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ABSTRACT

This study identifies classroom conditions that affect student empowerment and examines the relationship between student empowerment and high computer access (HCA). The study involved observation in two fourth grade classrooms--one week in an ACOT classroom (with high computer access), and one week in a non-ACOT classroom (without high computer access). Descriptive data were collected, including field notes, videotapes, interview notes, and student materials. The data were analyzed to identify conditions that affect student empowerment and to explore their relationship to the students' use of computers. Four classroom conditions were identified that promote student empowerment. Empowerment was high when students were able to shape their activities and assignments, when the assignments were sizeable, when the assignments were cognitively and socially complex, and when evaluative feedback to students was primarily private and task-related. The research indicates that these four conditions are also related to HCA. Questions arising from the research are: (1) What is an appropriate level of student empowerment? (2) What kinds of classroom management techniques work well in student-empowered classrooms? and (3) Is HCA related to the students' use of productivity software? (22 references) (GL)

ACOT

Apple Classrooms of Tomorrow

Research

Student Empowerment

The Influence of High Computer Access on Student Empowerment

(An Exploratory Study of the Nashville ACOT Site)

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ACOT Report # 1
1989

Apple Classrooms of Tomorrow
Advanced Technology Group
Apple Computer, Inc.

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Preface

The Apple Classrooms of Tomorrow research project explores learning when children and teachers have immediate access to interactive technologies.

Apple Classrooms of Tomorrow℠(ACOT℠) is a research project that explores learning when children and teachers have immediate access to interactive technologies. To pursue this research focus, ACOT establishes technology-rich classroom sites and encourages teachers to develop new curriculums and methods of instruction that take advantage of the technology. Within these environments, university-based researchers examine the long-term effects of the technology on teaching and learning. The project also supports R&D projects that apply current learning theories in the development of curriculums, tools, and environments that can be integrated into ACOT and other classrooms.

This research summary is one of a series of reports that documents the efforts of ACOT, in collaboration with educators and researchers, to determine how technology can be used most effectively to improve teaching and learning.

The original research report, "The Influence of High Computer Access on Schoolwork and Student Empowerment: An Exploratory Study of the Nashville ACOT Site," is available through the ERIC Document Reproduction Service, 3900 Wheeler Avenue, Alexandria, VA 22304; (703) 823-0500.

For further information about the Apple Classrooms of Tomorrow research project, contact Connie Troy-Downing, Apple Computer, Inc., 20525 Mariani Avenue, M/S 76-2A, Cupertino, CA 95014; (408) 974-5219.

Introduction

ACOT teachers report that with HCA, their students are more enthusiastic and independent learners. Teachers also report that when students can control their assignments they are more highly motivated and successful learners.

In addition to anecdotal evidence, there is a growing body of research that supports the positive role of student empowerment in the learning process.

ACOT teachers report that their students are increasingly more curious and assertive learners now that they have technology at their fingertips. The teachers claim their students are no longer reluctant to take on new challenges, in fact, they often pioneer selected topics far beyond the given assignment, just for fun.

ACOT teachers report that in their high computer access (HCA)[1] classrooms, students are able to learn without being taught (in the traditional sense) by the teacher. Instead, the teacher provides challenges, such as writing a report or building a model, and students do the research and acquire the information to complete the project. ACOT students work independently and collaboratively on these projects, and teachers act as resources, research guides, and partners in exploration. The teachers claim that when students have control over their assignments, they are more highly motivated and more successful learners.

Clearly, there is a new kind of teacher-student relationship emerging in the ACOT classrooms. With interactive technology tools for learning, the students gain strength and confidence in their ability to acquire skills and understandings on their own. Equally significant, the ACOT teachers encourage students to exercise this empowered learning approach by providing direction and guidance.

Although the role of nurturing independent learners is a relatively new one for many ACOT teachers, pedagogical support for empowered learning has been around for a while. Studies of personal causation (deCharms, 1983; 1984), locus of control (Rotter, 1966), self-efficacy (Bandura, 1982), and perceived personal control (Stipek & Weisz, 1981), among others, explore these relationships in classroom settings. These studies, consistent with the

[1]High computer access (HCA) in this study, refers to learning environments where computers are readily available for use by students and teachers. Apple Classrooms of Tomorrow supports a number of K-12 classroom sites that feature HCA.

observations of ACOT teachers, support the notion that when students take greater control of their learning, they learn more effectively.

In recent years, ACOT teachers have become strong advocates of empowered learning and indeed, the term, "student empowerment" has been used extensively within the project. Until now, however, the term has lacked clear definition and identifiable classroom conditions. Enthusiastic and supportive of the empowered learning that occurs in ACOT classrooms, the project initiated a research study to examine the nature of student empowerment and explore its potential in HCA classrooms.

This report summarizes an exploratory study that took place at the Nashville ACOT site during the spring of 1988. The research draws upon recognized characteristics of student empowerment and identifies classroom conditions that promote it. In addition, the research explores relationships between empowered learning and the students' use of computers.

The Study

This study identifies classroom conditions that affect student empowerment and examines the relationship between student empowerment and HCA.

The current study seeks to identify classroom conditions that affect student empowerment and validate anecdotal evidence supporting the notion that HCA promotes empowered learning in ACOT classrooms.

An Exploratory Approach

In order to identify characteristics of student empowerment in the learning process, it is necessary to define student empowerment, analyze the process of learning, and examine the relationships between them. To determine relationships between student empowerment and HCA, one must examine how the students' experiences of empowerment relate to their use of computers.

Student empowerment exists when students are in control of their own learning.

Student Empowerment

Student empowerment in this study refers to an internal state in which students see themselves as responsible for, in control of, or the source of their own learning. In the classroom, student empowerment is dependent upon the allocation of power between teachers and students. When students control few elements in the learning environment, their empowerment is low; when they control many elements, their empowerment is high.

The process of learning in school occurs as students experience a variety of schoolwork activities and behaviors.

The Learning Process

The study is based on the assumption that the process of learning in school occurs as students experience a variety of schoolwork activities and behaviors. Their schoolwork consists of series of tasks that involve some combination of thinking, watching, listening, reading, writing, speaking, or physical manipulation. Learners generally engage in one or more of these activities when completing an assigned task. Over time, the manner in which they complete these activities is expressed in work habits, attitudes and achievement test scores. Therefore, in order to understand the potential role of empowerment in the learning process, one must examine the sequence of activities that constitutes schoolwork.

Data Collection

The study involved observation in both an HCA classroom (ACOT) and a classroom without HCA (non-ACOT). Descriptive data were collected, including field notes, videotapes, interview notes, and student materials. The data were analyzed to identify conditions that affect student empowerment and to explore their relationship to the students' use of computers.

To identify characteristics of student empowerment and their relationship to computer use, the research was designed to include daily observation in both HCA and non-HCA classrooms. This study involved observation in two fourth grade classrooms—one week in an ACOT classroom (with HCA) and one week in a non-ACOT classroom (without HCA) in the same school. Descriptive data were collected, including extensive field notes, videotapes, interview notes, and assorted student materials.

Field notes included a running record of classroom organizational features, task specifications, and student work-related and social responses to their schoolwork.

These field notes were taken in both classrooms throughout the school day, except when non-academic activities were scheduled.

Videotape documentation covered the entire school day (with some exceptions) for one week in each classroom. Except for occasional focus on individual students and student groups, the video camera was set to encompass as much of the classroom as possible and left unattended. Approximately 25 hours of videotape was shot in the ACOT classroom and 16 hours in the non-ACOT classroom.

Interviews with ACOT staff and the non-ACOT teacher centered on classroom organization, instructional activities, student task requirements, and instructional materials. Numerous informal interactions during the school day also contributed to the data. In addition, student materials were collected, such as writing samples and other assigned work.

When data collection was completed, the data were systematically coded and analyzed in order to identify conditions that affect student empowerment and to explore their relationship to the students' use of computers.

The data analysis began by identifying and recording schoolwork task objectives or sets of objectives. Each task was then categorized in terms of the following: general subject matter, specific subject matter, task size, task duration, task complexity, task purpose, and task evaluation procedure. The tasks were also subdivided into one or more subtasks. Each of these subtasks was categorized in terms of the following: product, student shaping of process and product, format, work location in the classroom, duration, function, number of different tasks existing at the same time, number of work groups operating at the same time, and material resources used.

The characteristics of tasks and subtasks were keyed into a computerized database. Rows and columns of the database were selected and sorted in various ways to provide distributions of tasks and task characteristics within each of the classrooms.

The Findings

Classroom Conditions that Affect Student Empowerment

The study identified four classroom conditions that promote student empowerment:

The study identified four classroom conditions that affect the level of student empowerment.

Task Shaping

Empowerment was high when students were able to shape their activities and assignments.

The level of student empowerment was high when learners were able to expand, modify, or in some way "shape" their work activities and completed assignments. As opportunities for task shaping increased, so did the level of student empowerment. For example, when students could determine the topic for a report and the sources they would consult, they were more empowered than when a teacher (or set of directions) specified the topic, the sources, and other elements of the process.

Task Size

Empowerment was high when assignments were sizeable.

When students worked on large assignments such as writing a play or constructing a model, they experienced high levels of empowerment. Conversely, when they undertook short assignments such as workbook exercises and flash card activities, students experienced low levels of empowerment. Indeed, as their tasks increased in size, so did the opportunity for empowerment.

Task Complexity

Empowerment was high when assignments were cognitively and socially complex.

Activities that required problem solving and other higher-order cognitive behaviors offered greater opportunity for student empowerment.

Cognitively complex tasks such as building a computer-controlled model, for example, required students to restructure information, generate open-ended responses, synthesize information, develop and apply strategies, and solve problems. Tasks of low cognitive complexity, such as completing worksheets and defining spelling words,

required students to recall information that had previously been presented and then label and classify objects or concepts. As tasks became more cognitively complex, the opportunity for student empowerment increased.

Student activities that required more complex social organization were also more empowering for students. For instance, small-group projects that involved students in collaborative effort, required complex social organization (role differentiation and teamwork), as opposed to teacher-led tasks that students completed in parallel or whole-group formats.

Empowerment was high when evaluative feedback to students was primarily private and task-related.

Evaluative Feedback

Feedback that was presented in private settings as opposed to public settings, and feedback that was task-related as opposed to person-related, were associated with higher levels of student empowerment.

Feedback provided by the computer was generally private if students were working independently, and computer feedback was usually task-related rather than person-related. Private, task-related feedback by the computer appeared to promote further task involvement as opposed to ego involvement on the part of students.

A Classroom with Empowered Students

The research indicates that the four classroom conditions that promote student empowerment are also related to HCA.

This research indicates that student empowerment fluctuates over time, and although both classrooms experienced varying levels of student empowerment, the ACOT class with HCA had a higher average level of student empowerment.

One example of an activity with high student empowerment was a team project that involved students in planning and building computer-controlled models. The task was empowering because it was sizeable, cognitively and socially

In the ACOT classroom, the four indicators of student empowerment were also related to HCA. The level of student task shaping increased when the level of computer use increased. Larger tasks and complex tasks frequently involved computers directly in their implementation. In addition, the amount of public feedback and person-related feedback that students received while doing schoolwork went down when they were working with computers.

complex, and involved task-related feedback. Computer technology was central in implementing all stages of this project.

During the week of observation in the ACOT classroom, a number of activities that promoted high levels of student empowerment were noted. One involved student teams in constructing working models. The goal for each team was to build a computer-operated model with LEGO TC logo materials,[2] but the entire process of planning and construction was left to the fourth-grade students. The teams planned what to build and how to organize and distribute the tasks involved in completing the project. Team members took on individual jobs such as builders, programmers, and recorders. When construction began, teammates depended upon one another to problem-solve, test, and refine their products. The models under construction included a car wash with movable levers, a basketball court with an active scoreboard, and a house with working lights.

The construction task was sizeable, since there were several intermediate products, and it took four to five person hours to complete. The cognitive complexity of the task was high since it involved a complex design, computer programming to get the models to function, and problem solving as the project proceeded. The complexity of social organization was also high, since the task required role differentiation among team members and the development of a decision-making process in order to complete the task. Teacher feedback was low because the student groups relied on one another for feedback during the process. When the teacher was called upon to help, feedback was focused on the task rather than the person. Upon completion of the project, teacher feedback was again task-related rather than person-related.

In addition to the indicators of empowerment identified in this project, high levels of student involvement and motivation were noted. During the process of completing their models, students became so highly engaged that when the teacher signalled the end of the work period, several students verbalized their disappointment at having to stop.

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[2] LEGO TC logo construction kits include plastic building blocks, levers, gears, wheels, switches, sensors, etc., for building models. The kits also provide programming capability that enables students to write simple computer programs to operate moveable parts of the construction.

Other activities in the HCA classroom that supported high levels of student empowerment included writing a play, keeping a journal, and working on a student newspaper. In all of these activities students relied heavily on their computers. Activities that offered little student empowerment included taking recall tests, completing practice exercises, and listening to large-group instruction.

Summary Analysis

The study verifies that HCA is associated with higher levels of student empowerment.

In conclusion, the exploratory study shows that in the Nashville ACOT classroom, high access to computers was associated with higher student task shaping, larger and more complex tasks, and task environments that had relatively low frequency of public feedback that was person-related. These are the same conditions that are associated with higher levels of student empowerment. Therefore, high access to computers is associated with higher levels of student empowerment.

Implications for the Future

Student Empowerment in Perspective

Questions that arise from the current research:

What is an appropriate level of student empowerment?

The study identifies four indicators of student empowerment and demonstrates that these factors are also likely to be present in an HCA classroom. What does this finding mean for the future of technology in education? Should educators strive for greater levels of student empowerment? Would extremely high student empowerment lead to classroom anarchy, or is there a balance of activities that is appropriate for the classroom and for individual students? Further exploration of student empowerment in HCA learning environments will help answer these critical questions.

What kinds of classroom management techniques work well in student-empowered classrooms?

Classroom Management Issues

In the current study, the researcher observed that when students are empowered to shape the processes and products of their schoolwork, the activity and noise levels in the classroom increase dramatically. Consequently, as student empowerment increases in the classroom, so does the need to alter traditional approaches to classroom management.

In ACOT and other classrooms that promote high levels of student empowerment, teachers often develop new approaches to classroom management. Although management strategies are not examined in the current study, the issue clearly needs to be addressed as technology and student empowerment become more pervasive.

Is HCA related to the students' use of productivity software?

The Use of Productivity Software

Educators who advocate the use of productivity (tool) software in preference to curriculum software present arguments that are similar to those offered by supporters of student empowerment. Proponents of productivity software say that tools such as word processing, database, and graphics applications, provide students with more control over the process of designing and implementing their assignments. In fact, when students use software tools they are completely in charge of their completed assignments as the tool does nothing by itself.

Is the use of productivity software directly related to student empowerment? Further exploration in this area could provide important information to teachers, curriculum developers, and software developers.

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