



Technology and Assessment Study Collaborative

Technology Promoting Student Excellence:
An Investigation of the First Year
of 1:1 Computing in New Hampshire
Middle Schools

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Abstract:

Despite continued interest in and excitement about 1:1 computing, few research studies fully address the impacts on teaching and learning in these intensive computing environments. Given the initial positive results of recent 1:1 research and program evaluations, especially the Maine seventh and eighth grade statewide program, more public and policy-maker attention has turned to 1:1 technology as a promising educational reform. The current paper presents a program evaluation of the initial nine months of a 1:1 laptop program across six New Hampshire middle schools. The analysis of the New Hampshire data reflects many of the most cited benefits of 1:1 computing including: increased teacher and student use of technology across the curriculum, increased student engagement and motivation, and improved teacher-student interactions. In addition, participating teachers report improvements in student achievement and students' ability to retain content material.



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Introduction

“The transition to pervasive computing has profound implications for education and may represent as great a paradigm shift as the invention of writing itself.”

Bull, Bull, Garofolo, and Harris, 2002, p1.

Few modern educational initiatives have been as widespread, dramatic, and costly as the integration of computer technologies into American classrooms. Believing that increased use of computers will lead to improved teaching and learning, greater efficiency, and the development of important skills in students, educational leaders have made multi-billion dollar investments in educational technologies such that the national ratio of students to computers has dropped from 125:1 in 1983 to 4:1 in 2002 (Russell, Bebell, & Higgins, 2004). More recently, a new technology-rich environment is emerging in hundreds of American classrooms where technology is not a shared resource. Instead all teachers and students have access to educational technology through a 1:1 student to computer ratio.

The first 1:1 laptop program was launched in 1989 at the Ladies' Methodist College in Australia and at present, 1:1 laptop programs exist across Europe, including established 1:1 programs in France, Spain, Northern Ireland, and Germany. Domestically, 1:1 laptop programs are underway in a wide variety of educational settings including elementary, middle and high schools across rural, suburban and urban settings. The largest 1:1 laptop program is in Maine

where all of the 7th and 8th grade public school students and teachers across the state's 239 middle schools have Apple iBook laptops and are in the third year of the state funded Maine Learning Technology Initiative (MLTI) program. Another large school laptop program was launched at approximately the same time in Henrico County, Virginia where over 25,000 wireless laptops have been distributed to students and teachers spanning grades 6 through 12. Smaller 1:1 laptop programs are currently in place in a wide variety of educational settings including private and public institutions across elementary, middle and high schools currently including 25% of all Maine high schools.

Despite growing interest in and excitement about 1:1 computing, relatively little research focuses on teaching and learning in these intensive computing environments (Schacter, 1999). However, initial research findings, anecdotal evidence, and program evaluations suggest several positive outcomes including: increased student engagement (Russell, Bebell, Cowan & Corbelli, 2003), decreased disciplinary problems (MEPRI, 2003), increased use of computers for writing (Russell, Bebell, & Higgins, 2004), and teachers' perceived increase in students' academic performance (GMSP, 2004). One nearly universal finding across 1:1 research and evaluation is that teacher and student use of computers dramatically increases when compared to technology use prior to the 1:1 programs.

Given the initial positive, albeit limited results of current 1:1 technology programs, especially the Maine 7th and 8th grade statewide program, more public and policy-maker attention has turned to 1:1 technology as a promising educational reform. In late 2003, Governor Craig Benson of New Hampshire announced that he planned to spearhead a 1:1 pilot program across a handful of struggling New Hampshire schools. Specifically, Benson sought to replicate the findings of neighboring Maine's laptop program; publicly stating that: "under Maine's program absences, tardiness, and disciplinary cases are down while learning measures have increased" (Benson, 2003). In this paper, I summarize the development and implementation of the New Hampshire 1:1 laptop initiative and detail the first year results of the program evaluation.

Technology Promoting Student Excellence

On September 2, 2003, New Hampshire Governor Craig Benson announced a program to provide 1:1 wireless laptop computing to all seventh grade students and teachers in six of New Hampshire's neediest schools. The program, called "Technology Promoting Student Excellence" (TPSE), sought to locally replicate some of the positive results associated with Maine's two-year-old statewide laptop program. Specifically, the Governor cited decreases in absences, tardiness and disciplinary problems as well as increases in student learning and skill building as direct results of 1:1 technology initiatives.

Raising over 1.2 million dollars from 24 private organizations, the program is entirely privately funded allowing the program to be implemented more quickly than most educational initiatives. The Governor's office requested a list containing the state's "neediest" schools from the New Hampshire Department of Education. Principals at the nineteen schools were contacted and encouraged to compete for participation in the program through a lengthy application process. The six participating schools were announced in November 2003:

- Armand R. Dupont School (Allenstown, NH)
- Indian River Middle School (Canaan, NH)
- Haverhill Cooperative Middle School (N. Haverhill, NH)
- Paul School (Sanbornville, NH)
- Thornton Central School (Thornton, NH)
- Winnisquam Regional Middle School (Tilton, NH)

In January 2004, the program officially launched with Governor Benson personally handing out Apple iBook computers to seventh grade students¹ at each of the participating schools. In addition to the laptop computers, the TPSE program includes wireless classroom access, laptop computers for teachers, digital cameras, printers, video cameras, and a video conferencing camera. Apple's contract also stipulates teacher training and program support, which began in December 2003. Lastly, as part of the TPSE program, Boston College's Technology and Assessment Study Collaborative was awarded \$20,000 to conduct a one-year external evaluation to examine the initial effects of the program on instructional practices and classroom ecology. This paper summarizes the findings of the first year evaluation of the TPSE program.

Methodology

Teacher and student pre- and post-surveys were the primary data collection tool used for this evaluation to document changes in instructional practices, classroom ecology, and beliefs about educational technology. With the limitations of time and budget, already established online and paper-based surveys were adapted. Paper-based surveys were collected from the participating teachers and students across the six schools in January 2004 (just before the laptops were integrated into classrooms) and again in late May/early June 2004 (after the students and teachers had been using the new technology for about six months). These two survey administrations provided pre and post survey data from over 400 seventh grade students and 35 teachers across the six TPSE schools. As described in more detail below, a web-based follow-up survey was also used to collect data from the participating teachers in October 2004. Table 1 displays the data collection timeline used for the current study.

Table 1: Data Collection Timeline

	Pre Survey	Post Survey	Follow-Up Web Survey
Teacher Data	Jan. 2004	May/June 2004	Oct. 2004
Student Data	Jan. 2004	May/June 2004	---

Student and Teacher Surveys

Given the wide range of purported educational benefits afforded by ubiquitous technology, the student and teacher surveys collected information about a wide range of outcomes that may result through uses of educational computers by teachers and students across multiple subject areas. Both survey instruments were adapted from well-established, validated instruments² and compiled specifically to address the concerns and issues inherent in the TPSE design. The survey instruments were then subject to an external review from a team of educational technology experts including Chris Dede, Andy Zucker, John Bailey, Michael Russell and Linda Roberts. The student survey included measures of students' access to technology in school, use of technology in school across subject areas, personal comfort level with technology, access to technology at home, and various uses of technology at home. The teacher survey included measures of technology use in and out of the classroom, demographic information, teachers' comfort level with technology, and teachers' attitudes toward technology. Copies of the student and teacher surveys can be found in Appendix A and Appendix B respectively.

All surveys were printed and delivered to the six schools based upon the estimated January 2004 school enrollment. In nearly all cases, student surveys were distributed by a teacher or school principal and returned by mail to Boston

College where they were inputted into a computer database by trained undergraduate students, graduate students, and administrative staff. The response rates for the “pre” and “post” student surveys are reported below in Table 2.

Table 2: Response Rates for “Pre” and “Post” Student Surveys

	Estimated Number of Seventh Grade Students	Pre (1/04) Responses	Post (5/04) Responses
Dupont	63	61 (97%)	58 (92%)
Haverhill	73	73 (100%)	47 (64%)
Indian River	118	100 (85%)	96 (81%)
Paul	80	64 (80%)	61 (76%)
Thornton	28	27 (96%)	28 (100%)
Winnisquam	175	114 (65%)	134 (77%)
TOTAL	537	439 (82%)	424 (79%)

As Table 2 shows, the student survey response rate varied across the six TPSE schools from 100% (Haverhill 1/04) to 64% (Haverhill 5/04). Overall, the response rates generally fell in an acceptable range, with an 82% average response rate for the January administration and a 79% average response rate for the May/June administration.

The teacher survey response rates is more challenging to calculate as each school subscribed to a different school structure in addition to differing definitions of which teaching positions “counted” as participating TPSE teachers. For example, in one school, librarians and teacher aides were considered participating teachers while in other schools they were not. Additionally, some seventh grade classes were structured so that students had different teachers for each of their classes while other schools used a self-contained classroom model. In one school, the enrollment was so small that seventh grade students shared a classroom with eighth grade students creating a different learning environment than the other settings. In each case, the school chose to distribute the participating teacher survey to who they thought was appropriate.

In total, there were 47 total teacher responses across the six schools including both pre- and post-surveys. The breakdown of the completed teacher surveys are presented in Table 3.

Table 3: Pre-Post Teacher Survey Responses

	Responding Teachers
Pre-TPSE:	25
Post-TPSE:	22
Total N:	47

Across both pre- and post-survey administrations, approximately 10% of the teacher surveys were completed by school personnel other than Math, Social Studies, English Language Arts/Reading, or Science teachers. The breakdown of teacher respondents by subject area (both pre and post) is as follows (not mutually exclusive categories/subject areas):

- 9: Social Studies
- 9: Science
- 9: English Language Arts/Reading
- 8: Math

In conclusion, the actual teacher response rate seems reasonable given the limitations and constraints of data collection. In addition, the survey results have been shared with staff members of the participating schools. Both participating teachers and principals have conveyed that the teacher survey findings and results accurately represented their technology use and effectively captured overall staff sentiment.

Web-based Follow Up Teacher Surveys

In addition to the student and teacher surveys, it was requested by various program stakeholders to further query the teachers on the effects of the technology during the Fall of 2004. Specifically, there was a call for evidence that the laptops had made a significant impact on how teachers conduct their classes and how students of different ability levels are learning with the new technology. Teachers were queried with 12 Likert response items (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree) that addressed specific changes in their beliefs, practices and abilities since the adoption of the 1:1 program. In addition, teachers were also presented with a list of 14 types of student behavior, attitudes and activities and were asked to rate how such actions have changed (Declined, No Effect, Improved) since the laptop program was first launched. Teachers were asked to focus the responses to these survey items based on specific groups of students. These groups included:

- high achieving students
- at-risk or low-achieving students, and
- traditional students

Nearly all of the items used in the Fall 2004 follow-up teacher survey were adapted from the 1:1 teacher survey used in the Piscataquis Community High School Study (Great Maine Schools Project, 2004).

The teacher follow-up survey questions were administered through a secure web site that allowed teachers to respond anonymously to the short (fifteen-minute) follow-up survey. Each of the participating principals was contacted

to encourage staff participation and a resulting 32 TPSE teachers completed the follow-up survey. Given the previously discussed issues involved in defining participating teachers across the different settings, it is estimated that at least a 65% response rate was reached for the web-based follow up teacher survey. Generally a 65% response rate is an acceptable response rate for conducting survey research (Kerlinger, 1986). It should be noted that the specific results of the web-based follow up survey have been shared with staff and administration of the participating schools who conveyed that the findings fairly represented the overall staff sentiment.

Results

The findings presented in this report are based on pre- and post-surveys administered to students and teachers during the winter and spring of 2004. In addition, findings from a web-based follow up teacher survey administered in the Fall of 2004 are included. It is important to note that the majority of data presented represents the first six months of a 1:1 laptop initiative across six New Hampshire schools. Although this is an unusually short period of time to expect any educational effects, changes or reforms, the program leaders felt it was important to document the more immediate effects of the program on educational practices and beliefs. The present effort, thus, examines a 1:1 program in its infancy.

The results section of this paper begins by presenting findings from the student pre- and post-laptop surveys. Next, the pre- and post-survey data from the teachers is presented. Lastly, data from the web-based follow up teacher survey is presented. In most cases, statistical significance is not noted within the text. As the data reveal, the pre-post changes occurring within the student data are typically quite large. Given the moderate-sized sample, nearly all of the results were statistically significant at both the .05 level and .01 level. Despite the smaller sample size of participating teachers, statistical significance was detected for the majority of pre/post teacher survey analyses.

Student Pre/Post Survey Data

Students were first surveyed in early January 2004 just as the components of the TPSE 1:1 laptop program were being installed in their classrooms and schools, but before the students had actually begun using their new laptops. The same students were surveyed again in late May/early June of 2004 to measure the immediate effects of 1:1 computing on use of computers across the curriculum. The survey examined both general patterns of in-school technology use as well as more detailed and subject specific uses of technology both in school and at home.

Figure 1: Frequency of General Classroom Technology Use Across the Six Schools

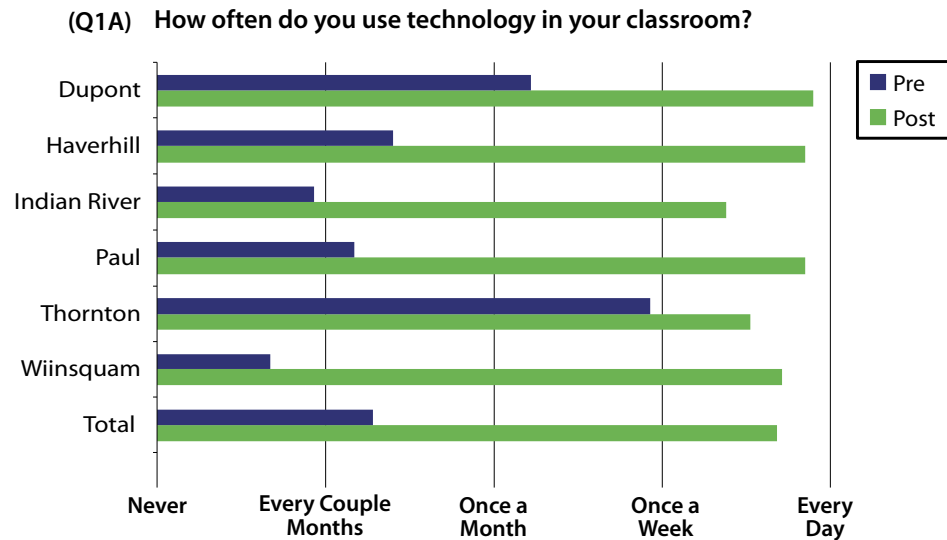


Figure 1 shows the average daily frequency of general classroom technology use across the six TPSE schools from both the January 2004 (pre) and the May/June 2004 (post) student survey administrations. In each of the TPSE settings, average technology use increased over the five/six months of 1:1 computing. In many cases (Indian River School, Paul School and Winnisquam School), student reported technology use increases from being almost non-existent to nearly every day. In general, Figure 1 illustrates a substantial increase in how regularly students are spending in-class time using technology. Additionally, Figure 1 shows that an increase in student-reported technology use was found across all settings, such that all six schools had frequent technology use occurring within six months of the TPSE inception.

Figure 2: Frequency of Students' Reported Computer Use Across Major Subject Area

(Q3) How often do you use a computer in school for each of the following subjects:

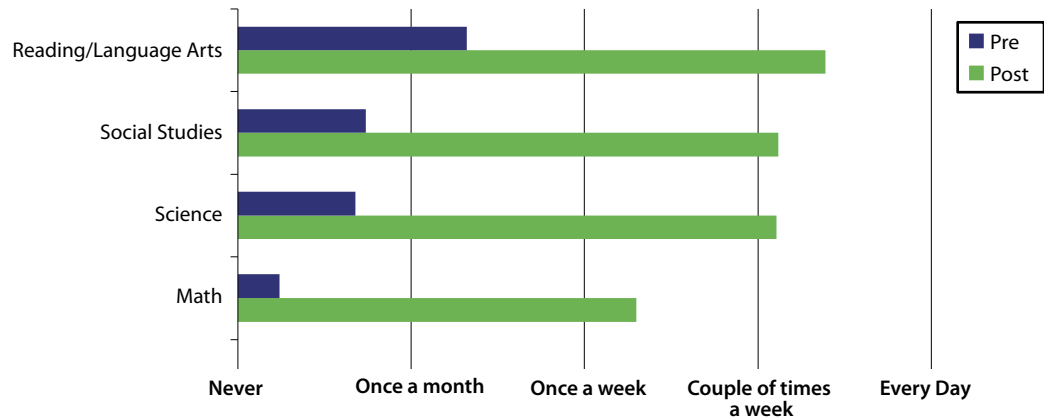


Figure 2 illustrates the average daily frequency of computer use across the curriculum for both the January 2004 (pre) and the May/June 2004 (post) student survey administrations. Here the students report increased computer use across all of the major subject areas. Students' pre-measures showed slightly greater than "once per month" computer use in Reading/Language Arts which was the most frequently reported subject for pre-TPSE in-school computer use. Pre-TPSE measures of Social Studies, Science and Math classes all indicated even less computer use than Reading/Language Arts with nearly no use originally reported for Math. In the post-measures, each subject shows an increase indicating that computer had become a frequent component across the curriculum. Although not reported in the current paper, the patterns of increased computer use across all of the major curricular areas were found in each of the six participating TPSE schools. To summarize, Figure 1 shows that technology use increased in every TPSE setting while Figure 2 shows that this increase in use occurred across the major curricular content areas. Figure 3 illustrates the variety of specific computer uses reported by the students in school for both pre-1:1 and post 1:1 measures.

(Figure 3 is shown on the following page.)

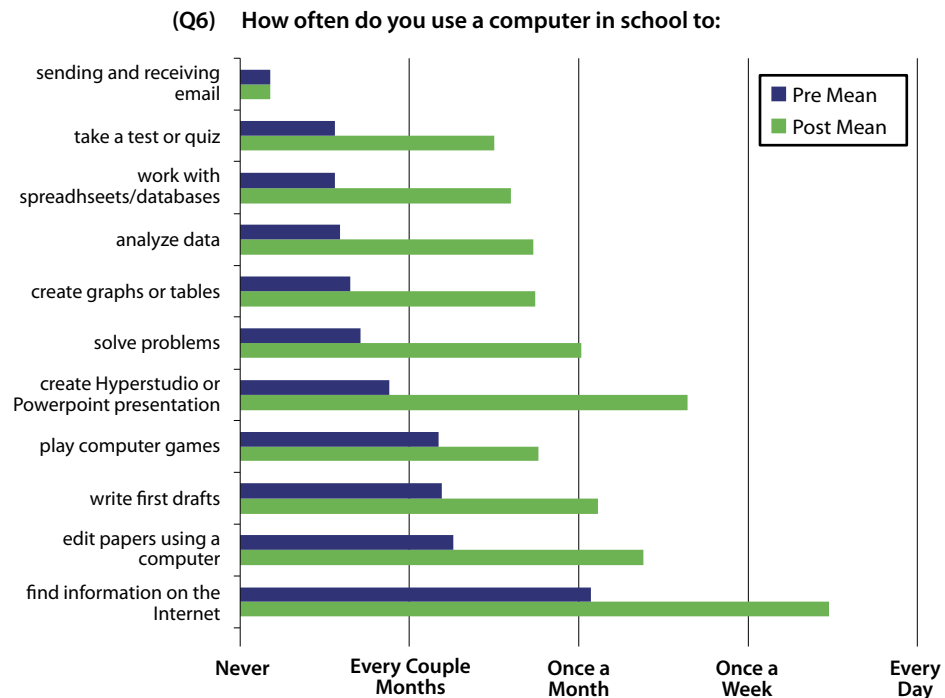
Figure 3: Frequency of Specific Student Technology Uses in School

Figure 3 shows the average daily frequency for specific student computer uses for both the January 2004 (pre) and the May/June 2004 (post) student survey administrations. Ranked from least frequently occurring to most frequently occurring, students reported very infrequent use of email, testing, analyzing data, creating graphs or spreadsheets on average in the pre-TPSE survey. Before 1:1 computing, students reported using computers to find information on the Internet and writing and editing papers as their most frequently occurring in-school computer uses. In the post measures, nearly all types of technology use increased. The exception is email use, which was generally discouraged during school time across all six schools. Again, use of the Internet and writing papers remain frequently occurring technology uses, however, creating Hyperstudio and Powerpoint presentations is reported to occur nearly as frequently. Also, students' reported use of computers to work with spreadsheets, databases, analyze data, and create graphs and tables increases in the 1:1 settings, triangulating the previous finding of increased technology use in Mathematics. In general, Figures 2 and 3 together illustrates that six months into the TPSE program students were using technology for a fairly wide variety of applications in school across the core curriculum.

Figure 4: Students' Reported Skills Across a Variety of Educational Technology Uses

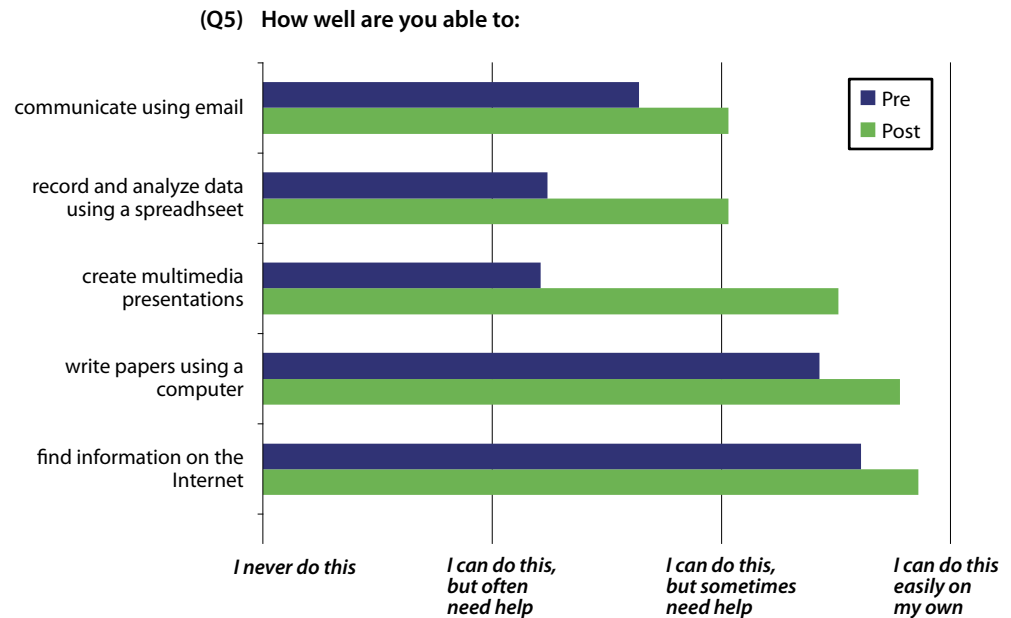


Figure 4 illustrates students' self reported pre and post technology skills. In every case, students report a post-TPSE increase in their ability to use technology, particularly for recording and analyzing data and creating multimedia presentations. These skills correspond to the previous results that illustrated increases in students' use of technology for recording and analyzing data and using spreadsheets in school. In general, students reported the most comfort using computers to write papers and find information on the Internet where the majority of students reported that they could perform such tasks "easily on my own" or "sometimes need help."

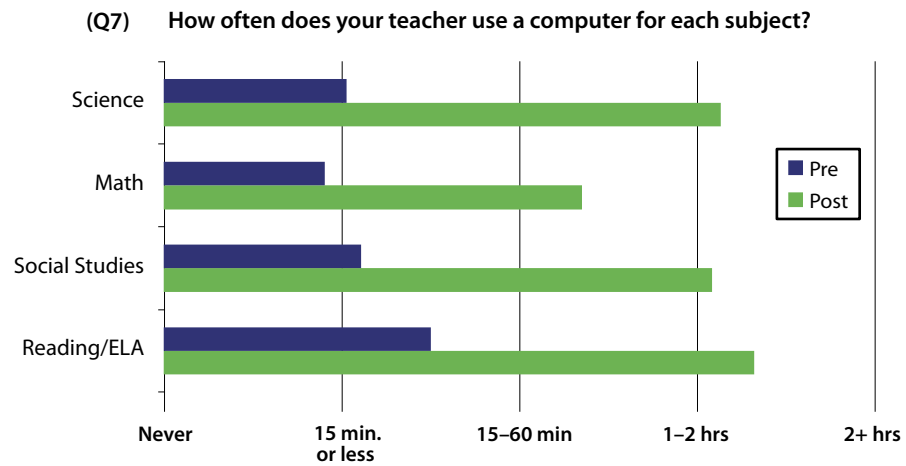
Figure 5: Students' Reported Teacher Use of Computers Across Curriculum

Figure 5 shows both the pre and post-TPSE measures of teachers' use of technology as reported by their students across the curriculum. Mirroring the students' self reported use of technology during this same period, students report that their teachers are using technology most frequently in Reading/ Language Arts in both pre-laptop and post-laptop measures. Teachers' use of technology increases in the post measures across all subject areas providing evidence that within the six months of the TPSE program, both teachers and students have increased their use of technology across the curriculum.

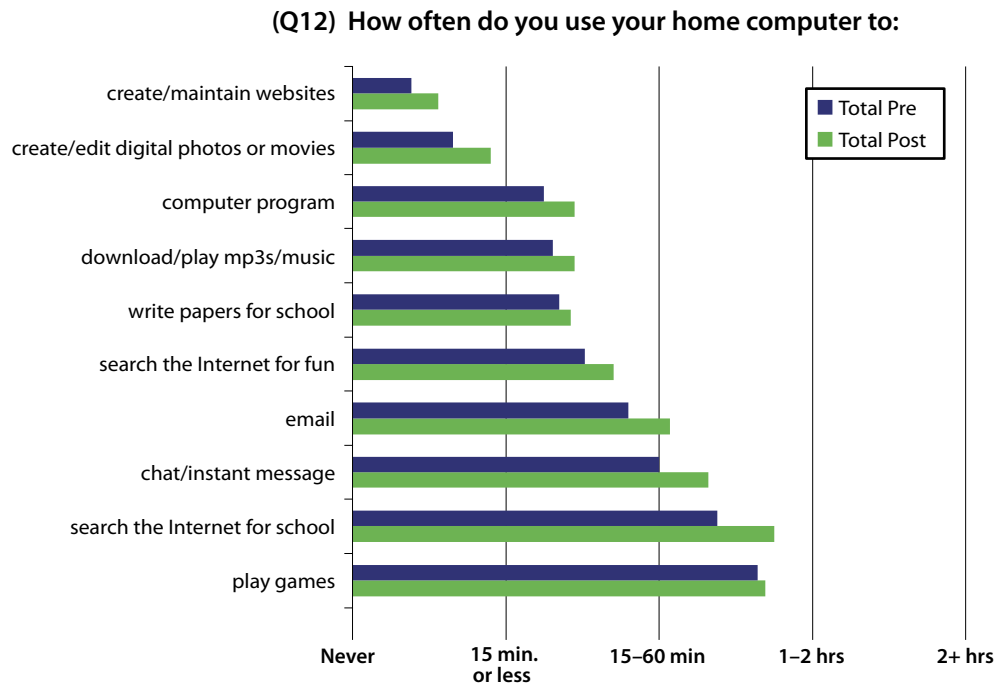
Figure 6: Frequency of Students' Reported Home Computer Use

Figure 6 illustrates the frequency of students' home computer use during the initial six months of the TPSE project. Over 90% of participating students reported having some access to a computer at home in the January 2004 survey, although the computers' age, quality, and ease of access varied widely. On average, Figure 6 shows that students were largely using technology at home for personal enjoyment (games, searching the Internet for fun, emailing) and school related tasks (search the Internet for school, write papers for school) with regular frequency. Comparing the pre and post-TPSE measures shows a small but consistent increase across all forms of home technology use. The largest relative "gains" in home technology use over the course of the six months were found for "searching the Internet for fun", "chatting/instant messaging", and "emailing".

Teacher Pre/Post Survey Data

Teachers were first surveyed in early January 2004 just as the first components of the TPSE 1:1 laptop program were being installed in their classrooms and schools. The same teachers were again surveyed in late May/early June of 2004 with a nearly identical instrument to measure the immediate effects of 1:1 computing across the curriculum. The pre-post teacher surveys included measures of various educational technology uses, teacher attitudes, technology access, and frequency of assigning technology-based assignments and activities. The results of the pre-post teacher survey are presented below; however, the current paper yields more space to the web-based follow-up teacher survey which included more detailed and specific survey items.

Teachers were first surveyed on the amount of technology they had access to in their schools and classrooms. Before the start of the TPSE program, the average classroom had 0.04 laptop computers, 3.2 desktop computers, and 1.9 AlphaSmarts or PDAs. In the post measure, access to technology in the classroom increased dramatically with an average classroom now having 18.5 laptop computers, 2.3 desktop computers, and 3.3 AlphaSmarts or PDAs available. The most obvious result of the implementation of any 1:1 laptop program is that there will be a large influx of new technology into the learning environment. The next set of survey questions explores the impact that this new technology and program had upon teacher practices and beliefs.

Figure 7 illustrates a number of educational pre/post technology uses for teachers across the six TPSE sites.

(Figure 7 is shown on the following page.)

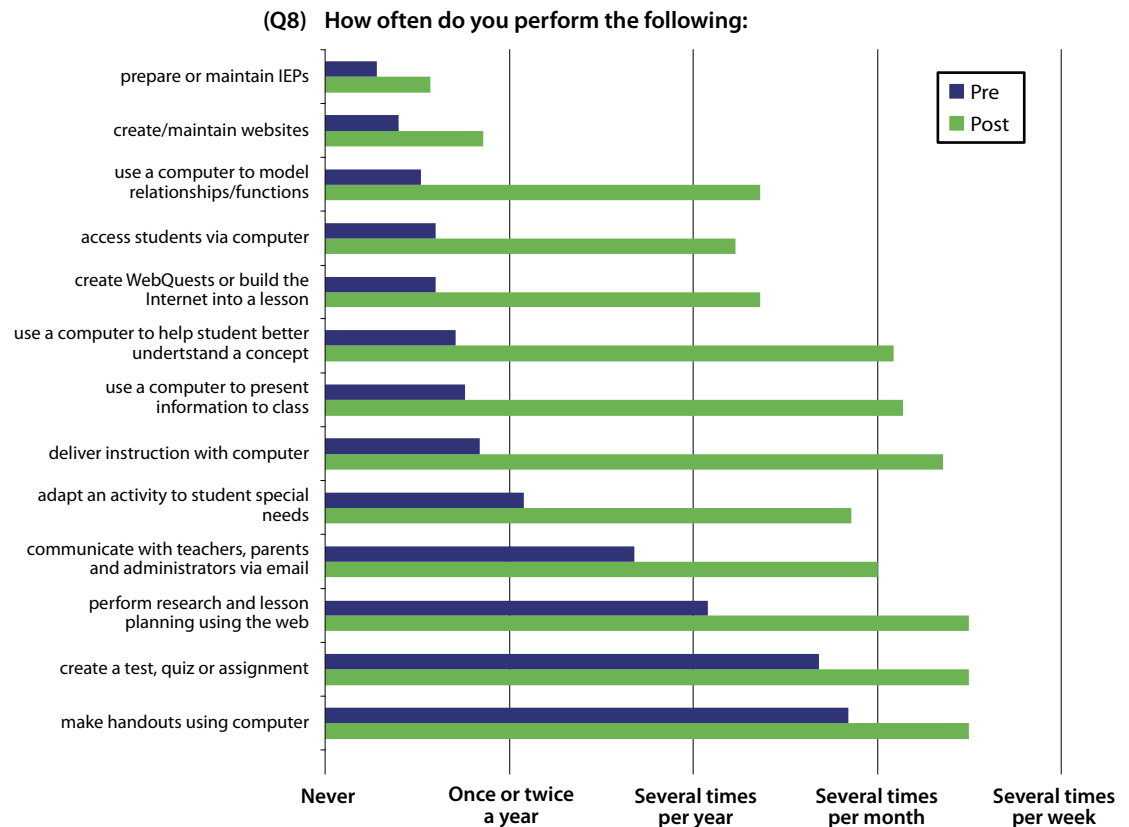
Figure 7: Teachers Pre and Post Frequency of Technology Use

Figure 7 shows the average frequency of teachers' various uses of technology collected during the pre (January 2004) and post (May/June 2004) TPSE surveys. In the pre 1:1 environment, teachers' most frequent uses of technology included using computers for making handouts and creating tests, quizzes and assignments, which occurred nearly several times per month, on average. Additionally, teachers also reported using a computer for performing research and lesson planning at least several times year, on average. Most of the other surveyed technology uses occurred with notably less frequency in the pre-TPSE environment averaging between almost never and once or twice a year. For every educational technology use included in the survey, an increase in teachers' average frequency of use was recorded in the first six months of the TPSE program. Using computers for making handouts and creating tests, quizzes and assignments remained teachers' most frequent uses of technology but were occurring between several times per month and several times per week, on average, in the post-TPSE surveys. In addition, performing research and lesson planning using the Internet, delivering instruction using a computer, using a computer to present information to the class, and using a computer to help students better understand concepts occurred nearly as frequently in the post measures (between several times per month and several times per week).

Teachers' in-class uses of technology saw the largest increases in occurrence with some specific uses averaging from less than once or twice per year in the pre-TPSE survey to over several times a month in the post-TPSE survey. Based upon the results in Figure 7, it is apparent that teachers quickly altered their existing practices in the 1:1 environment by increasing their use of technology for planning, research, preparation as well as communication, adapting lessons for special needs students, and general classroom instruction. In addition to teachers' own use of technology, the current study also explored teachers' frequency of assigning their students various technology embedded assignments. The results of these analyses are presented in Figure 8, below.

Figure 8: Frequency of Teachers' Assigning Students to Create Products Using Technology

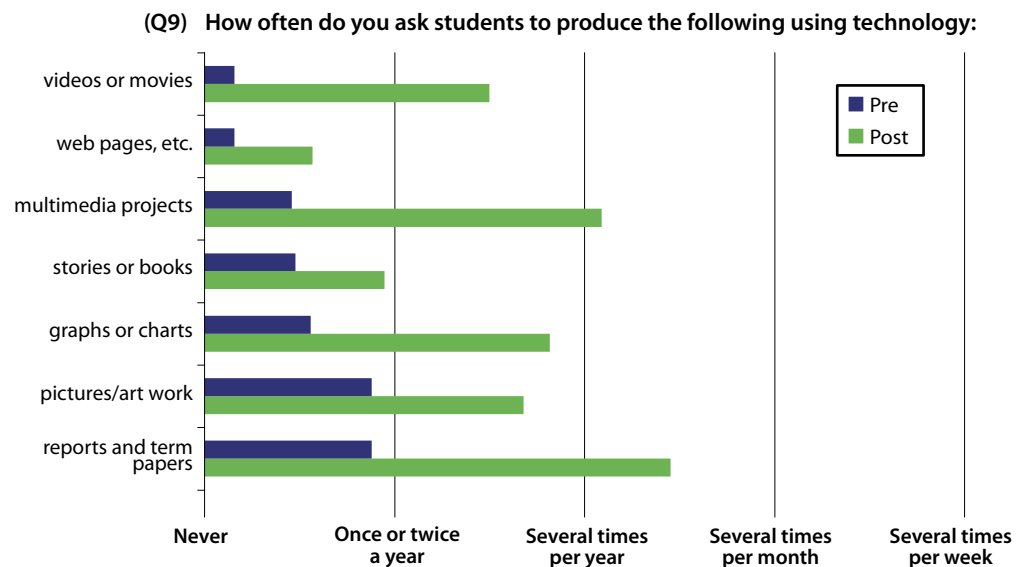


Figure 8 shows the pre and post frequency of teachers' assigning students to create various products using technology. In the pre 1:1 environment, teachers report assigning students technology-based products less than once or twice per year on average with the most frequent products being reports, term papers and pictures/art work. In the post-TPSE setting, teachers report an increase in each type of student product, on average, with the greatest increase observed for multimedia products, reports and term papers, videos and movies, and graphs and charts. Multimedia projects and reports and term papers become the most frequently assigned student projects in the post-TPSE setting occurring at least several times per year, on average.

In addition to observing shifts in the patterns and frequency of teachers' use of technology, the current investigation also explored shifts in teachers' attitudes and beliefs in the pre/post surveys as well as in greater detail in the

web-based follow-up survey. Although teachers' beliefs and attitudes were more fully explored in the web-based follow-up surveys, the pre-TPSE and post-TPSE surveys showed shifts in teachers' attitudes, confidence and beliefs. Specifically, a statistically significant increase was observed in teachers' belief of the "importance of computers in your teaching" in the post-TPSE surveys with the majority of respondents stating that computers were either "very important" or "somewhat important" in their teaching. A similar shift was also observed for measures of "teachers' confidence with using computers as a teaching tool" with the majority of respondents stating that they were either "very confident" or "somewhat confident" in post-TPSE surveys. Teachers' attitudes towards technology were generally positive in both pre and post-TPSE surveys with the majority of respondents indicating that they "strongly agree" or "agree" to the following statements:

- Students create better-looking products with computers than with other traditional media.
- Computers help students grasp difficult curricular concepts.
- Students work harder at their assignments when they use computers.
- Students are more willing to write second drafts when using a computer.
- Students develop a deeper understanding of the subject material.

In the pre-TPSE survey teachers did not as strongly agree with the statement: "students interact with each other more while working with computers", however in the post-TPSE surveys teachers overwhelmingly "strongly agreed" or "agreed" to this same statement. The only belief statements regarding the positive impacts of technology that did not increase in the teachers' post-TPSE surveys was "students develop a deeper understanding of the subject material" which had generally high levels of agreement in the pre-TPSE survey.

Teacher Follow Up Survey Data

In addition to the previously presented student and teacher pre/post survey data, further follow-up data was collected from the participating teachers during the Fall of 2004. The following results detail the data collected via a web-based survey in October 2004 from 32 teachers across the six TPSE schools focusing specifically on their beliefs and experiences having taught in a 1:1 laptop setting. First, Figure 9 illustrates the results of series of Likert-scaled items presented to teachers regarding teachers' beliefs and experiences in the TPSE program. Next, Figures 10–20 detail teachers' specific beliefs on the TPSE program impacts on high-achieving, low-achieving and traditional (i.e. average) students.

Figure 9: Teacher Beliefs as Measured by the Follow-up Teacher Survey (October 2004)

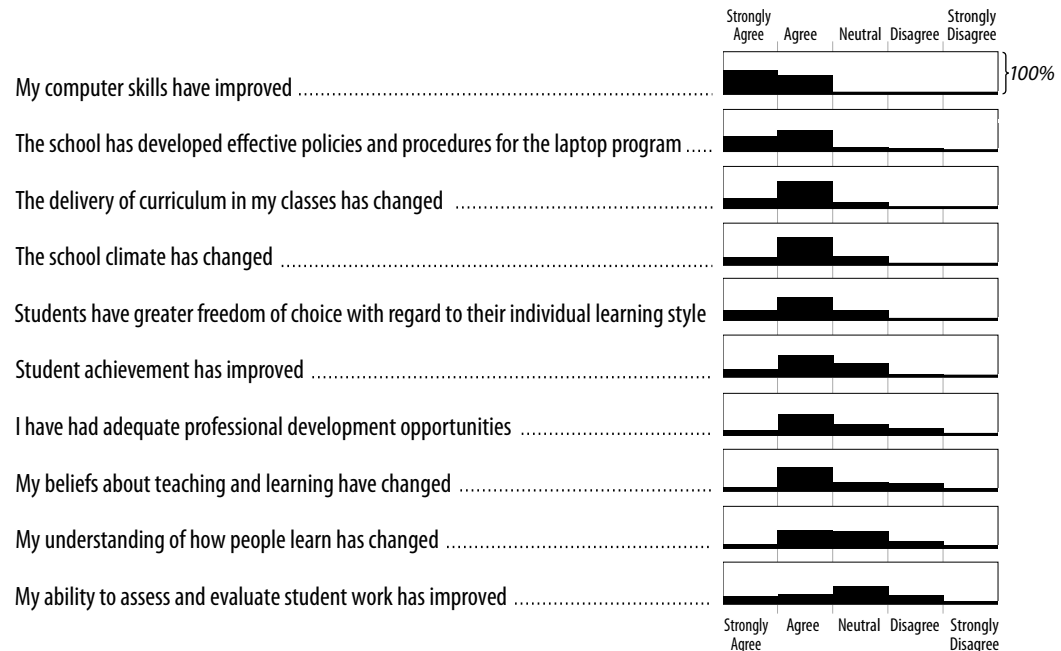


Figure 9 shows ten follow-up survey items and teachers' average responses ranked from most agreement to least agreement (top to bottom). As Figure 9 illustrates, participating teachers were generally quite positive toward their experiences and beliefs regarding the TPSE program and 1:1 computing. All (100%) responding teachers "strongly agreed" or "agreed" that their personal computer skills had improved since the beginning of the TPSE program. In addition, the teachers noted overwhelmingly that the school culture and environment has been affected by the program. Specifically, over 80% of responding teachers "strongly agreed" or "agreed" that the school climate had changed and over 70% of teachers believed that their role as a teacher within their own classroom had changed. In addition, nearly 90% of all responding teachers reported that the delivery of curriculum within their classes had changed since their school began the TPSE program. The majority of teachers also reported a personal shift in their own beliefs about teaching while nearly 50% of teachers reported that their understanding of how people learn had also changed (approximately 15% "disagreed" or "strongly disagreed" while 37.5% responded "neutral"). Teachers generally saw the new technology as a benefit for students with over 65% of respondents reporting that they felt student achievement had improved and nearly 75% of respondents stating that their students now have "greater freedom of choice with regard to their individual learning style." Lastly, teachers generally responded favorably to the implementation of the TPSE program itself with nearly 85% of teacher stating that their "school had

developed effective policies and procedures for the laptop program” and only about 15% of teachers disagreeing with the statement that they had been provided with “adequate professional development opportunities.”

Figure 10: Teachers’ Beliefs on the Impact of 1:1 Computing on Students’ Participation in Class

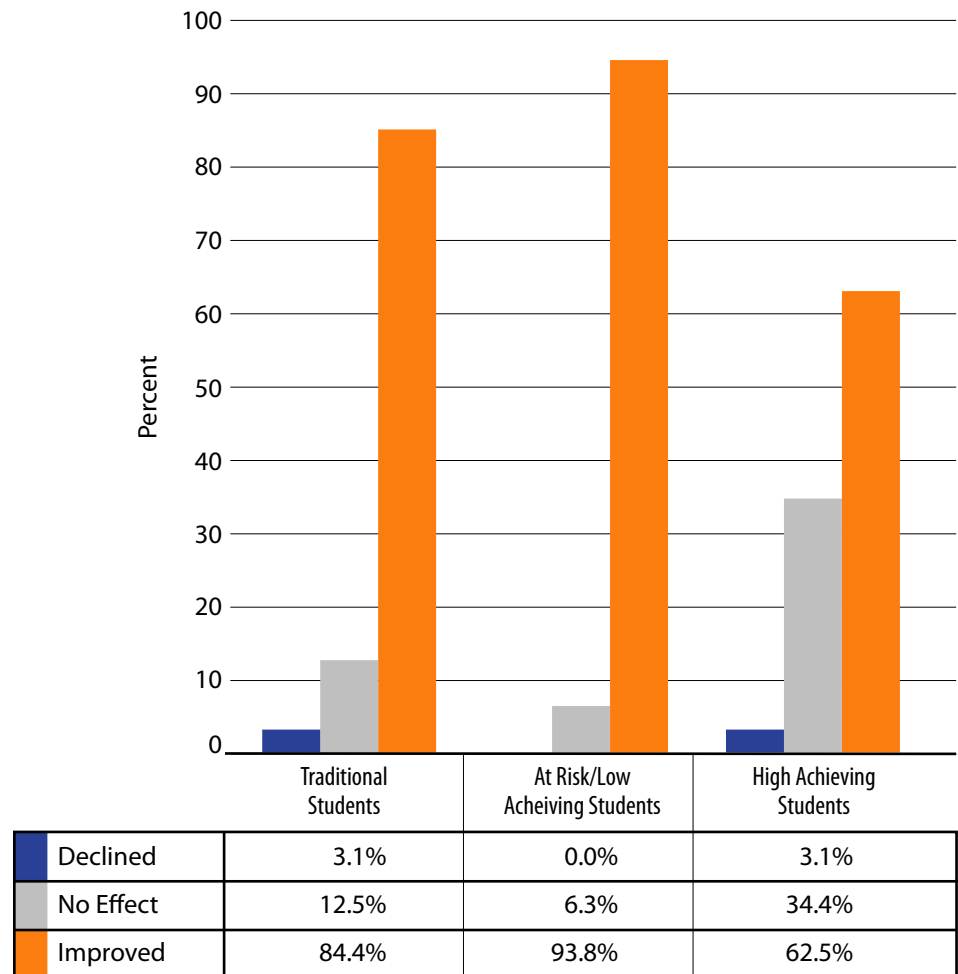


Figure 10 illustrates teachers’ beliefs on the impact of 1:1 computing on student’s participation in class. For all types of students, teachers found the TPSE program improved the participation of students in class. The most improved category was greatest for “at risk/low achieving” students with nearly all responding teachers (93.8%) reporting improvement in class participation compared to 84.4% for “traditional” students and 62.5% for “high achieving” students. One responding teacher (3.1% of all respondents) believed that the 1:1 laptops had led to declined class participation for his or her “traditional” and “high achieving” students.

Figure 11: Teachers' Beliefs on the Impact of 1:1 Computing on Students' Attendance

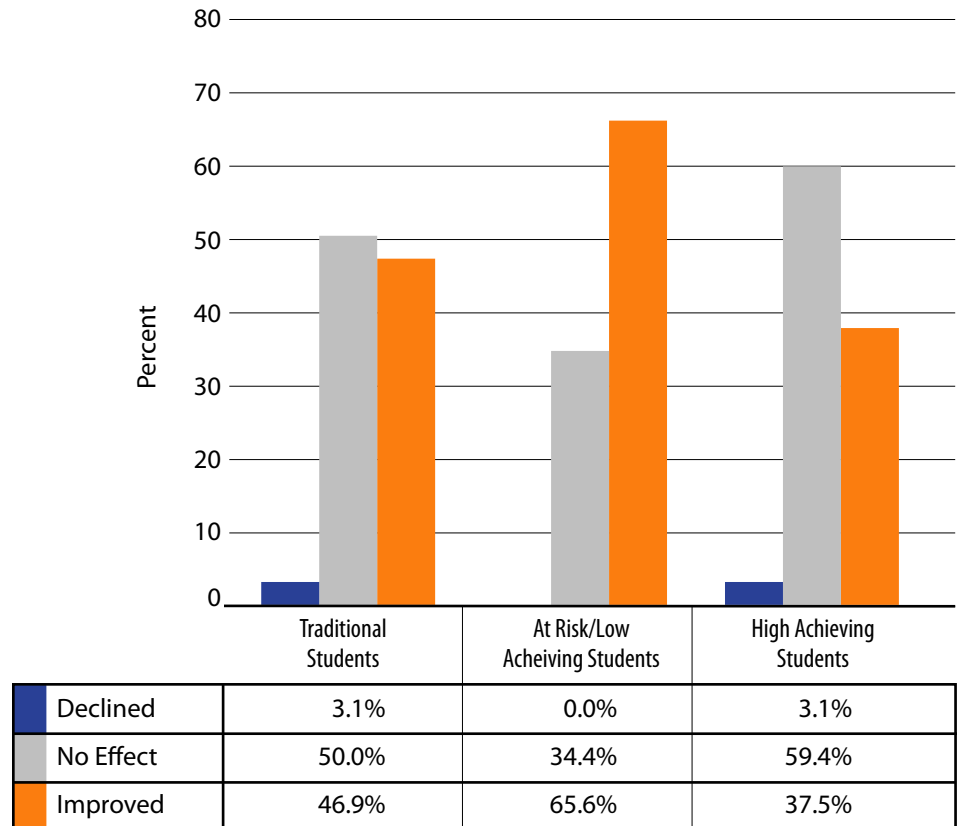


Figure 11 illustrates teachers' beliefs on the impact of 1:1 computing on students' attendance. For all types of students, teachers reported the TPSE program improved or had no effect upon attendance of students. "At risk/low achieving" students were seen to benefit most from the 1:1 program with 65.6% of teachers reporting improvement in attendance compared to 46.9% for "traditional" students and 37.5% for "high achieving" students. One responding teacher (3.1% of all respondents) associated 1:1 laptops with declined student attendance for his or her "traditional" and "high achieving" students.

Figure 12: Teachers' Beliefs on the Impact of 1:1 Computing on Students' Motivation

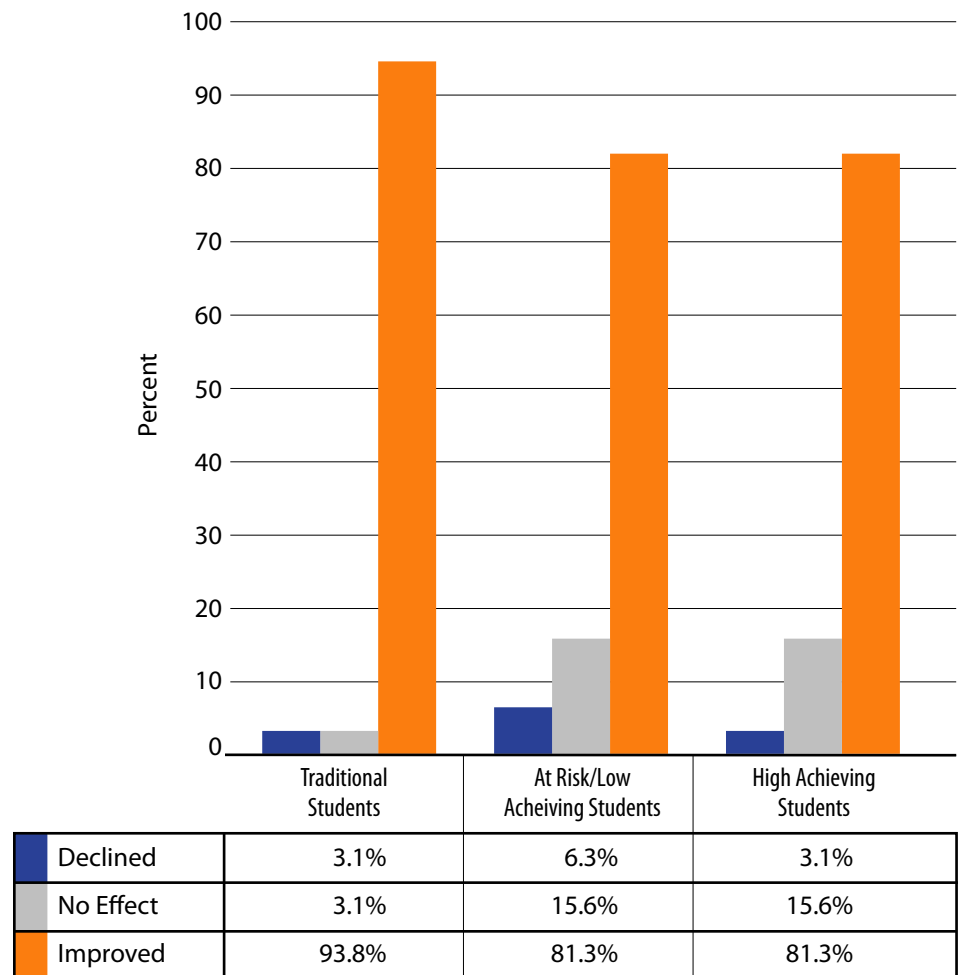


Figure 12 shows teachers' beliefs on the impact of the TPSE program on students' motivation during class. For all types of students, teachers found the laptop program to improve student motivation. The largest percentage of improvement was found for "traditional" students with nearly all responding teachers (93.8%) reporting that student motivation improved compared to 81.3% for both "at-risk/low achieving" students and "high achieving" students.

Figure 13: Teachers' Beliefs on the Impact of 1:1 Computing on Students' Engagement /Interest Level

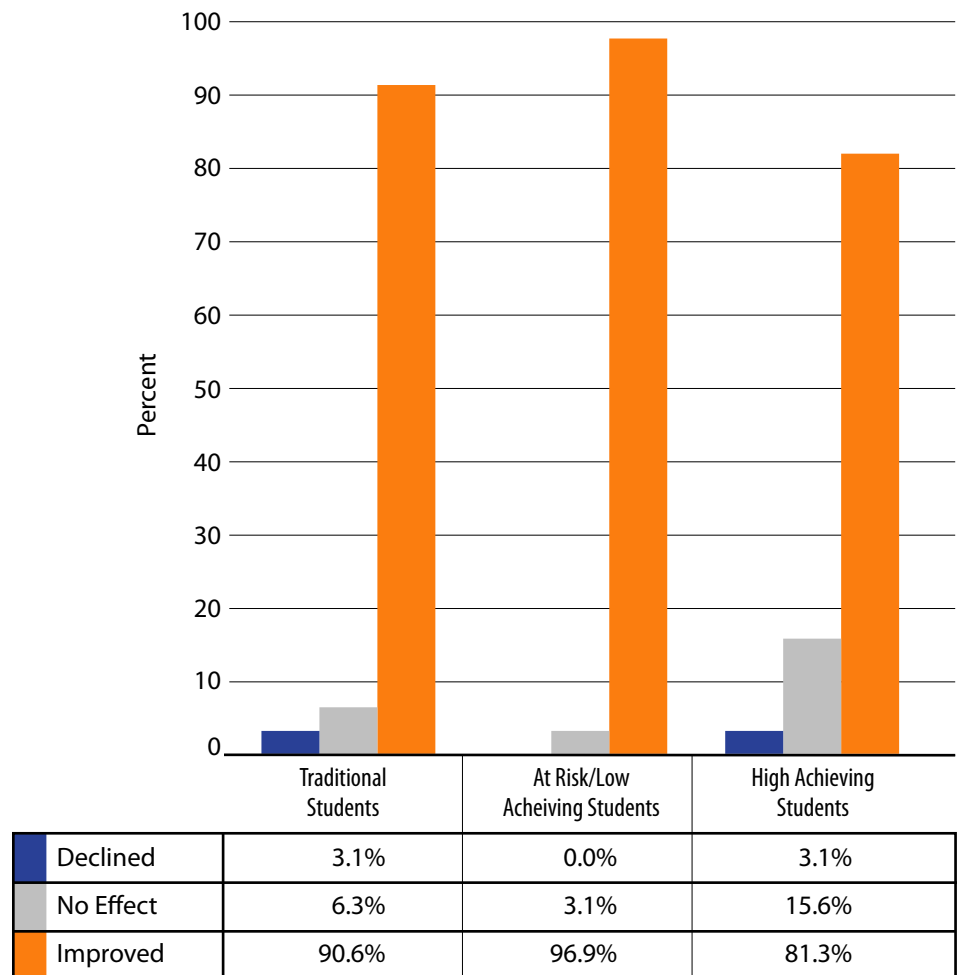


Figure 13 depicts teachers' beliefs on the impact of 1:1 computing on students' engagement and interest level during class. For all types of students, teachers found the TPSE program to improve student engagement. The improved category was greatest for "at risk/low achieving" students with nearly all responding teachers (96.9%) reporting that student engagement improved compared to 90.6% for "traditional" students and 81.3% for "high achieving" students. Again, one responding teacher (3.1% of all respondents) believed that the TPSE program had led to declined student engagement for both "traditional" and "high achieving" students.

Figure 14: Teachers' Beliefs on the Impact of 1:1 Computing on Students' Ability to Work Independently

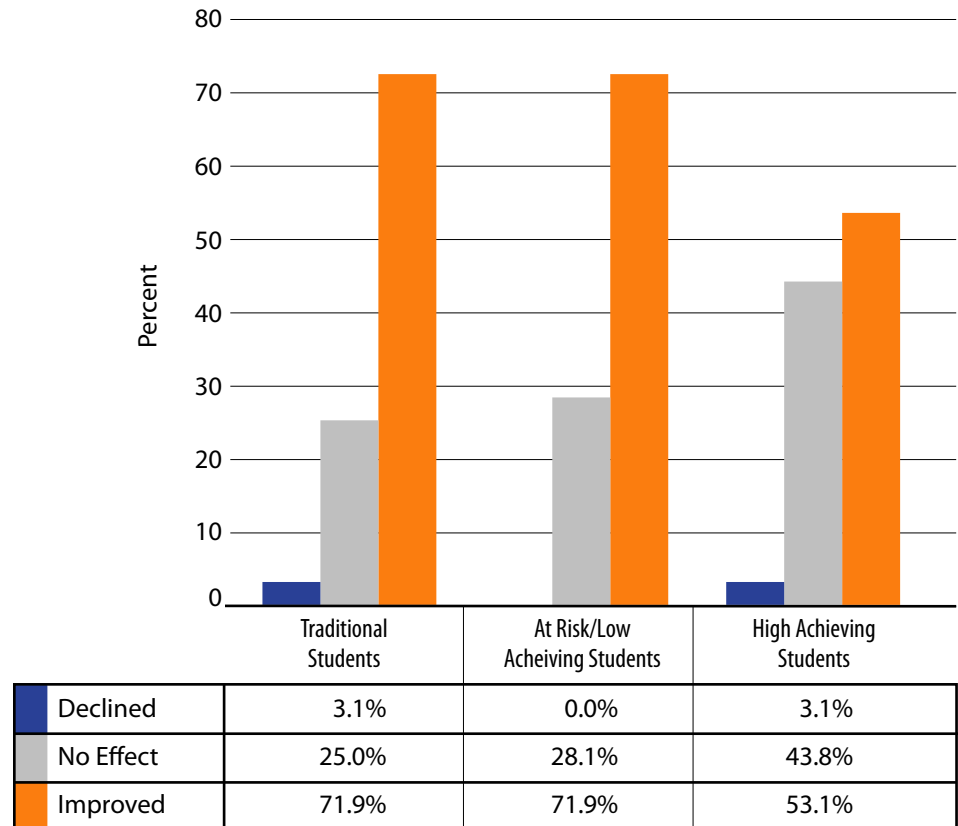


Figure 14 illustrates teachers' beliefs on the impact of 1:1 computing on students' ability to work independently. For all types of students, teachers generally believed the TPSE program improved the students' independent working skills. Both "traditional" and "at risk/low achieving" students were seen to benefit most from the 1:1 program with 71.9% of teachers reporting an improvement in students' ability to work independently. One responding teacher (3.1% of all respondents) associated 1:1 laptops with a decline in students' ability to work independently for his or her "traditional" and "high achieving" students.

Figure 15: Teachers' Beliefs on the Impact of 1:1 Computing on Students' Ability to Work in Groups

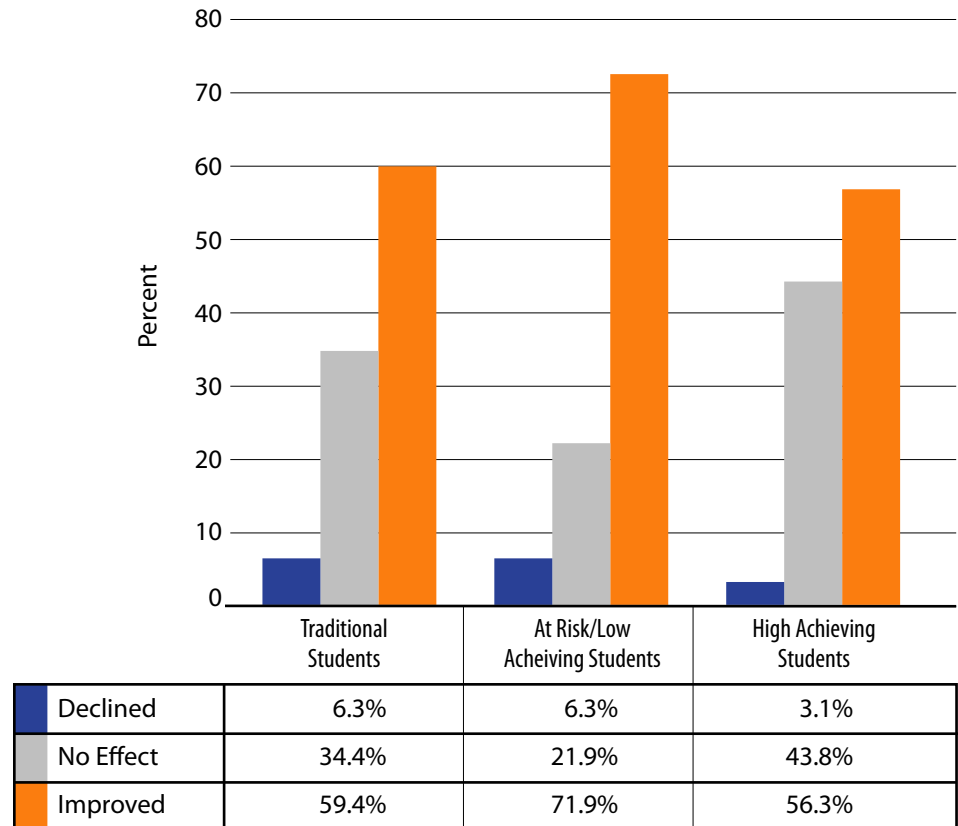


Figure 15 shows teachers' beliefs on the impact of 1:1 computing on students' ability to work in groups. For all types of students, teachers generally believed the 1:1 program improved the students' independent working skills. "At risk/low achieving" students were seen to benefit most from the TPSE program with 71.9% of teachers reporting an improvement in students' ability to work in groups. Two (6.3%) responding teachers associated 1:1 laptops with a decline in students' ability to work in groups for their "traditional" and "at risk/low achieving" students while one (3.1%) teacher reported a decline in "high achieving" students' ability to work in groups.

Figure 16: Teachers' Beliefs on the Impact of 1:1 Computing on Students' Ability to Retain Content Material

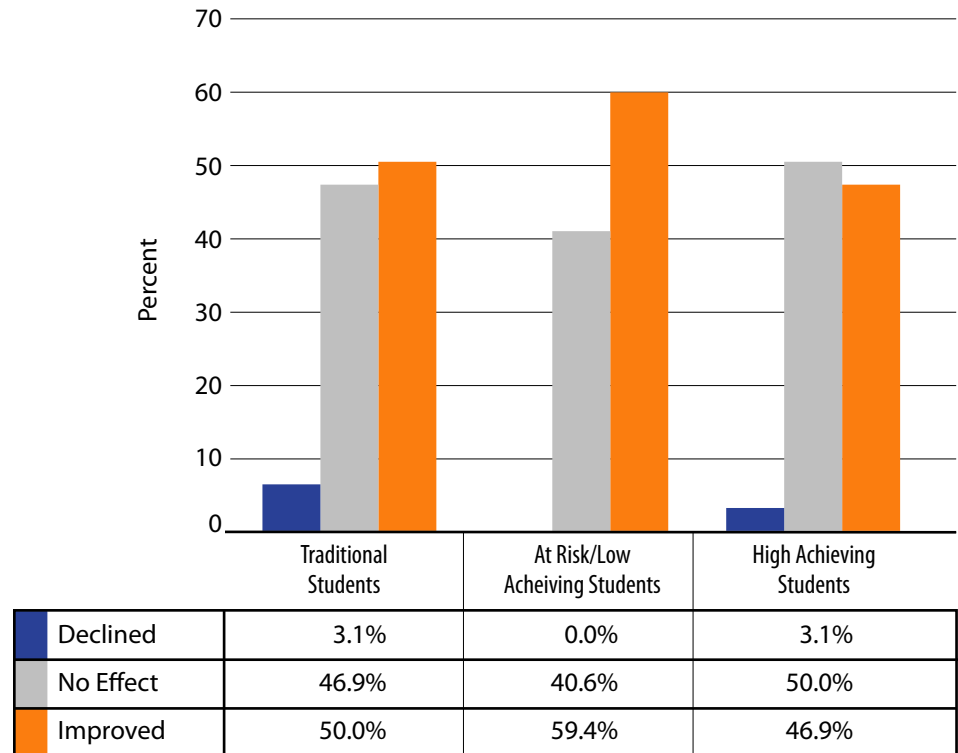


Figure 16 shows teachers' beliefs on the impact of 1:1 computing on students' ability to retain content material. For all types of students, teachers were nearly equally split between believing the TPSE program improved students' ability to retain content material or had no effect. Teachers reported that "at-risk/low achieving" students were exhibiting the greatest improvement in their ability to retain content material with 59.6% of respondents reporting improvement since the inception of the TPSE program. Again, one responding teacher (3.1% of all respondents) associated 1:1 laptops with a decline in students' ability to retain content material for his or her "traditional" and "high achieving" students.

Figure 17: Teachers' Beliefs on the Impact of 1:1 Computing on Students' Interaction With Teachers

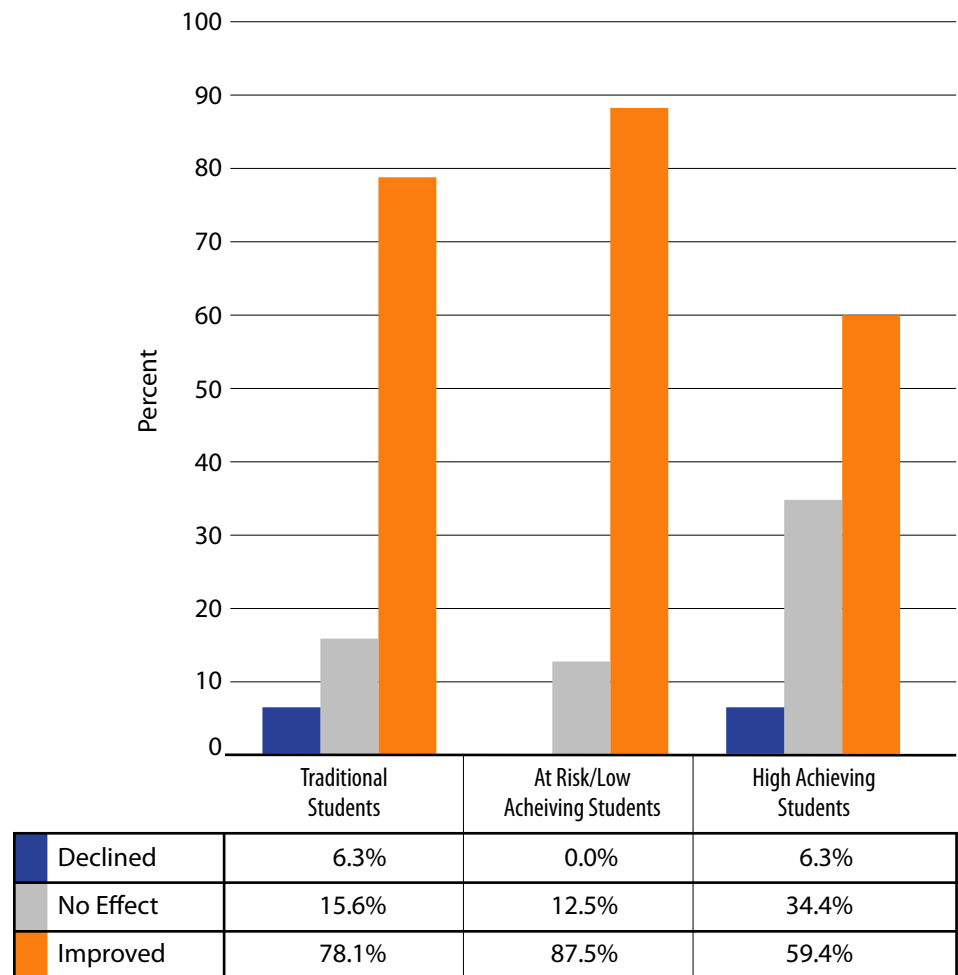


Figure 17 depicts teachers' beliefs on the impact of 1:1 computing on students' interactions with teachers. For all types of students, teachers generally found the TPSE program to improve students' interactions with teachers. The category with the lowest percent of improvement was for "high achieving" students with nearly 60% of responding teachers reporting that students' interactions with teachers improved compared to 78.1% for "traditional" students and 87.5% for "at-risk/low achieving" students. Two (6.3%) responding teachers believed that the TPSE program had led to declines in the quality of students' interaction with teachers for both their "traditional" and "high achieving" students.

Figure 18: Teachers' Beliefs on the Impact of 1:1 Computing on Students' Interaction With Other Students

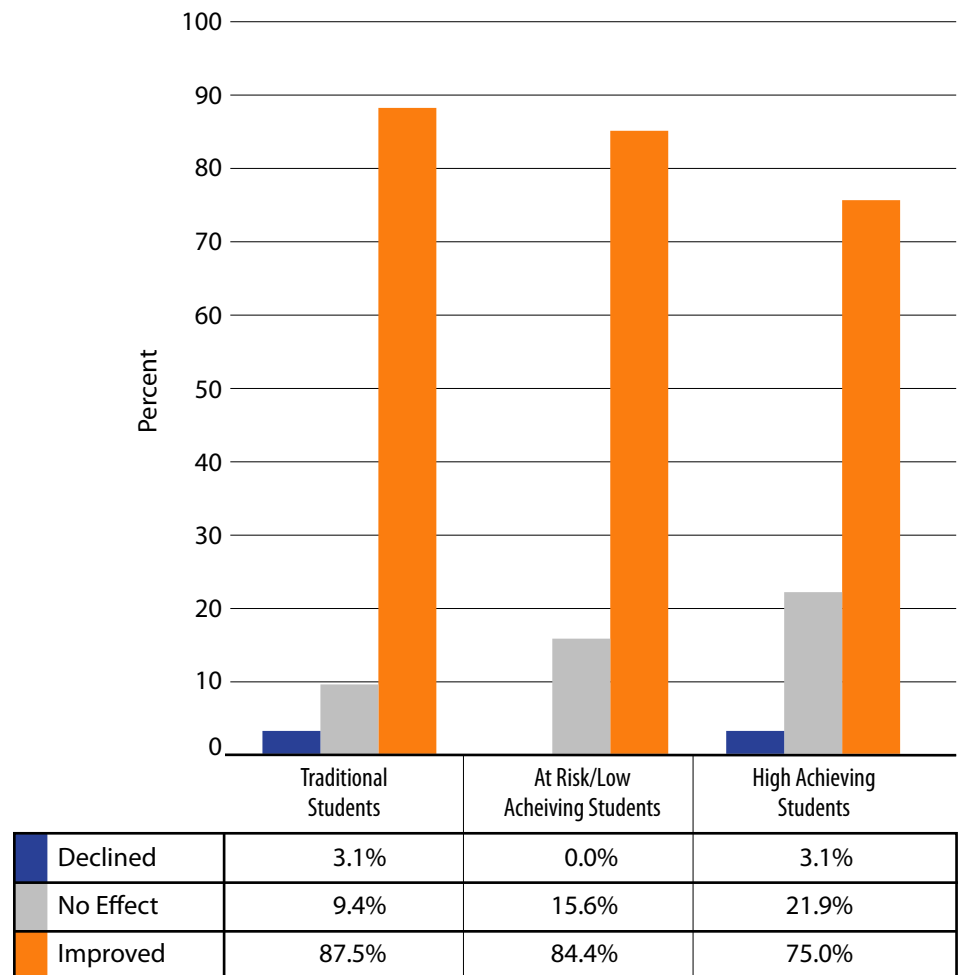


Figure 18 illustrates teachers' beliefs on the impact of the TPSE program on students' interactions with other students. For all types of students, teachers found that 1:1 computing improved students' interactions with the other students. Again, the category with lowest percent of improvement was for "high achieving" students with 75% of responding teachers reporting that students' interactions with other students improved compared to 87.5% for "traditional" students and 84.4% for "at-risk/low achieving" students. Again, one teacher (3.1% of all respondents) associated 1:1 laptops with a decline in students' interactions with the other students for his or her "traditional" and "high achieving" students.

Figure 19: Teachers' Beliefs on the Impact of 1:1 Computing on the Quality of Student Writing

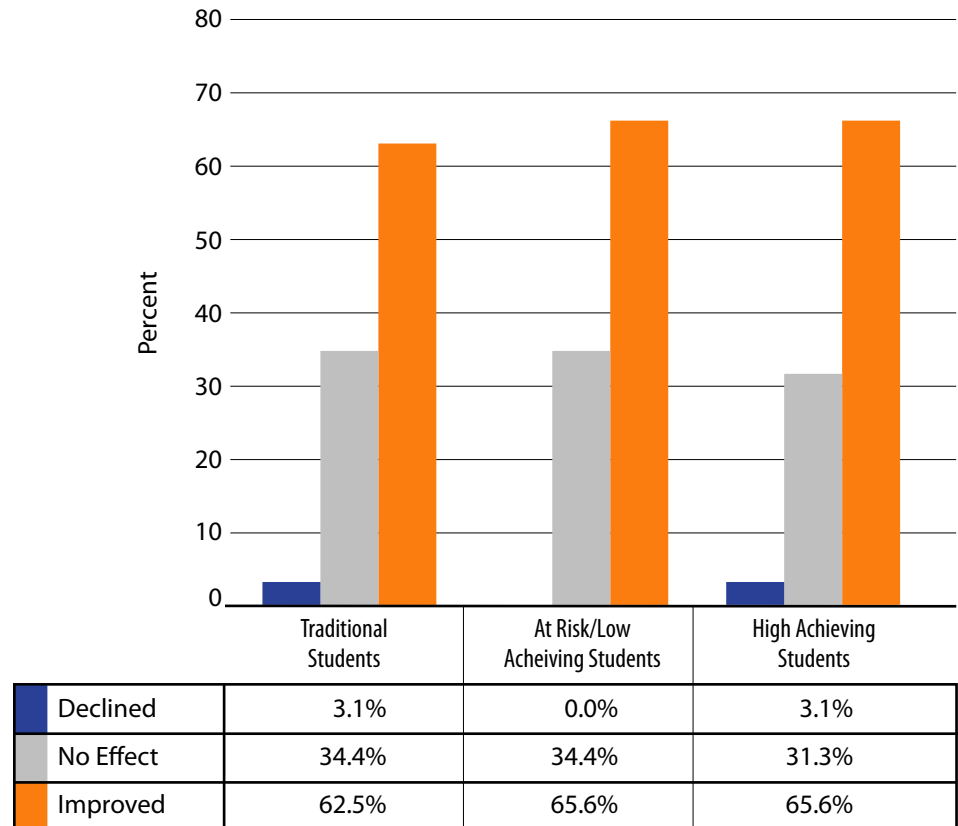


Figure 19 illustrates teachers' beliefs on the impact of 1:1 computing on students' writing quality. For all types of students, teachers generally believed the TPSE program improved the quality of students' writing. All groups of students (traditional, at-risk/low achieving, and high achieving) had very similar results with approximately 65% and 35% of teachers believing the quality of student writing had improved or had no effect, respectively. Once again, a single responding teacher (3.1% of all respondents) associated 1:1 laptops with a decline in students' quality of writing for his or her "traditional" and "high achieving" students.

Figure 20: Teachers' Beliefs on the Impact of 1:1 Computing on Peer Review in Class

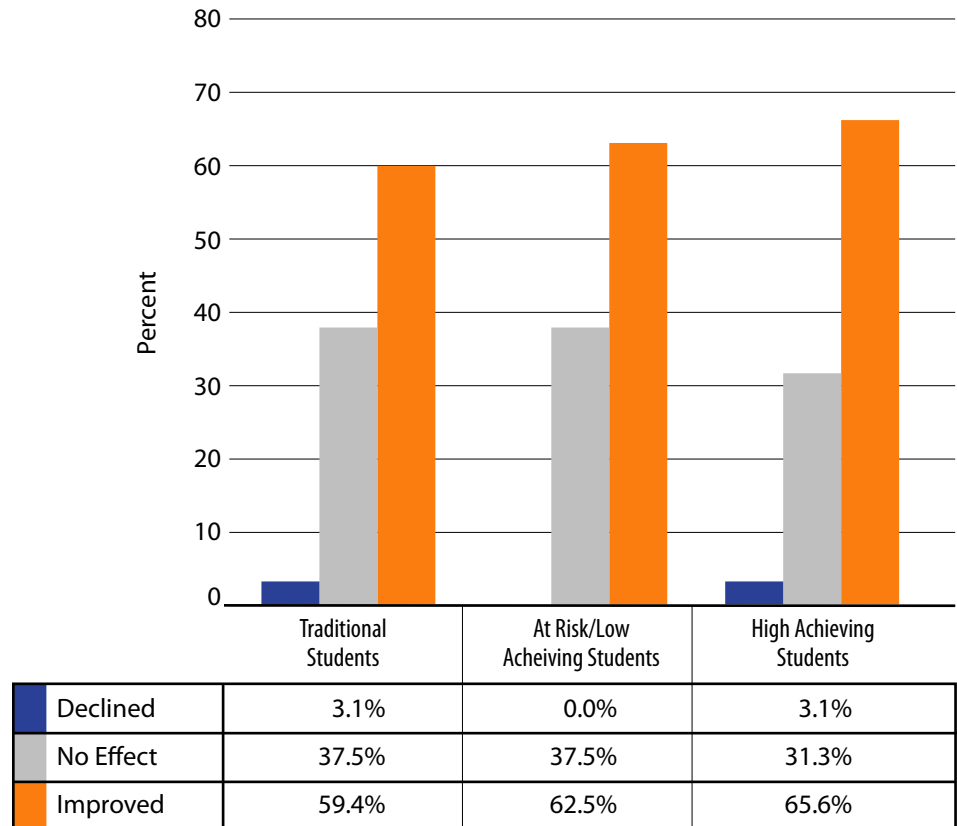


Figure 20 illustrates teachers' beliefs on the impact of 1:1 computing on students' peer review in class. For all types of students, teachers believed the TPSE program improved the peer review process of students. Both "high achieving" and "at risk/low achieving" students were seen to benefit most from the 1:1 program with 65.6% and 62.5% of teachers reporting improvement during peer review, respectively. Again, one responding teacher (3.1% of all respondents) associated 1:1 laptops with a decline in peer review in class for his or her "traditional" and "high achieving" students.

Discussion

Despite continued interest in and excitement about 1:1 computing, little scholarly literature examines the impacts on teaching and learning in these intensive computing environments (Schacter, 1999; Russell, Bebell, & Higgins, 2004). Given the initial positive results of 1:1 program evaluations, especially the Maine seventh and eighth grade statewide program, more public and policy-maker attention has turned to 1:1 technology as a promising strategy for spurring educational reform. The current paper explored the immediate effects (first nine months) of a 1:1 laptop program across six New Hampshire middle schools modeled after the Maine Learning Technology Initiative. The results of New Hampshire evaluation are consistent with the initial research findings, anecdotal evidence, and program evaluations of the Maine laptop program as well as other 1:1 programs that have been studied to date.

Initial findings from the New Hampshire 1:1 laptop program are consistent with many of the most cited benefits of 1:1 computing including: increased student engagement (Russell, Bebell, Cowan & Corbelli, 2003), decreased disciplinary problems (MEPRI, 2003), increased use of computers for writing (Russell, Bebell, & Higgins, 2004), and teachers' perceived increase in students' academic performance (GMSP, 2004). Like other studies of 1:1 computing (Russell, Bebell, & Higgins, 2004), participating teachers and students' use of computers dramatically increased across the curriculum.

The current investigation focused on the early stages of a 1:1 laptop program and documented that within the first six months of the TPSE program both students and teachers were actively using computers and other new technologies with a substantially greater frequency than prior to the program. In addition, the teacher and student surveys in each of the six schools indicate that technology use was widespread across the major curricular areas (i.e., Math, English/Language Arts, Science, and Social Studies). The data also indicates that, within six months of the programs inception, students and teachers were using computers in ways that they previously did not. In the pre-TPSE surveys (January 2004), students reported using technology sporadically in school to find information on the Internet and as a word processing tool. In the May/June 2004 post-TPSE surveys, students reported using technology as their primary means of composing and editing text, finding information, as well as creating presentations, sharing information, creating spreadsheets, analyzing data, and creating graphs and tables.

The pre- and post-TPSE teacher surveys also document that teachers quickly integrated technology into their work. Not only were increases recorded in teachers' use of technology for planning and preparation, teachers began using technology as an instructional tool across the curriculum and required students to create products using technology. Teachers also overwhelmingly

reported that their participation in the 1:1 laptop program had improved their own technology skills, abilities, and confidence. The survey results also show that many teachers report that their participation in the program led them to change their understanding of how people learn and to reflect on education as a whole. Given that over 60% of staff participating in the TPSE program had been teaching for at least five years, the transformational effects that occurred during the first six to nine months of the 1:1 computing initiative are striking.

In addition to showing increases in students and teachers' use of technology in school, the results of the web-based follow-up teacher survey (October 2004) document teachers' strong belief that the TPSE program had positive impacts on teaching and learning for all types of students. Specifically, nearly all teachers reported that students across all ability levels were more motivated, more engaged, and participated more when laptops were available at 1:1 ratio. Most teachers also reported improvements in their interactions with students and interactions among students. The improvement of student to teacher interactions was reported to be greatest for at-risk/low achieving students. In addition, the majority of teachers noted that students' peer review improved during the initial months of the TPSE program. Despite concern that 1:1 laptop programs may lead to less collaborative work among students, the majority of TPSE teachers report that students of all ability levels demonstrated improvements in both working independently as well as collaboratively with their peers.

Since there were no common measures of student learning across participating schools, no testing data was available to examine the effects of the TPSE program on student learning. However, several survey questions asked teachers about their perceived impact of the laptop program on their students' learning and academic progress. Teachers generally reported improvements in student achievement and indicated increases in students' ability to retain content material and the quality of students' writing. Teachers also reported that laptops were used to better meet students' learning styles and differentiate instruction.

The results of this evaluation are striking for a number of reasons. First, the relatively short time between pre and post data collection periods shows that the impacts of a 1:1 laptop program can occur quickly. Within six months of the initial laptop distribution and staff training, there is evidence that the technology is being used frequently and widely across the curriculum by teachers and students. Given teachers' generally positive ratings on the implementation of the TPSE program and their approval of their professional development offerings, it appears that the TPSE program is an initial success. Although not the focus of the present evaluation, the program's success undoubtedly is attributable to a number of factors that include the program's training and professional development component, the technical and curricular support provided

to the staff, as well as the school culture and leadership. Secondly, the evaluation results demonstrate the transformational effect 1:1 computing had on instructional practices and learning opportunities in each of the six schools. As also reported for Maine's laptop initiative, teachers not only changed the way they developed and delivered their lessons by incorporating technology, but teachers also report large shifts in classroom dynamics and interactions. Moreover, this led a large segment of the participants to reevaluate their understanding of teaching and learning. In today's age of top-down educational reform, which is seldom embraced by school leaders and staff, the fact that a 1:1 pilot program can transform the way veteran teachers approach and understand teaching and learning is noteworthy.

It is important to remember that the current investigation focused on a very short time period during the early stages of a newly established 1:1 program. As such, the positive effects described by teachers and students may be influenced by the novelty of the program or the attention focused upon the program from the Governor, the evaluator and the public (i.e. Hawthorne effect). In addition, the evaluator focuses solely on student and teacher voices. The perspectives of parents, administrators and policy maker are absent from this evaluation. However, informal conversations with the school principals reveal a similarly positive depiction of the program. It is also important to recall that the six participating TPSE schools were selected purposefully for the program (largely based upon need) and completed an intensive application process. The data presented in the current paper pertains to school settings that actively sought participation in a 1:1 laptop program and were schools struggling financially and/or academically.

Given that the present study focuses on the early stages of the TPSE program, it would be beneficial to continue the evaluation work across the six schools. It would also be valuable to document the principals practices and beliefs since the role of principals has been shown to be an important that influences the success of traditional technology programs (O'Dwyer, Russell & Bebell; 2004). Quantifiable measures of student achievement should also be collected to examine if teachers' reported benefits of 1:1 computing translate into improvements in traditional measures of student achievement (i.e. test scores). Given that there is already ample evidence of computer use across the curriculum, these six school settings provide ideal sites to conduct further research on the impacts of technology use on teaching and learning.

This report begins with a quote that espouses the huge scope of educational reform possible with the advent of 1:1 computing. Many technology proponents claim the development of ubiquitous computing will revolutionize teaching and learning in a way not unlike the introduction of textbooks and the arrival of affordable paper for student writing. Amidst all of the various calls for sweeping educational reform, 1:1 computing presents a powerful

educational catalyst with initial evidence of changing teachers' and students' roles, providing students with a variety of learning styles/options, and access to the limitless information found on the Internet. The evaluation of the New Hampshire TPSE program examined the transition teachers and students are making from a traditional educational environment to a 1:1 laptop program. Not surprisingly, the data collected through surveys found large increases in technology use across subject areas. More importantly, however, the impacts on teaching and learning reported by the participating teachers and students suggest a true revolution in teaching and learning may be beginning to take root.

Endnotes

- 1 The TPSE program was directed initially at seventh grade students and teachers only.
- 2 Specifically, the USEIT Study surveys were primarily used in the development of the TPSE/NH survey instruments. For an overview of the USEIT Study and a psychometric description of the survey instruments see Russell, Bebell, & O'Dwyer; 2003.

References

- Bebell, D., Russell, M., & O'Dwyer, L.M. (2004). Measuring teachers' technology uses: Why multiple-measures are more revealing. *Journal of Research on Technology in Education*, 37(1), 45–63.
- Benson, C. (2003). *Technology Promoting Student Excellence*. Speech given September 9, 2003. Concord, NH: author.
- Bull, G., Bull, G., Garofalo, J., & Harris, J. (2002). Grand Challenges : Preparing for the technological tipping point *Contemporary Issues in Technology and Teacher Education* [Online serial], 2(1).
Retrieved from <http://www.citejournal.org/vol2/iss1/general/article2.cfm>
- Cuban, L. (2001). *Oversold and underused*. Cambridge, MA: Harvard University Press.
- Goldberg, A., Russell, M., & Cook, A. (2003). The effect of computers on student writing: A meta-analysis of studies from 1992 to 2002. *Journal of Technology, Learning, and Assessment*, 2(1).
- Kerlinger, F. (1986). *Foundations of behavioral research*. New York: Holt, Rinehart & Winston.
- Great Maine Schools Project (GMSP). (2004). *One-to-one laptops in a high school environment: Piscataquis Community High School Study; Final Report*. Retrieved March 1, 2004 from, <http://www.mitchellinstitute.org>
- Maine Education Policy Research Institute (MEPRI). (2003). *The Maine Learning Technology Initiative: Teacher, Student, and School Perspectives Mid-Year Evaluation Report*.
- Mann, D., Shakeshaft, C., Becker, J., & Kottkamp, R. (1999). *West Virginia's Basic Skills/Computer Education Program: An Analysis of Achievement*. Santa Monica, CA: Milken Family Foundation.
- Mathews, J. (1996, October). *Predicting teacher perceived technology use: needs assessment model for small rural schools*. Paper presented at the Annual Meeting of the National Rural Education Association, San Antonio, TX.
- McNabb, M., Hawkes, M., & Rouk, U. (1999). *Critical issues in evaluating the effectiveness of technology*. Proceedings of the Secretary's Conference on Educational Technology: Evaluating the Effectiveness of Technology. Retrieved January 10, 2003 from, <http://www.ed.gov/Technology/TechConf/1999/confsum.html>
- O'Dwyer, L., Russell, M., & Bebell, D. (2004). *Elementary teachers' use of technology: Characteristics of teachers, schools, and districts associated with technology use*. Boston, MA: Technology and Assessment Study Collaborative, Boston College.
- Oppenheimer, T. (2003). *The Flickering Mind: The False Promise of Technology in the Classroom and How Learning Can Be Saved*. New York, NY: Random House.
- Papert, S (1992). *The Children's Machine*. New York, NY: Harper Collins.
- Papert, S. (1996). *The Connected Family: Building the Digital General Gap*. Atlanta, GA: Long Street Press.

- Ravitz, J., Wong, Y., & Becker, H. (1999). *Teacher and teacher directed student use of computers and software*. Irvine, CA: Center for Research on Information Technology and Organizations.
- Russell, M., Bebell, D., & Higgins, J. (2004). Laptop learning: A comparison of teaching and learning in upper elementary classrooms equipped with shared carts of laptops and permanent 1:1 laptops. *Journal of Educational Computing Research*. Vol. 30 No. 3.
- Russell, M., Bebell, D., Cowan, J., & Corbelli, M. (2003). An AlphaSmart for each student: Do teaching and learning change with full access to word processors? *Computers and Composition*, 20, 51–76.
- Russell, M., O'Brien, E., Bebell, D., & O'Dwyer, L. (2003) *Students' Beliefs, Access, and Use of Computers in School and at Home*. Boston, MA: Boston College, Technology and Assessment Study Collaborative.
- Russell, M., Bebell, D., & O'Dwyer, L. (2003) *Use, support, and effect of instructional technology study: An overview of the USEIT study and the participating districts*. Boston, MA: Technology and Assessment Study Collaborative.
- Schacter, J. (1995). *The impact of educational technology on student achievement*. Santa Monica, CA: Milken Exchange on Educational Technology,
- Silvernail, D. L., & Harris W. J. (2003). *The Maine Learning Technology Initiative: Teacher, Student, and School Perspectives Mid-Year Evaluation Report*. Maine Education Policy Research Institute. Retrieved September 21, 2004 from, <http://www.usm.maine.edu/cepare/pdf/ts/mlti.pdf>

Appendix A: TPSE Student (Post) Survey

7th Grade NH Technology Survey (June 2004)

Please write your name and your classroom teachers' names in the box below:

Your Name: _____

Your School: _____

Your Math Teacher's Name: _____

Your Science Teacher's Name: _____

Your English/Language Arts Teacher's Name: _____

Your Social Studies Teacher's Name: _____

Think about how much you and your teacher use technology in 7th grade and answer the questions below. For each question use a pen or pencil to "bubble in" the box for the response that is most correct. If you have any questions, please ask for help. Thank You!

1. How often do you use technology (computers, AlphaSmarts, etc.) **in school**?

	<i>Never</i>	<i>Every Couple Months</i>	<i>Once a Month</i>	<i>Once a Week</i>	<i>Every Day</i>
In your classroom	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
In a Computer lab	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
In the library	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

2. Where do you usually learn how to do new things with computers?

- 1 I never learn to do new things with computers
- 2 At home
- 3 At school

3. How often do **you** use a computer in school for each subject?

	<i>Never</i>	<i>Every Couple Months</i>	<i>Once a Month</i>	<i>Once a Week</i>	<i>Every Day</i>
Reading/Language Arts	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Social Studies	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Math	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Science	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

4. Which of these statements best describes your personal use of computers?

- 1 I never use a computer.
- 2 When I use a computer, I am usually afraid it won't work properly or that I might break it.
- 3 I use a computer on my own, but sometimes I have difficulty figuring out how to complete an unfamiliar task.
- 4 I use a computer with confidence and can figure out how to do just about anything I need to do.

5. How well are you able to do the following?

	<i>I never do this</i>	<i>I can do this, but often need help</i>	<i>I can do this, but sometimes need help</i>	<i>I can do this easily on my own</i>
Write papers using a computer	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
Communicate using Email	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
Record and analyze data using a spreadsheet	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
Find information using the Internet	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
Create multimedia presentations	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

6. How often do you use a computer **in school** to:

	<i>Never</i>	<i>Every Couple Months</i>	<i>Once a Month</i>	<i>Once a Week</i>	<i>Every Day</i>
send and receive email	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
write first drafts	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
edit papers using a computer	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
create graphs or tables	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
find information on the Internet	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
create a Hyperstudio or PowerPoint presentation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
play computer games	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
work with spreadsheets/databases	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
solve problems	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
analyze data	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
take a test or quiz	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

7. How often does **your teacher** use a computer for each subject?

	<i>Never</i>	<i>Every Couple Months</i>	<i>Once a Month</i>	<i>Once a Week</i>	<i>Every Day</i>
Reading/Language Arts	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Social Studies	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Math	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Science	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

8. About how many books of your own do you have at home, not counting your school books or comic books?

- 1 5 or fewer
- 2 6-25
- 3 26-50
- 4 51-100
- 5 more than 100

9. How many computers, if any, do you have at home?

- 1 0 (if you do not have a home computer, skip question 10, 11 and 12)
- 2 1
- 3 2
- 4 3 or more

10. When you are at home, how difficult is it for you to get onto your home computer when you want to?

- 1 Often difficult
- 2 Sometimes difficult
- 3 Never difficult

11. How long have you had a computer at home?

- 1 Less than one year
- 2 A year or two
- 3 Three or four years
- 4 As long as I can remember

12. How often do you use your **home** computer to:

	<i>Never</i>	<i>Once a month</i>	<i>Once a Week</i>	<i>Couple times a week</i>	<i>Every Day</i>
play games	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
chat/instant message	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Email	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
search the Internet <u>for school</u>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
search the Internet <u>for fun</u>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Download or play MP3/music	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
write papers for school	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
computer program	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
create/maintain web sites	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
create/edit digital photos or movies	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

Thank you for completing this survey!



Appendix B: TPSE Teacher (Post) Survey

NH Teacher Technology Survey (June 2004)

Directions: Please answer each of the questions below. Use a pencil or pen to “bubble in” the box for each response that is most correct. Thank You.

Your Name: _____ **School:** _____

1. What subject areas do you currently teach 7th grade students (check all that apply):

- Social Studies/History/Geography
- Science
- English/Language Arts
- Math
- Other _____

2. How many years have you taught throughout your career?

- 1 Less than 1 year
- 2 1-2 years
- 3 3-5 years
- 4 6-10 years
- 5 11-15 years
- 6 More than 15 years

3. How important are computers in your teaching?

- 1 Very Important
- 2 Somewhat Important
- 3 Not Very Important

4. How confident are you when using computers?

- 1 Very Confident
- 2 Somewhat Confident
- 3 Not Very Confident

5. Please write in the number of each of the following that you currently have in your classroom.

	Desktop computers
	Laptop computers
	AlphaSmarts/Danas/Palm Pilots
	LCD Projector/Computer Projection System
	Printers

6. Please indicate which of the following you currently have available to you.

<input type="checkbox"/> 1	Internet access in your classroom
<input type="checkbox"/> 1	TV monitor with VCR
<input type="checkbox"/> 1	A computer for teacher use

7. How do you or your students use an LCD projector/Computer Projection System in your classroom?

- 1 Never
- 2 Once per month
- 3 Once per week
- 4 3 times per week
- 5 Daily

8. How often do you perform the following?

	<i>Never</i>	<i>Once or twice a year</i>	<i>Several times a year</i>	<i>Several times a month</i>	<i>Several times a week</i>
Use a computer to deliver instruction to your class	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Prepare or maintain IEPs using a computer	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Adapt an activity to students' individual needs using computers	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Make handouts for students using a computer	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Create a test, quiz or assignment using a computer	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Perform research and lesson planning using the Internet	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Create WebQuests or build the Internet into a lesson	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Use a computer to present information to your class	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Use a computer to help students better understand a concept	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Use a computer to model relationships and/or functions	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Create and maintain web pages	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Assess students using a computer	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Use a computer to communicate with teachers, parents or administrators	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

9. How often do you ask students to produce the following using technology:

	<i>Never</i>	<i>Once or twice a year</i>	<i>Several times a year</i>	<i>Several times a month</i>	<i>Several times a week</i>
Reports and term papers	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Multimedia projects	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Web pages, web sites or other web-based publications	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Pictures or artwork	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Stories or books	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Graphs or charts	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Videos or movies	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

10. Indicate how much you agree or disagree with each of the following statements?

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
Students create better-looking products with computers than with other traditional media.	1	2	3	4
Students interact with each other more while working with computers.	1	2	3	4
Computers help students grasp difficult curricular concepts.	1	2	3	4
Students work harder at their assignments when they use computers.	1	2	3	4
Students are more willing to write second drafts when using a computer.	1	2	3	4
Students develop a deeper understanding of the subject material	1	2	3	4

11. How often do students perform the following activities?

	<i>Never</i>	<i>Once or twice a year</i>	<i>Several times a year</i>	<i>Several times a month</i>	<i>Several times a week</i>
Students work individually on school work using computers.	1	2	3	4	5
Students work in groups on school work using computers.	1	2	3	4	5
Students perform research or find information using the Internet or CD-ROM.	1	2	3	4	5
Students use a computer or portable writing device for writing.	1	2	3	4	5
Students use a computer to solve problems.	1	2	3	4	5
Students learn keyboarding skills.	1	2	3	4	5
Students use a computer to play educational games.	1	2	3	4	5
Students use a computer to play games for fun.	1	2	3	4	5
Students present information to the class using a computer.	1	2	3	4	5
Students use a spreadsheet/database to record, explore or analyze data.	1	2	3	4	5
Students use probes (e.g., thermometers, etc.) attached to a computer.	1	2	3	4	5
Students use email to consult with "experts".	1	2	3	4	5
Students use computers to communicate with students in other schools.	1	2	3	4	5
Students use a computer to develop basic skills.	1	2	3	4	5
Students use a computer to deepen their understanding of concepts.	1	2	3	4	5
Students use a computer to model relationships and/or functions.	1	2	3	4	5
Students do a project or paper using a computer <u>outside of class time</u> .	1	2	3	4	5

12. Rate how much each of the following conditions are obstacles for you in making more effective use of technology.

	<i>Not An Obstacle</i>	<i>Minor Obstacle</i>	<i>Major Obstacle</i>
Do not have enough computers for all my students	1	2	3
Professional development prepares me to use technology in the classroom that is not available in my classroom or school	1	2	3
Professional development prepares me to use technology in the classroom but I do not have enough time to “practice”	1	2	3
Insufficient or inadequate software	1	2	3
Insufficient or inadequate support on how to use technology in the classroom	1	2	3
Outdated computers are available to me	1	2	3
Too many students in my class	1	2	3
The kinds of computers and software are different from the computers used at home by myself or my students	1	2	3
Not sure how to make technology relevant to my subject	1	2	3

13. Indicate how much you disagree or agree with each of the following statements about teaching and learning.

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
Teachers know a lot more than students; they shouldn’t let students muddle around when they can just explain the answers directly.	1	2	3	4
A quiet classroom is generally needed for effective learning.	1	2	3	4
It is better when the teacher- not the students- decides what activities are done.	1	2	3	4
Students will take more initiative to learn when they feel free to move around the room during class.	1	2	3	4
Instruction should be built around problems with clear, correct answers, and around ideas that most students can grasp quickly.	1	2	3	4
How much students learn depends on how much background knowledge they have- that is why teaching facts is so necessary.	1	2	3	4
Students’ writing quality is worse when they use word processors.	1	2	3	4
Computers encourage students to be lazy.	1	2	3	4

Thank you for completing the survey!

For more info. visit www.intasc.org



Appendix C: TPSE Teacher Follow-Up Web Survey

October 2004 NH Teacher Survey

The following short teacher survey is part of the evaluation of the Technology Promoting Student Excellence program. It is important that we accurately capture teacher attitudes and opinions about the New Hampshire laptop program. Please take a few minutes to complete the following survey.

We ask that you fill in responses for each survey item. To submit the survey, all items must be completed. The responses are entirely anonymous and strictly confidential. If you have additional comments or concerns regarding the New Hampshire laptop program, please email Damian Bebell at bebell@bc.edu. Many thanks for your continued cooperation.

Background Information
What is your current school:
<input type="text" value="--- Please select one ---"/>
Have you received a laptop through the Technology Promoting Student Excellence (TPSE) program?
<input type="radio"/> Yes <input type="radio"/> No
What grade level(s) do you currently teach? (please check all that apply)
<input type="checkbox"/> Grade 6 <input type="checkbox"/> Grade 7 <input type="checkbox"/> Grade 8
What subject area do you currently teach? (please check all that apply)
<input type="checkbox"/> Math
<input type="checkbox"/> Science
<input type="checkbox"/> English/Language Arts
<input type="checkbox"/> Social Studies/Geography/History
<input type="checkbox"/> Art/Music
<input type="checkbox"/> Other: please specify <input style="width: 100px;" type="text"/>

Please indicate whether you agree or disagree with the following statements :

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Since the laptop program began:					
My goals for students have changed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My role in the classroom has changed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The school climate has changed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student achievement in my classes has improved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My beliefs about teaching and learning have changed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My computer skills have improved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My understanding of how people learn has changed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The delivery of curriculum in my classes has changed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have had adequate professional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

development opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The school has developed effective policies and procedures for the laptop program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students have greater freedom of choice with regard to their individual learning style	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My ability to assess and evaluate student work has improved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate below the effect you think laptops have had on different groups of students in the following areas:

	Traditional Students			At-Risk or Low-Achieving Students			High Achieving Students		
	Declined	No Effect	Improved	Declined	No Effect	Improved	Declined	No Effect	Improved
Participation in class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preparation for class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attendance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motivation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engagement / Interest level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to work independently	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to work in groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to retain content material	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaction with teachers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaction with other students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of student writing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student peer review in class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please take the survey once only!

SUBMIT SURVEY