

EARLY EVIDENCE FROM THE FIELD
THE MAINE LEARNING TECHNOLOGY INITIATIVE:
IMPACT ON STUDENTS AND LEARNING
OCCASIONAL PAPER #1

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Abstract

The Maine Learning Technology Initiative (MLTI) is a statewide program that, according to the Task Force on Maine's Learning Technology Endowment, is intended to:

“...transform Maine into the premier state for utilizing technology in kindergarten to grade 12 education in order to prepare students for a future economy that will rely heavily on technology and innovation.” (Task Force on Maine's Learning Technology Endowment, 2001, p. vi).

One of the strategies Maine is using in preparing youth for the future economy is a statewide program to provide every seventh and eighth grade student and their teachers with laptop computers, and to provide professional development and training for helping teachers integrate them into their classroom instruction. This paper examines the impact that the distribution of laptops to students in Maine is having on students and their learning. Seventh and eighth grade students who had received laptops in the 2002/2003 school year, as well as their teachers were the focus of this evaluation. Data from surveys, case studies, interviews, classroom observations, and document analysis have been examined in order to more closely identify the laptop initiative's impact on student learning. Preliminary findings suggest that since the implementation of the laptop program student engagement and attendance has increased and the classroom atmosphere has shifted including more student/teacher and student/student collaboration.

The Maine Learning Technology Initiative: Impact on Students and Learning

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Introduction

This report presents mid-year evidence from the Year One evaluation of the Maine Learning Technology Initiative. The Maine Learning Technology Initiative (MLTI) is a statewide program that, according to the Task Force on Maine's Learning Technology Endowment, is intended to:

“...transform Maine into the premier state for utilizing technology in kindergarten to grade 12 education in order to prepare students for a future economy that will rely heavily on technology and innovation.” (Task Force on Maine's Learning Technology Endowment, 2001, p. vi).

The initiative was established on the premise that technology and innovation will play key roles in Maine's economic future. Nearly 70% of business and information technology (IT) professionals nationwide report that their companies are concerned about the Digital Divide because they, and the U.S. economy in general, need more IT talent. According to the Children's Partnership (2002), by 2010, jobs in the computer and mathematical fields are expected to increase by 67%. However, Maine currently ranks 44th in the United States in the number of high-tech workers. New Hampshire, on the other hand, ranks 28th and Massachusetts ranks 4th. In terms of average high tech wages, Maine ranks 43rd, while New Hampshire and Massachusetts rank 14th and 3rd respectively.

Implementation of the Laptop Program

One of the strategies Maine is using in preparing youth for the future economy is a statewide program to provide every seventh and eighth grade student and their teachers with laptop computers, and to provide professional development and training for helping teachers integrate them into their classroom instruction. A pilot project using this strategy was undertaken in Spring 2002, in which seventh grade students and their teachers in nine Exploration Schools were provided laptops. A program of professional development for teachers that introduced teachers to the laptop and basic computer skills also began during this time and is continuing, with increasingly sophisticated training focused more specifically on teachers' academic content areas. In the fall of the 2002-2003 academic year, the first full implementation

phase of the MLTI began. In this current phase, over 17,000 seventh graders and their teachers in over 240 schools across the state have received laptop computers. Concurrently, the Department of Education has initiated a professional development network consisting of several new roles and regional positions.

Each of the 243 middle schools in the state nominated a Teacher Leader who then received training that would enable them to serve as a leader within their school for the MLTI. These Teacher Leaders now serve as contact and support personnel for the classroom teachers in the buildings where they teach.

A second role that has been created is that of Regional Integration Mentors (RIM). A RIM is a teacher within each of the nine superintendent regions in the state who, in addition to their regular teaching responsibilities, assists MLTI staff in the development of a statewide network of professional development related to technology integration in middle schools and within each region.

The most recent roles created in the MLTI professional development network are Content Mentors and Content Leaders. Content Mentors are specialists and statewide leaders in specific content areas; mathematics, science, language arts and social studies. Content Leaders are content specialists within each of the nine superintendent regions. These individuals serve as resources, along with the RIMs and teacher leaders within each region, to help organize, establish, and maintain the MLTI professional development network within each region and the state. These positions have been created to facilitate greater integration of curriculum and technology and as support for the transformation of teaching and learning in Maine's classrooms.

This report presents some early evidence on the effectiveness and impact of the implementation of the Maine Learning Technology Initiative (MTLI) on students and their learning. These findings are the result of work which began in June 2002 when Commissioner J. Duke Albanese, Maine Department of Education, asked the Maine Education Policy Research Institute (MEPRI) to conduct the first year evaluation of MLTI.

MEPRI was created in 1995 by the Maine State Legislature. It is a non-partisan research institute funded jointly by the Maine State Legislature and the University of Maine System. The Institute conducts education policy research for the Legislature, and under grants and contracts, conducts a variety of studies and evaluations on education topics. Each year it publishes a Condition of Maine K-12 Education report, a report which documents changes in over 50

education indicators, and a Legislative District Education Report which describes school systems within each legislative district.

Methods and Procedures

Research Questions

In the area of students and Learning, three core long-term questions exist. These questions include:

What is the impact on students' skills in acquiring and constructing new knowledge?

What is the impact on student achievement?

What is the impact on Maine's digital divide?

Obtaining answers to these core questions will require a multiple-year evaluation. However, preliminary research has focused on determining how, and to what extent, pre-conditions or forerunners for long-range achievements are occurring in the Initiative. In other words, are the laptops being used at this early stage in such a fashion that will lead to greater student learning and achievement in the future? For example, greater engagement in the learning process increases student learning, so one foci of the Year One evaluation is to determine if student engagement has increased with the laptops, and if so, how, and why. Thus, for this report is focused on addressing the following questions:

How are students using the Maine Learning Technology Initiative?

What has been the impact of the MLTI on students and their learning?

What obstacles, if any, are students encountering as they use laptops and technology?

Data Sources

Because collecting extensive evaluation evidence from all students, teachers, and schools participating in this initiative is cost and time prohibitive, a matrix sampling strategy has been used in the Year One evaluation for identifying different types of middle schools, student populations, educator populations, and communities. This permits different questions to be answered using representative samples. In addition, this strategy minimizes the intrusion of data collection strategies into the operation of schools, and the teaching and learning process. The eighth graders in the Exploration Schools are also a focus of the Year One evaluation. The

purpose of including this group in the sample is to determine the continuing impact of the spring 2002 Exploration School pilot program.

The evaluation plan is using a mixed-methods approach to evaluation. Using multiple evaluation and research methodologies and varied sources of evidence provides a more comprehensive framework for triangulation of evaluation evidence, and increases the validity, reliability and generalizability of findings. *Surveys*, some of which are web-based, are being used as a primary means of gathering data from large samples of students, educators and parents. *Case studies* of representative schools and student groups are being conducted. *Interviews, focus groups, classroom observations and analyses of school level documents, such as memos to parents, school policies, and including analysis of student work*, are essential data collection strategies. The evaluation team is also attempting to track the impact of the Year One program on student achievement and school level performance. However, more time will be needed to draw reliable conclusions on these aspects of MLTI.

Surveys have been both web-based and mailed. Students were asked to respond to web-based surveys. Teachers received a mailed survey which was also available online. Surveys were designed to collect a breadth of information on the use and impacts of the laptops. Copies of the survey instruments appear in Appendix A.

Site visits, interviews, and observations have been designed to provide more in-depth information on specific uses and impacts. Protocols for interviews, and observations conducted during site visits to the 9 Exploration schools and eight additional middle schools, were created and used by the staff of MEPRI to insure consistency in the data collection process.

The information contained in this report is based on an analysis of several data sources, but principally on an analysis of survey results from student and teacher surveys and interviews of students, parents, teachers, principals, and other support staff. Some information has also been taken, where appropriate, from the MLTI website, Maine Learns (www.mainelearns.org), which invites teachers and parents to post success stories related to MLTI.

Sample

A web-based survey was developed to gather data about how students are using their laptops. All 7th grade students participating in MLTI, along with a small number of 8th graders who received laptops as a part of the Demonstration School pilot program, were notified by their teacher that the survey was available and the web address was provided. A total of 8007

responses representing 46% of all students surveyed were received. An initial analysis of these returns revealed 423 duplicate responses; that is, some students responded more than one time to the web-based survey. Although not large enough to alter the findings, these duplicates were removed prior to further analysis leaving the final sample to 7584 responses representing 44% of all students surveyed.

Results

Preliminary Findings

This section of the report provides mid-year evidence addressing three key questions:

- ❖ How are students using the Maine Learning Technology Initiative?
- ❖ What has been the impact of the MLTI on students and their learning?
- ❖ What obstacles, if any, are students encountering as they use laptops and technology?

Responses to these questions are derived from an analysis of data pertaining to Students and Learning. However, before turning to this evidence, an important cautionary note is in order. The evidence presented here is taken primarily from surveys and interviews conducted during the first five months of the implementation of the program. The reader is reminded that conclusions are necessarily tentative and that evidence collected during the second half of this implementation year will provide a more definitive assessment of the effectiveness and impact of the laptop program on teachers, students, and schools.

How are students using the Maine Learning Technology Initiative?

Prior to the laptop initiative, computer access was limited due to the low number of available computers in most schools. Additionally, students and teachers reported that making time to visit the computer labs was difficult and restricted the use of computers within the classroom setting. According to findings from the web-based student survey, prior to the Maine Learning Technology Initiative, computer use in school comprised only a small portion of the students' educational instruction time. Of those students who responded to the survey, only 10% reported that they used computers in school at least five hours a week or more before receiving their laptops. However, since the initiation of the laptop program the number of students reporting that they use computers in school at least five hours a week or more has jumped to 61%. As some students stated in interviews:

“Last year we had to go to the computer lab down the hall and if there was a class going on there, you were out of luck, you couldn’t do your research. With these [laptops] you just open up your laptop and boom, the Internet is there.”

“Last year we just had desktop computers . . . and we would have to go all the way down to the lab and then all the computers would be full and you had to wait, and it’s a lot better this year because we all have our own.”

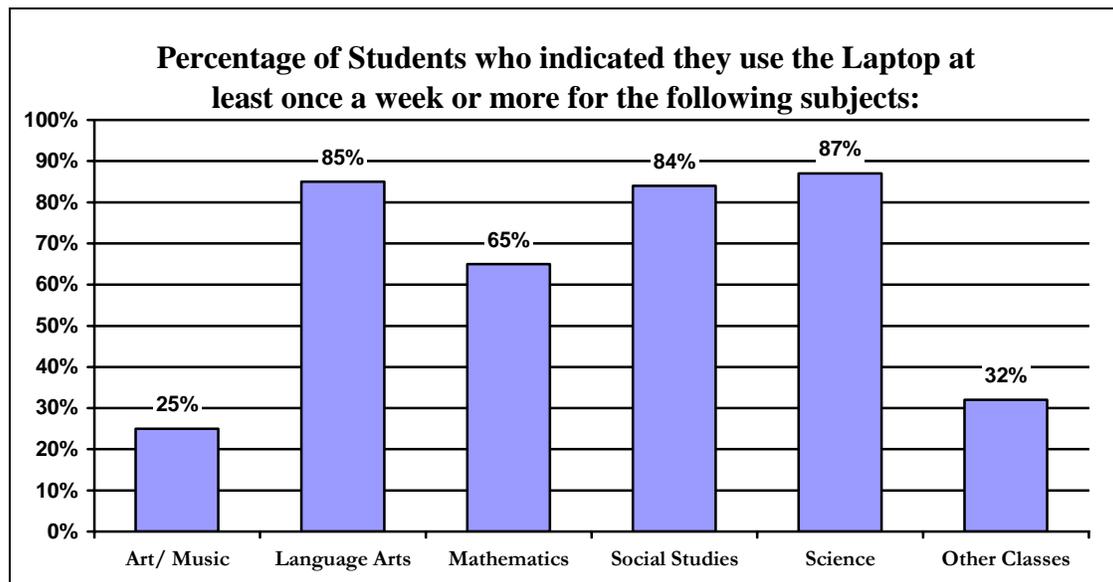
“And plus we can take them from classroom to classroom. Like in our science classroom last year we only had one computer, and it didn’t work very well either. But [the laptops] work well.”

In addition to no longer needing to access technology through the computer lab, the utilization of laptops within the classroom has lessened the need for students to share limited print and other resources in their classrooms and library. Instead of having to share one copy of encyclopedias or dictionaries, every student now has access to these resources via their laptop. One teacher remarked in an interview:

“One of the things I see as most beneficial is that it’s quick. There is no hesitation. There’s no ‘wait, I need to go get a dictionary.’ ... I don’t have to prompt them to go to the media center to find media, they just do it.”

Figure 1 reports the use of the laptops in different content areas. As may be seen from the figure, students are using the laptops in most of their classes, albeit in varying degrees. Students are using their laptops most often in Language Arts, Social Studies, and Science.

Figure 1



It appears from teachers' comments that these subjects provide an easier avenue initially for incorporating laptop use as a result of the up-to-date information provided on the Internet for social studies and science, and because of the word processing capabilities utilized in language arts. One teacher described her experience on the Maine Learns website in these words:

“As part of a Social Studies unit on the election, students were given the task to work as publicists for one of the gubernatorial candidates and create a slideshow about the candidate. They used their laptops to research the issues, endorsements, and biographical information. At the end of the week students were able to watch slide shows on the various candidates. And the really cool part for me was correcting their slide shows in the comfort of my own home - they e-mailed their completed project to me!”

One student remarked in an interview:

“Well, I think that the information is a lot more up-to-date so that if you needed facts for Maine population, for example, it's probably a lot more up-to-date if you were to go on the Internet than it would be to go into a textbook that was made in like 1980.”

Students are also reporting that they use laptops in their mathematics classes, but the evidence in Figure 1 reveals that the laptops are used less frequently in this content area. Teachers reported that available Internet resources in mathematics generally are neither as extensive nor as rich as in other subject areas. In response to an interview question about subjects where the laptops are not used as frequently one teacher responded:

“In math there has been no real change. I've not been able to find software that is really relevant to my teaching.”

“With the math some of the symbols and stuff are not easily accessed so it doesn't always make much sense to use the laptops for note taking and things. So if I know exactly what's going to be and we're not going to run into any of those problems, then I let them do that and they like it.”

Still, some teachers find the laptops and technology helpful in mathematics. For instance, as some teachers reported in interviews:

“There's a website called Cool Math for Kids where there are some various math activities around facts and skill work and whatever. And they've been able to go on those websites. They do things independently and enjoy that exploration process from an instructional standpoint.”

“In my class, the kids are just blossoming because a lot of students don't have access to computers at home or access to the internet at home, and in Math I've been using the different educational websites for reinforcement and for guided practice and they really like the hands-on and enjoy that.”

As noted by students:

“In math we’ve learned about fractions before but when we go on the fractions on the Internet then we find that they help give us new things to learn about.”

“Our math teacher taught us how to use Microsoft excel spreadsheet to do math problems. So we can always use excel to do problems.”

The MLTI project staff has recognized teachers’ perceptions of a lack of Internet resources for content areas such as Math and, as a result, has hired Content Mentors for each of the core subject areas. These Content Mentors are in the process of conducting workshops throughout the state on the integration of technology in the classroom. The state’s Content Mentor for Mathematics, for example, recently held regional workshops for mathematics teachers which appear to have been highly effective. Many teachers wrote comments like the following on the workshop evaluation forms:

“Having content specific groups was most helpful. The fraction tools will be used Monday in my classroom. I emailed the 6th grade teacher with these sites so she can access them as well! Isn’t technology great – she emailed me back during class and said that she was checking out the websites!”

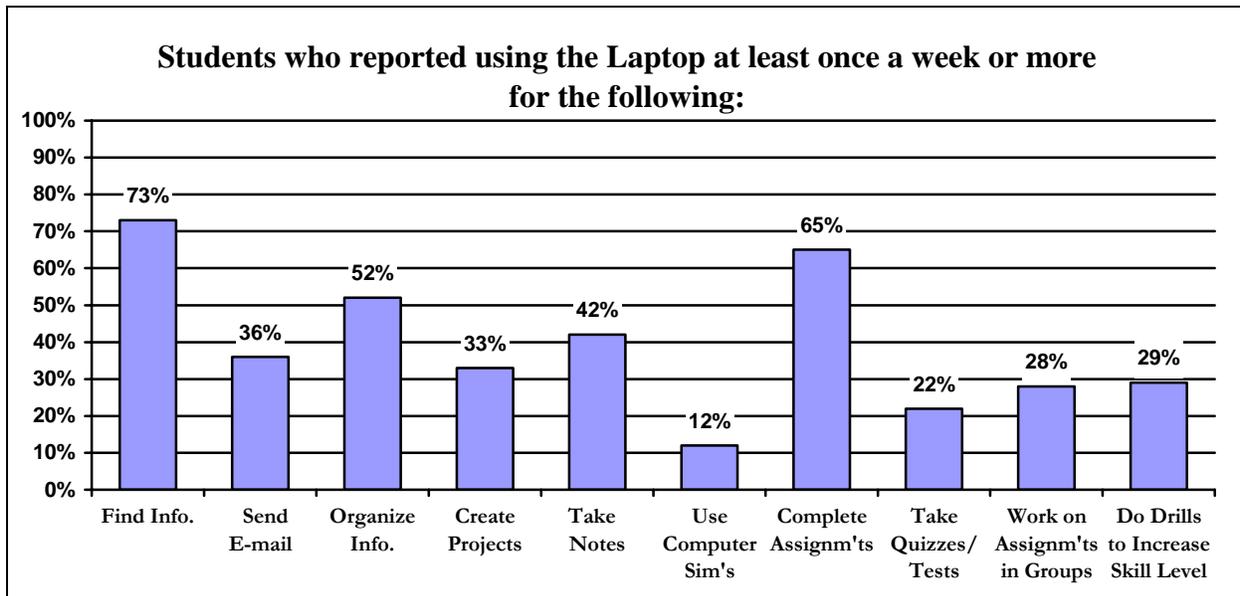
“I really was needy for websites that were workable for classes that I teach (not just play sites). This workshop really gave me a wealth of information . . . Students will be using their laptops much more and in a constructive format in the classroom.”

“I learned that the laptops can be a time saving device that supplements and enhances a curriculum already in place. I think there are many, many possibilities for use in math. I was doubtful before this workshop.”

“The iTeach Math site is superb! The lesson on comparing fractions and percents allows the student to visually see the relationship between all three. The use of the pies and bars Fraction Model has a variety of learning tools for students to expand their understanding of fractions.”

In terms of usage, the laptop program has engaged students in using laptops in a variety of ways. Figure 2 displays students’ responses to a survey item that asked them to indicate how often they used their laptops for a variety of purposes. At least two-thirds of students surveyed said they are using their laptops to find information and complete assignments. These responses coincide with teacher surveys, which found that students are using their laptops primarily to word process (60%) and to conduct research (56%).

Figure 2



Two examples from students are,

“We use them to make projects, like iMovie, we’ll make movies on them for social studies. And for science we use them a lot to go on the Internet and find information for notes . . . and in reading we go on the Internet and go to news sites and check articles.”

“We had a project where we had to research famous Maine politicians and we use that [the laptop] to help find out facts. For example, we had to find biography and U.S. history at the time that they served.”

In addition to using the laptop to find information, students report using their laptops to communicate via e-mail with teachers and classmates. Since the laptops were introduced in the schools, students are now able to e-mail both their teachers and fellow classmates when working on projects or if they have questions outside of the classroom. One-third of students reported that they use their laptop to communicate via e-mail at least once a week or more.

“We had a period for poetry and we would write poetry. And if we had problems we could just e-mail our teacher.”

The immediate e-mailing capability has also helped some teachers provide continuity in their instruction, even when they have had to be away from the classroom. One teacher reported on the Maine Learns website:

“Another great way to use the laptops – I was out sick with my children for a couple of days. I e-mailed what was happening for the day to my students. I even

set up times to be available for immediate responses to e-mails to answer any questions. It was great!"

Another described the benefits of e-mail in a similar fashion on the Maine Learns website:

"Whenever I am out of the classroom for a day I am always thinking, 'What am I going to find when I get back? Am I going to need to redo lessons?' This was the case when I need to stay home with my daughter one day in October. Fortunately for me I was able to e-mail my students to let them know that I would be on-line during their class and they could e-mail me with their questions."

During an MLTI regional meeting a principal reported:

"I do journaling with some of the kids, so I see e-mail as a way to do this."

The web-based student survey evidence also indicated that students are using their laptops in other ways including organizing information (52%), taking notes (42%), creating projects (33%), and doing drills to increase their skill level (29%). One student said in an interview:

"I use it mostly for research and then probably presentation comes after that. And also when we have tests coming, we sometimes have the option to take it on the computer because there's an Internet site where they print it off and you can just take it off the computer. That way we can get our grades right away because the teacher prints it off and gives it back to us."

Another said:

"We went on these online games that helped us with the parts of speech because we weren't exactly grasping it from the textbook."

Overall, students appear to be utilizing the laptops within many of their core subject areas. While the students are using the laptops primarily for finding information, word-processing, and communicating with teachers and other students, it appears the implementation of the laptop program is beginning to open up new ways of learning for many students.

What has been the impact of MLTI on students and their learning?

When asked this type of question, one student remarked:

"I like Social Studies more because last year was before we had them we just kind of used the textbooks, but now we get to go on the Internet and actually, you know, some speeches that we have we can find on the Internet and on WorldBook and that makes it a lot more interesting."

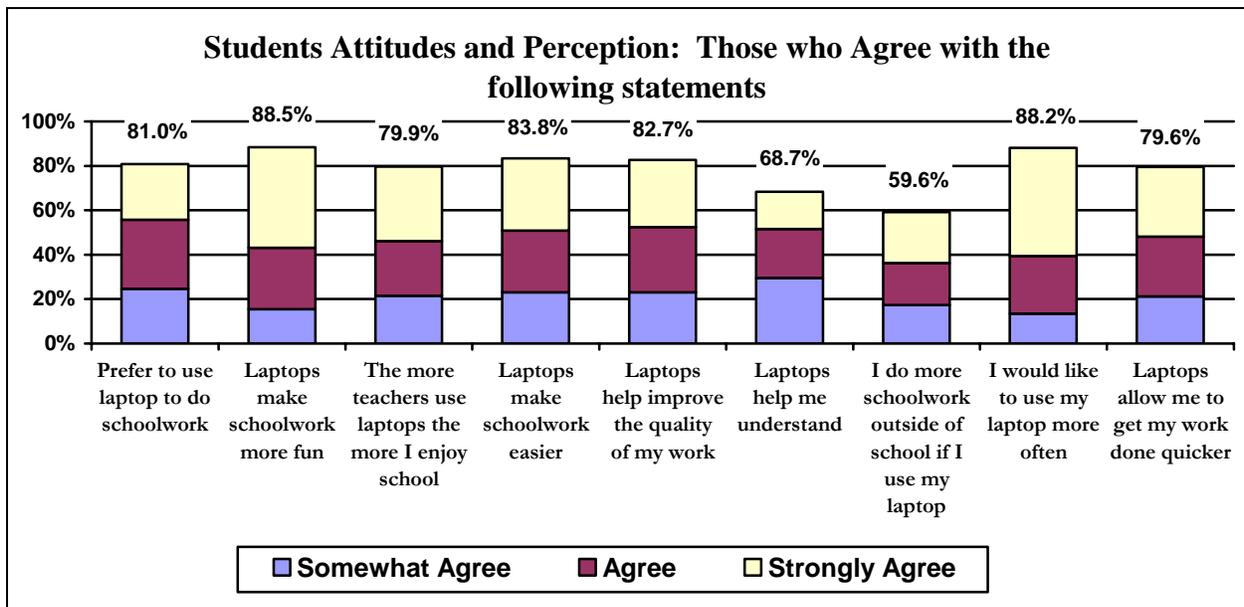
Another student replied:

"Actually it improved my reading because I don't like to read. And when I got the laptops I just loved reading the stuff online because it's pretty interesting, more than the textbooks."

These quotes describe some of the effects that the laptop program is having on students and their learning. One item on the web-based student survey asked students to rate their level of agreement with nine different statements pertaining to the impact of the laptops on learning using a six point scale that ranged from strongly disagree to strongly agree. Figure 3 displays the percentage of students who indicated they somewhat agreed, agreed, or strongly agreed with each statement. It is clear from their responses that students would like to use their laptops more often (88%), that students believe that laptops make schoolwork more fun (89%), and that they are a preferred tool for doing school work (81%). Additionally, 80% of students reported that the more teachers use laptops to teach, the more they enjoy school. This is important because for many students the less interested they are in school, the less likely they are to learn. As one student stated:

“Well, I think that it makes them[classes] a lot more interesting because before hand we had to use mostly outdated textbooks and so the laptops are a lot more up-to-date and actually it does help you motivate, motivates us a little bit because it’s a lot more interactive.”

Figure 3



Another said:

“If I’m looking up something in Science and I don’t really want to, say I look it up in the textbook and there is more interesting facts online because there are so many different websites and I get more interested in what I’m doing . . .”

Interviews with teachers support students' agreement that the laptops are having a positive impact on learning. One teacher leader reported to her RIM:

"I have noticed increased attention to task and an excitement about learning new computer skills."

In addition to an increased interest in school, many students are reporting that the presence of laptops makes their schoolwork easier to do, and helps them to improve the quality of their work. Almost 85% of students felt this way, and roughly 69% of students stated that laptops help them understand their classes better. In a student interview one student remarked:

"Last year I was doing pretty bad. I probably got in the C's area and this year I only had one C, so I'm going to make Honors this quarter."

One teacher describes the impact this way:

"My kids are really excited about writing time. I can't say that that's always been the case. Something's different this year. I'm finding, just looking at my first round of short stories, the average story is 5 pages! They're just willing to go further. It's so much easier to revise . . . there are lots of fun things to engage them . . . there are just a lot of connections, and they're feeling their creativity because they have a great tool."

Another teacher writes on the Maine Learns website of his success:

"Students were given time at home to prepare essay question answers for their Maine History test covering the age of exploration and the first colonies. Since we are not yet allowing iBooks to go home, copies of notes were printed to bring home with their books to help them prepare for the test. On the day of the test as the questions were passed out, one of the seventh graders asked if they could use their iBooks to type the test. I indicated that I expected they would. The eighth graders asked for equal treatment and asked to go to the computer lab so they could type theirs also. The results: 9 Exceeded standard (A+ or A); 7 Met standard (A-, B+, B, or B-); and 2 Partially met standard (C+ or C). Two of the papers were 8 pages in length, size 12 font, double spaced for 5 questions. All were still writing at the end of 90 minutes when I ended the session."

While the laptops appear to be having a positive impact on students' work within school, some students are also reporting some positive affects at home. When asked whether or not they are using their home computer more or less since acquiring their laptops, many students responded they are using their home computers more often to research information on the Internet and to type their papers for school. Some students state that this increase is due to the fact that they now have a better understanding of how to use their computers and the Internet.

"I think that I use it [home computer] more now because it's easier for me to understand technology a little bit better because I'm more familiar with it."

Also, more than half (60%) of those students who responded to the survey stated that they do more schoolwork outside of school if they are able to use their laptop. While many schools have yet to allow the laptops to go home, almost 90% of students stated that they would like to use their laptops more often. One student in particular, when asked whether or not he would like to take his laptop home with him, even if it meant receiving more homework replied, *“Yes, because we could still finish it quicker!”*

Although the majority of students have not been able to take their laptops home yet, the use of these tools within the classroom has helped to a certain degree to diminish the effects of rural isolation for many students. Students and teachers alike now have the ability to connect to information, resources, and people outside of their own region, state, and country via e-mail and the Internet. Without leaving the classroom students have the opportunity to make “virtual” tours of museums around the world, observe collections of marine sciences data, or hear authors discussing writing and literature.

“In Geography we are doing the Middle East, like the mosques. We go on WorldBook and it shows you images and you get to look around the mosque. And we wouldn’t normally be able to do that.” (Student Interview)

“We have used them to research Maine artists in preparation for going to the Farnsworth Art Museum. The laptops have enabled students to view contemporary Maine artists through museums, personal artist websites, and the Maine Arts Commission. This allowed all students to see the art first hand. I never could have afforded all the slides and books to do this without the laptops.” (Teacher Interview)

“Some days you just say, ‘This is the greatest thing that ever showed up in my classroom,’ last week we were talking about the declaration of independence, we went to a site where you can look at the picture of the real one, and you can look at the edited version that John Adams and Ben Franklin edited. When you are studying language arts, you edit your work, well, here is one of the greatest documents in history and you can take the kids there and show how it was also edited.” (Teacher Interview)

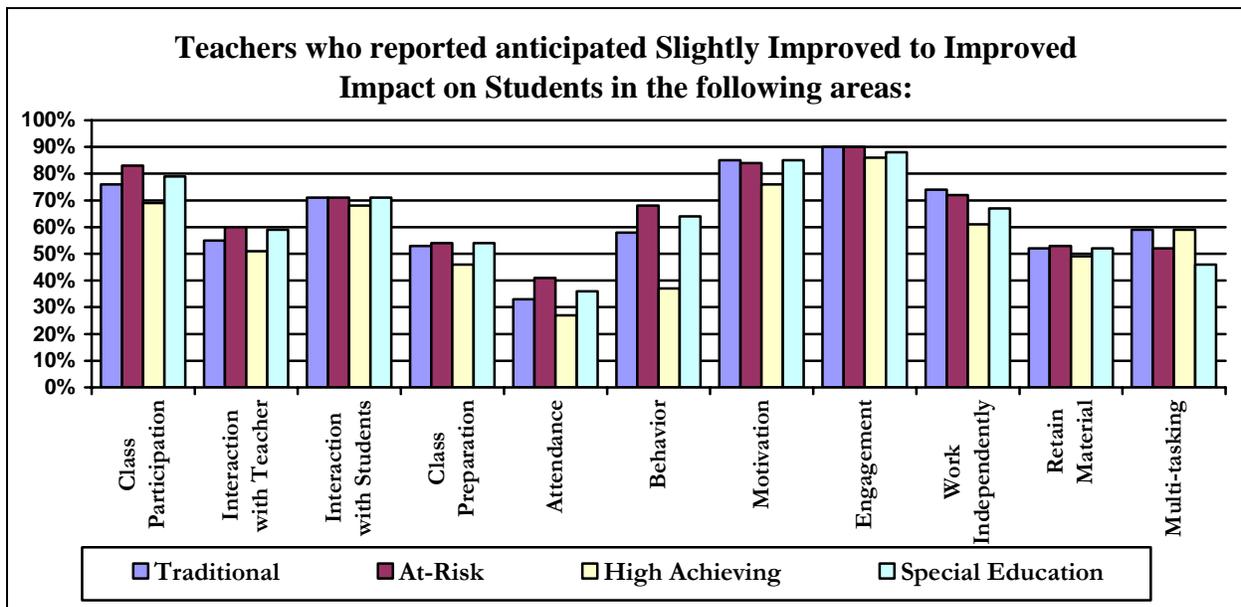
Another important impact of the laptops is that the interactions within the classroom also appear to be shifting. Teachers are reporting that the interactions occurring between students and teachers and between students and students have been enhanced. According to the teacher survey, roughly 55% of teachers responded that the laptops improved students’ interactions with them, and approximately 70% of teachers stated that interactions between students have improved. Moreover, 58% of teachers also stated that the laptop initiative has had a somewhat

positive to very positive impact on student and teacher collaboration. For example, some teachers are reporting witnessing more spontaneous informal teaching occurring in their classrooms in which students are helping out other students and helping to answer some technological based questions raised by teachers. As some teachers stated in interviews:

“I think they [the students] feel empowered because they can show me things on the computer that I don’t understand. Often the students know the answers that I don’t in terms of just the day to day workings of the machine or how to get the machine to do things. That reverses the role of the student and teacher which is fun for them and me too. It also fosters cooperation between the kids . . . it has created a lot more opportunities for interaction between peers.”

“I don’t know how to do an iMovie either but I’ve got five kids in my class that do, and they’re teaching other kids and they teach me.”

Figure 4



Are all types of students experiencing these positive impacts of the laptops? It appears so, from the perspective of teachers. And some are benefiting more than others, relatively speaking. Figure 4 represents teachers’ ratings of the anticipated impact of the laptops on eleven different learning-related behaviors for four different groups of students described briefly as: traditional, at-risk, high-achieving, and students in special education programs. According to the survey results, teachers anticipate improvements in all areas. Over 70% of teachers expect positive impacts for all students in class participation, motivation, and engagement. They

anticipate the greatest improvements for at-risk and special education students. Interview data indicate that some teachers are already observing these changes:

“If you look at some of the needier kids, there’s definitely been a marked improvement between on-task behavior, active participation. You know, that’s a big thing. You’ve got kids that just tend to sit there and that active participation has gone up. Definitely by 75-80%.”

“And the thing that I like, not only does it teach to the individual but it especially the special needs kids, because it really, for most of them, levels the playing field, for these special needs kids. We’ve got some kids that have some pretty severe needs and they can do some stuff that’s right up with the other kids.”

One teacher, when asked about the impact of the laptops on students with disabilities responded:

“I have a student in class who has asbergers syndrome, as an example, but he is able to use the laptop. He has difficulty with writing. He doesn’t particularly like the process of writing but he likes the laptop better than he likes his pen or pencil. He produces more because of the laptop.”

Another teacher commented during an interview:

“So I think it puts kids more on a level field. If you’re not a good writer you don’t always have to write. There are other ways to accomplish the same goals. I find kids with disabilities to be much quicker in picking up the technology pieces than your standard traditional high achieving kid. They are the ones who teach me . . . oh no Ms. Smith [name changed] . . . this is how you do this. They are very quick.”

However, it is not merely the special needs students that are improving as a result of the laptop program. As one teacher noted in an interview:

“I did a research project last year on on-task behavior. I did a language arts exercise, both using worksheets and laptops, and then I did a math exercise using worksheets and laptops. I did an observational study of on-task behavior, found out different criteria, identified different on-task behaviors, and measured them between one and the other. It was clear that they [the students] were much more on task when they were using the laptops. They then had an examination after both [the worksheets and the laptop assignments] and they did much better after using the laptops.”

While teachers expect high achieving students to experience more moderate improvements, relatively speaking, some parents reported positive impacts on their high achieving children. One parent explained in an interview that while her son has typically done really well in school, the implementation of the laptop program has helped him to keep busy when he finishes his homework and is waiting for the rest of his classmates to catch up.

“He’s a very bright child who a lot of times in standard classrooms can be done his work and so with the laptop there is always something quiet that he can be doing. . . The laptop gives him the power of, ok you’re still working on that, but I can go back and finish my homework now while you’re doing that. There’s that versatility there where he can go and not get in trouble and that was a real issue for him because he is a little information sponge.”

Another parent described on the Maine Learns website the impact on her son in these words:

“My son been so fortunate to have been ‘in the right place at the right time;’ namely, heading into 7th grade when this initiative got underway... Simply put, my 7th grade son is loving his laptop. Thus far he’s created two slide shows for projects in Spanish and in Language Arts, assisted his tech coordinator in gaining Internet access for students at home, done virtually ALL of his homework since November on his machine, and in general, enjoyed every discovery he’s made as a new Apple user (he uses a PC at home as well). His laptop talks, plays snippets of good music and stores all his files for easy access, at his fingertips. He can do homework in waiting rooms, on long car rides, on his mother’s boring shopping trips—anywhere! He feels good about his accomplishments in a way I haven’t seen for the past 7 years. He’s learning more material, and he’s learning it faster. He’s excited about learning. Bravo!!!”

Students, teachers, and parents alike are reporting many positive impacts that the MLTI is having on students and their learning. The utilization of the laptops has provided the students with opportunities to gather knowledge not otherwise available with standard textbooks and other classroom materials. Faster, easier access to communicate more readily with teachers and peers has made learning and going to school, and even homework, a more pleasant experience. These observations about the impact of the laptops on student learning are generally true for all students including those students who teachers define as at-risk and students with disabilities. There is also evidence that the nature of learning within the classroom is changing, with students taking more responsibility for their own learning. While it is still too early to determine the long-term impacts that the laptop program may have on student learning, the early findings support the notion that students are more interested and engaged in school, a condition that is generally accepted as essential to learning.

What obstacles, if any, are students encountering as they use laptops and technology?

Although students are very excited about the laptops, almost half of all students (45%) responding to the survey indicated having had a problem with using their laptop within the last two weeks. Students report that slow Internet connections, lost work due to problems with presentation software, and difficulty charging their laptops sometimes has an impact on their work. In interviews students reported:

“I’ve had trouble getting onto the Internet. Sometimes when I try, this rainbow circle comes up spinning and won’t stop.”

“Well sometimes when there’s a lot of people on the laptops trying to get on the Internet or the email to check something from your teacher, the server builds up...so it starts to freeze and it gets slower.”

“At one point there was a problem with my battery. It turned out it was dead, that it wasn’t charging when it was plugged in to charge.”

In reference to slow Internet connections, students are responding that they are still able to keep up with the class assignment and that oftentimes teachers have back up plans in place. In interviews students reported:

“We usually save it constantly so if that happens [Internet freezes] we can just force quit out of it or restart it.”

“Well, the teacher usually has a backup plan. Like if we are supposed to read the story on the Internet then they will hand us out the paper version.”

“I think I can catch up as long as you follow what the teachers tell you and save every once in a while. Then you can just force quit out of what you are doing and reopen it and then it’s right there.”

While some students are still able to keep up with the classroom instruction, some teachers report having to take the time to plan two classroom assignments in case of slow or non-existent internet connections. Also, while teachers tend to research appropriate websites for their students outside of the classroom, some teachers are reporting that they must then take additional time in the classroom to ensure that students will have access to these sites. Further research will need to be done to determine if these problems are short-term in nature or if they will continue as long-term issues for the classroom.

One concern raised early on in the implementation process involved student misuse of the laptops. However, preliminary data suggests that student misuse of the laptops has been minimal. According to the student survey, 15% of those students who responded stated that they have had their computer taken away for more than a class period for any reason. Therefore, it’s possible that the number of students who’ve had their laptops taken away for a disciplinary problem related directly to laptop usage may be even smaller. As one teacher explains in a teacher interview:

“It’s amazing when you give an adolescent a responsibility that many people didn’t think that they could handle, and I think if you look overall at the incidence and the percentage of the kids who are taking them home, they are doing a wonderful job and it’s great to see it. It’s helping that responsibility, it may be something that they know they’re going to get it next year probably the same one, and they want to take care of it. It’s not just a tool or piece of technology--it’s something that helps them grow.”

A principal also stated in an interview:

“And because they are lugging these laptops back and forth and doing this stuff at home, it’s been a lot of responsibility placed on them for these things and they just seem to be taking them back and forth and doing the right thing by them.”

Another obstacle which some teachers and students are experiencing involves take-home policies and Internet access. Since a considerable number of schools have yet to allow laptops to go home, and some homes lack Internet access, some teachers are finding they must allow more time during the school day and in their classes for students to complete assignments which use the laptops and/or the Internet. According to respondents from the student survey, only 14% of students stated that they had been allowed to take their laptop home. While a vast majority of these same students report having computer (93%) and Internet (88%) access at home, teachers are still cautious to assign computer and Internet based homework, so as not to exclude even a few students. As one teacher puts it:

“Certainly not everybody [has access to a computer at home] which is kind of an issue at this point, in a way, in terms of assignments and homework and expectations that way. Anything involving the Internet I stay away from just because there are enough students here that don’t have either a computer or computer with Internet access at home that it limits those possibilities.”

These problems, reflective of the “digital divide” should be resolved once more students are permitted to take the laptops home to complete homework and a system is in place for students to connect to the internet.

Discussion

This report examined the impact that the distribution of laptops to students in Maine is having on students and their learning. Overall, early evidence indicates that the Maine Learning Technology Initiative has dramatically increased the use of technology within schools. Students have reported using their laptops to research information, complete assignments, create projects, and communicate with teachers and other students. As the students begin to use the laptops more within their classes, they report an increase in interest in their school work and an increase

in the amount of work they are doing both in and out of school. The nature of student learning in classrooms may be also changing because students have the tools to pursue, organize, analyze, and present information more readily at hand. The classroom atmosphere appears to be shifting from teacher led to more student inspired instruction with students spontaneously searching out new information using their laptops and openly sharing this knowledge with other students in the classroom, as well as with their teachers. Although some students continue to experience technical problems, most are excited about using the laptops in their classes and are excited about the prospect of using the laptops more often.

While initial data reveals some positive effects on students and their learning, it is important to remember that conclusions are tentative and data collected during the second half of the implementation year will provide a more definitive assessment of the effectiveness and impact of the laptop program on students. Some of the obstacles noted in this report, such as problems with software, take-home policies, and Internet access will need to be monitored to determine if they are short-term issues or longer term concerns. Additionally, even though preliminary data suggests positive effects on student interest and an increase in the information available to students, whether or not these factors lead to increased academic achievement will need to be determined through further research.

Appendix A

Copies of Survey Instruments

MAINE LEARNING TECHNOLOGY INITIATIVE (MLTI)
Student Survey

Section I. Demographic Information

School Name: _____

Grade Level (circle one): 7th Grade 8th Grade

Gender (circle one): Male Female

Are you able to take your laptop home? Yes No Don't Know

If yes, how often do you take your laptop home?

- Once a week
- Two or three days a week
- Every day

When can you take your laptop home? (*Please check only one*)

- Only when I have been given a laptop project to do for homework
- As often as I want

Did you have a computer at home *before* you got your laptop? Yes No

If yes, how long have you been using a computer at home? _____ years

If yes, do you have access to the internet at home? Yes No

Have you ever taken a computer technology class at your school? Yes No

Before you received your laptop, how often did you use a computer **at school**?

- 0 hours per week
- 1-4 hours per week
- 5-10 hours per week
- more than 10 hours per week

Now that you have your laptop, how often do you use a computer **at school**?

- 0 hours per week
- 1-4 hours per week
- 5-10 hours per week
- more than 10 hours per week

What grades do you normally receive in school?

- | | |
|-------------------------------------|---|
| <input type="checkbox"/> Mostly A's | <input type="checkbox"/> Mostly A's and B's |
| <input type="checkbox"/> Mostly B's | <input type="checkbox"/> Mostly B's and C's |
| <input type="checkbox"/> Mostly C's | <input type="checkbox"/> Mostly C's and D's |
| <input type="checkbox"/> Mostly D's | <input type="checkbox"/> Other _____ |

In which subjects or classes do you use computers? (Check all that apply.)

- | | |
|--|--------------------------------------|
| <input type="checkbox"/> None | <input type="checkbox"/> Math |
| <input type="checkbox"/> Language Arts (reading/writing) | <input type="checkbox"/> Science |
| <input type="checkbox"/> Social Studies / History | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Art/Music | |

MAINE LEARNING TECHNOLOGY INITIATIVE (MLTI)
Student Survey

Section II. Laptop Skills

Rate your own skill in using the following:	Never Used	Beginner (I am just learning how to use this)	Intermediate (I am comfortable using this)	Advanced (I can help teach others)	Don't Know
Word processing	1	2	3	4	5
Email	1	2	3	4	5
Internet search engines (ex. AltaVista, Infoseek, Yahoo)	1	2	3	4	5
Spreadsheet software (ex. Excel)	1	2	3	4	5
Presentation software (ex. PowerPoint)	1	2	3	4	5
Paint or draw on the computer	1	2	3	4	5
Simulation software (ex. Lemonaid, SimCity)	1	2	3	4	5
Other: _____	1	2	3	4	5

Section III. Using the Laptop as a Tool

Circle the response that most accurately describes how often you use your laptop to do the following:					
	Never	Less than monthly	One or more times per month	One or more times per week	Every day or almost every day
Finding information for assignments	1	2	3	4	5
Sending email (communicating with friends and/or teachers)	1	2	3	4	5
Organizing information	1	2	3	4	5
Creating presentations and projects	1	2	3	4	5
Taking notes	1	2	3	4	5
Using computer simulations (ex. Lemonaid, SimCity, etc.)	1	2	3	4	5
Completing assignments	1	2	3	4	5
Taking quizzes / tests / assessments	1	2	3	4	5
Working on assignments in small groups	1	2	3	4	5
Doing drills to increase your skills in Math or Science or English, etc.	1	2	3	4	5

MAINE LEARNING TECHNOLOGY INITIATIVE (MLTI)
Student Survey

Section IV. Attitudes and Perceptions

Circle the response that most accurately describes your level of agreement with the following statements:						
	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
I prefer to use a laptop to do my schoolwork.	1	2	3	4	5	6
Laptops make schoolwork more fun/interesting.	1	2	3	4	5	6
I believe that the more often teachers use laptops to teach, the more I will enjoy school.	1	2	3	4	5	6
I believe that it is very important for me to learn how to use a laptop.	1	2	3	4	5	6
Laptops make schoolwork easier to do.	1	2	3	4	5	6
Laptops help me improve the quality of my school work.	1	2	3	4	5	6
Laptops help me understand my classes better.	1	2	3	4	5	6
I do more homework outside of school if I am able to use my laptop.	1	2	3	4	5	6
I would like to use my laptop more often.	1	2	3	4	5	6
Laptops allow me to get my work done more quickly.	1	2	3	4	5	6
I am excited about the laptop program.	1	2	3	4	5	6

Within the **last two weeks** have you had any problems with using your laptop? ____ Yes ____ No

If **Yes**, please explain these problems. _____

Section V. Computer Infraction Policies

Have you been instructed on what will happen if you misuse your computer? ____ Yes ____ No

Have you had your laptop taken away **for more than a class period** for any reason? ____ Yes ____ No

If yes, why was it taken away? _____

For how long was it taken away? ____ days

MAINE LEARNING TECHNOLOGY INITIATIVE (MLTI)
Teacher Survey

Directions: Please complete and return this survey by **December 6, 2002** in the enclosed pre-addressed postage-paid envelope. Your opinions are very important in completing a thorough evaluation of the MLTI. Please know that any information you provide in this survey is considered strictly confidential and absolutely no information will be given that may identify you to your school or the Department of Education.

If you have any questions, please feel free to contact **Dawn Lane at 207-228-8221** or by email dawnm@usm.maine.edu, **Paula Gravelle at 207-780-5497** or by email gravelle@usm.maine.edu, or **David Silvernail at 207-780-5297** or by email davids@usm.maine.edu.

School Name: _____

How long have you had your laptop? _____ week(s)

How long have your students had their laptops? _____ week(s)

Section I. Your Use of the Laptop as a Tool

Listed below are some ways in which **you** may be using your laptop in your work. Please indicate how frequently you use your laptop for your work in each area listed.

On average, how frequently do you perform the following tasks using your laptop:	Never	Less than once a week	Once a week	A few times a week	Once a day	Often during the day
1. Conducting research that contributes to lesson plans and curriculum design	1	2	3	4	5	6
2. Developing instructional materials and / or presentations	1	2	3	4	5	6
3. Producing homework assignments	1	2	3	4	5	6
4. Assessing student work	1	2	3	4	5	6
5. Managing student information	1	2	3	4	5	6
6. Communicating with colleagues inside and outside the school	1	2	3	4	5	6
7. Communicating with parents and students	1	2	3	4	5	6
8. Other: _____	1	2	3	4	5	6
9. Other: _____	1	2	3	4	5	6

Please describe a way in which you have been able to integrate the laptops into your classroom activities (i.e. created a lesson, online quizzes, using iMovie in student presentations, etc.)

MAINE LEARNING TECHNOLOGY INITIATIVE (MLTI)
Teacher Survey

Section II. The Laptop's Impact on Teachers and Teaching

Listed below are some areas which may have been affected by your use of the laptop. Please indicate the impact of the laptop program on you and your classroom practices in the following areas.

Impact Areas	Very Negative	Negative	Somewhat Negative	Neutral	Somewhat Positive	Positive	Very Positive
1. Planning for instruction	1	2	3	4	5	6	7
2. Presenting lessons	1	2	3	4	5	6	7
3. Creating assignments	1	2	3	4	5	6	7
4. Providing feedback to students	1	2	3	4	5	6	7
5. Assessing students	1	2	3	4	5	6	7
6. Creating integrated / interdisciplinary lessons	1	2	3	4	5	6	7
7. Teacher / Student collaboration	1	2	3	4	5	6	7
8. Teacher / Teacher collaboration	1	2	3	4	5	6	7
9. Classroom management	1	2	3	4	5	6	7
10. Other: _____	1	2	3	4	5	6	7
11. Other: _____	1	2	3	4	5	6	7

Section III. Your Students' Use of the Laptop as a Tool

Listed below are some ways in which your **students** may use their laptop in the classroom. Please indicate how frequently your students use their laptop in your classroom for each area listed.

How often do students in your classroom use the laptop to do the following:	Never	Less than once a week	Once a week	A few times a week	Once a day	Often during the day
1. Word processing of papers	1	2	3	4	5	6
2. Taking notes on the computer	1	2	3	4	5	6
3. Managing / analyzing information	1	2	3	4	5	6
4. Researching information	1	2	3	4	5	6
5. Completing assignments / taking tests	1	2	3	4	5	6
6. Doing drills to increase their competency (educational drill software, online quizzes, FunBrain, etc.)	1	2	3	4	5	6
7. Creating culminating projects to show what they have learned (web pages, multimedia projects, videos, etc.)	1	2	3	4	5	6
8. Other: _____	1	2	3	4	5	6
9. Other: _____	1	2	3	4	5	6

MAINE LEARNING TECHNOLOGY INITIATIVE (MLTI)
Teacher Survey

Section IV. The Laptop's Impact on Students and Learning

Listed below are some areas that may be impacted by the use of laptop's in the classroom. For each area please indicate the impact you think that the laptops will have/have on different student groups.

Areas	Traditional Students					At-Risk Students					High Achieving Students					Special Education Students				
	Declined	Slightly Declined	No Effect	Slightly Improved	Improved	Declined	Slightly Declined	No Effect	Slightly Improved	Improved	Declined	Slightly Declined	No Effect	Slightly Improved	Improved	Declined	Slightly Declined	No Effect	Slightly Improved	Improved
Participation in class	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Interaction with you	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Interactions with other students	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Preparation for class	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Attendance	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Behavior	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Motivation	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Engagement / interest levels	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Ability to work independently	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Ability to retain content material	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Multi-tasking	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Other: _____	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Other: _____	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

Section V. Professional Development

How would you rate your overall skill level in the use of the laptop for instruction:

- _____ Novice
- _____ Beginner (i.e. word processing, email)
- _____ Intermediate (i.e. Spreadsheets, PowerPoint, etc.)
- _____ Advanced (i.e. integrating technology into class work)
- _____ Expert (i.e. can teach staff how to operate various programs and supportive technology)

MAINE LEARNING TECHNOLOGY INITIATIVE (MLTI)
Teacher Survey

Below are listed different types of professional development and/or support for laptop use. Please indicate the appropriate response for each activity listed.

Professional Development Activity	Not Available	Available, But Did Not Participate	Not Effective	Somewhat Effective	Effective	Very Effective
1. Maine State Department of Education/ MLTI sponsored workshops	1	2	3	4	5	6
2. Local workshops/seminars on how to use the laptop	1	2	3	4	5	6
3. Local workshops/seminars on integrating the laptop into curriculum	1	2	3	4	5	6
4. Help-desk technical support provided by the district, in-school specialists, or others	1	2	3	4	5	6
5. Apple Help-Desk	1	2	3	4	5	6
6. Informal help from colleagues	1	2	3	4	5	6
7. Self-taught	1	2	3	4	5	6
8. Other: _____	1	2	3	4	5	6
9. Other: _____	1	2	3	4	5	6

Section VI. Demographic Information

1. How many years have you been teaching? _____ years

2. Highest Level of Education Completed: *(please check one)*

- | | |
|---|--|
| <input type="checkbox"/> Bachelor's Degree | <input type="checkbox"/> Master's Degree plus credits |
| <input type="checkbox"/> Bachelor's Degree plus credits | <input type="checkbox"/> Certificate of Advanced Study |
| <input type="checkbox"/> Master's Degree | <input type="checkbox"/> Doctorate |

3. Concentration area in which you teach: *(check all that apply)*

- | | | |
|--|--|--|
| <input type="checkbox"/> Science | <input type="checkbox"/> Foreign Languages | <input type="checkbox"/> Mathematics |
| <input type="checkbox"/> English/Language Arts | <input type="checkbox"/> Social Sciences | <input type="checkbox"/> Fine Arts |
| <input type="checkbox"/> Technology | <input type="checkbox"/> Special Education | <input type="checkbox"/> Physical Development/Health |
| <input type="checkbox"/> Gifted/Enrichment | <input type="checkbox"/> Library Services | <input type="checkbox"/> Guidance |

4. Please list the grade levels that you teach: _____ (grades)

5. Do you teach in a multi-age/grade classroom? Yes No

MAINE LEARNING TECHNOLOGY INITIATIVE (MLTI)
Teacher Survey

Section VII. Comments and Suggestions

Please describe successes you have experienced with the MLTI.

Please describe any challenges you have experienced with the MLTI.

Please include any other comments that you think may help us in assessing the impact of the MLTI and laptop program.

THANK YOU FOR YOUR ASSISTANCE.

benefit: student learning, teaching and administration, family and home, social and community, and economic development. The studies we cite represent examples rather than an exhaustive list. Detailed references may be found in the bibliography at end of this white paper.Â Reviewing data from the 1996 National Assessment of Educational Progress in mathematics, one study reported that students using home computers more often had higher levels of achievement in mathematics. (Wenglinsky, USA) This seems to echo findings from previous studies, describing incremental impacts when technology is more mobile, personalized, and integrated throughout the day and across the curriculum. â€¢ Another impact noted by researchers is increased family interaction.