How Does Computer Use Compare Between Laptop and Non-Laptop Teachers?

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Purpose of the Study

Smart Idea: Laptops for Teachers. Primary Teachers Get Laptops, Training. Governor Delivers First Laptop Computers to Michigan Teachers. Schools Unpacking Laptops. From Maine to Michigan to England to Australia, laptop computers are in the news. More and more schools are supplying their teachers with portable computers—computers that the teachers may use 24 hours a day, seven days a week if they choose; computers that teachers can take anywhere, anytime. Laptops carry a unit cost of $1,200 to $2,000, about twice the price of comparable desktop computers. Why are schools willing to spend their scarce resources on these expensive pieces of technology? What are the advantages of using laptops vs. desktops? How does computer use compare between laptop and non-laptop teachers?

My district has equipped 20 teachers and one administrator with laptop computers, using both grant and district funds. Fifteen of those teachers work in my building, the junior-senior high school. The teachers have used the laptops for five to eight months. The purpose of this study is to compare how the teachers with laptops use technology, both personally and professionally, as compared to the teachers without laptops. I hope to establish that teachers who are provided with laptops integrate technology more often and more effectively into their curricula, thus increasing student achievement. I also hope to use the data I collect to justify to my school board the purchase of laptop computers for all teachers in the district.

Review of the Literature

Benefits of Laptop Computers for Elementary Teachers

The Clark County, Nevada, School District implemented the "Laptop for Teachers" program during the 1998-99 school year. The purpose of the program was to investigate the use of laptops to provide teachers with technology access both at school and at home. The program was funded by the state of Nevada through an initiative earmarked for professional development in schools with a high number of at-risk students. Twenty Grade K-5 teachers from 12 pilot schools who submitted written applications were chosen to participate. Each received a laptop computer, a laser printer for his/her classroom, and an inkjet printer for home use. In addition, each pilot school was given four projection devices, a scanner, and a digital camera.

The educational computing strategists (ECS) from nine of the schools provided technology instruction, and each participating teacher was paid for 30 hours of professional development on such topics as the basics of laptops, multimedia, Internet resources, graphing, and problem solving. The instruction included not only training on the laptops and software applications, but also training on technology integration techniques.

The district also performed a review of literature on teacher laptop programs in order to find out what was already known about such programs, as well as to identify methodology and instrumentation that might be useful in the district's evaluation of its own program. From a study done by Weast, Parry, and Peterson with fifth grade teachers in South Dakota, they found that teachers provided with laptops increased their daily use of computers from 11 percent to 56 percent. These teachers cited a benefit of having a laptop as "the constant availability," and 95 percent said the program had "extremely positive effects for them professionally."

In a series of case studies performed in England and Wales, Phillips, Bailey, and Fisher found that almost all of the teachers having laptop access reported gains in information technology skills. In yet another study done in a district in New Jersey (and summarized in another of my literature reviews), Gold noted the following advantages to providing their teachers with portable computers:

- Positive attitudes and increased communication among teachers
- More flexibility in providing staff development
- More cooperative learning
- More time to experiment with using technology

The Clark County School District decided to collect data by performing two case samples: one consisting of data from teachers identified as frequent users of the laptops and a second from information provided by the ECSs who also participated in the project and provided training. The district compared the data provided by the teachers with the data from the ECSs in order to determine the validity of the impressions of the teachers. The district used a separate online survey for each group to collect the findings.

Seven of the teachers considered themselves beginners, and 19 felt they were intermediate computer users when they received the laptops. None saw themselves as experts. When asked to list beneficial uses of the laptops, the teachers gave responses which researchers organized into two broad categories: individual use benefits and group use benefits. The table below summarizes the benefits listed by the teachers.

Benefits of Teacher Laptop Use	
Individual Uses	**Group Uses--Collaborative Learning with Projection**
• Teacher Growth—convenient access, building confidence, communication • Professional Productivity—lesson plans, data management, creating materials, resource gathering • Student Use—Individual student use, alternative learning opportunity	• Visual organization of processes • Visually enhanced instruction • Student presentations • Attracting student interest and attention • Student motivation • Researching online • Modeling software use

Data was then collected from the ECSs, who had access to the teacher classrooms for daily interaction and for observation. The ECSs observed the benefits outlined by the teachers in the table above as well as two additional benefits: generating teacher enthusiasm and retaining teachers. Because the schools participating in the laptop program are considered economically disadvantaged and have a high number of at-risk students, they also have high rates of teacher turnover. However, several teachers opted to stay in those schools because they could not imagine being without their laptops!

The ECSs also noted increased use of the laptops when projection devices are available. One ECS observed: “I found students amazed and engaged in guided learning activities with the laptop and projection devices. The enhanced dynamics of the technology and the ability for whole-class interactions led to some stimulating lessons.” Another ECS noted: “Using laptops with the LC projectors has opened a new way of viewing educational material. Linked with the Internet, a world of knowledge is at their fingertips and (those of) their students.”

In summary, teachers in this study felt that having access to laptops gave them more time to develop technology skills, “build confidence, prepare lessons, and increase their professional

productivity." Other studies have found that lack of time and lack of access often inhibit teachers from using technology. This study shows that providing teachers with laptop computers is a way to remove those barriers. And when used with projection devices, the laptops also become powerful tools for student learning.

Falba, C., Grove, K., Anderson, D., & Putney, L. (2001). Benefits of laptop computers for elementary teachers [Electronic version]. *Journal of Research on Technology in Education*, *33*. Retrieved April 1, 2002, from http://www.iste.org/jrte/33/5/falba.html

"Laptop Computers and Their Impact on Sixth-Grade Learning"

In 1997, the Beaufort County, SC, School District initiated an "anytime, anywhere" laptop program for 300 of their sixth graders. An evaluation study was conducted after the first year of the program to measure the effects on the laptops on the attitudes and perceptions of the students, parents, and teachers involved in the program. The data was gathered using a pre- and post-survey approach.

All three of the groups surveyed felt that the use of the laptops contributed to improvement in certain skills and knowledge of the sixth graders, including spelling and writing. In addition, almost half of the students felt their improvement in reading and math skills was attributable to use of the laptops.

The teachers, who were also given laptops as part of the program, were asked to evaluate their own use of computers. A comparison of answers to key questions both before and after the initiation of the laptop program is shown in the table below.

	Not at all		**Some**		**A lot**	
	Before	**After**	**Before**	**After**	**Before**	**After**
How much do you use computers in your instruction?	18%	0%	65%	28%	18%	72%
	Preparing Materials		**Reinforcing Lessons**		**Personal Research**	
How will you use laptops in your instruction?	44%	11%	12%	56%	12%	22%

In addition, prior to the program, another 12 percent said they would use the laptops as a reward for students. After the first year, however, no teachers indicated that they were using the laptops as rewards.

The initial evaluation of the Beaufort County laptop program showed that teachers were using computers more often and in different ways in their instruction after they were given laptops. However, since all of their students were also using laptops, in my opinion these findings may not be indicative of how teachers use technology when only they have access to laptops.

Stevenson, K. (1999, March). Laptop Computers and Their Impact on Sixth-Grade Learning. *The Technology Source.* Retrieved from http://ts.mivu.org/default.asp?show=article&id=39.

LAPtop vs. Non-LAPtop: Comparison Data
Teachers and Their Use of Technology, October 2000

The Jordan Middle School in Palo Alto, California, was in the first year of its Learning Assistance Program (LAPtop). Laptops were purchased for all sixth grade staff members, and during the spring of 2001, one sixth grade team was to participate in a three-month pilot, when each student would also be given a laptop to use at school and at home. At the conclusion of the pilot, a decision was to be made whether to proceed with a grade level test during the 2001-02 school year.

Teachers were surveyed to collect data about their personal and professional backgrounds, teaching styles and practices, technology use at home and at school, attitudes about computers in general, and attitudes about LAPtop in particular. Surveys were given to the 20 LAPtop staff members and 24 non-LAPtop teachers (control group) in the seventh and eighth grade core subject areas. Overall, the Non-LAPtop group was found to have received more technology training over the past three years than the LAPtop group; however, 59 percent of the LAPtop teachers were new to the district in 2000 as opposed to 30 percent of the Non-LAPtop teachers. The district had been targeting technology use for several years, which might explain why the Non-LAPtop teachers with more years in the district had received more training.

Both groups said that the most effective ways for them to learn new technology skills are to: (1) work with a colleague; (2) practice and ask questions; and (3) see a demonstration. Eighty-seven percent of the control group identified their teaching styles as “student-centered,” and 83 percent used project-based instruction. About 60 percent of the LAPtop teachers described their teaching styles with those descriptors. However, 50 percent of the control group also used “traditional” teaching styles compared to only 30 percent of the LAPtop group.

When asked to identify the percentage of time their students spent working in groups, working independently, and working as a whole class, both the LAPtop and Non-LAPtop teachers said that their students spend about one-third of their time in each of the groupings. Both groups also reported assigning one to three projects a year that utilize technology tools, and neither listed computer work as a "typical" activity.

Nearly all of the LAPtop and Non-LAPtop teachers have computers at home and use word processing, web browsers, and email programs most often. However, the LAPtop teachers use their home computers more than the control group—50 percent logged on an average of 60 minutes a day versus only 20 percent of the control group. LAPtop teachers also used their computers for longer periods of time at school.

In addition, the LAPtop teachers had more positive attitudes about student use of computers, seeing more advantages and fewer disadvantages than their Non-LAPtop counterparts. For example, 75 percent felt that the use of word processing software would improve student writing skills compared with only 43 percent of the control group.

In conclusion, this survey did not disclose pronounced differences in the way the LAPtop teachers used their computers as compared to the Non-LAPtop teachers. It appears to me, however, that the LAPtop teachers had used their laptops only a short period of time before the survey was taken. I wonder if the survey results would have been different if the district had waited until the LAPtop teachers had received more technology training and had more time to get acquainted with their new computers.

LAPtop vs. Non-LAPtop: Comparison Data. Teachers and Their Use of Technology, October 2000. . [Online]. Available: http://www.jordan.palo-alto.ca.us/laptop/evaluation/nonlap-baseline2000.pdf. (2002, March 2).

"Leadership, Learning and Laptops: How One District Brought Everyone On Board"

This article focuses on the distribution of laptop computers to teachers in the Lawrence Township Public Schools in Lawrenceville, New Jersey. The laptops were financed through a technology referendum passed by the community in April 1998,which enabled the district to upgrade its technology networks, electrical systems, and hardware and software, as well as to provide for teacher computers and training. However, the district struggled with the notion of teacher training and how to provide it in a timely and meaningful way before the students had access to the new equipment. The solution was to provide each of the 300 teachers with a laptop computer and to provide training during the six months it took to get the new technology equipment installed and operational.

The district found that the laptops created enthusiasm for technology among the teachers and that this enthusiasm was passed on to their students. One teacher said, "I went home last night, and I sat there for three hours on my couch with my laptop, and I just played and learned. If you had taken that same computer and put it in my classroom, I would have never spent three hours after school, playing and learning." The district also saw increased communication, cooperative learning, and collaboration among teachers who may never have had reason to talk to each other previously.

The project allowed the district to provide staff development formally, informally, during lunch periods, and after school. They had as many as 85 to 90 teachers attending sessions and were able to group by grade level, skill level, or subject area to meet individual needs. Even reluctant teachers began to see the value of using technology in their teaching as well as in their lives.

Gold, R. (1999, September/October). Leadership, Learning and Laptops: How One District Brought Everyone on Board. *Multimedia Schools*, 6, 32-37. Retrieved March 2, 2002, from Academic Search Premier.

A More Complex Picture:
Laptop Use and Impact in the Context of Changing Home and School Access

This report is the third in a series of research studies on Microsoft's Anytime Anywhere Laptop Learning Program. In this program, each student is given a laptop loaded with Microsoft Office software, and teachers are given laptops and instruction in integrating the technology into their curricula. The third year of the report focused on how the laptops impacted teaching and learning, with a concentration on how the laptops might support a more constructivist approach to instruction. Although the report provided insight into how the laptops are influencing student achievement and test scores, I will focus my review on how the teachers' 24/7 access to laptops has affected the their use of technology, both on a personal and professional level. I will compare computer use between the laptop teachers and their non-laptop counterparts.

1. Internet use. Although both groups of teachers had comparable classroom access to the Internet, the laptop teachers used the Internet once a week; the non-laptop teachers averaged once a month. The laptop teachers showed more increase in use of the Internet than in any other classroom application, moving from logging on "close to never" three years ago to almost once a week currently.

2. Assignment of homework. Laptop teachers assigned homework that required computer use seven times more often than did the non-laptop teachers. Of course, this may be due to the fact that the laptop teachers were certain that their students had access to computers, since the students had 24/7 laptop access as well.

3. Teaching practices. Laptop teachers have moved toward more constructivist teaching practices during the three years of the program, including more frequent use of student-led inquiry and collaborative work. The data on the non-laptop teachers showed no significant

change in teaching practices during the same period. Non-laptop teachers reported using direct instruction nearly every day, as compared to the laptop teachers who now use this more traditional approach only about once a week.

4. Use of computers for academic purposes. Laptop teachers are asking their students to use computers in significantly different ways than they did three years ago. Students are conducting research and data analyses, running collaborative and interactive projects, and creating documents, graphics, and multimedia presentations. The non-laptop teachers did not increase the use of these practices significantly over the three-year period. Again, the difference between the two groups may have been the laptop students' access to computers both at home and at school.

5. Confidence in technology skills. Laptop teachers have more confidence in their own technology skills than the non-laptop teachers, but the differences were noteworthy in only two areas—general computer use and email. The likeness may be due to comparable access to computers and to technology training.

6. Attitudes on effects of technology on student outcomes. As compared to their non-laptop counterparts, laptop teachers feel that technology has more of a positive effect on their students. The non-laptop teachers also view the impact of technology positively, and only two areas show statistically significant differences in the opinions of the groups--fluency in using technology for a variety of educational purposes and amount of time students spend working with class or schoolmates. When all of the laptop teachers (matched and unmatched with non-laptop teachers) were compared with the non-laptop teachers, the laptop teachers rated an additional two areas more positively—amount of research students do and number of roles

students assume in learning. In addition, laptop teachers see student use of computers as more essential to their teaching.

Walker, L., Rockman, S., & Chessler, M. (2000). A more complex picture: laptop use and impact in the context of changing home and school access. San Francisco, CA: Rockman et al.

Methodology

I began my research by distributing surveys on technology use to every teacher in my building, excluding myself. I chose to use surveys as one means of collecting data because we have both laptop and non-laptop teachers in our building, and I thought that our teachers would serve as a good source of data to compare the technology use between the two groups.

Thirty-two of the 48 surveys were returned to me, 13 from laptop teachers and 19 from non-laptop teachers. I divided the completed surveys into two categories, laptop teachers and non-laptop teachers, according to the answers given for Question 1, "Do you use a laptop or a desktop computer most of the time?" I then plotted the responses to each question in an Excel spreadsheet and calculated total number of responses, averages, or percentages, depending on the content of the questions. I did separate spreadsheets for laptop and non-laptop responses and then compiled a comparison of data between the two.

Next I randomly chose four teachers to interview on both their attitudes about technology and how they use computers in their instruction. I interviewed two laptop and two non-laptop teachers during their preparation periods or after school. The interviews allowed me to ask more open-ended questions than those in the surveys.

In addition, I posted the following question on the Classroom Connect listserv:

> *I am conducting a study on the following topic:* How Does Computer Use Compare Between Laptop and Non-Laptop Teachers? *I am interested in hearing from schools that have provided their teachers with laptop computers to use 24/7 or from teachers who have been given the laptops. (Are there any Michigan teachers out there?) Have you seen differences in the way these laptop teachers are using technology in their instruction as compared to teachers without laptops? Do you see differences in teaching styles between the two groups? What do you feel are the advantages and disadvantages of providing teachers with laptops? Does your school also have a laptop program for students? Do you provide technology-training opportunities for your teachers? If so, what type of professional development program has been the most successful in your district? I*

am also reviewing literature on the topic and would appreciate recommendations on articles, books, or web sites that may help me in my research.

I posted the question on the listserv because I am interested in if and how teachers in other parts of the country are using laptops. I also wanted to compare technology use by teachers in my school with their counterparts in other districts. I have included the responses I received from the listserv subscribers in the Appendices section of this paper.

Finally, I analyzed the hours of district-sponsored technology training that both laptop and non-laptop teachers in my building have attended since August 2001. I was interested in seeing whether the laptop teachers were more motivated to increase their proficiency with technology and learn new ways to integrate technology into their curricula.

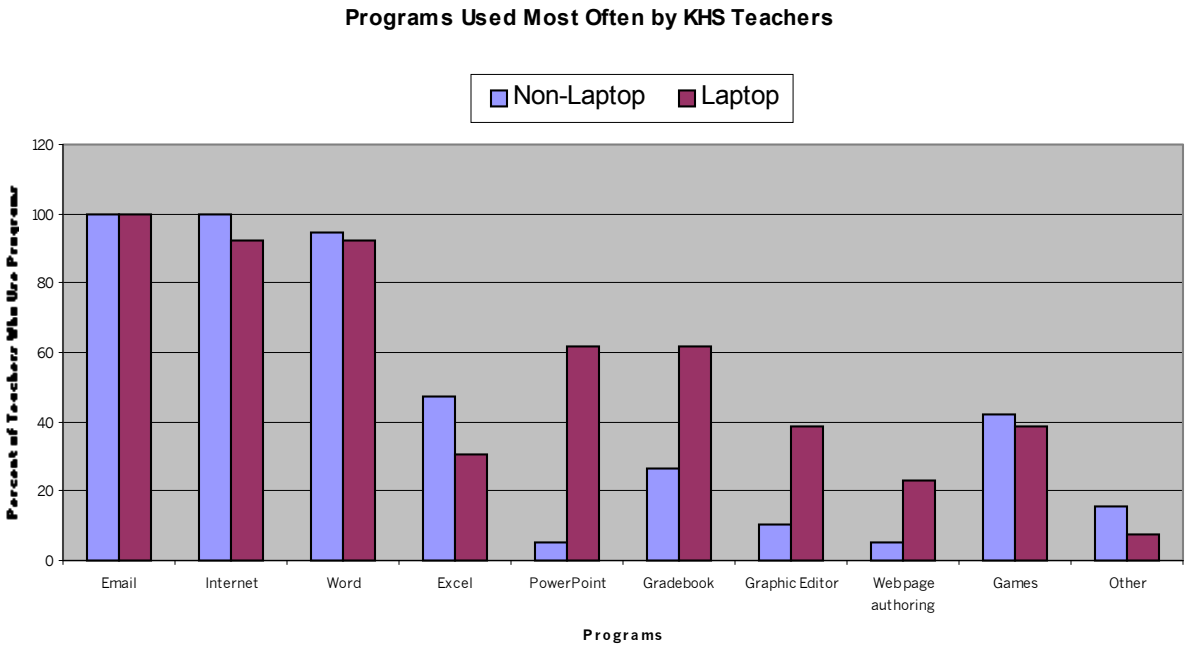
Findings

My research found significant differences in the way that teachers who own laptops use technology as compared to their non-laptop counterparts. Laptop teachers use technology more often and for longer periods of time. Laptop teachers assign more projects and use direct instruction and other traditional methods of teaching less. And laptop teachers are more confident in their ability to integrate technology effectively into their curricula.

Survey of Keystone High School Teachers

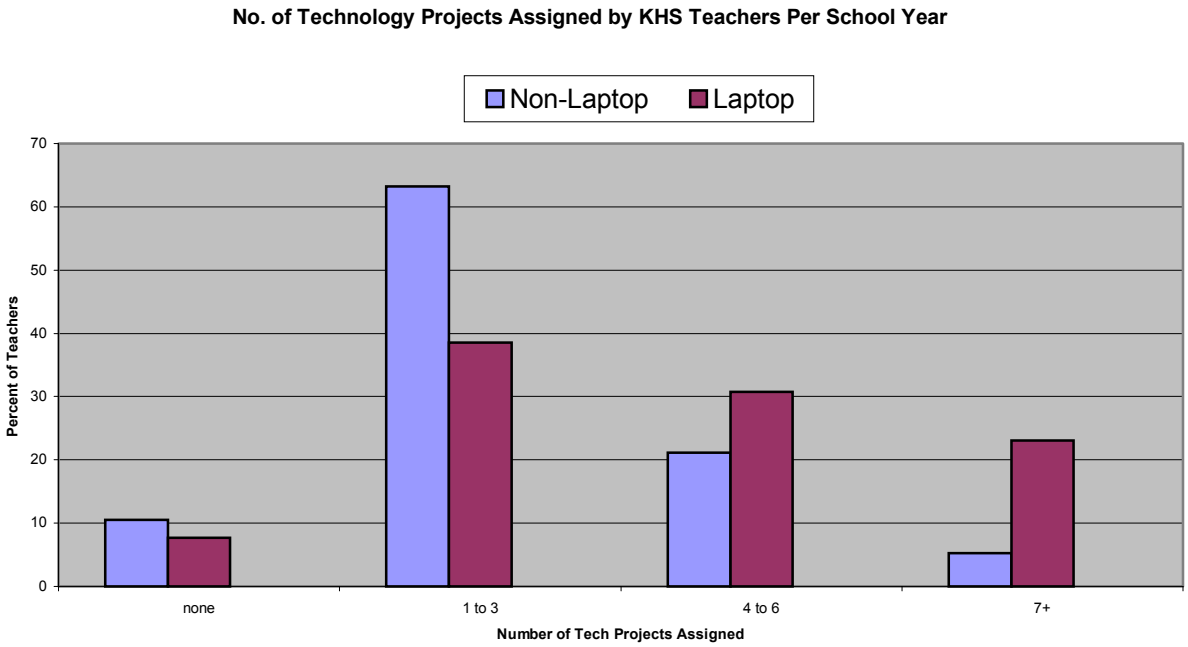
Laptop teachers at Keystone High School (KHS) have less teaching experience than their non-laptop peers, 11.8 years vs. 19.5 years. Both groups feel they learn new technology skills best by participating in a hands-on demonstration, and the vast majority of all teachers feel very comfortable using basic computer applications such as email, word processing, and the Internet. All but one of the teachers surveyed has access to a computer at home.

Both the laptop and non-laptop teachers use email, the Internet, and word processing applications most often. More non-laptop teachers (47.4%) use spreadsheets than laptop teachers (30.8%); however, laptop teachers were significantly more likely to use presentation software (PowerPoint), an electronic grade book, photo-editing software, and web-authoring software.



Laptop teachers use project-based instruction more often (30.8% vs. 5.3% of the non-laptop group). Non-laptop teachers (57.9%) more often describe their teaching style as student centered (vs. 46.2% of laptop teachers). Interestingly, approximately 31 percent of both groups use direct instruction, such as lectures, to provide their students with information.

The majority of non-laptop teachers assign one to three projects during an average school year that utilize technology. Students of the laptop teachers complete more technology projects; 38.5% of laptop teachers assign one to three technology projects, 30.8% assign four to six, and 23.1% supervise seven or more projects utilizing technology in their classes. Only 5.3% of non-laptop teachers give more than seven technology-based assignments.



Students of both non-laptop and laptop teachers use word processing applications most often. However, students of laptop teachers are much more likely to use PowerPoint presentation software, Publisher (desktop publishing), and FrontPage (web page authoring software). These same students also use games and other applications such as graphing programs, Research Assistant, and Inspiration.

Laptop teachers at KHS spend much more time using their computers during a given week—an average of 14.7 hours as compared to 6.8 hours of use by non-laptop teachers. Laptop teachers have also received more hours of technology training since August 2001, 16.3 hours vs. 4.7 hours. This data maybe somewhat skewed as the teachers who received laptops as part of our Technology Learning Challenge Fund (TLCF) grant attended a three-day technology integration workshop; this workshop was not offered to the non-laptop teachers.

On a scale of one to ten, with ten being "very confident," KHS laptop teachers rated their confidence in integrating technology into their classrooms at 8.2, while non-laptop teachers rated their confidence level at 5.9.

Both laptop and non-laptop teachers at KHS expressed the need for more time to plan lessons that integrate technology. Five laptop and six non-laptop teachers added time-related comments to their surveys. As one teacher put it, "I just need more time to plan." Another stated, "I have some ideas about implementing technology in my classroom. I haven't had time to develop these ideas or put them into use."

When interviewed, both the laptop and non-laptop teachers were asked to list the advantages and disadvantages of using computers in education. Their responses are summarized in the table below.

Advantages		Disadvantages	
Laptop Teachers	Non-laptop Teachers	Laptop Teachers	Non-laptop Teachers
Find information easily Can present material more easily (PowerPoint) Can do more writing and editing Can research and write at same time	Kids exposed to more research and ideas Timesaver (editing) Improved quality of products	Down time when computers don't work Takes more time to cover material Students have poor keyboarding skills Filtering software blocks quality sites	Too much information for students to absorb Students waste time; get distracted on Internet

The laptop and non-laptop teachers agree that using computers in the classroom increases student motivation. They feel that students are more excited about learning when they can use technology instead of being given information via a lecture. Both groups also agreed that technology could increase student achievement. One laptop teacher said that using technology helps the lower achievers, and another stated that using computers makes students better writers and editors.

The laptop teachers feel that all teachers would benefit from having a laptop, but only if they received proper training. However, one non-laptop teacher did not see a need to give all teachers laptops. He said that he has a computer at school and a computer at home, so a laptop is "not that big of a deal."

Analysis and Discussion

Several themes have emerged as I researched articles for my literature reviews, compiled survey and interview results, and read responses to my listserv inquiry.

Laptop (and Non-Laptop) Teachers Need Technology Training

Giving teachers laptop computers is not enough. Districts must also provide training on use of the laptops as well as on effective technology integration techniques. Successful laptop programs have at least one thing in common: teachers have been in-serviced on how to use their new computers. The successful teacher laptop programs that I read about in my literature reviews had extensive staff technology training components.

At Keystone, teachers were required to attend "out-of-the box" trainings before taking their laptops home. We helped them set up their Internet and email accounts and discussed the general operation and care of the laptops. Teachers who received their laptops through the TLCF grant also attended a three-day technology integration workshop provided by Intouch with Learning, Inc. In addition, all high school teachers were invited to participate in weekly one-hour "Thursday Tech Tips" sessions after school, where we covered such topics as PowerPoint, Publisher, and Access Power Library. We also discussed ways to integrate the software into existing or new lessons. The TLCF grant allowed us to pay the teachers for their time, and they were also granted Act 48 professional development hours. In addition, our in-service days almost always include technology workshops.

An Illinois laptop teacher reported that his district requires attendance at eight hours of technology training each semester as well as monthly meetings. He said teachers are given "multiple opportunities to learn," and the district has a technology coordinator on staff who

offers weekly classes and "as-needed" instruction. (T. Bowen, personal communication, April 8, 2002)

In contrast, a teacher from Michigan told me that laptop teachers in his district attended mandatory training before being issued laptops; however, they have had little opportunity for training since. He said that teachers who used computers before receiving laptops are using them more often now, but those who did not use computers earlier are still not using them with students. He also reported that the untrained teachers are still poor troubleshooters and suffer from a great deal of computer downtime. "To really utilize our computers I believe there needed to have been more training. Rather than just 'give' a computer to each staff member, I think it would have been beneficial to have each staff member demonstrate basic skills to 'earn' the computer." (K. Kuziel, personal communication, March 11, 2002)

Laptops Make Technology More Accessible by Teachers

Teachers are more likely to use their computers for both experimentation and lesson planning when they have 24/7 access. Even though most teachers now have computers at home, they are undoubtedly sharing them with family members. As one KHS teacher put it, "Laptops are really nice because they can travel with you."

An Illinois teacher made the following point, "Not only do I have the ability to take my work with me (I've done all kinds of work all over the country but also while in France with students), but I have found that I push myself to improve my use of technology."
(T. Bowen, personal communication, April 8, 2002)

A teacher from Missouri stated about her district's laptop program, "It has allowed the teachers to work on a class Web site or look for WebQuest or lesson plans anytime that it is convenient for them. After a training session they are able to go home and try out what they just

learned. They can keep up with their email at home as well as at school." (J. Friesen, personal communication. March 11, 2002)

A technology coordinator from New Jersey summed up her district's teacher laptop program as follows: "My staff has taken giant leaps on the use of technology in the classroom because of their access to laptops for the last three years. It has made them computer "comfortable" in an extremely short period of time and has given them the confidence to learn.... with their peers and independently.... and not be embarrassed when they don't know a concept." (R. Gold, personal communication, March 27, 2002)

Laptops Change the Way Teachers Teach

It is evident from my literature reviews, surveys, and listserv responses that laptop teachers are changing their teaching styles. The Rockman report showed that students of laptop teachers do more research and collaborative projects and create more documents, graphics, and multimedia presentations. Laptop teachers at Keystone are assigning more technology-related projects and more of these teachers are labeling their instructional styles as "project based." In addition, their students are using presentation and other multimedia software applications more often than students of non-laptop teachers.

A teacher who works in Missouri's enhancing Missouri's Instructional Networked Teaching Strategies (eMINTS) program told me, "Part of our evaluation also showed a great amount of teacher change toward student-centered, inquiry-based, collaborative instruction." (J. Friesen, personal communication. March 11, 2002)

Studies, including the Rockman analysis of the Microsoft Anytime Anywhere Laptop Programs and the evaluation report of the eMints program, show that students benefit from these

student-centered classrooms and inquiry-based, collaborative instruction. Test scores have risen in districts that have implemented such instructional strategies.

Conclusions

How does computer use compare between laptop and non-laptop teachers? Laptop teachers:

- ✓ Have increased access to technology
- ✓ Spend more time using technology for both professional and personal purposes
- ✓ Are more confident about their own technology skills
- ✓ Use more project-based, collaborative instruction and less direct instruction
- ✓ Make more assignments requiring the integration of technology
- ✓ Are more confident about integrating technology into their curricula
- ✓ Are more enthusiastic about student use of computers and technology use in general

In my opinion, the data certainly justifies the purchase of laptop computers for teachers. Although laptops are more expensive than desktop computers (prices of laptops continue to drop), these laptops can theoretically be used 24 hours a day, 7 days a week, 52 weeks a year. Similar desktop units placed on a teacher's desk get used only during the school day and the school year.

Teacher laptop programs, along with appropriate, as-needed, and ongoing training, have been shown to develop more technologically advanced teachers. These same programs, which emphasize student-centered, inquiry-based, collaborative learning, have also been proven to increase student achievement. Teachers must be confident about their own use of technology before they will use it in their instruction. And the data shows that laptop teachers have more confidence in their technology skills.

I will recommend to my superintendent that the Keystone School District continue to provide its teachers with laptop computers, along with training in the use of the laptops for technology integration. I believe our teachers will benefit, and our students will benefit as well.

Reference List

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