implications

Researchers could explore how the learning process is altered due to improved student attitudes. While presenting their projects, these students exhibited many of the traits that Papert championed as the ideal learning situation: students valued the learning process as much, if not more, as their product. This was particularly evident during one group's presentation: they did not save their revised project to the disk, so they lost most of their graphics the day before they were scheduled to present. Due to time restraints, the group did not have an opportunity to fill in the gaps of their program. Nevertheless, their classmates praised them for the connections made and the work put into the project. One student wrote on his evaluation form, "I know this group worked really hard and it's a shame it all got lost." In a videotaped interview, the group reported that although they were frustrated with the situation, they were "eager to get started again and to possibly do add something else." A future study could concentrate on how students focus more on the learning process during crises such as this.

As part of altering the learning process, MicroWorlds may also affect the relationship between student and teacher. Would a teacher, in fact, become more of a facilitator and monitor within the classroom when using MicroWorlds? From our

observations, we found this to be true, but further empirical research would be necessary to validate our suspicion. In addition, this relationship may even transcend the computer lab and change instructional models within the classroom.

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APPENDIX A

Background Information

Please answer the following questions.

11. Do you have a computer at home? _____
    If so, how often do you use it? _____
12. What kind of software have you used? _____

_____

_____

_____

13. Have you ever SEEN MicroWorlds before this project?
    _____
    Have you ever USED MicroWorlds before this project?
    _____
    If so, how often do you use it?
    _____

APPENDIX B

Computer Affect Survey

Circle the number (1-7) that is closest to how you felt while using a computer.

Unlikable	1	2	3	4	5	6	7	Likable
Good	1	2	3	4	5	6	7	Bad
Unhappy	1	2	3	4	5	6	7	Happy
Uncomfortable	1	2	3	4	5	6	7	Comfortable
Calm	1	2	3	4	5	6	7	Tense
Exciting	1	2	3	4	5	6	7	Dull
Pleasant	1	2	3	4	5	6	7	Unpleasant

(Source: Computer Attitude Measure (adapted), Kay, 1989).

APPENDIX C

Student Survey

Please indicate whether or not you agree with the following statements by circling SA (Strongly Agree), A (Agree), N (Neutral), D (Disagree), or SD (Strongly Disagree).

I enjoyed the Author Study unit.

SA A N D SD

My group members argued with each other.

SA A N D SD

I felt that the Logo language stifled my creativity.

SA A N D SD

I feel confident that I can use the MicroWorlds program in the future.

SA A N D SD

I want to use computers to publish again.

SA A N D SD

I found my group members helpful and cooperative.

SA A N D SD

I found the computer project more difficult to use than regular writing.

SA A N D SD

The Logo language is fun to learn and easy to use.

SA A N D SD

The Author Study unit was boring.

SA A N D SD

APPENDIX D

Student Affect Survey

Rate each statement on a scale of 1 (disagree) to 7 (agree).

1. Computers help me be more creative.
   1 2 3 4 5 6 7
2. Computers do not significantly improve the quality of my education.
   1 2 3 4 5 6 7
3. Computers help make my work more interesting.
   1 2 3 4 5 6 7
4. It is important to learn about new computer programs.
   1 2 3 4 5 6 7
5. I do not need a computer for my studies.
   1 2 3 4 5 6 7
6. My abilities in school improve by using a computer.
   1 2 3 4 5 6 7
7. Computers make school work more difficult.
   1 2 3 4 5 6 7
8. Computers help me be more productive.
   1 2 3 4 5 6 7
9. Computers motivate me to be more productive.
   1 2 3 4 5 6 7
10. Computers make my life more difficult.
   1 2 3 4 5 6 7

APPENDIX E

Open-Ended Questions

1. Did you find this project fun? Why or why not?

2. Do feel that using MicroWorlds helped you at all in your understanding of the author you are studying, and the connections to his/her works?

3. Would you be interested in creating a multimedia presentation similar to this one in any of your other classes? Why or why not?

4. Describe some other situations (other than a Language Arts subject) that you could apply the idea of using the computer to communicate your thoughts, research, etc.

5. Did you feel prepared when you first sat down at the computers? If not, when did you begin to feel comfortable?

6. Describe any difficulties you had while working on this project.

7. If we were to do this project in another class who has never used MicroWorlds before, what could be done better?

8. If you were to have another opportunity to use MicroWorlds in this Language Arts class, what would you like to see happen differently next time?

9. What did you like most about this project?

10. What did you like least about this project?

APPENDIX F

Group Member Evaluation Form

Please rate the following on the scale of 1-5; 1=poorly demonstrated, 5=very well demonstrated.

1.	Connections between author's life and writing	1	2	3	4	5
2.	Creativity of project	1	2	3	4	5
3.	Variety of media	1	2	3	4	5
4.	Effect of finished product	1	2	3	4	5
5.	Cooperation of the group members	1	2	3	4	5
6.	Involvement of the group members	1	2	3	4	5

APPENDIX G

Audience Evaluation Form

Please rate the following on the scale of 1-5; 1=poorly demonstrated, 5=very well demonstrated.

1. Connections between author's life and writing	1	2	3	4	5
2. Creativity of project	1	2	3	4	5
3. Variety of media	1	2	3	4	5
4. Effect of finished product	1	2	3	4	5

Figure 1

Student Affect of MicroWorld Project on Five Dimensions: Over-all Unit, Cooperative Learning, MicroWorlds Program, Publishing Tool, Logo Language

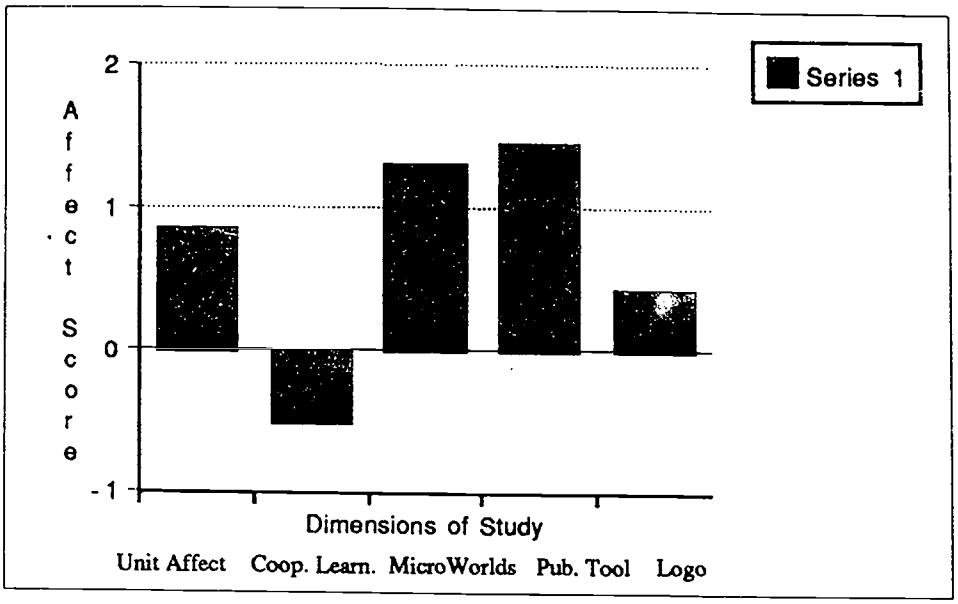
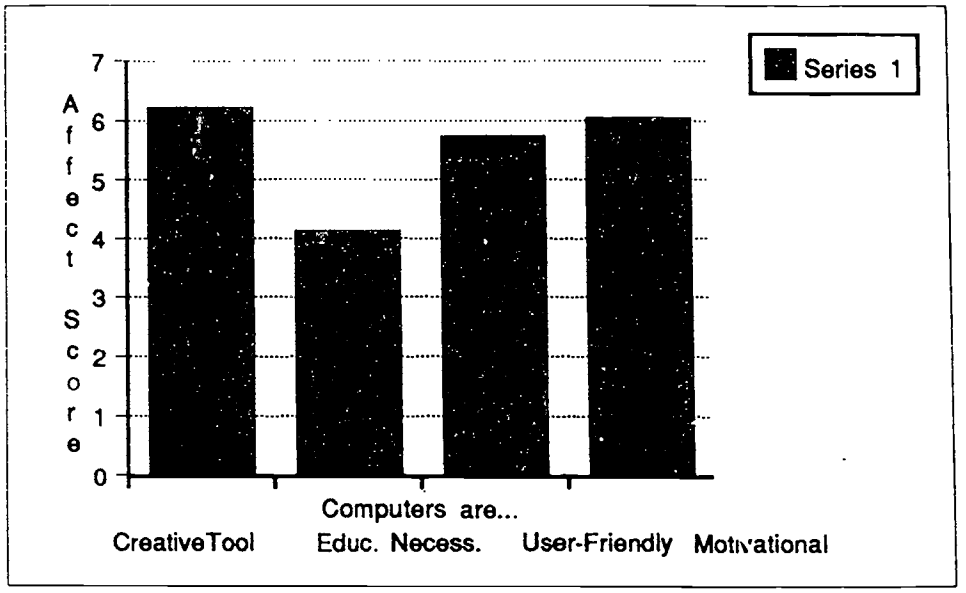


Figure 2

Student Affect of Computers as a Creative Tool, Educational Necessity, a User-Friendly Tool, and a Motivational Tool



Lesson Plan: MicroWorlds and Author Study

Grade Level: sixth

Time: approximately two weeks

Rationale: This lesson will introduce students to computer "publishing" using various media forms as they investigate their author of study.

Objectives:
1. Students will work cooperatively within a group of three.
2. Students will create three to five pages of text and graphics using the MicroWorlds software.
3. Students will develop at least three generalities about their author and integrate them into the MicroWorlds project.

Procedures:
1. Introduction: Model samples of MicroWorlds and a author study project will be shown. Students will observe and describe the characteristics and abilities of MicroWorlds. Ideas will be recorded.
2. Organization: Students will be placed into groups of three based on their bookgroups already established within the class. As a whole class, students will brainstorm for subtopics of author study. All ideas will be recorded.
Students will be placed within their groups and begin to develop their ideas on at least three subtopics about their author.
3. Creation: Students will work within the computer lab for at least four days to develop their ideas within the MicroWorlds pages. Teachers will aid in Logo programming.
4. Presentation: Each student group will present their project to their classmates.

Evaluation:
Students will be evaluated based on observations of cooperative groups and their MicroWorld projects. Each project must have at least three pages, each including some text and graphics that relate to the author. Also, each project should include at least three major subtopics of study.