
THE IMPACT OF PORTABLE TECHNOLOGIES ON TEACHING AND LEARNING: YEAR TWO REPORT

Prepared For:
Athens Academy

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INTRODUCTION

In the summer of 1999, faculty in the Department of Instructional Technology at The University of Georgia were contracted by technology leaders at Athens Academy to conduct a long-term evaluation of the use of portable technologies in their school. This document describes the results from year two of this four-year evaluation project.

The document begins with background information about the origins of the portable technologies and the highlights from year one of the evaluation effort (1999-2000). Next, we present a brief overview of the primary project activities carried out during year two followed by a description of the evaluation activities conducted during year two (participants, data collection and analysis efforts). Next, there is a presentation of results from the data collection and a review of findings from year two. Finally, we summarize key points from the year two evaluation and make recommendations for year three.

BACKGROUND

Athens Academy has been a center of innovation for the integration of technology and media into the classroom since 1990 when the Academy formed an international educational partnership with the Bertelsmann Foundation to expand the ways students learn with all forms of media. The heart of what came to be known as the Media Across the Curriculum Project (MACP) is integrating media and technology into the Academy's liberal arts college preparatory curriculum.

The final phase of MACP began in 1999 and will end in 2003. This final phase of MACP has three primary goals:

1. expanding the innovative practices with the integration of personal technologies (laptop computers),
2. enhancing and developing models for faculty development, and
3. developing and implementing an evaluation to document the impact and the effectiveness of the personal technologies on teaching and learning.

The original vision established in the rationale for infusion of laptop computers into Athens Academy focused on creating "...a 'toolset' that could be effectively used in almost every curriculum area" and could be used anywhere, anytime to facilitate writing, communication, and resource use (Keith & Smith, 1997). It was believed at the onset of the project that, by providing each teacher and student with portable technology that can assist them in their day-to-day learning tasks and enhance communication, the goal of learning anywhere, anytime would become a reality. That belief continues to inspire the people engaged in this innovative project. The laptop initiative at the Academy, along with similar initiatives at other schools (Belanger, 2000), is predicated on the belief that computing has become an essential tool for thinking, problem-solving, and learning in the 21st Century.

Despite the enthusiasm and commitment of the proponents of the laptop program, belief is not sufficient, and vigorous evaluation is required. Continuing this line of inquiry is important if we are to reveal best practices for creating and sustaining ubiquitous computing environments. Athens Academy is a superior environment for doing so.

Year one of the evaluation included the following major activities:

- ?? preparing and obtaining approval for the overall plan for the four year evaluation project,
- ?? authoring a white paper titled *Ubiquitous Computing for Teaching, Learning, and Communicating: Trends, Issues, and Recommendations*,
- ?? constructing an evaluation project web site (<http://lpsl.coe.uga.edu/Projects/AAlaptop/>), and
- ?? collecting data concerning the preparation and attitudes of the teachers and students at Athens Academy before they received their laptops.

The major results of the year one data collection can be summarized as follows:

- ?? all participants (teachers, students, administrators, parents, and technology staff) were very enthusiastic about the onset of the project,
- ?? teachers expressed concern that there might be insufficient time for preparation of lessons that would fully incorporate the portable technologies into the curriculum,
- ?? although there was a general consensus that the project should support a move toward a more learner-centered classroom, both teachers and students reported being most comfortable with a more traditional teacher-centered, curriculum directed classroom, and
- ?? extensive technological and pedagogical support for the teachers who got their laptops in the Spring was established by the technology team at the Academy.

YEAR TWO PROGRAM ACTIVITIES

The second year of the laptop initiative was preceded by an intensive summer of technology training and planning for use of the laptops in their classrooms involving the middle school teachers. To extend the work started with the *20-Minute Modules* in the spring of 2000, Mike Callinan and other members of the technology team met with middle school teachers on a daily to weekly basis throughout the summer to assist them with creating Web pages and developing plans for other applications of

the laptops. Although this was an intensive time investment on the part of the technology staff as well as the teachers, it was an investment whose return was felt ten-fold when the teachers returned to campus in August. Not only were they expressing more comfort with the technology than they had in the previous year, the questions they were asking clearly demonstrated an increase in technology literacy skills.

As the new school year got underway, the technology staff members were quickly submersed in the preparation for middle school students to receive their laptops in October. To prepare everyone, informal discussions were held in the classroom with students and formal meetings were held with parents. The rollout in mid-October of 2000 was widely acknowledged as a huge success and the 7th and 8th grade students eagerly began an eight-month adventure with their new laptops.

While the middle school teachers and students began to grapple with the technology infusion, the upper school began preparations with the teachers. Upper school English, mathematics, science, and social studies teachers received their laptops in early September, and staff development began immediately. Building on the skills developed in the previous year's *20-Minute Modules* staff training format, the Media and Technology Staff created a yearlong program for upper school training. The upper school Director scheduled each teacher for an hour of training during the regular school day. This hour did not interfere with teachers' planning periods and was an additional hour built into the upper school schedule specifically to accommodate technology training. Four training sessions occurred each week. The modules focused on developing higher levels of skill in Applications, Accessing and Using Information, and Integrating Technology into Teaching and Learning. Working only with upper school faculty allowed the training to target grade and discipline-specific level needs.

While the upper school teachers worked on becoming more comfortable with the tools, upper school students were exposed to the technology in the classroom as their teachers began to experiment with applications such as PowerPoint, Excel, and access to the World Wide Web. Like the middle school teachers the year before, upper school teachers utilized their laptops on a daily basis, both on campus and at home, beginning the modeling of portable, wireless technology use in a classroom setting.

YEAR TWO EVALUATION ACTIVITIES

The second year of the evaluation project was once again filled with a variety of activities, resulting in an exponential growth in data! Overall, it was an intensive data collection year – especially in the spring after a special meeting with Saul Rockman, an evaluation consultant, who was brought to the Academy to advise us in January. In the fall, we had three primary data collection efforts; but in the spring, as displayed in Table 1, we quadrupled our activities with the addition of the upper school.

Table 1. Data collection activities during 2000-2001.

Fall Data Collection		
Teachers	Students	Parents
Laptop Day	Laptop Day	MS Parent Meeting
MS Observations	MS Observations	
Spring Data Collection		
Teachers	Students	Parents
MS Observations	MS Observations	Parents Technology Survey
US Focus Groups	MS Survey (initial)	
US Surveys (initial)	MS Focus Groups	
MS Usage Logs	MS Usage Logs	
MS Focus Group	US Surveys (initial)	
MS Survey (end 1st year)	MS Usage Logs	
	MS Surveys (end 1st year)	

All together, we ended up with six different types of data collection activities: (1) surveys, (2) observations, (3) interviews/focus groups, (4) test scores, (5) usage logs, and (6) notes from meetings with various groups.

A major event that occurred during the second year of this evaluation was a refinement of focus, based on consultations with Saul Rockman, Bertelsmman Foundation representations, and the Athens Academy technology team. In keeping with our commitment to conduct a *responsive evaluation*, we adjusted our primary areas of emphasis for the evaluation along with the specific questions being addressed. Our revised major evaluation areas and questions are as follows:

Enhancing the Teaching and Learning Environment

?? Are there differences in roles/responsibilities that can be attributed to the ubiquitous computing environment?

?? Are there differences in the processes of learning that can be attributed to the ubiquitous computing environment?

?? What are the affective implications of the ubiquitous computing environment?

Enhancing Achievement and Performance

?? How much is learned in English, History/Geography, Math, and Science that can be attributed to the ubiquitous computing environment?

Enhancing Key Qualifications for the Information Age

?? Are there differences in cognitive skills? that can be attributed to the ubiquitous computing environment

?? Are there differences in media literacy skills that can be attributed to the ubiquitous computing environment?

YEAR TWO PARTICIPANTS

Teachers

Two cohorts of teachers participated in the second year of the evaluation. First, there were the eight middle school teachers (grades 7 and 8), and second, there were the 36 upper school teachers (grades 9 through 12).

Middle School Cohort. The cohort of eight participating middle school teachers, four 7th grade and four 8th grade teachers:

1. completed questionnaires (see Appendix A for a copy of the beginning and end of year instruments),
2. enabled classroom observations by members of our evaluation team, and
3. participated in interviews.

The teachers' main subjects were: mathematics (two teachers), science (two teachers), geography (one teacher), history (one teacher), and English (two teachers), representing the targeted subject-areas for the evaluation. These eight teachers all teach about the same number of students each day (approximately 67), and deal with the same average size of classes (16 - 17). Teaching experience varies greatly in the sample ranging from a minimum of 1 year to a maximum of 29 years of prior experience. The average teaching experience of these eight teachers by the end of 2001 was 12 years.

Upper School Cohort. The cohort of 36 participating upper school teachers represented four grade areas: 9th grade, 10th grade, 11th grade, and 12th grade. Although the evaluation is focused primarily on 9th and 10th grade learners, the four grades have been included in the teacher data because many teachers teach across grade levels. The upper school teachers completed a questionnaire (see Appendix A for a copy of the instrument) and participated in interviews.

The teachers' main subjects come under the fields of science as well as the humanities and languages, with the following subjects being represented the targeted core area for the evaluation: mathematics (6), science (5), history (5), and English (12). These 36 teachers all teach about the same number of students each day (approximately 75), and deal with the same average size of classes (approximately 15). Teaching experience varies greatly in the sample from a minimum of no years of prior teaching experience to a maximum of 35 years of prior experience. The

median teaching experience of these 36 teachers by the end of 2001 amounted to 13 years.

Learners

Several cohorts of learners participated in the second year of the evaluation. Our primary focus was on the middle school students (grades 7 and 8) who received their laptops during the second year of the project. In addition, data was collected from sixth grade students and upper school students (grades 9 and 10) who would receive laptops in the fall term of year three.

Middle School Cohort. The middle school learner sample consisted of 125 students (57? 7th grade and 68? 8th grade). The students participating in the evaluation completed a variety of data collection activities:

1. beginning of the year questionnaires (for all 7th grade students and new 8th grade students),
2. classroom observations, and
3. focus group interviews.

The seventh grade sample included 49 percent female and 51 percent male students (that is 28 female and 29 male students). The students' age ranged between 12 and 14, with an average age of 13 years. When data was collected, the distribution was as follows: 9 students were 12, 46 were 13, and 2 were 14 years old. Out of the 57 students in the seventh grade sample, 84 percent were Caucasian, 8 percent Asian-American and 1 percent African-American (that is 48 Caucasian and 5 Asian-American, and 1 African-American students) (3 did not report ethnicity) (see Table 2 for an summary).

Table 2. 7th grade demographics

7th Graders		
Gender	Number of Students	Percent
Males	29	51%
Females	28	49%
Age		
12 years old	9	16%
13 years old	46	80%
14 years old	2	4%
Ethnicity		
Caucasian	48	84%
Asian-American	5	8%
African-American	1	1%

The eighth grade sample included 59 percent female and 41 percent male students (that is 40 female and 28 male students). The students' ages ranged between 13 and 15, with an average age of 14 years. At the time data was collected, the distribution was as follows: 20 students were 13, 46 were 14, and 2 were 15 years old. Out of the 68 students in the eighth grade sample, 85 percent are Caucasian, 13 percent Asian-American, and 1 percent Hispanic (that is 58 Caucasian, 9 Asian-American and 1

Hispanic students). This closely aligns with the overall demographic profile of the school where 15 percent of the student body are minorities (see the summary in Table 3).

Table 3. 8th grade demographics

8th Graders		
Gender	Number of Students	Percent
Males	28	41%
Females	40	59%
Age		
13 years old	20	29%
14 years old	46	68%
15 years old	2	3%
Ethnicity		
Caucasian	58	85%
Asian-American	9	13%
Hispanic	1	1%

Students Receiving Laptops, 2001-2002 Cohort. Three cohorts of learners who would receive laptops at the beginning of year three were included in the year two data collection. These 6th, 9th and 10th grade students answered a questionnaire in May 2001 (59–6th grade, 70–9th grade and 68–10th grade).

The sixth grade sample (summarized in Table 4) included 46 percent female and 54 percent male students (that is 27 female and 32 male students). The students' age ranged between 11 and 13, with an average age of 12 years. At the time data was collected the distribution was as follows: 16 students were 11, 42 were 12, and 1 was 13 years old. Out of the 59 students in the sixth grade sample, 80 percent are Caucasian, 14 percent Asian-American, and 1 percent African-American (that is 47 Caucasian, 8 Asian-American, and 1 African-American students). Three did not report ethnicity.

Table 4. 6th grade demographics.

6th Graders		
Gender	Number of Students	Percent
Males	32	54%
Females	27	46%
Age		
11 years old	16	27%
12 years old	42	71%
13 years old	1	2%
Ethnicity		
Caucasian	47	80%
Asian-American	8	14%
African-American	1	1%

The ninth grade sample included 41 percent female and 59 percent male students (that is 29 female and 41 male students). The students' age ranged between 14 and 16, with an average age of 15 years. At the time data was collected, the distribution was as follows: 14 students were 14, 52 were 15, and 4 were 16 years old. Out of the 70 students in the ninth grade sample, 83 percent are Caucasian, 4 percent Asian-American, 1 percent African-American and 1 percent Hispanic (that is 58 Caucasian, 3 Asian-American, 1 African-American, and 1 Hispanic students) (see summary in Table 5).

Table 5. 9th grade demographics.

9th Graders		
Gender	Number of Students	Percent
Males	41	59%
Females	29	41%
Age		
14 years old	14	20%
15 years old	52	74%
16 years old	4	2%
Ethnicity		
Caucasian	58	83%
Asian-American	3	4%
African-American	1	1%
Hispanic	1	1%

The tenth grade sample included 53 percent female and 47 percent male students (that is 36 female and 32 male students). The students' age ranged between 13 and 16, with an average age of 16 years. At the time data was collected, the distribution was as follows: 1 student was 13, 20 were 15, and 47 were 16 years old. Out of the 68 students in the tenth grade sample, 88 percent are Caucasian, 6 percent Asian-American, and 4 percent African-American (that is 60 Caucasian, 4 Asian-American, and 3 African-American students). One student did not report ethnicity. The demographics are summarized in Table 6.

Table 6. 10th grade demographics

10th Graders		
Gender	Number of Students	Percent
Males	32	47%
Females	36	53%
Age		
13 years old	1	1%
15 years old	20	29%
16 years old	47	70%
Ethnicity		
Caucasian	60	88%
Asian-American	4	6%
African-American	3	4%

METHODS

Data Collection

We collected our first data for the second year of the evaluation project at the beginning of the school year in the middle school, and ended our data collection near the end of the school year in May 2001 with a final interview with the middle school teachers. Our second year evaluative efforts were focused on ascertaining the degree to which the project was reaching three key goals:

- ?? enhancing the teaching and learning environment at Athens Academy,
- ?? enhancing achievement and performance, and
- ?? enhancing key qualifications for the information age.

Specific questions and data collection methods are displayed in Figure 1. Copies of instruments used during the second year are in the Appendices (A: teacher questionnaire, B: interview protocol, C: student survey, D: usage logs, E: observation protocol).

Methods	questionnaire	interview	usage logs	observations
Questions				
Impact on teaching & learning?	?	?	?	?
Impact on achievement and performance?		?		?
Impact on information age qualifications?	?	?	?	?

Figure 1. Data collection matrix.

Data Analysis

Several methods of analysis were used to interpret the data. Responses to the teacher questionnaires and student surveys were imported into SPSS so that descriptive statistics could be generated. Factor analysis was also used to help inform the results when needed. Tapes from the interviews were analyzed and themes were identified through inductive analysis and coding. Reflective notes were recorded by each member of the evaluation team who participated in the focus group meetings and classroom observations. The reflective notes were used to substantiate the themes identified from the analysis of the focus group tapes and checklists from the observations. Themes and trends were also identified in the usage logs completed by middle school teachers and students. The results of the analysis from the year two data collection are discussed in the next section of this report.

FINDINGS TO DATE

The Findings to Date section of the report is organized around several major themes. These have been divided into two main sections: the middle school cohort and the upper school cohort. Each section is then further divided into two main subsections: themes related to teachers and themes related to learners. Main themes described in the subsections include:

Teachers

- 1) The teaching and learning environment
- 2) Impact on achievement and performance
- 3) Views on information age qualifications

Learners

- ?? Computer use and expertise
- ?? Attitudes Toward school and using laptops for learning
- ?? The learning environment
- ?? Impact on performance

Each theme is reported in a separate section that includes the following information:

- 1) A quotation from the literature relevant to the theme
- 2) An **Introduction** to the theme and its key points
- 3) **Data** revealed by the evaluation to date (e.g., quotes from focus groups, percentages from surveys)
- 4) The evaluators' **Interpretation** of the data, and
- 5) A recommendation captured in **Next Steps**.

What technology will not do is make the teacher's life simple. The kind of teaching and learning that we have described requires teachers with multiple skills. The subject matter is inherently challenging, and because it is evolving and open-ended, it can never be totally mastered. Especially at first, the technology itself poses challenges, like learning to set up equipment, remembering software commands, and troubleshooting system problems. New roles pose many challenges, too. The teacher must be able to launch and orchestrate multiple groups of students, intervene at critical points, diagnose individual learning problems, and provide feedback.

Nevertheless, in classrooms where teachers have risen to this challenge, a profound change is occurring in the learning environment. Technology plays an important role, but it is a supporting role. The students are the stars. The playwright and director—and the power behind the scene—is, as always, the teacher.

*– Barbara Means
& Kerry Olsen
Educational Leadership, 1994*

MIDDLE SCHOOL TEACHERS: THE TEACHING AND LEARNING ENVIRONMENT

Introduction

This theme captures teachers' attitudes toward the teaching process and how they create their learning environment. This includes teaching methods, activities, and how laptops are used in the classroom.

Data

Three primary sources of data were used to inform this area: observations in the classroom, usage logs completed by teachers during a week in the spring, and an end of the year focus group.

Observations. Observations revealed that the majority of the middle school teachers were using the laptops in their classrooms during the 2000-2001 school year. Highest use occurred in two primary subject areas: English and science. Other core subject areas, history/geography and math, made use of the laptops, but not as extensively as English and science.

Observations also revealed that two primary activities were enabled by having access to the laptops in the classroom: word processing and information seeking. Students took notes on a regular basis with the laptops. Students were also engaged in information seeking activities using Web-based resources such as search engines and databases. In addition, teachers made extensive use of the laptops to do presentations with and for the students.

Usage Logs. Teachers reported using the laptops with students to search for information and for note-taking in class in the usage logs. Teachers also reported the facilitation of several administrative tasks using the laptop, including e-mail amongst themselves as well as with parents, and creating tests/resources for use in class. They also used the computers for lesson planning and gathering resources for use during a lesson. Programs used included Outlook, Explorer, MicroGrade, Word and Excel. Time spent on tasks utilizing laptops generally ranged from 10 minutes to over two hours within one day. See Figure 2 for more information on use by 7th grade teachers and Figure 3 for more information on use by 8th grade teachers and the amount of time spent on average per day.

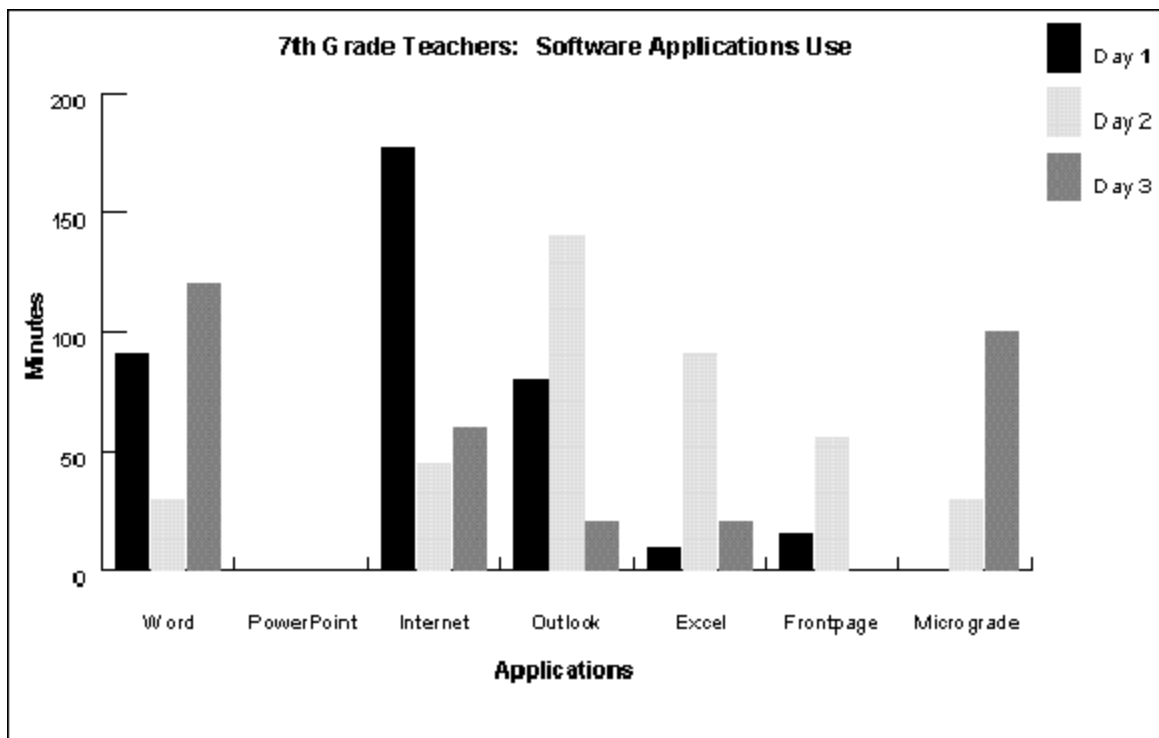


Figure 2. 7th grade teachers application use and amount of time used.

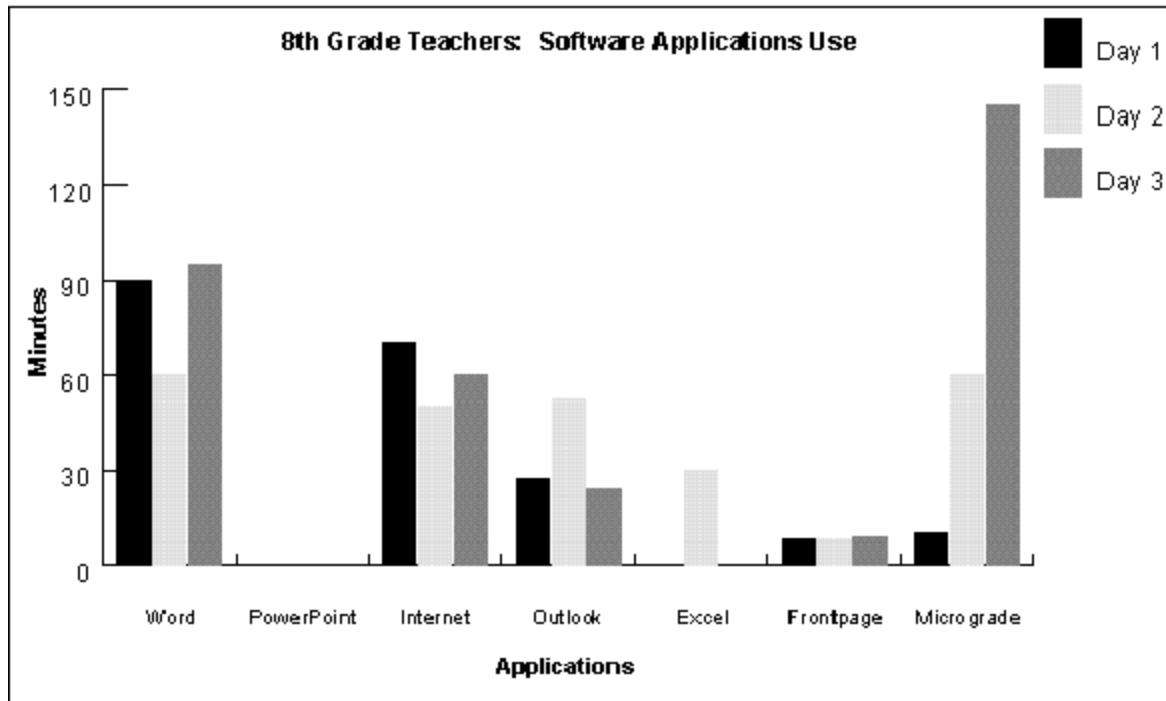


Figure 3. 8th grade teachers application use and amount of time used.

Focus Group. Teachers reported using the laptops in a variety of ways during the focus group interview: word processing, Web pages, graphics, finding resources and for presentations. The teachers also reported that the laptops made it easy for the students to study for exams (reviewing teachers notes, reviewing individual notes, etc.). Teachers reported that they were using the laptops for keeping track of grades (e.g., MicroGrade) and for communicating with each other. Several teachers also reported using the laptops to increase communication with parents.

The laptops have also had an impact on the day-to-day workings in the classroom. Teachers reported that the laptops had a substantial impact on management in the classroom, particularly in keeping students on task and assisting students with skills related to the use of the laptops. Teachers indicated they are having to change how they think about what they are doing and that the laptops have created a greater need for planning ahead.

There is also an indication that the laptops are having an impact on the curriculum and the roles of the teacher in the classroom. As indicated by one teacher: *the curriculum has to evolve and change*. Several other teachers indicated that they perceived their role to be changing, moving from being the sole provider of information to more of facilitator in the classroom. Although this was generally regarded as a positive development, there was also concern expressed about the time demands created by this shift in roles.

Interpretation

Many things have evolved and changed in the middle school classrooms since the teachers first received their laptops during the spring of 2000. Certainly the laptops are being used more and for a variety of activities. The teachers are exploring ways to use the laptops, both for their own use as well as for use with their students.

Perhaps the greatest impact the laptop has had to date is in how teachers are doing their jobs. Data indicate that the teachers are primarily using the tool for instructional and administrative-related activities – with a focus on the tool for their productivity versus use with their students. This is not uncommon when new tools are introduced into an educational setting. Similar findings were documented in a report published by Rockman et al. in 1998 in their evaluation of the *Anytime Anywhere Learning* and *Notebooks for Schools* projects funded by Microsoft and Toshiba America. Like the teachers at the Academy, teachers in the Rockman et al. research used a variety of tools and in a variety of ways, predominately for instructional and administrative purposes rather than student-driven or student-based activities. While ultimately the students benefit from the teachers use of the tools, the data do not indicate as much direct use with the students to date.

As indicated in the first year report, change takes time. Certainly the teachers indicate a willingness and are even eager to learn ways to integrate the laptops into their classroom. But these teachers, as others with or without laptops, are limited by the amount of time they have for planning and the location and development of resources. Nonetheless, as they extend and enhance their own skills, it is likely that we will see an increase in both the ways in which the laptops are used with the students as well as the time allocated to use of the laptops in the classroom.

Next Steps

To realize the full benefits of technology integration, a variety of teaching methods and learning techniques will need to be demonstrated, implemented and practiced by the teachers. Teachers need examples and models of teaching and learning techniques that have been proven to be effective in technology-enhanced learning environments. Providing support to teachers as they learn these new methods and techniques will greatly assist with their implementation and adoption. The variety of software applications used demonstrates a wide range of abilities and ease with programs. Opportunities to share how teachers and students are using laptops in an open forum may spark ideas and provide collaborations among faculty.

...there is evidence in some of these studies that learning technology is less effective or ineffective when the learning objectives are unclear and the focus of the technology use is diffuse. “One of the enduring difficulties about technology and education,” according to Dr. Martha Stone Wiske, co-director of the Educational Technology Center at the Harvard Graduate School of Education, “is that a lot of people think about the technology first and the education later.”

*- John Schacter,
Milken Family Foundation
([http://www.mff.org/
publications/publications.taf?](http://www.mff.org/publications/publications.taf?)
page=161)*

MIDDLE SCHOOL TEACHERS: IMPACT ON ACHIEVEMENT AND PERFORMANCE

Introduction

This theme captures information concerning teachers' attitudes toward the laptop program and its impact on achievement and performance. The theme relates to the impact on the teachers themselves as well as the impact on their students.

Data

Two primary sources of data were used to inform this area: observations in the classroom and an end of the year focus group.

Observations. The teachers seem to be making extensive use of the laptops to assist them with their instructional and administrative tasks. Observations in a variety of classrooms and at various times revealed that while teachers are using the laptops with their students, the use is limited, both in terms of applications and time on task.

Focus Group. During the end of the year focus group, the teachers reported that they are seeing an increase in a variety of computer skills – both their own as well as that of their students. One teacher stated that *everything is more efficient* with the laptops and several echoed this statement, indicating that the laptop has really had an impact on their instructional and administrative performance, making their lives much easier with tasks such as management and communication.

Interpretation

The laptops are certainly having an impact on how teachers are performing tasks, They are also beginning to have an impact on what students are doing in the classroom and how they are completing the tasks. However, to date, the overall impact on student achievement has been limited. Like the overall use of the laptops, the limited impact on achievement is not unusual when a new innovation is first introduced into a learning setting. For example, the Apple Classroom of Tomorrow (ACOT) project, a thirteen year experiment in providing ubiquitous computing that ran from 1995 to 1998, reported a similar slow evolution in the degree to which the classroom environment changed and achievement was affected (Fisher, Dwyer, & Yocam, 1996).

As teachers become increasingly more comfortable with the technology, as well as gather other ideas for how to use the laptops in their classroom, they will likely begin integrating the laptops in more seamless ways. It is at this point that we will be able to get better indications of how the technology is impacting achievement and performance of the students.

Next Steps

During the end of year focus group, teachers indicated that great use of the laptop in the classroom was both desirable and do-able – and something that would be much easier during the next academic year. In order to enable teachers to accomplish this goal, they need models and ideas for how best to use the laptops in their classrooms. They also need time to practice these strategies so that they can become comfortable with new methods.

One of the most dramatic ways education technology can make learning more dynamic and engaging is by forging real world contexts for academic exploration. Technology allows educators and students to augment curriculum with current information and timely study of real world events. Such authentic, relevant investigation encourages students to discover and understand practical implications and to produce knowledge with important applications.

*– CEO Forum,
Year 4 Report, June 2001
Key Building Blocks for Student
Achievement in the 21st Century*

MIDDLE SCHOOL TEACHERS: VIEWS ON INFORMATION AGE QUALIFICATIONS

Introduction

This theme captures teachers' perceptions regarding key qualifications of the information age and the impact of the laptop initiative for enabling and enhancing these skills.

Data

Three primary sources of data were used to inform this area: observations in the classroom, usage logs completed by teachers during a week in the spring, and an end of the year focus group.

Observations. Observations revealed that teachers and students were engaged in activities that would enhance key information age qualifications, particularly information seeking and information evaluation. Teachers made extensive use of the Web for planning, looking for new information they could bring into their classroom as well as breaking news on world events. Teachers also used the Web with their students, guiding them in looking for information as well as helping students evaluate the information once it was retrieved.

Usage Logs. The *Day in the Life* activity logs completed by the middle school teachers revealed that teachers were making extensive use of information technologies, in and out of the classroom. Of the tool use reported, the Internet and Web were the most frequently used. The tools were also used for a variety of purposes. Teachers reported that they used the Internet to increase communication with parents and students after school. The teachers indicated use of the Web to find information for their classrooms (with as much time as more than 2 hours devoted to this activity) as well as use of the Web with their students to extend the walls of the classroom, bringing in up-to-date information to enhance the learning experience.

Focus Group

One of the points the teachers emphasized during the focus group interview was the extensive use of Web-based resources to assist them with enhancing their classroom practice. Teachers indicated that the Web enabled them to bring **real** resources into their classrooms easily and in a "right-on-time" fashion.

Teachers reported that their computer literacy was much higher than it was a year ago, and also indicated that the computer literacy of their students was also higher. Teachers also reported that they were using it to help extend the cognitive skills of their students, particularly in terms of study and time management skills.

Interpretation

Of the areas examined in the second year of the laptop evaluation, this is perhaps the area that has shown the greatest growth from year one to year two. Teachers recognize the value of the laptop as a powerful information tool and by the end of the year, they were beginning to explore how it could be used in the classroom to transcend traditional print and other media resources. As a result, they are now using the laptop as an information age tool to extend and enhance what they do as professionals.

Next Steps

Teachers are eager and willing to make use of the laptop as an information tool in their classroom. However, two of the biggest deterrents from their perspective are ideas and time. During the end of year focus group the teachers emphasized again that they need and want ideas for what Web-based resources to use and how to make them work efficiently and effectively in their classrooms. They also emphasized a need for time to review Web sites that may be useful in their classrooms. Finding ways to help support teachers in this effort will greatly enhance the laptop initiative.

... just because every child at Mott Hall has a computer doesn't mean that the computers are used by every teacher, or that they're used every day, as the experiences of an 8th grade class on a recent Wednesday suggest. In their social studies and mathematics classes, the students left their laptops under their desks. In a community-service class, one girl used a laptop and TV monitor to show the class a World Wide Web site she had created about volunteering at a local elementary school. In science, the students used laptops in groups for word processing or generating charts and graphs, to revise project reports based on their teachers' written comments. In English, the students created empty tables on their laptop screens in the beginning of the period, conducted a discussion about the novel *To Kill a Mockingbird*, and returned to the laptops only during the last few minutes of the period to plug in a few words. With the exception of the science class, where the computers were truly used as a tool, the fact that the students had laptops seemed irrelevant.

– *Laptops for all doesn't mean they're always used*
(Zehr, 2000).

Education Week
(<http://www.edweek.org/ew/ewstory.cfm?slug=39laptop.h19>)

MIDDLE SCHOOL LEARNERS: COMPUTER USE AND EXPERTISE

Introduction

This theme relates to where learners are using computers, the activities in which they are engaged with computers, and their perceptions of their own expertise with using computers.

Data

Four primary sources of data were used to inform this area: observations in the classroom, usage logs completed by 7th and 8th grade students during a week in the spring (n = 8)¹, focus group interviews with 7th and 8th graders (n = 8), and an end of the year survey (n = 125). To help further delineate the data, the information will be presented in three categories: Computer Use at School, Computer Use at Home, and Expertise with Computer Applications.

Computer Use at School. The students reported a high use of the laptops, both at home and at school, with 72% of the 7th graders reporting almost daily use and 79% of the 8th graders reporting almost daily use. The majority of the students also reported *often* or *sometimes* getting to decide when to use the laptops (77% in 7th grade and 78% in 8th grade). The mandate that the laptops are always with the students is also reflected in the data, with 72% of the 7th graders reporting that they *rarely* or *never* get to decide when to bring the laptop to school. This was not consistent with what was reported with the 8th grade, where 43% of the 8th graders reported they *always* get to decide when to bring the laptops and 38% reporting they *never* get to decide. This trend was also echoed in terms of deciding when to take the laptop home, with 67% of the 7th graders and 35% of the 8th graders reporting that they *always* get to decide when to bring it home and 37% reporting they *never* get to decide when to bring it home (see Tables 6 and 7 for a more detailed report of use of the laptops for grades 7 and 8).

¹ It is important to note that with the usage logs, a small number of students were used this year to test the viability of the data collection method. We will be using the usage logs again during the third year with more students and teachers in both the middle and upper school as we found that these logs do provide significant indicators of typical uses and data points to investigate further in the future.

Table 6. 7th grade students frequency of using laptops

7th Grade Experience with Laptops					
Frequency in Percent					
	Never	Rarely	Sometimes	Often	Always
1. Student decides when he or she wants to use the laptop to work on assignments.	1.8	12.5	48.2	33.9	3.6
2. Student decides when her or she wants to bring the laptop to school.	68.4	7	1.8	0	22.8
3. Student decides when he or she wants to bring the laptop home.	68.4	1.8	1.8	0	28.1

Table 7. 8th grade students frequency of using laptops

8th Grade Experience with Laptops					
Frequency in Percent					
	Never	Rarely	Sometimes	Often	Always
1. Student decides when he or she wants to use the laptop to work on assignments.	1.5	7.4	35.3	42.6	13.2
2. Student decides when her or she wants to bring the laptop to school.	38.2	8.8	4.4	5.9	42.6
3. Student decides when he or she wants to bring the laptop home.	36.8	11.8	7.4	8.8	35.3

Responses to questions regarding how the computers are being used in school were also revealing. Nearly half (47%) of the 7th graders and 62% of the 8th graders reported that they use the laptop to do school work almost daily. Students also reported use of a variety of tools, including use of the Internet almost daily (60% - 7th graders; 76% - 8th graders) to send e-mail (45% of the 7th graders daily; 62% of the 8th graders daily) and search for information (52% of the 7th graders and 52% of the 8th graders searching on a weekly basis). The students also reported a high use of the Microsoft Word application for word processing almost daily (38% of the 7th graders; 52% of the 8th graders) or weekly (45% of the 7th graders and 34% of the 8th graders) (see Table 8 and 9 for a breakdown of the tools used by grade level).

Table 8. 7th grade students use of tools

7th Grade Frequency of Use with Computer Applications					
Frequency in Percent					
	Never	Once or Twice a Year	Monthly	Weekly	Almost Daily
1. Play games	3.5	7.0	19.3	45.6	24.6
2. Do schoolwork	3.6	1.8	3.6	41.1	50
3. Word processing	0	0	12.3	47.4	40.4
4. Spreadsheets	3.6	21.4	39.3	35.7	0
5. Presentation	0	10.7	83.9	5.4	0
6. Multimedia & Webpages	5.3	57.9	35.1	0	1.8
7. Internet	0	0	3.6	32.1	64.3
8. Search for information on Web	1.8	0	17.5	54.4	26.3
9. Email	3.5	1.8	10.5	35.1	47.4
10. Tutorials/drill & practice	43.9	28.1	24.6	1.8	1.8
11. Graphics	8.9	16.1	46.4	26.8	1.8

Table 9. 8th grade students use of tools

8th Grade Frequency of Use with Computer Applications					
Frequency in Percent					
	Never	Once or Twice a Year	Monthly	Weekly	Almost Daily
1. Play games	7.4	4.4	8.8	26.5	52.9
2. Do schoolwork	3	1.5	9	23.9	62.7
3. Word processing	0	1.5	10.6	34.8	53
4. Spreadsheets	1.5	32.4	60.3	5.9	0
5. Presentation	0	31.3	59.7	9.0	0
6. Multimedia & Webpages	52.9	32.4	11.8	2.9	0
7. Internet	0	0	5.9	7.6	76.5
8. Search for information on Web	0	4.4	11.8	51.5	32.4
9. Email	0	1.5	3	31.8	63.6
10. Tutorials/drill & practice	51.5	30.9	16.2	1.5	0
11. Graphics	20.6	33.8	22.1	19.1	4.4

This data was echoed in the usage logs where students reported the most frequently used applications as being the Internet/Web, Word, PowerPoint and Excel. Our observations are also aligned with the data reported by the students. Students were frequently observed connecting to the Internet and/or Web. We were also able to observe them using various other tools during the academic year, particularly Word and PowerPoint.

While the laptops are receiving a considerable amount of use in school for structured class activities, our observations, as well as the usage logs completed by the students (n=4 7th graders and n=5 8th graders), indicate that this is not all that is occurring in the classroom. In school, the students reported using the laptops for finding resources, writing, sending e-mail and playing games (23% of the students in the 7th grade reported playing games almost daily on the end of year survey with 53% of the

8th graders reporting similar activities), with time ranging from 5 to 40 minutes for individual activities by subject area (see Figures 4 and 5 for detail by subject area).

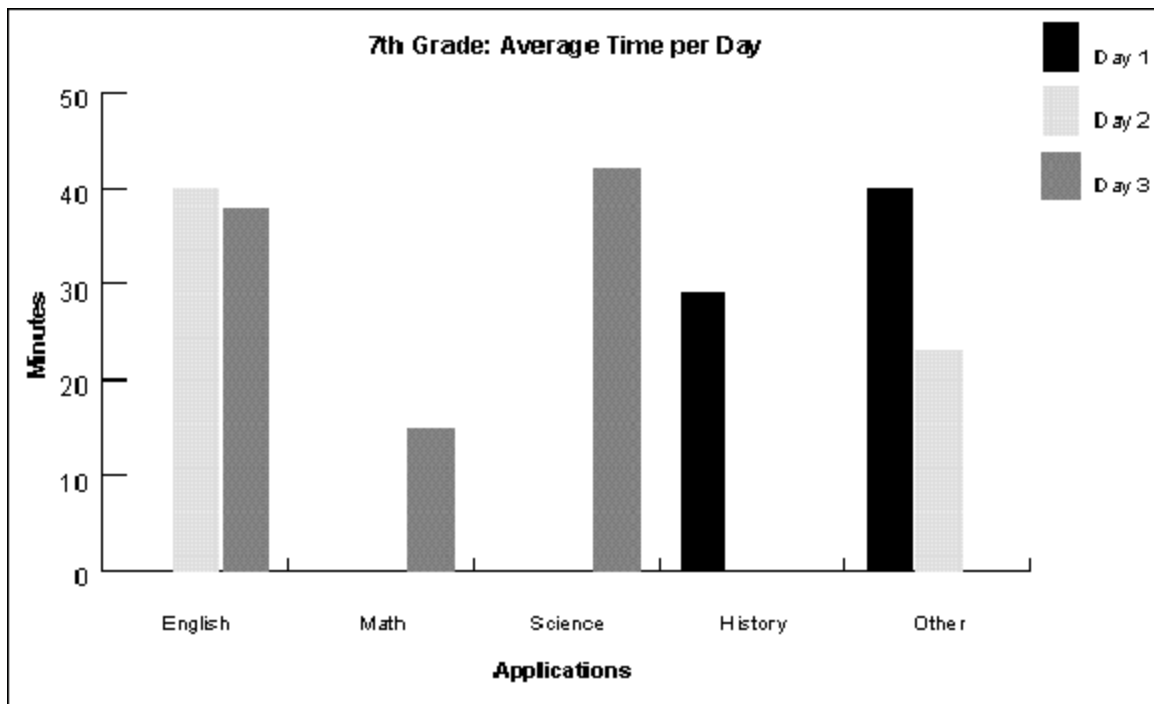


Figure 4. 7th grade students application use and amount of time used.

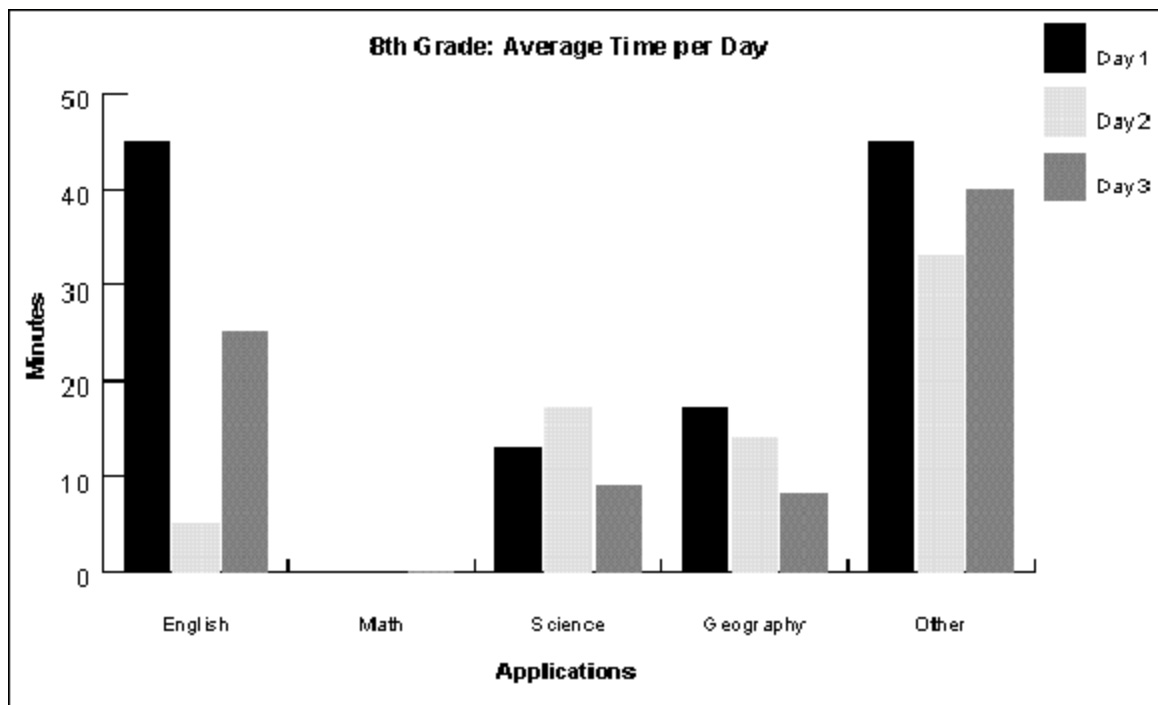


Figure 5. 8th grade students application use and amount of time used

While students also reported use of the laptops outside of the core subject areas (e.g., study hall), we limited our data reporting to the main areas under consideration.

Computer Use at Home. In terms of computer use at home, there was an interesting grade-level differentiation in the usage logs. The 7th grade students did not report a considerable amount of use of the laptops at home. The usage logs revealed that most of the activities completed with the laptops at home were more personal in nature (e.g., downloading music, sending e-mail to friends), with only one of the four students reporting using the laptop to complete a writing assignment for English.

The 8th grade students, in comparison, reported a high level of use at school and at home. Despite reporting the challenge of different types of Internet connections at home during the focus group interviews, the majority did report using it for school work at home, with the primary subject areas being Geography and English. While they also reported using the laptops for personal reasons, school work received a greater focus in the 8th graders usage logs, with applications like Word, Explorer and Media Player topping the list.

Expertise with Computer Applications. The students reported a high level of expertise with a variety of applications. 65% of the 7th graders and 61% of the 8th graders reported that they *rarely* or *never* need help with word processing. Similar percentages reported that they *rarely* or *never* need help with PowerPoint (55% - 7th grade; 68% - 8th grade). A few students described possessing exceptionally advanced technology skills such as pressing their own music CDs and advanced levels of online game participation.

The students' expertise is really highlighted with Internet and Web-based applications. 42% of the 7th graders and 44% of the 8th graders consider themselves to be experts with Web-based applications (i.e., Explorer). They also view themselves as experts with e-mail applications, with 43% of the 7th graders and 46% of the 8th graders reporting themselves to be experts with Outlook (see Tables 10 and 11 for a more detailed representation of levels of expertise).

Table 10. 7th graders expertise with applications

7th Grade Expertise with Computer Applications					
Frequency in Percent					
	I always need help.	I sometimes need help	I rarely need help.	I never need help.	I can help other. I am an expert.
12. Games	0	17.9	26.8	32.1	23.2
13. Word processing	1.8	1.8	30.4	39.3	26.8
14. Spreadsheets	1.8	38.6	36.8	8.8	14.0
15. Presentations	1.8	7.1	30.4	28.6	32.1
16. Multimedia & Webpages	10.5	31.6	26.3	17.5	14.0
17. Internet	0	0	22.8	33.3	43.9
18. Email	0	0	8.8	45.6	45.6
19. Tutorials/drill & practice	3.8	25.0	38.5	28.8	3.8
20. Graphics & pictures	3.5	21.1	33.3	26.3	15.8

Table 11. 8th graders expertise with applications

8th Grade Expertise with Computer Applications					
Frequency in Percent					
	I always need help.	I sometimes need help	I rarely need help.	I never need help.	I can help other. I am an expert.
1. Games	1.5	7.6	33.3	30.3	27.3
2. Word processing	0	2.9	29.4	32.4	35.3
3. Spreadsheets	3.0	35.8	32.8	20.9	7.5
4. Presentations	0	6	26.9	41.8	25.4
5. Multimedia & Webpages	16.9	27.7	26.2	21.5	7.7
6. Internet	0	5.9	22.1	27.9	44.1
7. Email	0	3	10.4	40.3	46.3
8. Tutorials/drill & practice	6.6	26.2	31.1	32.8	3.3
9. Graphics & pictures	4.7	29.7	34.4	25.0	6.3

This confidence in use of computer applications is also indicated when asked about their expertise in comparison with their peers. 30% of the 7th graders and 38% of the 8th graders disagreed that they do not perceive that their peers know more than them (33% of the 7th graders and 34% of the 8th graders neither agreed nor disagreed that their peers were more knowledgeable about computers). This is a significant shift from the initial surveys during the first year when the majority of the students reported that their peers did know more than them.

Interpretation

Computer Use at School. The laptops are indeed seeing considerable use at school and a variety of applications are being used. While this is exciting and offers a great deal of promise for continued increases in use, how they are being used should also be examined. In the usage logs, students reported using the laptop primarily for locating resources, writing, sending e-mail and creating back-ups of their computers. While each of these activities is important, the students are not spending a great deal of time completing any one of these tasks, nor are they showing indications of going beyond what is required/asked by the teacher (57% of the 7th graders and 70% of the 8th graders report *rarely* or *never* going beyond what is asked of them by the teacher).

Our observations also confirmed that the tasks the students are currently completing with the laptops are primarily administrative in nature (e.g., e-mail, note-taking). Few high-level cognitive tasks were engaged by the students, for example, the creation of multimedia knowledge representations (Jonassen & Reeves, 1996). When the students were completing tasks that could be categorized as high-level, the time on task was fairly limited (ranging from 5 - 40 minutes as reported in the usage logs).

Computer Use at Home. While the students have reported experiencing challenges with getting connected at home, this is not deterring them from finding ways to use their laptops there. It is not overly surprising that the students are reporting that they are using the laptops for personal tasks when at home. E-mail and downloading music files were among the top activities reported on the usage logs, reflecting the students' personal interests in staying connected, both on a personal and cultural level.

Expertise with Computer Applications. The students demonstrated considerable growth between the beginning of the year and end of the year in terms of their perceived level of expertise with computer applications. It was particularly encouraging to see their views of themselves change over the course of the year. While last year they clearly indicated that many of their peers knew more than they did, by the end of the year, they reported a more level playing field.

Next Steps

Similar to the middle school teachers, the middle school students demonstrated considerable growth in the last year of using the laptops. Students reported an increase not only in terms of their use of the laptops, but also an increase in their expertise with computer technologies overall. This increase in skill and confidence level presents teachers and administrators with an opportunity to continue exploring other ways in which the laptops can be used to enhance the learning experience for the students. Now that the majority of the 7th and 8th students have the basic skills in place, steps can be taken to help move them to the next level so that the laptop can become more of an extension to their thinking and doing.

Learners of all ages are more motivated when they can see the usefulness of what they are learning and when they can use that information to do something that has an impact on others - especially their local community (McCombs, 1996; Pintrich and Schunk, 1996).

–National Research Council,
How People Learn: Brain, Mind Experience, and School,
(<http://books.nap.edu/books/0309070368/html/61.html#pagetop>)

MIDDLE SCHOOL LEARNERS: ATTITUDES TOWARD SCHOOL AND USING COMPUTERS FOR LEARNING

Introduction

This theme examines four aspects of attitudes toward computers and school: (1) attitudes toward school and schoolwork in general, (2) attitudes toward using computers for schoolwork and learning, (3) interest in computers and perceived relevance of computer ability, (4) and the impact laptops have had on their performance.

Data

Two primary sources of data were used to inform this area: focus group interviews with the 7th and 8th graders and an end of the year survey. See Tables 12 and 13 for summary information for 7th and 8th grade.

Table 12. 7th graders attitudes toward computers and school

7th Grade Attitudes Toward Computers & School					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Laptops make schoolwork easier to do.	3.5	8.8	24.6	47.4	12.3
2. I prefer to use my laptop to do schoolwork instead of using paper and pencil.	7	12.3	31.6	24.6	24.6
3. Using laptops for schoolwork can also have disadvantages.	0	5.3	21.1	50.9	22.8
4. Laptops make schoolwork more fun and interesting.	5.4	3.6	33.9	37.5	19.6
5. Laptops help me improve the quality of my schoolwork.	1.8	10.5	28.1	47.4	12.3
6. Laptops are helping me make better grades.	8.9	25.0	51.8	10.7	3.6
7. The laptops are too much trouble to carry around.	3.5	12.3	29.8	26.3	28.1
8. I look forward to the continued use of laptops in my classes.	5.3	5.3	29.8	38.6	21.1
9. I need to learn many new skills to use my laptop for my schoolwork.	12.7	38.2	32.7	12.7	3.6
10. I generally enjoy schoolwork.	40.4	21.1	21.1	17.5	0
11. Compared to other students, I really enjoy being in class.	26.8	21.4	32.1	14.3	5.4
12. Many of my classmates know more about computers than I do.	14.0	29.8	33.3	19.3	3.5
13. I want to learn more about computers.	3.5	8.8	45.6	29.8	12.3
14. I am currently trying to learn more about computers.	8.9	25.0	35.7	19.6	10.7
15. I would be equally prepared to enter college without the laptop program.	15.8	31.6	26.3	15.8	10.5
16. Having my laptop in class is an advantage when it comes to learning.	12.5	8.9	26.8	39.3	12.5
17. I think my ability with computers will affect the grades I get.	8.9	26.8	46.4	14.3	3.6

Table 13. 8th graders attitudes toward computers and school

8th Grade Attitudes Toward Computers & School					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Laptops make schoolwork easier to do.	1.5	11.9	34.3	40.3	11.9
2. I prefer to use my laptop to do schoolwork instead of using paper and pencil.	4.5	14.9	25.4	31.3	23.9
3. Using laptops for schoolwork can also have disadvantages.	4.5	4.5	10.4	52.2	28.4
4. Laptops make schoolwork more fun and interesting.	3.1	13.8	30.8	36.9	15.4
5. Laptops help me improve the quality of my schoolwork.	9.0	11.9	37.3	31.3	10.4
6. Laptops are helping me make better grades.	16.4	37.3	37.3	3.0	6.0
7. The laptops are too much trouble to carry around.	7.4	14.7	17.6	29.4	30.9
8. I look forward to the continued use of laptops in my classes.	4.5	1.5	37.3	41.8	14.9
9. I need to learn many new skills to use my laptop for my schoolwork.	15.2	39.4	33.3	10.6	1.5
10. I generally enjoy schoolwork.	39.7	29.4	16.2	13.2	1.5
11. Compared to other students, I really enjoy being in class.	23.5	29.4	36.8	10.3	0
12. Many of my classmates know more about computers than I do.	10.3	38.2	33.8	13.2	4.4
13. I want to learn more about computers.	1.5	7.5	41.8	43.3	6.0
14. I am currently trying to learn more about computers.	4.4	27.9	42.6	22.1	2.9
15. I would be equally prepared to enter college without the laptop program.	6	23.9	28.4	28.4	13.4
16. Having my laptop in class is an advantage when it comes to learning.	4.4	17.6	42.6	30.9	4.4
17. I think my ability with computers will affect the grades I get.	10.3	16.2	47.1	22.1	4.4
18. Laptops are more useful at home than in school.	4.4	17.6	48.5	20.6	8.8

In general, 7th grade students hold a rather positive view about being in school. 45% of the 7th graders reported they enjoy being in class. 53% of the 8th graders disagree or strongly disagree that they enjoy being in class. The overall trend changes slightly when it comes to whether or not the students enjoy schoolwork, with both grades being more aligned. 58% of the 7th graders and 69% of the 8th graders reported that they do not enjoy schoolwork, regardless of having the laptops. This

finding from the surveys was also echoed by the students during focus group interviews.

The students do have a very positive attitude toward using the laptops for schoolwork and learning. 57% of the 7th graders and 40% of the 8th graders report that they perceive that the laptops improve the quality of their work as well as improve their attitude toward school. They also agree or strongly agree that the laptops make work easier, with 60% of the 7th graders and 52% of the 8th graders reporting this result. During the focus group interviews, students reported specific ways in which the laptops help them with their work, including: helping increase typing speed, making their work more organized, saving time (e.g., faster research), contacting teachers more easily via e-mail, and finding more information related to classroom activities via the Web.

Almost half of the 7th graders (46%) and over half (55%) of the 8th graders indicate that they prefer using the computer over paper and pen/pencil and that it makes their work more interesting (53% - 7th grade; 50% - 8th grade). About half reported that they see *disadvantages* with use (51% - 7th graders; 52% - 8th graders *agreed*), stating they perceive challenges with use of the laptops. Several specific examples were mentioned during the focus group interviews. First, they said that teachers sometimes move too fast through the material shown on the computer and it is easy to get lost. Second, they noted that with laptops, it is also easy to get distracted and in both instances (getting lost or distracted), they didn't get too worried because they knew that they could rely on classmates for notes. A third challenge mentioned by the learners during the focus groups is that it is easy to play games on the laptops when the teacher isn't looking and that can make it difficult to focus in class.

Despite their concerns about some disadvantages of using laptops, the students' general interest in computers remains strong and their perceptions of their own computer skills is quite high. Overall, they appear to be quite confident. 47% of the 7th graders and 53% of the 8th graders do not perceive that they need new skills to use the laptops.

While overall the trends in terms of the students' attitudes is quite positive, there are some data points that indicate some dissatisfaction with use of the laptops. For example, 52% of the 7th graders and 61% of the 8th graders reported that it was too much trouble to carry the laptops. In another question related to perceived challenges, almost equal numbers of students indicated that they feel they would be just as well prepared for college/life after the Academy, with (48% - 7th graders; 30% - 8th graders) or without (27% - 7th graders; 41% - 8th graders) a laptop. However, the student reported looking forward to continued use of the laptops. 60% of the 7th graders and 56% of the 8th graders indicated that they strongly agree or agree to the continued use of the laptops.

Interpretation

As in the first year of the initiative, students continue to maintain an overall positive attitude toward the laptop initiative. While there are indications that they are not happy with some specific components of the initiative (e.g., weight of the unit, battery life, losing data), overall the students seem to value having and using the laptop for learning and communicating. This positive outlook will continue to aid the overall initiative as we move forward into the third year.

A challenge that may need attention is the perceived weight of the machines. The students clearly indicated during the focus group interviews that the unit is heavy, and repeatedly stated that the laptop presented challenges in terms of carrying it around. It may be that this perception can be altered with more thoughtful application of the tool. On the other hand, given that the new laptops purchased for the students above and below these cohorts of 7th and 8th graders are considerably lighter, complaints about the weight may be exacerbated.

Next Steps

Since the students have a positive attitude toward being in school and an even more positive attitude toward use of the laptop for learning, teachers have the opportunity to take advantage of this attitude and potentially use the laptops to help students develop a more positive outlook on schoolwork and the formal teaching and learning process. The challenge will be finding activities and applications that will help the students to continue to stretch their abilities so they do not become bored. Using the latest software and accessing powerful cognitive tools via the Web may reduce negative perceptions toward the laptops.

Educators invest a lot of effort building treehouses for children... An alternative would be to provide a wealth of materials that students can use for exploration and construction. A multimedia learning environment focusing on particular concepts, topics, or themes can focus student learning without distracting from exploration. Are you building treehouses for your students? Or, are you giving students the chance to create their own treehouses for learning?

*–Annette Lamb,
Building Treehouses
for Learning
([http://eduscapes.com/
sessions/tree/index.htm](http://eduscapes.com/sessions/tree/index.htm))*

MIDDLE SCHOOL LEARNERS: THE LEARNING ENVIRONMENT

Introduction

This theme examines student perceptions of various activities during a school day as well as preferred teaching and learning methods.

Data

One primary source of data was used for this category: the end of year survey. The data is divided into two main categories: Overall Perceptions of the Learning Environment and Learning Environment Preferences (see Tables 14 and 15 for an overall summary of learning environment data).

Table 14. 7th graders learning environment

7th Grade Perceptions of Learning Environment					
Frequency in Percent					
	Never	Rarely	Sometimes	Often	Almost Always
1. Teacher instruction/ demonstrations.	1.8	5.3	35.1	24.6	33.3
2. Students work from textbooks.	0	5.3	38.6	35.1	21.1
3. Teacher prepared activities.	0	0	17.5	52.6	29.8
4. Group work.	1.8	22.8	61.4	14	0
5. Individual projects.	0	5.4	44.6	44.6	5.4
6. Group projects.	1.8	26.6	52.6	19.3	0
7. Teacher-led class discussion.	1.8	12.7	20	40	25.5
8. Media use (videos, tapes)	7	36.8	40.4	15.8	0
9. Student presentations of individual or group projects.	0	8.8	47.4	38.6	5.3
10. Go beyond classroom information at home.	25.0	32.1	26.8	7.1	8.9

Table 15. 8th graders learning environment

8th Grade Perceptions of Learning Environment					
Frequency in Percent					
	Never	Rarely	Sometimes	Often	Almost Always
1. Teacher instruction/ demonstrations.	0	2.9	20.6	38.2	38.2
2. Students work from textbooks.	0	2.9	35.3	51.5	10.3
3. Teacher prepared activities.	0	1.5	19.1	54.4	25
4. Group work.	1.5	14.7	64.7	19.1	0
5. Individual projects.	0	4.5	19.1	54.4	25
6. Group projects.	1.5	16.2	57.4	25.0	0
7. Teacher-led class discussion.	0	1.5	25.8	39.4	33.3
8. Media use (videos, tapes)	3	20.9	49.3	25.4	1.5
9. Student presentations of individual or group projects.	1.5	26.9	55.2	13.4	3.0
10. Go beyond classroom information at home.	30.9	39.7	26.5	2.9	0

Overall Perceptions of the Learning Environment. The students' overall perceptions of the learning environment have not altered a great deal during the last year. 55% of the 7th graders and 76% of the 8th graders report learning primarily through teacher instruction and teacher demonstrations. The teacher is also at the center when it comes to the discussions, with 60% of the 7th graders and 70% of the 8th graders reporting that the discussions are teacher-led.

A similar trend is seen when looking at activities engaged in by the students. 78% of the 7th graders and 79% of the 8th graders reported completing teacher-created activities. Most of these activities are completed on an individual basis in the 7th grade (84%), while in the 8th grade, fewer appear to be individual (37%). The students reported that group work is completed sometimes (58% - 7th graders; 65%

8th graders). When discussions are held or activities are completed, media is *rarely* or *never* used in the 7th grade (42%). In 8th grade, media is *sometimes* used 49% of the time.

Learning Environment Preferences. What did shift significantly during the last year are students' perceptions of how they learn most. The 7th graders reported learning most from group work, individual projects, and teacher led discussions. The 8th graders reported learning most from teacher-led instruction/demonstration and teacher led discussion. While the 7th graders expressed different preferences from what was reported during the initial surveys, the 8th grade students continue to indicate that they learn most from teacher-led discussions and teacher-led instruction/demonstration.

Interestingly, reports from students regarding how they enjoy learning stayed consistent during the last year. The 7th graders reported that they enjoy learning from media use, group work, and group projects. The 8th graders reported that they enjoy learning from media use and group work. Both groups were aligned with the data reported during the initial surveys where students indicated that they learn most from media use, group work, and team projects,

Interpretation

Overwhelmingly, students reported learning most from group work, individual projects and teacher-led discussions. What they reported learning the most from did not align with the activities they reported enjoying most. In terms of enjoyment, students rated mediated instruction, group work and group projects the highest.

What is also interesting is that students are not perceiving that they learn best in the current classroom environment. While last year, teachers and students were more well-aligned with their perceptions of the environment and best practices for teaching and learning, this was not the case this year. While teachers have given indications that things need to change, they have not yet moved in this direction.

Next Steps

The data indicates that students are ready for a new approach to teaching and learning. Given that the teachers are beginning to talk about a need for change themselves, it may prove to be a good time to begin a transition into a more learner-centered environment. Careful implementation will be critical in making this transition. As with the first year, the students' interest in mediated instruction (non-human) may prove to be the factor that makes the transition into a technology-integrated learning environment easier.

...the need for [critical thinking] will surely expand. Indeed, the development and identification of this characteristic could become the central focus of education.

– Helmstadter, 1985
(quoted in McDaniel & Lawrence, 1990)

UPPER SCHOOL TEACHERS: VIEWS ON TEACHING AND LEARNING

Introduction

This theme incorporates many areas associated with teaching and learning: how teachers structure their courses, teacher satisfaction with student performance, views of teacher and student roles in the process, and perceptions of their satisfaction with the teaching process.

Data

One primary source of data was used for this category: initial surveys completed prior to or just after receiving the laptops.

All upper school teachers stated that they enjoy teaching (86% *strongly agree*) and that they welcome innovations (42% *strongly agree*, 50% *agree*). A high percentage also claimed to organize their courses to accomplish outcomes (42% *strongly agree*, 44% *agree*), as well as to suit their instruction to the students' needs (39% *strongly agree*, 31% *agree*).

The two items that asked for the teachers' preferences concerning giving students choice in what they do, and directing most student work, respectively, produced many neutral reactions (30% / 22% *neutral*). A majority of the teachers *agree* with the statement that they were pleased with the standard of work accomplished by their students (64%). On average, the teachers *agree* that they encourage students to help each other with schoolwork, that they prefer students to take responsibility for their own learning, and that students seem to enjoy learning.

Data related to general views on teaching and learning are summarized in Table 16.

Table 16. Upper school teachers general views on teaching and learning

Upper School Teachers' Views on Teaching & Learning					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I enjoy teaching.	0	0	2.9	8.6	88.6
2. I generally welcome innovations.	0	2.9	2.9	51.4	42.9
3. I organize my course primarily to accomplish the outcomes.	0	2.9	8.6	45.7	42.9
4. I organize my course primarily to suit my students' needs.	0	0	26.5	32.4	41.2
5. I prefer to give students choice in what they do.	0	17.6	32.4	38.2	11.8
6. I prefer directing most student work.	0	5.9	23.5	67.6	2.9
7. I am pleased with the standard of work produced by my students	0	0	14.3	65.7	20
8. I encourage students to help each other with school work.	0	0	13.9	30.6	55.6
9. I prefer students to take responsibility for their own learning.	0	2.8	2.8	38.9	55.6
10. Most of my students seem to enjoy learning.	0	0	8.6	68.6	22.9

Interpretation

Overall, the upper school teachers enjoy teaching. They also welcome innovation in the classroom. These two factors will be very important to the success of the laptop initiative.

Another item of interest to the laptop initiative is the teachers' orientation to outcomes and students. Similar to the middle school teachers during the last academic year (1999-2000), these are both closely aligned in the survey results. This could indicate that while the teachers are very focused on meeting outcomes, they are also equally interested in their students' needs, and how well the outcomes are accomplished on an individual basis.

The teachers apparently perceive that their role in the classroom is also of special import to the laptop initiative. Whether teachers perceive how much their roles may have to change is doubtful. Many teachers stated that a primary role for them was that of lecturer, with whole class instruction dominating. Sixty percent of the teachers reported that whole class instruction *almost always* or *often* happens. Teacher-led discussions and teacher demonstrations *often* or *almost always* occur. Again, this is very similar to what the middle school teachers reported during their initial survey last year.

Next Steps

There would appear to be some conflict in terms of what teachers would like to see happen with students in the classroom (i.e., taking on more responsibility) and their role in the classroom (i.e., that of lecturer and directing student learning). Research indicates that in order for students to take on responsibility for learning, they need to be given ownership over their learning. While the role of lecturer may not mitigate this move, other roles (e.g., coach, mentor) will help promote and strengthen it. Providing teachers with incentives for adopting new roles, as well as providing guidance in making the transitions, will be important for the successful change. The integration of ubiquitous computing is predicted to shift classrooms from teacher-centered to student-centered; we are already seeing indications of this happening in the middle school. Working to leverage this as much as possible in the upper school during the next year may help this trend move forward even faster with the 9th and 10th grades.

Even with adequate training, many teachers find technology threatening, at the very least.... Ignoring... teacher issues usually results in resistance and may well end or curtail a school's use of technology before it really has a chance to begin.

*-Linda Reksten,
Using Technology to Increase
Student Learning,
p. 9*

UPPER SCHOOL TEACHERS: ATTITUDES TOWARD USING COMPUTERS FOR TEACHING

Introduction

This theme captures information concerning upper school teachers' attitudes toward using computers for teaching as well as specifics on the laptop program.

Data

Two primary sources of data were used to inform the information contained in this category: focus group interviews and initial surveys completed prior to or just after receiving the laptops.

All of the teachers indicated that they are enthusiastic about the laptop program (84% *strongly agree* or *agree*) and expect that their teaching will benefit from laptop use (80% *strongly agree* or *agree*). The teachers' enthusiasm for the project was also evident in the focus group interviews. The teachers commented on the excitement of the program, and the high level of support they were receiving, especially in terms of training. Overall, they are generally confident regarding their computer use (25% *strongly agree*, 42% *agree*).

In terms of the need to learn new skills, 64% of the teachers indicate that they *agree* or *strongly agree* that they will need new skills. Several suggestions were offered during the focus group interviews. One primary suggestion was that they need step-by-step instructions. Teachers also indicated that they would like to have time to practice after learning the skills. Learning by doing was mentioned during the interviews as the best way to learn the skills that would be required to successfully integrate the laptops into the classroom.

A majority indicated that computer use will essentially change their teaching (60% *agree* or *strongly agree*), although 17% *disagreed* with this item. Table 17 provides an overview of the data from the initial surveys.

Table 17. Upper school teachers' views on computers use for teaching

Upper School Teachers' Views on Computer Use for Teaching					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I feel enthusiastic about the laptop program.	0	5.7	8.6	28.6	57.1
2. I expect my teaching to benefit from laptop use.	0	8.8	5.9	38.2	47.1
3. I feel confident about my ability with computers.	2.9	11.8	14.7	44.1	26.5
4. I need to learn many new skills before I can use computers for teaching.	0	25.7	8.6	31.4	34.3
5. Computer use will essentially change my teaching.	0	17.6	23.5	29.4	29.7

During the focus group interviews, many of the teachers indicated that they felt like it would and should change what they are doing in the classroom. Several teachers stated that the classroom would change as a result of the technology, and in ways that were perceived as positive. For example, when the teachers were asked about the benefits of the students having laptops, the teachers responded that they thought it would assist with communication and increase access to resources.

The teachers also described several challenges associated with the technology. Many teachers mentioned a concern with equipment challenges and that it might not be good to use in all areas. Teachers also mentioned that finding ways to manage the students with the laptops would also be a challenge.

Interpretation

The majority of upper school teachers hold positive attitudes toward the laptop initiative and generally appear to be optimistic toward their own ability with computers. While they do perceive challenges with the use of laptops, they also perceive many positive benefits, both for themselves and for their students.

Next Steps

Overall, these teachers are expressing very positive views on the use of computers for teaching. This will be a great benefit for the laptop initiative. In order to maintain this positive attitude, it will be important to provide a lot of support and guidance to the teachers as they move further toward the seamless integration of the technology into their classrooms. Collaborations and discussions with middle school teachers could allay apprehensions and provide models for upper school teachers from which to springboard. This may move upper school teachers more quickly through the learning curves of managing and integrating laptops in their classrooms.

While legislators often expect to see a direct correlation between the amount of money spent on computers and students' scores on standardized achievement tests, we have observed that there is an intervening variable – teacher behavior. Effective use of technology requires improvements in teaching. It's the combined effect of effective teaching and pedagogically sound technologies that lead to improvements in learning.

– SEIR*TEC
(<http://www.serve.org/seir-tec/publications/lessondoc.html>)

UPPER SCHOOL TEACHERS: THE TEACHING AND LEARNING ENVIRONMENT

Introduction

This theme captures upper school teachers' attitudes toward the teaching process and how they create their learning environment. This includes teaching methods, activities, and how laptops are used in the classroom.

Data

One source of data was used for this category: initial surveys completed prior to or just after receiving laptops.

Whole class instruction is the method used most in the learning environment (61% *often* or *always*) with teachers leading the discussion in class (53% *often* or *always*) or leading demonstrations (55% *often* or *always*). Teacher prepared activities are used more often than student prepared activities (75% *often* or *sometimes*). Group work and group projects are used less often (69% report *often* or *sometimes* using group work; 47% report that group projects are *sometimes* used). A summary of the data is presented in Table 18.

Table 18. Upper school teachers' views on teaching & learning environment

Upper School Teachers' Views on Teaching & Learning Environment					
Frequency in Percent					
	Never	Rarely	Sometimes	Often	Almost Always
1. Whole class instruction.	6.1	6.4	21.2	42.4	24.2
2. Textbook work.	12.5	18.8	31.3	34.4	3.1
3. Teacher prepared activity.	3	9.1	36.4	45.5	6.1
4. Student prepared activity.	9.1	36.4	48.5	6.1	0
5. Group work.	6.1	18.2	36.4	39.4	0
6. Group projects.	15.6	21.9	53.1	9.4	0
7. Individual projects.	6.1	6.1	57.6	27.3	3
8. Teacher led class discussions.	0	9.1	33.3	57.6	0
9. Teacher demonstrations.	0	15.6	21.9	53.1	9.4

Interpretation

Teacher prepared activities are more frequently used than student prepared activities or textbook work, and individual projects are more frequent than group work or group projects. This implies that teacher-led activities are generally more common and when student prepared activities occur, they are usually accompanied and organized by teacher instructions.

Next Steps

To realize the full benefits of technology integration, a variety of teaching methods and learning techniques will need to be implemented. As discussed in the results for the middle school teachers, teacher demonstrations and whole-class instruction are certainly effective in traditional classrooms. Yet other models of teaching and learning have proven effective in technology-enhanced learning environments. Providing support to teachers as they learn these new methods and techniques will greatly assist with their implementation and adoption. It is important to remember that any changes that are undertaken will be scrutinized very carefully with respect to their effects on student achievement on measures such as the SAT and AP tests.

Among the plethora of issues facing teachers and designers of educational tools and environments are the following two questions:

1. How can we engage and motivate students so that they are willing to attempt to learn?

2. How can we ensure that what is learned during the educational interaction can be applied effectively outside that context?

– Benedict du Boulay, 2000

STUDENTS RECEIVING LAPTOPS, 2001-2002: COMPUTER USE AND EXPERTISE

Introduction

This theme relates to where the learners who will be receiving laptops in the fall of the third year are using computers, the activities in which they are engaged with computers, and their perceptions of their own expertise with using computers.

Data

One primary source of data was used to inform this area: an initial survey given prior to the students receiving the laptops. To help further delineate the data, the information will be presented in three categories: Computer Use at School, Computer Use at Home, and Expertise with Computer Applications

Computer Use at School. All of the students report that they have access to a computer at school. Individual access (97% of the 9th graders; 95% of the 10th graders) and access to a computer as a whole class (46% of the 9th graders; 63% of the 10th grade seem to be more common than using it in a small group setting or in pairs. For the 6th graders, access seems to occur mainly as a class (78%), with use focused on the individual level (54%).

Concerning the frequency of use, the students report that computers are used at school almost daily during a school year, but the percentages are small. For example, 46% of the 6th graders report almost daily use, while the percentages fall at 44% and 27% for 9th and 10th graders respectively. As a comparison, 72% of the 7th and 8th grade students with laptops reported almost daily use.

Internet applications are the most frequently used programs, followed by information seeking, and word processing. Games and school work were also reported as uses for the computers. These applications are, on average, used on a daily or almost daily basis, with school work completed on a weekly basis (see Tables 19, 20 and 21 for an overview of the data).

Table 19. Applications used by 6th graders

6th Grade Frequency of Use with Computer Applications					
Frequency in Percent					
	Never	Once or Twice a Year	Monthly	Weekly	Almost Daily
1. Play games	0	6.8	20.3	39.0	33.9
2. Do schoolwork	3.4	6.8	40.7	33.9	15.3
3. Word processing	0	3.4	20.3	40.7	35.6
4. Spreadsheets	63.8	15.5	15.5	5.2	0
5. Presentation	25.9	43.1	25.9	3.4	1.7
6. Multimedia & Webpages	56.9	22.4	19.0	1.7	0
7. Internet	0	0	15.3	27.1	57.6
8. Search for information on Web	0	3.4	43.1	32.8	20.7
9. Email	10.2	1.7	18.6	25.4	44.1
10. Tutorials/drill & practice	45.8	39.0	13.6	1.7	0
11. Graphics	24.6	36.8	15.8	17.5	5.3

Table 20. Applications used by 9th graders

9th Grade Frequency of Use with Computer Applications					
Frequency in Percent					
	Never	Once or Twice a Year	Monthly	Weekly	Almost Daily
1. Play games	2.9	7.2	33.3	34.8	21.7
2. Do schoolwork	0	0	8.6	61.4	30.0
3. Word processing	0	2.9	24.3	52.9	20.0
4. Spreadsheets	20.0	58.6	17.1	2.9	1.4
5. Presentation	10.0	80.0	8.6	1.4	0
6. Multimedia & Webpages	47.8	39.1	8.7	4.3	0
7. Internet	0	0	0	12.9	87.1
8. Search for information on Web	0	0	5.7	40.0	54.3
9. Email	1.4	0	10.0	21.4	67.1
10. Tutorials/drill & practice	64.3	22.9	4.3	8.6	0
11. Graphics	21.4	32.9	14.3	20.0	11.4

Table 21. Applications used by 10th graders

10th Grade Frequency of Use with Computer Applications					
Frequency in Percent					
	Never	Once or Twice a Year	Monthly	Weekly	Almost Daily
1. Play games	5.9	10.3	32.4	32.4	19.1
2. Do schoolwork	0	2.9	32.4	44.1	20.6
3. Word processing	1.5	5.9	33.8	44.1	14.7
4. Spreadsheets	32.8	50.7	13.4	1.5	1.5
5. Presentation	23.9	65.7	10.4	0	0
6. Multimedia & Webpages	58.8	27.9	5.9	5.9	1.5
7. Internet	0	0	7.4	22.1	70.6
8. Search for information on Web	0	1.5	17.6	30.9	50.0
9. Email	5.9	5.9	16.2	22.1	50.0
10. Tutorials/drill & practice	61.8	23.5	10.3	2.9	1.5
11. Graphics	32.8	26.9	20.9	10.4	9.0

Computer Use at Home. The vast majority of the students in all three grade levels report that their family has a computer at home, and on average they report to be using it almost daily (54% - 6th graders; 87% - 9th graders; 68% - 10th graders). The average time that the family has had a computer at home is 6 years across the three grades, but variance is high, and the values range between no years of having a computer at home and 16 years with a computer at home.

Expertise with Computer Applications. The students rated their own ability with computer applications on a five-point scale: ‘I always need help’ (1), ‘I sometimes need help’ (2), ‘I rarely need help’ (3), ‘I never need help’ (4), ‘I can help other people. I am an expert’ (5). Tables 22 - 24 show the average ratings for eleven applications for 6th, 9th, and 10th graders respectively.

Table 22. 6th graders expertise with applications

6th Grade Expertise with Computer Applications					
Frequency in Percent					
	I always need help.	I sometimes need help	I rarely need help.	I never need help.	I can help other. I am an expert.
1. Games	0	6.9	41.4	25.9	25.9
2. Word processing	0	8.9	35.7	28.6	26.8
3. Spreadsheets	33.3	19.4	33.3	8.3	5.6
4. Presentations	10.5	28.9	36.8	15.8	8.1
5. Programming	43.2	27	16.2	15.4	8.1
6. Databases	59.4	25	15	0	0
7. Multimedia & Webpages	35	27.5	15	12.5	10
8. Internet	1.7	10.2	22	28.8	37.3
9. Email	1.9	7.7	21.2	30.8	38.5
10. Tutorials/drill & practice	11.4	18.2	29.5	31.8	9.1
11. Graphics & pictures	12.8	34	21.3	23.4	8.5

Table 23. 9th graders expertise with applications

9th Grade Expertise with Computer Applications					
Frequency in Percent					
	I always need help.	I sometimes need help	I rarely need help.	I never need help.	I can help other. I am an expert.
1. Games	1.4	7.1	38.6	32.9	20
2. Word processing	0	7.2	26.1	42	24.6
3. Spreadsheets	4.7	35.9	35.9	17.2	6.3
4. Presentations	8.8	36.8	33.8	11.8	8.8
5. Programming	63.3	25	5	3.3	3.3
6. Databases	55.6	27	11.1	7.8	1.6
7. Multimedia & Webpages	44.3	24.6	18	11.5	1.6
8. Internet	2.9	7.1	14.3	48.6	27.1
9. Email	0	0	16.2	47.1	36.8
10. Tutorials/drill & practice	15.3	23.7	35.6	20.3	5.1
11. Graphics & pictures	10.8	40	24.6	16.9	7.7

Table 24. 10th graders expertise with applications

10th Grade Expertise with Computer Applications					
Frequency in Percent					
	I always need help.	I sometimes need help	I rarely need help.	I never need help.	I can help other. I am an expert.
1. Games	0	10.4	23.9	52.2	13.4
2. Word processing	1.5	5.9	23.5	42.6	26.5
3. Spreadsheets	17.2	34.4	32.3	14.1	3.2
4. Presentations	24.2	36.4	19.7	12.1	7.6
5. Programming	74.6	16.9	5.1	1.7	1.7
6. Databases	67.8	23.7	5.1	1.7	1.7
7. Multimedia & Webpages	53.3	23.3	8.3	11.7	3.3
8. Internet	3	7.6	10.6	39.4	39.4
9. Email	0	5.9	7.4	10.6	39.4
10. Tutorials/drill & practice	33.3	20.6	27	12.7	6.3
11. Graphics & pictures	29.2	23.1	15.4	16.9	15.4

Overall, the top applications reported as "I can help others" included the Internet and e-mail. Students in the 9th and 10th grade also reported a high level of proficiency with word processing.

Interpretation and Next Steps

Computer Use at School and Home. Students have considerable experience with using computers, both at school and at home. Furthermore, they have been using the technology for several years. This will serve as a good foundation for the increased use possible with laptops.

Expertise with Computer Applications. Overall, students are reporting a high level of use and expertise with Internet-based applications and word processing programs. This experience will also serve as a good foundation from which to build after the students receive their laptops.

The question is, What kind of public does schooling create? A conglomerate of self-indulgent consumers? Angry, soulless, directionless masses? Indifferent, confused citizens? Or a public imbued with confidence, a sense of purpose, a respect for learning, and tolerance? The answer to this question has nothing whatever to do with computers, with testing, with teacher accountability, with class size, and with the other details of managing schools. The right answer depends on two things alone: the existence of shared narratives and the capacity of such narratives to provide an inspired reason for schooling.

– Neil Postman,
The End of Education, 1995

STUDENTS RECEIVING LAPTOPS, 2001-2002: ATTITUDES TOWARD SCHOOL AND USING COMPUTERS FOR LEARNING

Introduction

This theme examines four aspects of attitudes toward computers and school for the students who will receive laptops in the fall of 2001: (1) attitudes toward school and schoolwork in general, (2) attitudes toward using computers for schoolwork and learning, (3) interest in computers and perceived relevance of computer ability, (4) and the confidence a student holds about his or her own computer skills.

Data

One primary source of data was used to inform this area: an initial survey given prior to the students receiving the laptops.

Overall, students have a positive attitude toward going to class, although this attitude shifts as the students get older. In 6th grade, only 27% reported that they do not enjoy going to class, while in 9th grade 61% reported not enjoying going to class and in 10th grade 56% reported not enjoying going to class. A similar trend was indicated with the response to the question of enjoying school work, with 46% of the 6th graders, 76% of the 9th graders and 80% of the 10th graders reporting they do not enjoy school work (see Tables 25 - 27 for additional details by grade).

Table 25. 6th graders attitude toward computers and school

6th Grade Attitudes Toward Computers & School					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Computers make schoolwork easier to do.	0	0	37.9	37.9	24.1
2. I prefer to use my computer to do schoolwork instead of using paper and pencil.	1.8	15.8	29.8	29.8	22.8
3. Using computers for schoolwork can also have disadvantages.	1.7	6.9	20.7	63.8	6.9
4. I look forward to attending school	20.7	24.1	27.6	22.4	5.2
5. Computers make schoolwork more fun and interesting.	0	7.1	39.3	41.1	12.5
6. Computers help me improve the quality of my schoolwork.	0	7.0	36.8	35.1	21.1
7. Computers are helping me understand classes	0	25.0	57.1	14.3	3.6
8. I look forward to the beginning of use laptop in class	0	3.4	15.5	24.1	56.9
9. I need to learn many new skills to use computer for my schoolwork.	17.2	34.5	31.0	15.5	1.7
10. I generally enjoy schoolwork.	27.6	29.3	22.4	17.2	3.4
11. I enjoy being in class	7.0	26.3	56.1	8.8	1.8
12. Many of my classmates know more about computers than I do.	12.3	26.3	38.6	15.8	7.0
13. I want to learn more about computers.	0	8.6	19.0	53.4	19.0
14. I am currently trying to learn more about computers.	0	24.1	22.4	43.1	10.3
15. I would be equally prepared to enter college without the laptop program.	6.9	25.9	46.6	15.5	5.2
16. Having my laptop in class is an advantage when it comes to learning.	0	8.6	41.4	27.6	22.4
17. I think my ability with computers will affect the grades I get.	5.2	13.8	44.8	31.0	5.2

Table 26. 9th graders attitude toward computers and school

9th Grade Attitudes Toward Computers & School					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Computers make schoolwork easier to do.	1.4	5.7	14.3	42.9	35.7
2. I prefer to use my computer to do schoolwork instead of using paper and pencil.	7.1	12.9	35.7	18.6	25.7
3. Using computers for schoolwork can also have disadvantages.	4.4	4.4	14.7	61.8	14.7
4. I look forward to attending school	35.7	17.1	30.0	15.7	1.4
5. Computers make schoolwork more fun and interesting.	1.4	12.9	41.1	31.4	12.9
6. Computers help me improve the quality of my schoolwork.	0	5.7	37.1	41.4	15.7
7. Computers are helping me understand classes	7.2	15.9	53.6	14.5	8.7
8. I look forward to the beginning of use laptop in class	8.6	10.0	18.6	31.4	31.4
9. I need to learn many new skills to use computer for my schoolwork.	18.6	28.6	31.4	15.7	5.7
10. I generally enjoy schoolwork.	45.7	30.0	18.6	5.7	0
11. I enjoy being in class	27.1	34.3	31.4	5.7	1.4
12. Many of my classmates know more about computers than I do.	11.4	30.0	30.0	17.1	11.4
13. I want to learn more about computers.	1.4	8.6	30.0	42.9	17.1
14. I am currently trying to learn more about computers.	2.9	20.3	24.6	34.8	17.4
15. I would be equally prepared to enter college without the laptop program.	7.1	25.7	31.4	30.0	5.7
16. Having my laptop in class is an advantage when it comes to learning.	0	7.1	38.6	38.6	15.7
17. I think my ability with computers will affect the grades I get.	2.9	10.0	42.9	32.9	11.4

Table 27. 10th graders attitude toward computers and school

10th Grade Attitudes Toward Computers & School					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Computers make schoolwork easier to do.	4.4	5.9	32.4	48.5	8.8
2. I prefer to use my computer to do schoolwork instead of using paper and pencil.	11.8	32.4	32.4	14.7	8.8
3. Using computers for schoolwork can also have disadvantages.	3.0	3.0	17.9	50.7	25.4
4. I look forward to attending school	44.1	19.1	32.4	4.4	0
5. Computers make schoolwork more fun and interesting.	8.8	23.5	39.7	23.5	4.4
6. Computers help me improve the quality of my schoolwork.	2.9	11.8	39.7	36.8	8.8
7. Computers are helping me understand classes	4.4	22.1	60.3	8.8	4.4
8. I look forward to the beginning of use laptop in class	13.2	25.0	25.0	25.0	11.8
9. I need to learn many new skills to use computer for my schoolwork.	20.6	17.6	20.6	30.9	10.3
10.I generally enjoy schoolwork.	39.7	39.7	14.7	5.9	0
11.I enjoy being in class	29.4	26.5	33.8	8.8	1.5
12.Many of my classmates know more about computers than I do.	11.8	19.1	35.3	23.5	10.3
13.I want to learn more about computers.	10.3	7.4	38.2	35.3	8.8
14.I am currently trying to learn more about computers.	11.8	11.8	44.1	29.4	2.9
15.I would be equally prepared to enter college without the laptop program.	5.9	23.5	29.4	27.9	13.2
16.Having my laptop in class is an advantage when it comes to learning.	5.9	13.2	47.1	26.5	7.4
17.I think my ability with computers will affect the grades I get.	10.3	14.7	44.1	25.0	5.9

When it comes to using computers for schoolwork and learning, most of the students have very positive attitudes. For example, half or more of the students in each grade perceive that computers make their work easier (50% - 6th graders; 79% - 9th graders; 58% - 10th graders) and the vast majority do not see disadvantages with the use of computers (57% - 6th graders; 74% - 9th graders; 75% - 10th graders). A high percentage of the learners in 6th and 9th grades report a preference for using computers (42% - 6th graders; 45% - 9th graders) and are looking forward to using it in class (48% - 6th graders; 62% - 9th graders). An exception to this trend was seen in the 10th grade where 24% reported a preference for using computers while 32% disagreed. Similarly, 37% of the 10th graders reported that they were looking forward to using it in class, but 25% disagreed (see Tables 28 - 30 for grade details).

Table 28. 6th graders attitude toward using laptops

6th Grade Attitudes Toward Using Laptops					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Computers make school work easier to do.	0	0	37.9	37.9	24.14
2. Using computers for school work can also have disadvantages.	1.7	6.9	20.7	63.8	6.9
3. I prefer to use computers to do school work instead of pencil and paper.	1.8	15.8	29.8	29.8	22.8
4. I look forward to the beginning of laptop use in my classes.	0	3.4	15.5	24.1	56.9

Table 29. 9th graders attitude toward using laptops

9th Grade Attitudes Toward Using Laptops					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Computers make school work easier to do.	1.4	5.7	14.3	42.9	35.7
2. Using computers for school work can also have disadvantages.	4.4	4.4	14.7	61.8	14.7
3. I prefer to use computers to do school work instead of pencil and paper.	7	12.9	35.7	18.6	25.7
4. I look forward to the beginning of laptop use in my classes.	8.6	10	18.6	31.4	31.4

Table 30. 10th graders attitude toward using laptops

10th Grade Attitudes Toward Using Laptops					
Frequency in Percent					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Computers make school work easier to do.	4.4	5.9	32.4	48.5	8.8
2. Using computers for school work can also have disadvantages.	3	3	17.39	50.7	25.4
3. I prefer to use computers to do school work instead of pencil and paper.	11.8	32.4	32.4	14.7	8.8
4. I look forward to the beginning of laptop use in my classes.	20.6	17.6	20.6	30.9	10.3

In terms of relevance of computer ability, a low percentage reported that they feel they are just as well prepared without the computer (27% - 6th graders; 33% - 9th graders; 30% - 10th graders). Trends were similar in terms of interest with computers. The majority of the learners in 6th and 9th grades reported that they want to learn more about computers (58% - 6th graders; 60% - 9th graders). Only 43% of the 10th graders reported wanting to know more about computers.

Interpretation

Overall attitudes appear to be optimistic and students seem to have a positive attitude toward the use of laptops in the learning process. However, it is important to note that there were many neutral responses to the questions related to benefits and challenges with computers. This trend was also seen in the initial surveys with the 7th and 8th graders. As students get more experience with the laptops, their responses are likely to become more definitive.

Next Steps

Since the students have a somewhat positive attitude toward schoolwork and a generally positive attitude toward computer use, teachers have the opportunity to take advantage of this attitude and potentially use the laptops to help students develop a more positive outlook on the use of the laptops in the formal teaching and learning process. Of course, this will depend primarily on how the new laptops will be used. If they are used as adjunct components that students and teachers see as apart from the normal processes of schooling, student attitudes toward them will likely be more negative than positive. Alternatively, if they become essential tools and seamless parts of the learning environment, attitudes are much more likely to be positive.

Significant trends over the past 15 or 20 years?the rising interest in—and power of "non-school schooling." The Internet is the most powerful example of this phenomenon, with all its glitter, coarseness, and nonsense. Teaching today is different because of the Internet. Its effects are just coming into focus, from the moral—it is easy to steal a passable research paper off the Internet—to the fascinating-kids can communicate with people across the globe.

– Ted Sizer,
*education @ the century's
 end, 1999,
 Teacher Magazine,
 (<http://www.edweek.org/tm/tmstory.cfm?slug=03cent.h11&keywords=technology>)*

STUDENTS RECEIVING LAPTOPS, 2001-2002: THE LEARNING ENVIRONMENT

Introduction

This theme examines the perceptions of various activities during a school day as well as preferred teaching and learning methods held by students who will receive laptops at the beginning of year three.

Data

One primary source of data was used to inform this area: an initial survey given prior to the students receiving the laptops. The data is divided into two main categories: Overall Perceptions of the Learning Environment and Learning Environment Preferences (see Tables 31 - 33 for an overall summary of learning environment data by grade level).

Table 31. 6th graders perceptions of the learning environment

6th Grade Perceptions of Learning Environment					
Frequency in Percent					
	Never	Rarely	Sometimes	Often	Almost Always
1. Teacher instruction/ demonstrations.	0	15.3	11.9	35.6	37.3
2. Students work from textbooks.	0	6.8	30.5	44.1	18.6
3. Teacher prepared activities.	1.7	0	16.9	35.6	45.8
4. Group work.	0	8.5	55.9	30.5	5.0
5. Individual projects.	0	5.2	48.3	41.4	5.2
6. Group projects.	0	8.5	55.9	30.5	5.1
7. Teacher-led class discussion.	0	1.7	25.9	39.7	32.8
8. Media use (videos, tapes)	0	3.4	20.3	57.6	18.6
9. Student presentations of individual or group projects.	1.8	20.0	49.1	20.0	9.1
10. Go beyond classroom information at home.	5.1	42.4	42.4	8.5	1.7

Table 32. 9th graders perceptions of the learning environment

9th Grade Perceptions of Learning Environment					
Frequency in Percent					
	Never	Rarely	Sometimes	Often	Almost Always
1. Teacher instruction/ demonstrations.	0	1.4	10	28.6	60
2. Students work from textbooks.	0	4.3	30.4	46.4	18.8
3. Teacher prepared activities.	0	4.3	30.4	46.4	18.8
4. Group work.	2.9	27.1	54.3	14.3	1.4
5. Individual projects.	0	2.9	45.7	44.3	7.1
6. Group projects.	2.9	27.1	54.3	14.3	1.4
7. Teacher-led class discussion.	0	1.4	10.4	36.2	52.2
8. Media use (videos, tapes)	0	10	41.4	40	8.6
9. Student presentations of individual or group projects.	2.9	30.0	44.3	18.6	4.3
10. Go beyond classroom information at home.	24.6	44.9	23.2	7.2	0

Table 33. 10th graders perceptions of the learning environment

10th Grade Perceptions of Learning Environment					
Frequency in Percent					
	Never	Rarely	Sometimes	Often	Almost Always
1. Teacher instruction/ demonstrations.	0	4.5	10.4	31.3	53.7
2. Students work from textbooks.	0	6.0	10.4	40.3	43.3
3. Teacher prepared activities.	0	1.5	28.4	44.8	25.4
4. Group work.	0	11.9	59.7	26.9	1.5
5. Individual projects.	0	6	32.8	50.7	10.4
6. Group projects.	6.0	32.8	43.3	14.9	3.0
7. Teacher-led class discussion.	0	1.5	14.9	28.4	55.2
8. Media use (videos, tapes)	0	26.9	41.8	26.9	4.5
9. Student presentations of individual or group projects.	0	13.6	59.1	18.2	9.1
10. Go beyond classroom information at home.	31.3	34.3	22.4	7.5	4.5

Overall Perceptions of the Learning Environment. The 6th, 9th and 10th grade students report a similar perception of the learning environment as that of the 7th and 8th grade students. 60% of the 6th graders, 80% of the 9th graders, and 84% of the 10th graders report learning primarily through teacher instruction and teacher demonstrations. The teacher is also at the center when it comes to the discussions, with 58% of the 6th graders, 87% of the 9th graders, and 82% of the 10th graders reporting that the discussions are teacher-led.

A similar trend is seen when looking at activities engaged by the students. 67% of the 6th graders, 65% of the 9th graders, and 69% of the 10th graders reported completing teacher-created activities. Many of these activities are completed on an individual basis, with percentages increasing with higher grades (37% - 6th graders; 51% - 9th graders; 60% - 10th graders). Students in all three grades reported that group work is completed some times (29% - 6th graders; 15% 9th graders; 29% - 10th graders). When discussions are held or activities are completed, media is *often* or *almost always* used. However, like the trends with individual activities, this percentage decrease as the grade-level increases (62% - 6th graders; 49% - 9th graders; 31% - 10th graders).

Learning Environment Preferences. In terms of learning environment preferences, trends with 6th, 9th and 10th grade students are similar to what they were for the 7th and 8th grade students at the beginning of the year. The 6th graders reported learning most from the teacher and group work. Both the 9th and 10th graders reported learning most from the teacher and teacher led discussions.

Reports from 6th, 9th and 10th grade students regarding how they enjoy learning were aligned with how the 7th and 8th graders reported they enjoy learning, both at the beginning and the end of the year. The 6th graders reported that they enjoy learning from group work, media use, and group projects. The 9th and 10th graders reported that they enjoy learning from media use, group projects, and group work.

Interpretation

Overwhelmingly, students reported learning most from teacher demonstration and class discussion. Group work also rated high. On the low end, students reported learning least from individual projects and student presentations.

What they reported learning the most from did not align with the activities they reported enjoying most. In terms of enjoyment, students rated group related activities and mediated instruction the highest. On the low end were learning from textbooks, individual projects, and teacher demonstration.

Next Steps

Given the students' positive attitude toward teacher-directed instruction, they may find moving to a more student-centered approach challenging. As was cautioned last year, careful implementation will be critical in making this transition. The students' interest in mediated instruction (non-human) is of particular interest and may prove to be the factor that makes the transition into a technology-integrated learning environment easier. The effects of ubiquitous Internet access in the upper school will be especially important to track. As noted in the opening quote for this section, those effects can range from very good to deplorable.

At the dawn of the 21st century, we are still at the beginnings of a technological revolution that is bringing dramatic changes to our society. This technological revolution will not automatically translate into a similar revolution in teaching and learning. While we have learned a tremendous amount about the implementation and use of technologies for teaching and learning in the past few years, the need for an expanded, ongoing national research and evaluation program to improve the next generation of technology applications for teaching and learning is profound.

*– US Department of
Education, e-Learning
([http://www.ed.gov/
Technology/elearning/](http://www.ed.gov/Technology/elearning/))*

OVERALL CONCLUSIONS & NEXT STEPS

The third year of the study began in August 2001, and once again the year will be filled with many activities. We will continue to work closely with the Athens Academy laptop participants both in terms of gathering data, and in working to make the initiative run smoothly toward success.

Some specific indicators for Next Steps may be generated based on overall trends within groups. Key points are highlighted below by group.

Our overall conclusions can be characterized as cautiously optimistic. Although we have seen only modest changes in teaching and learning activities and have been able to detect few effects in terms of achievement and performance (with the notable exception of *Information Age Skills*), we found generally positive attitudes toward the entire initiative among both students and teachers. We believe that these positive attitudes will provide a strong foundation for more obvious shifts in teaching and learning practices and eventual impact on diverse areas of achievement and performance.

TEACHERS

Middle School

1. Continue to want students to take responsibility, but are not empowering them to do so
2. Increased communication, especially amongst themselves
3. Primarily using the tool for productivity and management-related activities
4. Looking forward to this year – expect it to be easier
5. Needs: more time and ideas
6. Expressing a need to change what they are doing (end of year)

Upper School

1. Want students to take responsibility
2. Alignment with US teachers/US students in terms of view of learning environment
3. Looking forward to having the technology in the classroom
4. Expressing that the technology will create the need to change
5. Want/need ideas for how to use in the classroom – beyond how-to's

LEARNERS

Middle School

1. Indicate that they feel like they learn more from group work, group activities and media
2. Doing more with Internet/Web – primarily e-mail, finding resources. Also more with PowerPoint
3. Indicate that they want things to be different
4. Indicate that distractions are a challenge

Upper School

1. Higher baseline of skills than when 7th/8th started
2. Indicate that they feel like they learn more from teacher demonstration/instruction, class discussion and media
3. Excited about the laptops and looking forward to using them

POSITIVE TRENDS

There are also overall positive trends and challenges indicated in the second year data across groups. Access to laptops in the school has led to:

- ?? Increased communication – especially teacher to teacher
- ?? More convenient access to resources
- ?? Increased use of resources
- ?? Enhanced computer literacy skills – especially the teachers (not as dramatic with the students)
- ?? Equalized playing field – students reporting that "peers do not know more than me."

CHALLENGES INDICATED

There are some areas that appear to be creating challenges for teachers and students that need to be addressed. These include:

- ?? Logistics: the weight of the units, use of power cables in the classroom, and limited desk space appears to be creating issues for some teachers and students.
- ?? Technical challenges of wear and tear (and abuse in some instances) of the unit are creating challenges for teachers and students, as well as administrators and parents.
- ?? The invisibility of the laptops. Currently, the laptops are not invisible; that is, everyone is still very much aware of their presence in the classroom. To date, they remain outside the curriculum vs. integrated into it (i.e., there still is a *Time for Laptops*).

While there certainly are challenges that remain and others that will arise in the coming years, there are some examples of best practices that can be highlighted in the school. We have categorized these as best pedagogical practices and best information provision practices. The examples we include in this section are just a some of the best practices we observed. We have no doubt that there are many other examples of best practices that occur in the school everyday that we were not able to observe due to the constraints of data collection efforts.

EXAMPLES OF BEST PRACTICES

Pedagogical

We have a few examples of best pedagogical practices demonstrated to date. The first example is from 7th grade English. In this class after completing a unit on American poets, the teacher asked that each student gather information including photographs from the Web on each author (e.g., Robert Frost), focusing on the author's key work, background, family history, etc. The teacher then asked the students to create author flashcards with Microsoft's PowerPoint® application to facilitate studying for the unit test.

Another example comes from a 7th grade science classroom. Following a unit on genetics, the teacher found a way to get students involved in the content as well as critical thinking and analysis. The teacher posed four questions on cloning for his 7th grade science students. The students searched the Web to find the latest information on the topic, including ethical and scientific concerns to connect relevancy and content.

Examples of transitioning between previous pedagogical practice and new strategies to take advantage of the portable computing environment were also evident. In 8th grade science, the instructor migrated a former lecture on astronomy and the nine planets to student-led presentations. Students were divided into groups and collected scientific data and images from various resources on individual planets and celestial bodies. The students constructed PowerPoint presentations during class and at home to teach the class about their topic. Laptops were connected to a large-screen television as each group presented.

Another example of transitioning previous instruction comes from 7th grade History. To supplement a unit on the Depression, the teacher used a website that collected personal letters to Mrs. Eleanor Roosevelt. Prior to the laptops, she had printed out the letters and read them aloud to the class and then led a discussion. With the portable computing environment, all the students were able to view the website simultaneously and were able to read all the letters. She said the previous method was “not as effective as when all were on the site.” She plans to use the website again this year as well, because she felt the students seemed to enjoy the activity.

Information Sharing

We also have a few "best information sharing" practices to highlight. Teachers at all levels have indicated an increase in the level of electronic communication occurring on campus. Teachers reported that working with teammates and colleagues in general has been enhanced with the ease in communication brought about by e-mail. The 7th and 8th grade teachers also indicated an increase in the use of e-mail for communicating with parents and students. Certainly all of these forms of communication will help enhance the experience for everyone involved in the initiative.

Teachers also reported making use of the Web to post class pages to share information, again with colleagues, students and parents. Information on the teachers' Web sites include: homework assignments, notes from class, and information on grades. As with the increased communications, increased use of the Web for sharing resources and information will have a long-term positive impact on the initiative.

An example highlighting use of information technologies by students comes from 8th grade Geography. Students formed into six groups to finish a project to introduce African countries within one month. Following guidelines created by the teacher, each group used the laptop to retrieve information and images from the Web (Explorer) and created graphs of the data retrieved (Excel), Students then used Microsoft Word to produce posters of the information about the countries.

OVERALL RESEARCH QUESTIONS

Based on the collective data analysis and trends indicated in the data, we offer the following responses to the overall research questions.

Enhancing the Teaching and Learning Environment

1. Are there differences in roles/responsibilities that can be attributed to the ubiquitous computing environment?

There does not appear to be differences in roles/responsibilities in practice. However, both students and teachers are asking for changes.

2. Are there differences in the processes of learning that can be attributed to the ubiquitous computing environment?

It does appear that there are differences in the processes of learning that can be attributed to the laptops. The increased access to the Internet/Web has enabled an increase in use of resources in the classroom. There has also been an increase in presentations, both by teachers and students.

3. What are the affective implications of the ubiquitous computing environment?

While we do not have a lot of data that supports evidence of change in this area, we did find evidence of a leveling of the playing field. That is, there was an increase in the percentage of 7th and 8th graders at the end of the year who did not perceive that their peers knew more than they did. This was a significant change prior to receiving the laptops when many students indicated that they felt like their peers did know more than them.

Enhancing Achievement and Performance

1. How much is learned in English, History/Geography, Math, Science that can be attributed to the ubiquitous computing environment?

At the end of the second year, there was little or no evidence of quantitative differences in achievement and performance that could be directly attributed to the laptops.

Enhancing Key Qualifications for the Information Age

18. Are there differences in cognitive skills that can be attributed to the ubiquitous computing environment?

There is little or no evident that changes in cognitive skills were occurring as of the end of the second year.

2. Are there differences in media literacy skills that can be attributed to the ubiquitous computing environment?

Yes, there is some demonstration of this in the 7th and 8th grade. Students and teachers are thinking differently about how to use information sources for learning.

NEXT STEPS

The third year of the study began in August 2001, and once again the year will be filled with many activities. The timeline for Year Three is displayed in **Appendix F**.

We will continue to work closely with the Athens Academy laptop participants both in terms of gathering data, and in working to make the initiative run smoothly toward success.

Some specific indicators for Next Steps have been generated based on the overall findings in the study.

- ?? **Training and workshops** related to the laptops should be personalized to the curriculum in a just-in-time orientation.
- ?? Work on **integration** vs. use. Laptops should be a part of what is taught and not take over classroom activities.
- ?? **Time** is needed by teachers to help them with developing strategies to effectively integrate the technology into their classrooms as well as for other laptop-related activities: time to find resources, time to help the students with the technology, time to grade all the work, time to sit and chat with students/parents about the initiative, etc.
- ?? To date, more traditional, teacher-led activities and discussions have dominated the classrooms. However, students and teachers at various levels indicate a desire and/or need to change the structure in the classroom. Finding a way to assist teachers in identifying strategies and techniques to move toward a more learner-initiated/teacher-facilitated structure will help enable **change in the pedagogical practices** in the classroom.

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APPENDIX A: Teacher Questionnaires

APPENDIX B: Teacher Interview Protocols

APPENDIX C: Student Surveys

APPENDIX D: Student Interview Protocol

APPENDIX E: Usage Logs

APPENDIX F: Observation Protocol



APPENDIX G Year Three Timeline