

Digital Study Groups: Online Learning Environments in Middle School

Kevin Clark
George Mason University

Todd Jamison
Denison University

Debra Sprague
George Mason University

Abstract

The purpose of this study was to examine the impact of an online learning environment on student computer use, classroom/school activities, and parental involvement. An online learning environment was created with the goals of giving students access to a variety of software programs from home and school, facilitating home-school connectivity, and increasing student academic performance and technological competencies.

Educators are constantly being provided with new tools and methods for teaching students, and one of the most common tools is technology. Technology is often provided to educators as the ultimate tool because of its unlimited potential and ability to be customized to different settings. Although there is some excitement surrounding the introduction of new technological teaching tools, this excitement must be tempered with the examination of research-based practices.

Some research studies have found a positive link between student achievement and the use of technology in middle schools (Honey & Henriquez, 1996; Follansbee, Hughes, Pisha, & Stahl, 1997; Middleton & Murray, 1999). Researchers also suggest that active, self-directed, inductive, and exploratory computer activities might result in increased student learning for a broad range of students (Becker, 2000; Lepper & Chabay, 1985). Researchers (Becker, 2000; Sandholtz, Ringstaff, & Dwyer, 1997) have found that student engagement increased when computers are used as a set of classroom tools and not as the primary tool, when computer use was not separate from other classroom activities, when the computer was presented as a tool for exploration and experimentation, when teachers provided individualized computer instruction and use, when teachers gave the students more responsibility in determining and accomplishing learning tasks, and when content was dealt with across curriculum boundaries instead of discrete units.

In addition to using educational computing tools in school, students should also utilize those tools at home and in other non-school environments. Increasing computer use for learning tasks in the home may also have an impact on the amount of time

students spend on academic activities outside of school. Research has shown positive academic effects of home computer use by students (Attewell & Battle, 1999; Rocheleau, 1995). Roschelle, Pea, Hoadley, Gordin, & Means (2000) suggest that technology enhances learning in children by supporting four essential characteristics of learning: active engagement, participation in groups, frequent interaction and feedback, and connections to the real-world. Research has shown that students learn best when they are actively constructing knowledge from experiences, interpretations, and structured interactions. Participation in groups allows students to carry out more complex skills than they could execute alone, by imitating others and discussing the task (Roschelle et al.). A Computer Supported Intentional Learning Environment (CSILE) is a collaborative online environment that supports structured collaborative knowledge building by having students communicate their ideas. Becker (2000) found that students used CSILEs performed better on standardized tests with the strongest positive effects for students who were categorized as low or middle achievers. Students who participated in computer-based learning environments showed increased motivation, deeper understanding of concepts, and increased willingness to tackle difficult questions (Riel, 1992). Researchers also suggest that students learn more rapidly when they have frequent opportunities to apply the ideas they are learning and when feedback of success and failure is immediately provided (Becker, 2000; Anderson, 1996). Another pedagogical aspect of computing technology is that it can provide learners with excellent tools for applying concepts in a variety of contexts, thereby breaking the artificial isolation of school subject matter from real-world situations (Roschelle et al.). Although studies have shown that access to computers at home may have a positive impact on student achievement, it may also have a positive impact on parental involvement.

Many researchers have agreed that parental involvement is important to the academic success of students (Center on Families, 1995a, 1995b; Epstein, 1987; Fan & Chen, 2001). A key component of parental involvement is improved communication between schools and homes (Burbules, 1993; Center on Families, 1995a, 1995b; Epstein, 1995; Ramirez, 2001). Although schools typically correspond with parents through newsletters, memos, conferences, meetings, special events, phone, and mailings, technology can be used to create stronger communication between the school and the parents (Ramirez, 2001). Technology-enabled communication may utilize asynchronous tools such as computer conferencing, email, and discussion boards. Because asynchronous communication tools allow users to purposefully compose, edit, and organize their ideas, parents may be more willing to participate in technology-enabled school-home interaction and dialogue (Ramirez).

Many of the technological and pedagogical attributes mentioned previously can be presented via an online learning environment. The “online” aspect of the learning environment provides all of the technological benefits and features, while the “learning environment” portion provides the pedagogical benefits and features.

Rationale

The purpose of this research study is to examine the impact of an online learning environment on student computer use, classroom/school activities, and parental involvement. An online learning environment was created that gave students access to a variety of software programs from home and school or from any computer connected to the Internet. The online learning environment was a secure Internet environment where students and teachers were able to create and store files, use software applications, search the Internet, and access educational software designed to support the curriculum. The online learning environment also served as an information tool for parents and an instructional tool for teachers. For example, the online learning environment allowed teachers and students to create websites containing text and images and gave teachers the option to use a variety of participation tools such as: polls, message boards, asking questions, debates, and brainstorming. The environment also facilitated collaboration through the formation of buddy lists, class lists, school lists, and work groups. The environment was managed through administrative functions that allowed users to: add, remove, or suspend email accounts, and review content posted to the environment. This online learning environment was created with the following goals in mind: provide all students with access from home, facilitate home-school-community connectivity, and provide academic support and enrichment. Parents were encouraged to use the online learning environment to communicate with the school and teachers. Additionally, parents were asked to support and encourage the home use of the technology by their children.

The results of this study are important because they help investigate the design and implementation issues related to the use of technology in schools. With the proliferation of computing technologies and their application to learning, it is imperative that we examine the research findings to assure that new applications of technology are effectively designed and utilized. According to Johnson and Aragon (2002), quality online learning environments should be based on sound instructional design principles.

Methods

Participants

The 2000 Census reported that forty-three percent of the population residing in Northern Virginia lived in a different location in 1995, indicating a highly transient population (U.S. Census Bureau, 2002d). The Census also reported that a language other than English is spoken in 31 percent of the homes (U.S. Census Bureau, 2002b). Educational attainment is high with forty-six percent of the population over the age of twenty-five having earned a bachelor's degree or higher and twenty-one percent of the same population having completed a graduate or professional degree (U.S. Census Bureau, 2002b). Overall, the population is affluent with the annual median family income over \$67,000 and less than six percent with incomes below the poverty level (U.S. Census Bureau, 2002c). Seventy-three percent of the population is white, and Asians represent twelve percent of the population (U.S. Census Bureau, 2002a).

Participants in this study included seventh grade students from a middle school in Northern Virginia. Enrollment at the time of the study was 1,018 in the seventh and eighth grades. Of this number 916 were enrolled as general education, with 191 of these students participating in School-based Gifted and Talented and 102 in Special Education. Nearly ten percent of the students are enrolled in English for Speakers of Other Languages.

The pre-deployment administration of a survey included 453 respondents from the entire seventh grade, and post-deployment included 380 respondents. The net result was 300 pre- and post-deployment matched pairs available for analysis. Also, 114 parents or guardians of these seventh grade students were surveyed. The parents' responses were not matched to student responses.

Setting

The project school was situated in Northern Virginia, a racially, ethnically, culturally and financially diverse suburban area of the Washington, D.C. Metropolitan area. The school's mission states that the faculty, staff, students, and community of the school are committed to academic excellence and to the exploration and realization of individual abilities and talents in a caring and safe environment that fosters community involvement. Staff and community focus on the following objectives:

- Enhance the academic performance of all students with special emphasis in mathematics, science, and preparation for the Virginia Standards of Learning tests;
- Initiate a school philosophy that establishes clear expectations for student achievement and attendance;
- Respond to achievement challenges of racial-minority, ethnic-minority, and language-minority students;
- Strengthen the academic skills of students through the use of technology; and,
- Increase communications among faculty, staff, parents, and the community.

The school places a strong emphasis on academic achievement, and helping each student achieve his or her potential. The academic program was augmented with a computer-driven synergistic lab, multiple computers on each team; a computer lab for teachers of electives, and computers in the Media Center. All computers were high-end networked machines that were connected to the Internet. School and community collaboration was recognized as the foundation upon which to build a meaningful and safe learning environment. During the last several years, the school implemented a team concept to create "families" of learners, incorporated technology throughout the curriculum, added several new programs to assist special needs students, and developed a program to increase communications and parent involvement.

This project was initiated by the community in an effort to give students access to state of the art technology. During the academic year, members of the local school board, business leaders, and parents formed a committee to explore ways to provide technology

to all seventh graders at the middle school. The school district saw this collaboration as a way to improve students' scores on standardized tests. The committee chose to purchase Bocco Boxes (terminals that provide Internet access much like WebTV) for any student whose family did not have a computer available at home. In addition, computers were placed in the public library. A local Internet Service Provider (ISP) offered parents a substantial discount on home Internet access. The local university provided technical assistance through the establishment of a helpline. Through these resources, technology was available to any family that wished to participate in the project. Eighty percent of the seventh grade families chose to participate.

Research Design

The study was a mixed-methods pre-deployment post-deployment survey design. Identical versions of a mixed-response format survey were administered to students who were involved in the project. Parents were administered a post-deployment only survey in order determine their perceptions of the project. The student and parent survey instruments contained the following types of questions: Likert rating scale, multiple choice, categorical, and open-ended. The goal of the instrument was to collect quantitative data that could be analyzed for statistical significance, while also collecting less structured qualitative data that would be used to inform or provide insight into the quantitative data. An attempt was made to determine if student perceptions about school, their ability to use computers and Internet resources, and their ability to communicate electronically changed during the first year of the project implementation.

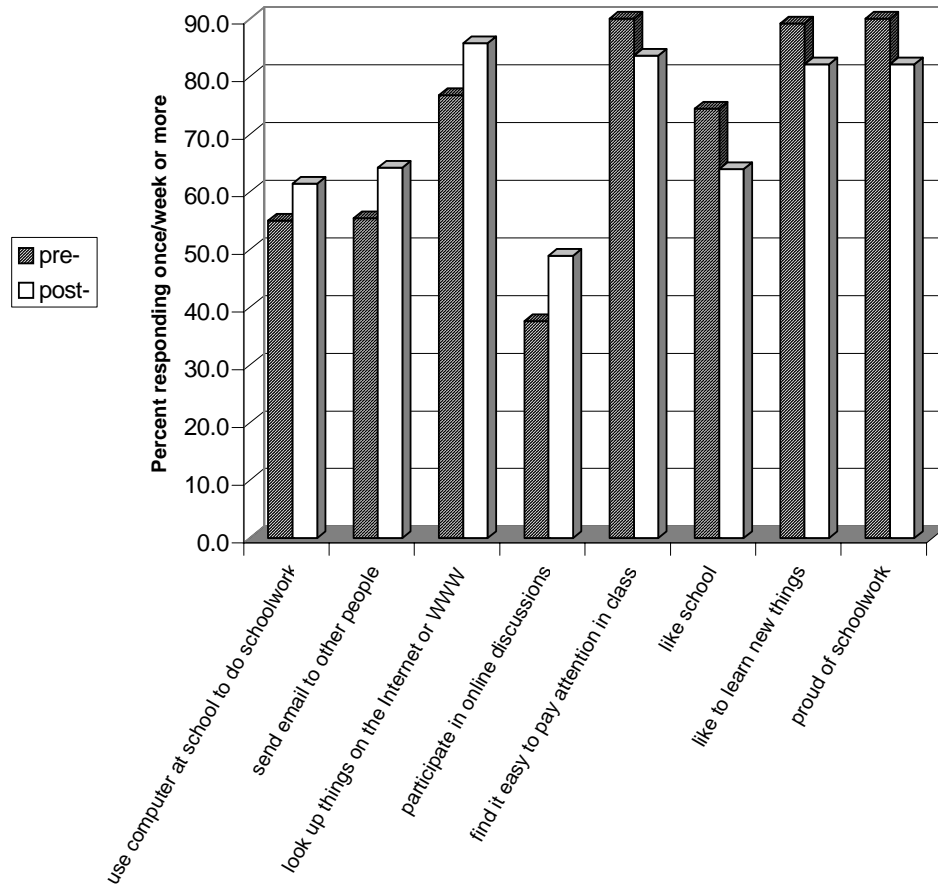
Results

Qualitative and quantitative analyses were employed because the intended audiences (e.g., parents, school board members, sponsors) were interested in basic information concerning student gains and parental perceptions. Qualitative data was analyzed using a simple sorting-bin technique. There were no notable trends in the students open-ended responses, which made up the qualitative data.

Response frequencies were tallied for all fixed response items for the student pre- and post-deployment surveys. Response frequencies are presented in Figure 1 for each of the items where student perceptions were found to have significantly changed between the pre- and post-deployment surveys. Statistical significance of response frequencies was established at the customary alpha level of .05.

The results of the student pre and post measures indicated whether their perceptions about school were impact by the use of the online learning environment. There were eight statistically significant findings (Figure 1), four had a positive effect while four had a negative effect. The statistically significant items that yielded a positive effect showed that students were more likely to: use a computer at school to do schoolwork, send email, perform Internet searches, and participate in online discussions. The statistically significant items that yielded a negative effect showed that students were less likely to: find it easy to pay attention in school, like school, like to learn new things, and be proud of their schoolwork.

Figure 1. Comparison of Statistically Significant Response Frequencies Between Students' Pre- and Post-Deployment Surveys



To determine the statistical significance of student changes in perception, the results were analyzed using paired samples T-test (Table 1). For items 6, 9, 10, and 11, the pre-deployment ratings were significantly lower than the post-deployment ratings. For items 15, 16, 17, and 20 the pre-deployment ratings were significantly higher than the post-deployment ratings. Hence, yielding a negative effect for items 6, 9, 10, and 11, and a positive effect for items 15, 16, 17, and 20.

Table 1

Student Survey Paired Samples T-test Results

	t	df	Sig. (2-tailed)
1. Do you have a computer at home?	1.096	296	0.274
2. Do you think computers can help you learn?	0.784	295	0.434
3. Do you think computers are hard to use?	-1.255	294	0.211

4. Do you know how to use the library to find books and other resources?	1.510	292	0.132
5f. If you do not understand something will you most likely ask someone at home?	1.000	116	0.319
6. I use a computer at school to do school work.	-4.273	297	0.000**
7. I like to write with pen/ pencil and paper.	0.182	297	0.856
8. I like to draw on paper.	0.488	298	0.626
9. I send E-mail to other people.	-5.319	294	0.000**
10. I look up things on the Internet or World Wide Web.	-5.761	294	0.000**
11. I participate in on-line discussions.	-5.405	295	0.000**
12. I play computer games.	-0.042	293	0.966
13. I like working with other students.	-1.103	297	0.271
14. I like working on the computer.	-1.789	295	0.075
15. I find it easy to pay attention in class.	2.715	297	0.007**
16. I like school.	4.239	293	0.000**
17. I like learning new things.	2.168	295	0.031*
18. I like to write on the computer.	1.397	299	0.163
19. I like meeting new people.	-0.274	294	0.784
20. I am proud of my schoolwork.	2.582	295	0.010**
21. I feel comfortable participating in class discussions.	-0.097	297	0.922
22. I like to draw on the computer.	1.568	296	0.118
23. I feel comfortable participating in class activities.	1.493	298	0.137

*statistically significant at $p < 0.05$

**statistically significant at $p < 0.01$

The goal of the parent survey was to examine the perceptions and views of parents after the deployment of the online learning environment was deployed. This examination included the use of technology at home, the perceived benefits to their children, and the perceived benefits to themselves. Although parents were encouraged to use the online learning environment to create a home-school connection, the majority of the in-home use was done by the students. The results of the post-deployment parent survey (Table 2a) revealed that most had a computer in their home (94.5%), most felt that computers helped their children learn (95.5%), most felt that computers were not hard to use (86.5%), and equal numbers (44% yes and 39.4% no) did and did not use the online learning environment in the library.

Table 2A

Parents Survey Results, Items 1 – 4

	Yes		No		Don't know	
	N	%	N	%	N	%
1. Do you have a computer at home?	104	94.5	6	5.5	0	0.0
2. Do you think computers can help your child learn?	105	95.5	3	2.7	2	1.8
3. Do you think computers are hard to use?	11	9.9	96	86.5	4	3.6
4. Do you or your child use the [project] system in the library?	48	44.0	43	39.4	18	16.5

The parent survey (Table 2b) also revealed that at least half were comfortable helping their children in school subjects like: math, science, computers, English, social studies, government, history, and health/physical education; but less than half were not as comfortable helping their children in subjects like: foreign language, art, music/band, sports/athletics, and other subjects.

Table 2B

Parents Survey Results, Items 5a – 5m

5. In which of the following subject areas are you comfortable helping your child?		
	N	%
a. Math	78	68.4
b. Science	58	50.9
c. Computers	60	52.6
d. English	80	70.2
e. Foreign Language	46	40.4
f. Social Studies	71	62.3
g. Art	40	35.1
h. Music/Band	29	25.4
i. Government	60	52.6
j. History	69	60.5
k. Health/Phys. Ed.	59	51.8
l. Sports/Athletics	48	42.1
m. Other subjects	17	14.9

Additional items in the parent survey (Table 2c) suggest that: parents do help their children with homework, parents do work with their child on the computer, their children often enjoy working alone on the computer, parents rarely participate in online discussions, parents enjoy exploring the internet, parents almost always enjoy working on the computer, their child's interest in school was not increased since the project started, parents are always proud of their child's school work, and their child is not more willing to do homework using the online learning environment.

Table 2C***Parents Survey Results, Items 6 – 14***

	Never		Occasionally		Sometimes		Frequently		Always	
	N	%	N	%	N	%	N	%	N	%
6. I help my child with homework	6	5.3	26	22.8	39	34.2	32	28.1	9	7.9
7. My child and I work together on the computer	18	15.8	46	40.4	32	28.1	14	12.3	2	1.8
8. My child enjoys working alone on the computer	0	0.0	3	2.6	8	7.0	29	25.4	71	62.3
9. I participate in online discussions	82	71.9	19	16.7	5	4.4	3	2.6	3	2.6
10. I like exploring the Internet even when my child is not using [project]	18	15.8	19	16.7	22	19.3	27	23.7	23	20.2
11. I like working on the computer	9	7.9	13	11.4	17	14.9	23	20.2	48	42.1
12. My child seems more interested in school since [project] started	38	33.3	20	17.5	19	16.7	11	9.6	11	9.6
13. I am proud of my child's schoolwork	1	.9	9	7.9	13	11.4	20	17.5	68	59.6
14. My child is more willing to do homework using [project]	32	28.1	21	18.4	21	18.4	13	11.4	14	12.3

Discussion

An explanation for the results of the student survey is that students might like computers but not like school. While this conclusion is plausible, there may be other factors at work. During the course of the project, students became more comfortable with, and made greater use of, the technology made available to them through the project. Thus, it might be concluded that the project encouraged students to use computers and online technology for productive learning activities. Another issue is that the student post-deployment survey was administered at the end of the school year, and because some of the questions were general and not tied specifically to the project students were likely to react to their desire for the school year to be finished rather than participating in the project.

The majority of the parents who responded to the post-deployment survey were technologically literate, had a computer in the home, did not think computers were hard to use, and believed that computers could help their children learn. Respondents were relatively comfortable helping their children with academic subjects, such as math, science, computers and English. In addition, the local public library was pleased to learn

that students and their parents were using Internet resources in the library to access the project online learning environment. The parent survey also revealed that about seventy-two percent had never participated in online discussions, and almost half of the parents thought that their children were not more willing to do homework using the online learning environment. Given that the parents were unable to monitor the student's level of involvement in the online learning environment, their unwillingness to do homework using the online learning environment may have been a reflection of their dislike for homework in general. Even though this is difficult to substantiate since a question about homework was not asked, students did respond favorably to using the online learning environment at school to do schoolwork.

Conclusion

While technology continues to be a useful classroom tool, further research is required to determine its most effective use and implementation. Because technology implementations do not always work perfectly the first time, patience is often required on the part of students and educators.

In this study, students' flexible resilience prevailed as they reported gains in project-related areas in spite of apparent communication breakdowns and "technical difficulties." This may be due in part to the fact that students find that project-based work with computers is highly engaging (Becker, 2000). More research needs to be done on effectively measuring the impact of online learning environments on the academic success of young people. Additionally, research should also focus on the role of the teacher or educator in these online learning environments. Some preliminary studies make a connection between student achievement via technology and the teacher professional development opportunities.

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