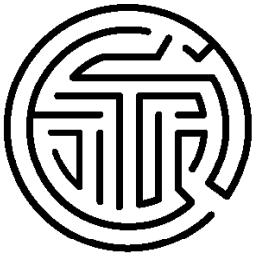

CCT REPORTS

MAY 2004

FINDINGS FROM THE 2003 END OF SCHOOL YEAR SURVEY INTEL TEACH TO THE FUTURE® U.S. CLASSIC IMPLEMENTATION

PREPARED BY

WENDY MARTIN
TOMOE KANAYA
JACINTH CRICHTON

CENTER FOR CHILDREN & TECHNOLOGY

EDUCATION DEVELOPMENT CENTER, INC. 96 Morton Street, 7th floor New York New York 10014 *tel* 212] 807.4200 *fax* 212] 633.8804 *tty* 212] 807.4284 *web* www.edc.org/CCT

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To inquire about permission, write to:
ATTN: REPRINTS
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EXECUTIVE SUMMARY

This report presents findings from the U.S. evaluation of the original or "Classic" version of the Intel Teach to the Future program. The data analyzed in this report come primarily from a survey administered in April 2003 to Classic Master and Participant Teachers in the United States. Additional data come from a survey administered to all program participants on their last day of Intel Teach to the Future training and from application data gathered before the training experience. This report reviews survey data on the following topics:

- Demographic information
- Technology access conditions of survey respondents
- Program impact on participants' use of technology
- Program impact on participants' teaching practice

The demographic and technology access data in this report show the following:

- Relatively equal percentages of respondents reported teaching across all grade levels.
- The subject the largest group of respondents reported teaching is "self-contained," meaning they teach a variety of subjects to a single group of students.
- The vast majority of respondents (91.4%) reported having access to computer labs or media centers in their schools.
- The largest group of teachers (40.2%) reported having 2-4 computers in their classrooms, although nearly a third (31.4%) reported having more than 5 classroom computers.

The analyses reported here also indicate that the program is having an impact on teachers' use of technology in their teaching. Specifically, the data show the following:

- *Teachers follow up on what they learn and create during their training.* Specifically, a large majority of teachers (79.1%) reported implementing the unit plans they developed during their training in the 2002-2003 school year, and a majority of teachers (63.4%) trained prior to the 2002-03 academic year reported using their unit plans more than once, suggesting they use the unit plans over multiple school years.
- *Teachers are using technology in new ways with their students since their training.* Slightly more than half of the respondents (51.3%) reported implementing technology-integrated lessons with their students that are different from the kinds of activities they did prior to participation in the program once a month or more. Further, 45% of respondents who had implemented a technology-integrated lesson reported being "very satisfied" with the experience.

- *Teachers report increases in the frequency of their students' use of computers to engage in a range of classroom activities after the training.* For example, more than half of the respondents (56.8%) reported having their "students work on computers to do lessons or activities during class" "more often" since their training.

- *There are small but consistent increases in teachers' use of a variety of different software applications other than those presented in the training*.

- *Large majorities of respondents reported positive student responses to the new technology-integrated lessons teachers introduce*. For example, 97% of teachers "agreed" or "strongly agreed" that "students were motivated and actively involved in the lesson," that "students with different learning styles were addressed well by the unit" (92.3%), and that "students helped one another with the technology" (96.2%).

- *Teachers who did and did not implement their unit plans did not describe dramatically different obstacles to technology integration.* The most commonly cited obstacles to technology integration for both teachers who had and had not implemented their unit plans were related to infrastructure and time issues. Further, the majority of both implementers and non-implementers felt that they had adequate administrative and technical/instructional support for technology integration.

The analyses presented in this report also show that the program is having an impact on participants' teaching practices. Specifically, the data show the following:

- *Teachers are aware of the specific messages about teaching strategies that are included in the Intel Teach to the Future curriculum and find them relevant to their work.* Specifically, the majority of respondents (59.4%) felt that it was "very true" that the teaching strategies presented in the Intel Teach to the Future training were relevant to their teaching goals.

- *Teachers experiment with the teaching strategies described in the curriculum when they return to their classrooms*. For example, roughly a third of teachers report using project-based teaching strategies more often since the training; large majorities of teachers report using technology more since the training to support their teaching practice; and half of the respondents reported using rubrics and essential questions more often since the training.

- *More than half of the respondents reported assuming greater technology-related responsibilities since participating in the training*. For example, 56.9% "agreed" or "strongly agreed" that they "have taken on more of a troubleshooting role with regard to technology use" in their schools since the training, and 56.7% "agreed" or "strongly agreed" that they had taken on more of a leadership role with regard to technology" in their school.

TABLE OF CONTENTS

INTRODUCTION 1
About Intel Teach to the Future 1

METHODS 2

FINDINGS 3
Respondent Teaching Backgrounds, Demographics and Technology Access 3
Subjects and grade levels taught 3
School types and students served 4
Training cohort 5
Comparison of End of Training and End of School Year respondents 6
Respondents' access to technology 7
Evidence of Teachers' Follow-up on Their Training 7
Implementation of unit plan and other technology-rich lessons 7
Satisfaction with implementation 8
Obstacles to implementation 8
Implementation challenges 9
Change in teachers' use of technology with students 11
Use of specific software and related technologies with students 14
Use of Intel Teach to the Future training materials 15
Impact on Teaching Practices 16
Relevance of teaching strategies 16
Use of project-based instructional strategies 17
Use of technology to support teacher practice 18
Student response to technology-integrated lessons 19
Reasons for using technology with students 21
Participant role in school 22

DISCUSSION 24

CONCLUSION 25

REFERENCES 26

INTRODUCTION

This report reviews data from a survey of teachers conducted in April 2003, along with relevant data collected from application forms and surveys administered at the last training session attended by Intel Teach to the Future participants. All of these data were collected as part of an evaluation of the U.S. implementation of Intel Teach to the Future, a professional development program for K-12 teachers.

About Intel Teach to the Future

Intel Teach to the Future was designed to provide a professional development experience that would prepare teachers to use technology with their students. The developers of the Intel Teach to the Future program began with two equally weighted goals, one related to the type of impact they wished to have, and one related to the scale of impact. The first goal was to improve the integration of technology into K-12 classrooms. The second goal was to train 100,000 teachers in the United States in three years and to create "critical masses" of trained teachers within participating schools and districts, on the assumption that if a significant segment of a given teaching population was trained, this cohort of trained teachers would exert a strong influence on the overall school or district approach to technology.[1]

The curriculum used in the Intel Teach to the Future trainings was developed in 2000 by the Institute for Computer Technology (ICT; www.ict.org) and Intel Corporation. It focuses on the use of commonly-available software in the context of inquiry-oriented and project-based teaching and learning, and stresses the alignment of curricula with standards. The forty-hour training sequence is delivered through a train-the-trainer model, with senior trainers from the Institute training Master Teachers from local districts or consortia of districts, who are then expected to train Participant Teachers in their districts. The training uses Microsoft productivity software, focusing primarily on how to use Windows-based versions of PowerPoint and Publisher to support students in creating presentations, web pages, brochures and newsletters. The training also discusses pedagogical and classroom management challenges associated with using technology with students, as well as conducting research on the Internet, and intellectual property issues.

The central activity of the curriculum is the creation of a unit plan, including model student work samples, support materials, and an implementation plan. Teachers are encouraged at the beginning of the training to select a unit that they already use in their teaching that might be enhanced with an infusion of technology. This structure is intended to allow teachers to expand their technical skills in the context of a curriculum development process. By designating a large amount of time in the workshops for the creation of immediately relevant materials, the curriculum not only puts the teachers' interests and concerns at the center of the training experience, but also enables them to walk away from the training with a usable product.

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[1] Intel Teach to the Future reached a million teachers worldwide as of June 2003. The program had equally important, parallel goal statements concerning its international implementation (which reaches thirty countries including the U.S.). The findings presented here are derived from evaluations of the United States implementation of the program. For more information about Intel Teach to the Future, visit www.intel.com/education.

METHODS

Since early 2001, EDC's Center for Children and Technology has been collecting several types of survey data from both Master Teachers and Participant Teachers involved in this program. Specifically, EDC has gathered survey data through the following mechanisms:

- *An application form, located on the Intel Teach to the Future website.* Through an agreement with Intel, which manages the application process for the program, the evaluation team is able to collect information on teachers' sex, racial/ethnic background, years of teaching experience, subject area, and grade levels taught. Responses are also collected for two questions about technology use: how prepared teachers feel to use technology with their students and how frequently teachers use various technologies in their teaching.

- *An End of Training survey, administered via the web.* All program participants are expected to complete this survey at the conclusion of their training. It focuses on respondents' perceptions of and reactions to the training and their trainer, and on whether they feel the experience has prepared them to integrate technology effectively in their classrooms.

- *An End of School Year survey, also administered via the web in April/May (2001-2004).* This survey focuses on teacher follow-up to the program and the impact of the program on teacher practice. The survey includes questions about implementation of the unit plan developed in the training, use of other technology-integrated lessons, use of various software packages, integration of different teaching methods, obstacles to implementation, and school climate.

This report reflects an analysis of these three datasets. First, the report examines teacher responses to the 2003 End of School Year survey. This survey was administered to all U.S. Classic Intel Teach to the Future participants who had completed the program prior to April 1, 2003, and received 4,223 valid responses. Second, the report examines data derived from the program applications of these respondents. In the End of School Year survey, specific data were collected to facilitate linking their survey responses back to their application data, and a successful match was made for 1,347 of the original pool of 4,223 respondents. Third, the report presents relevant data from the End of Training surveys that were administered to Master Teachers and Participant Teachers at the final training session. Throughout this report, we will refer to the 4,223 respondents to the End of School Year survey as the "survey respondents" and the subset of 1,347 as the "matched pool."

FINDINGS

Respondent Teaching Backgrounds, Demographics and Technology Access of Respondents

This section reports on a series of teaching background, demographic and technology access variables. As described above, some of these data reflect the responses of the entire group of End of School Year respondents (n=4,223) and some reflect the matched pool data, which are derived from data from those teachers whose End of School Year survey responses could be matched successfully back to their program applications (n=1,347).

Subjects and grade levels taught

The largest single group of teachers reported teaching "self-contained" classes (26.3%), which means they teach a range of subjects to the same group of students, usually indicating that the respondent teaches lower or middle elementary students (grades K-5, or, in some cases, grades K-6). The discrete subjects that the largest number of respondents reported teaching were English/Language arts (13%) and Science (11.5%). Fewer than 10% of respondents reported teaching any other subject, including computers (5.5%). See Table 1 for a summary (n=4,208).

Respondents were also asked to report the grade levels they teach. When interpreting the grade-level taught data, it is important to note that respondents were selecting among categories (Lower Elementary [K-3], Middle Elementary [4-5], Middle School [6-8] and High School [9-12]), and that each category does not represent an equivalent number of grades. Survey respondents were somewhat evenly segmented across grade level categories, although High School teachers are the largest single group (see Table 2, n=4,204). However, when the variation in the number of grades in each category is taken into account, Middle Elementary and Middle School grades each have greater representation (10.5% per each possible Middle Elementary grade, and 8.9% per each possible Middle School grade, as compared to 5.9% per Lower Elementary grade and 7.2% per High School grade). Overall, these data suggest that Lower Elementary grades have the least representation among End of School Year survey respondents.

TABLE 1. SUBJECT TAUGHT BY END OF SCHOOL YEAR SURVEY RESPONDENTS	
Subject	%
Self-contained	26.3
English, Literature, Language Arts	13.0
Science	11.5
History, Social studies	8.8
Math	8.1
Special Education	6.7
Computers 5.5 Arts	3.7
Librarian/Media Specialist	2.8
Foreign Language	2.0
Business	1.4
Other	10.1
Total	100.0

TABLE 2. GRADE-LEVEL TAUGHT BY END OF SCHOOL YEAR SURVEY RESPONDENTS	
Grade Level	%
Early Elementary (K-3)	23.4
Middle Elementary (4-5)	20.9
Middle School (6-8)	26.8
High School (9-12)	28.9
Total	100.0

School types and students served

The overwhelming majority of survey respondents reported teaching in public schools (96.1%). See Table 3 (n=4,205) for a complete reporting on this item. Respondents were also asked to report whether they had students classified in a number of different categories in their classrooms. We found that a majority of teachers had at least one student classified as ESL/Bilingual (53.2%), Special Needs (68.9%) or Honors/Gifted (56%). See Table 4 for a summary (n=4,223).

TABLE 3. SCHOOL TYPE OF END OF SCHOOL YEAR SURVEY RESPONDENTS

Type of School	%
Public	96.1
Private	1.7
Parochial	1.5
Charter	0.6
Total	100.0

TABLE 4. CLASSIFICATION OF END OF SCHOOL YEAR SURVEY RESPONDENTS' STUDENTS

Classification	%
ESL/Bilingual	
Yes	53.2
No	46.8
Total	100.0
Special Needs	
Yes	68.9
No	31.1
Total	100.0
Honors/Gifted	
Yes	56.0
No	44.0
Total	100.0
None of the above	
Yes	10.1
No	89.9
Total	100.0

Training cohort

This item was collected for all survey respondents (n=4,223). Respondents were asked if they had completed their training in the 2002-2003 school year; 38.3% had done so, and 61.7% had completed their training prior to that year.

The matched pool of respondents (n=1,723) was grouped into cohorts reflecting three academic years: 2000-01, 2001-02 and 2002-03. The largest percentage of respondents to the 2003 End of School Year survey in this matched pool was from the 2001-02 cohort (56.7%). Another 28.3% came from the 2002-03 cohort, and 15% came from the 2000-01 cohort. This finding reflects the large number of teachers trained via the Classic version of this program during the 2001-02 academic year. See Table 5 for a summary.

TABLE 5. MATCHED POOL ACADEMIC YEAR COHORTS

Academic year cohorts	%
2000-2001	15.0
2001-2002	56.7
2002-2003	28.3
Total	100.0

Comparison of End of Training and End of School Year survey respondents

The analysis of the matched pool (n=1,723) illustrates that respondents to the 2003 End of School Year survey are broadly representative of the larger population of Intel Teach to the Future participants, as represented by the Master Teacher and Participant Teacher respondents to the End of Training survey (n=49,329 for PTs; 1,702 for MTs as of December 2003).[2] However, some small differences appear.

- The matched pool tends to be from higher SES schools than the overall total: 59% were from schools with fewer than half of their students receiving free or reduced price lunch, as compared with 54.3% of the total respondents to the End of Training survey.
- A slightly smaller percentage of women were in the matched pool (74%) as compared to the larger pool of Application/End of Training survey respondents (78.3%).
- The matched pool also had a higher percentage of respondents who identified themselves as White (89.1%) than the larger group who completed the application form and End of Training survey (82.7%).
- A slightly higher percentage of the End of Training respondents were early elementary school teachers (26%) as compared to the matched respondents (20.6%).

In almost every "subject taught" category, the matched pool of respondents had a higher percentage reporting teaching each subject. This is possible because the application form allowed respondents to select multiple subjects taught, producing an overall frequency for the question that was much higher than the absolute number of respondents to the question. This finding suggests that the teachers for whom we were able to match application forms and End of School Year surveys have taught a wider range of subjects than the general pool of teachers. It is notable that 11% more of the matched pool respondents reported teaching computer science, science and math than the larger pool of teachers. However, because respondents could select more than one subject taught, it is likely that the 11% figure includes individual teachers who reported teaching two or more subjects.

[2] See the CCT/EDC reports, Summary Report, Intel Teach to the Future, U.S. Classic Program Cumulative Master Teacher End-of-Training Survey Data through Q4-2003, and Summary Report, Intel Teach to the Future, U.S. Classic Program Cumulative Participant Teacher End-of-Training Survey Data through Q4-2003.

Respondents' access to technology

The End of School Year survey asked respondents to provide information about the level of access to computers and the Internet available in their work environments. Very few respondents reported having no computers in their classrooms (2.1%). Teachers most commonly reported having 2-4 computers (40.2%), and over a quarter reported having only one computer (26.3%). Fourteen percent stated they had 5-7 computers available, and 17.4% reported having over 7 computers in the classroom (resulting in almost a third of respondents reporting five or more computers in their classroom). A majority (74.4%) reported that all of their classroom computers had access to the Internet, while 22.2% reported that "some" computers did. Only 3.2% reported that none of their classroom computers had access to the Internet.

A large majority of respondents (91.4%) reported having access to computer labs or media centers in their schools, and 98% of those reported that there was access to the Internet in these labs/centers. In some schools in the United States, lack of access to a school computer lab may indicate that the school has a policy of placing all technology in classrooms rather than school-wide labs. In the analysis of the classroom computer access of those 8.6% of teachers who reported not having access to computer labs, the data showed that 44.2% had 2-4 computers in their classroom, 27.8% had more than 5 computers and 24.7% had one computer in their classroom. Only 12 respondents among the entire group of 4,223 respondents reported not having access to either computer labs or classroom computers.

Evidence of Teachers' Follow-up on Their Training

The 2003 End of School Year survey asked respondents a range of questions about whether they had followed up on what they learned in the training upon returning to their classrooms. These included questions about implementation of materials developed during the training, new lessons and activities created and implemented, and various software applications used with students. The survey also asked respondents about the obstacles and challenges to technology integration they faced in their schools.

Implementation of the unit plan and other technology-rich lessons

A large majority of respondents (79.1%) reported that they had implemented some or all of their unit plan during the 2002-2003 school year (n=4,223). Among teachers who had been trained prior to the 2002-2003 school year (n=2,061, or 61.7% of the total pool of respondents), 63.4% reported using their unit plans more than once, 25.8% reported that they had done so once, and 10.8% reported that they had never implemented their unit plan. This indicates that a majority of respondents who were trained in previous years are not simply trying out their unit plans once and then giving them up, but are finding the unit plans useful enough to implement multiple times.

Prior findings from this evaluation have demonstrated that there are multiple reasons why a teacher might not implement the specific unit plan they developed during their training. For example, a teacher's teaching assignment may change, or the unit plan may be too complicated to implement in the time available. For this reason, the 2003 End of School Year survey asked whether and how often respondents have implemented other technology-integrated lessons with their students that involve uses of technology that were different from the kinds of technology-integrated lessons they had used prior to their training. More than a quarter of respondents reported that they were implementing other technology-integrated lessons more than once a month (29.3%), 22% reported doing so about once a month, 30.8% said they implemented less than once a month, 10.6% had only implemented their unit plan and 7.3% had not done either their lesson plan or a technology-integrated lesson.

Satisfaction with implementation

Those respondents who had integrated some kind of new technology-integrated lesson (a unit plan or some other lesson) were asked whether they had been satisfied with the experience (n=3,867). Forty-five percent of those who had implemented reported being "very satisfied" with the experience, and 38.9% reported feeling "somewhat satisfied." Among those who reported being dissatisfied, twice as many (10.7%) reported feeling "very dissatisfied" as "somewhat dissatisfied" (5.3%).

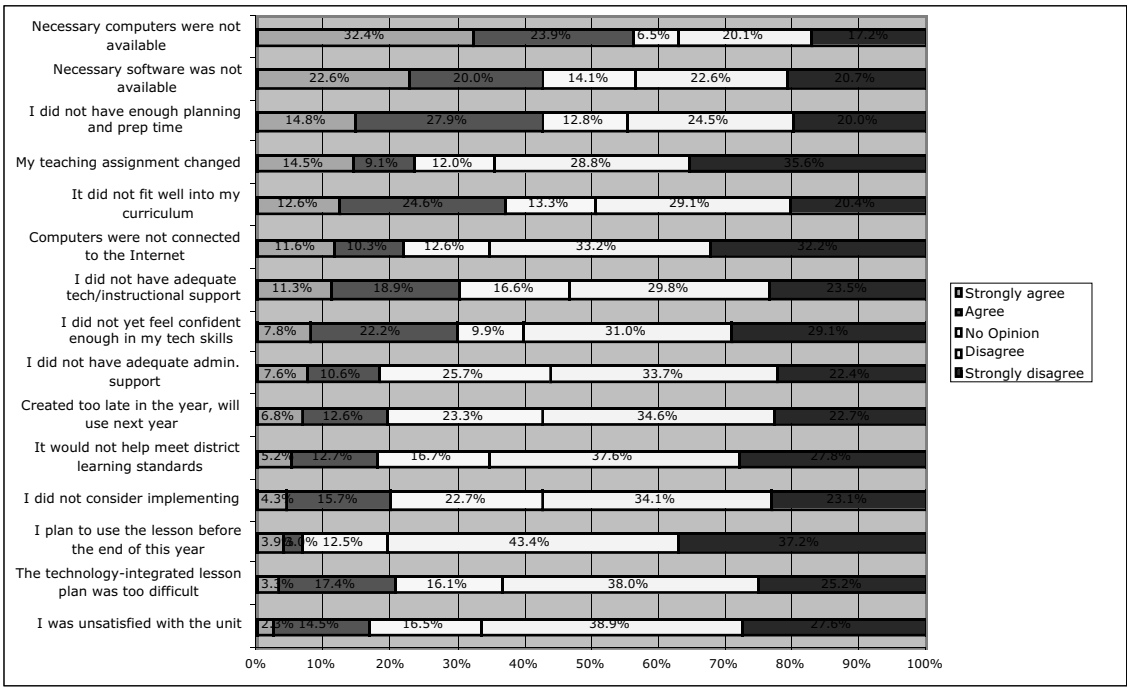
Obstacles to implementation

The End of School Year survey asked those respondents who had not implemented any new technology-integrated lessons to describe the possible reasons why they had not done so (n=309). The most common reasons why teachers did not implement were related to infrastructure issues (56.3% "agree" or "strongly agree" that the necessary computers were not available and 42.6% "agree" or "strongly agree" that the necessary software was not available) or to time constraints (42.7% "agree" or "strongly agree" that they did not have enough planning or prep time).

Of those who did not implement, fewer respondents felt that they "did not feel confident enough of their technology skills" (39.9% "agree" or "strongly agree"); that they were unsatisfied with their unit (33.5% "agree" or "strongly agree"), or that the lesson would not help them meet district learning standards (34.6% "agree" or "strongly agree"). These findings suggest logistical obstacles are more likely to be keeping teachers from using technology with their students than more fundamental hurdles, such as feeling that such activities are not relevant to their curriculum or that they do not have the skills to implement such activities.

Also striking are the relatively small percentages of teachers who say that they did not have the support needed to implement technology in their teaching. Only 18.2% "agree" or "strongly agree" that they "did not have adequate administrative support," and only 30.2% "agree" or "strongly agree" that they "did not have adequate technical/instructional support." With the exception of the item about necessary hardware not being available, no item was identified as an obstacle by a majority of those respondents who reported not implementing a technology-integrated lesson (see Figure 1).

Figure 1. Obstacles to Technology Integration



Implementation challenges

Teachers who do implement a technology-integrated lesson after their training may face challenges in the classroom as well. The End of School Year survey asked those respondents who had implemented their unit plans or a technology-integrated lesson what challenges they faced when they used these materials in their teaching (see Figure 2). The majority of respondents did not rate most of the items included in the question as significant challenges.

Some of the most encouraging responses (in that they indicated teachers were not experiencing these challenges) were related to their local school climate and to the preparation to implement technology-integrated lessons that they gained in the training. For example:

- Few respondents agreed (11.2%) that they did not have enough administrative support, and only 17.2% agreed that they did not have enough technical or instructional support, suggesting that the vast majority of these teachers are working in environments in which the use of technology in teaching is encouraged (or at least not discouraged) by their administrators and perhaps by additional staff (such as technology coordinators) who facilitate the use of technology.

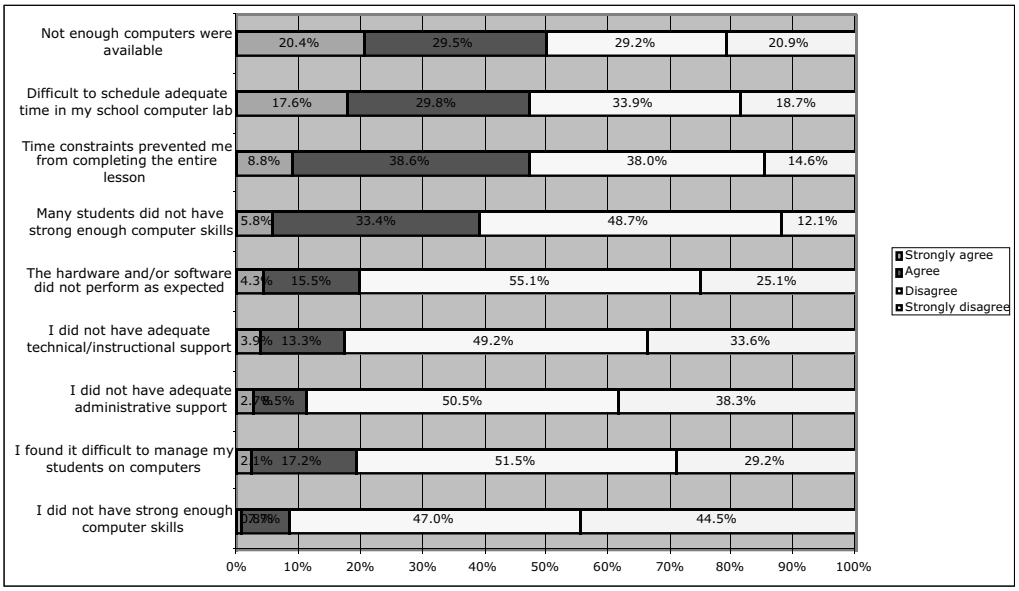
- Only 8.5% of respondents felt that they "did not have strong enough computer skills" to implement the lesson successfully. This response validates an earlier evaluation finding: other survey data collected in this evaluation demonstrates that as a group, teachers participating in this training became significantly more prepared to integrate technology into their classrooms after participating in the program.[3]

[3] See reports on End of Training survey data, cited above.

- A relatively small number of teachers said they "found it difficult to manage [their] students on the computers" (19.3%). Other research has shown that classroom management can be a particularly difficult challenge when teachers attempt to integrate technology in their teaching. However, an integral part of the Intel Teach to the Future curriculum is the development of an implementation plan, and discussion of classroom management strategies. This finding suggests that these elements of the training are successfully preparing teachers to manage their students when they have them work with technology.

The items that respondents found most challenging were related to infrastructure and time. Half of the respondents (50.1%) agreed that there were "not enough computers available; 47.4% agreed that "it was difficult to schedule adequate time in [their] school computer labs" and 47.4% agreed that "time constraints prevented [them] from completing the entire lesson." Much of the research in educational technology suggests that infrastructure, time, professional development and administrative support are the four factors that can most significantly facilitate or impede successful technology integration. These findings suggest that even with training and support, time and access persist as challenges in many educators' experiences.

Figure 2. Challenges to Implementation



Change in teachers' use of technology with students

Some of the most striking changes uncovered in the analysis of the 2003 End of School Year survey were related to students' use of computers to engage in a variety of classroom activities. Both the application for participation in the program and the End of School Year survey asked the question: "During a typical two week period, in how many class meetings did your students do each of the following?" Respondents were then given a list of classroom activities that their students might engage in that involved computers. For example, respondents were asked how frequently they had their students "Learn about subject matter," "Solve problems," "Work collaboratively with other students in the same classroom," or "Produce multimedia products, web pages or video reports/projects." When matched data (n=1,347) were analyzed for teachers who completed both the application form and the End of School Year survey, there was an increase in teachers' reported frequency for several of these activities, specifically, the following:

- When asked how often their students "used computers to learn about subject matter," 0.2% of teachers in the application form said they had their students do this 9-12 times in a two-week period. In the End of School Year survey, that percentage had increased to 15.3% (see Figure 3).
- Similarly, on the item that asked how often teachers "have their student solve problems using computers," 0.3% in the application form reported doing this 9-12 times in a two-week period, while 10.4% said they did so that often in the End of School Year survey (see Figure 4).
- On the program application form, 32% of respondents said that in a typical two-week period they did not have students work collaboratively with other students using the computer. That percentage decreased to 21.5% in the End of School Year survey (see Figure 5).
- Similarly, 59.5% of teachers said in their application forms that in a typical two-week period they did not have students produce multimedia products. In the End of School Year survey that percentage dropped to 34.7% (see Figure 6).

Figure 3. Change in Learning about Subject Matter with Computers (pre-post)

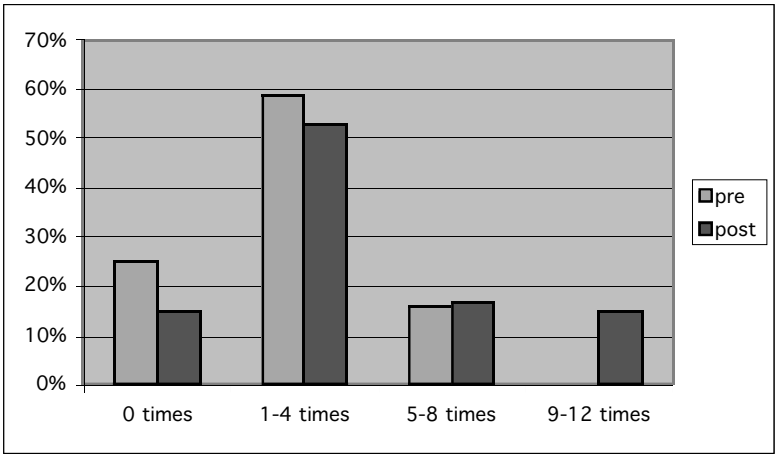


Figure 4. Change in Solving Problems Using the Computer (pre-post)

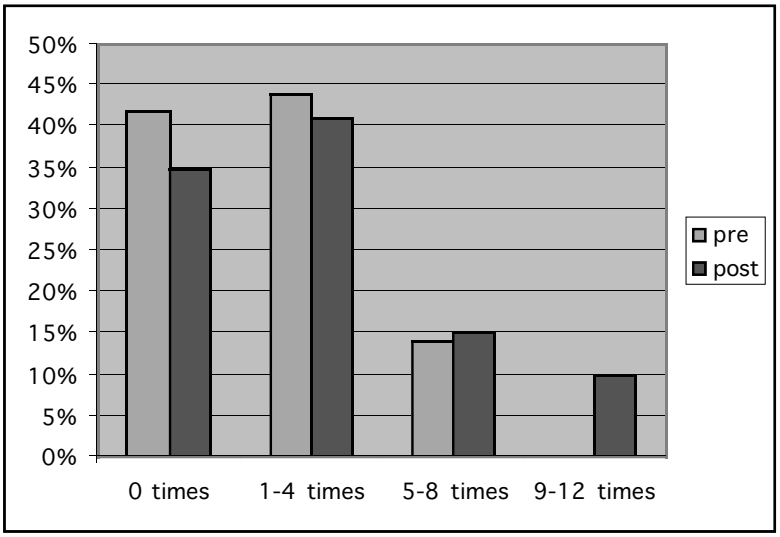


Figure 5. Change in Working Collaboratively Using the Computer (pre-post)

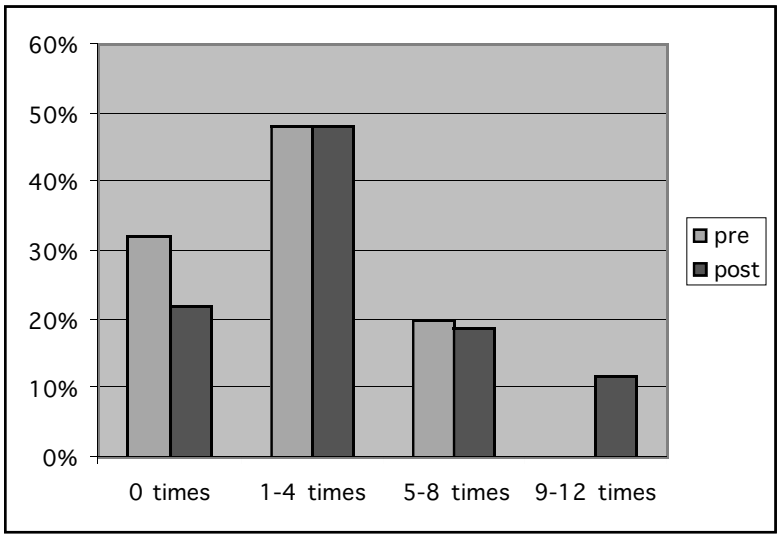
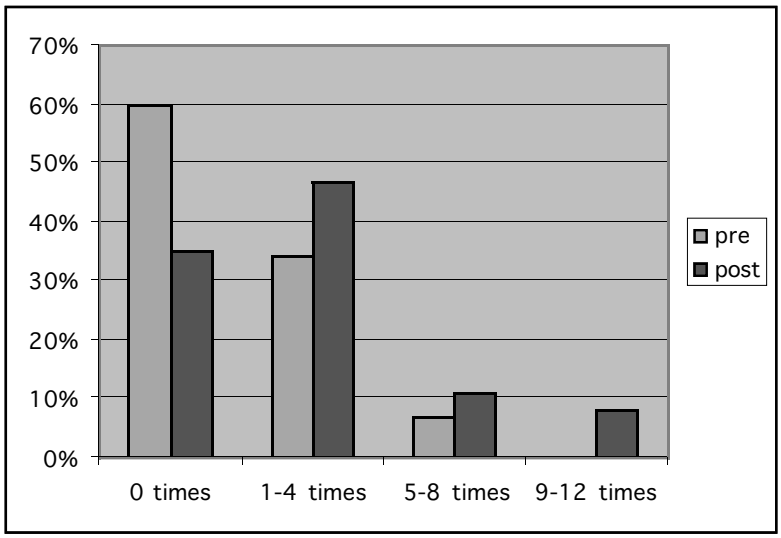


Figure 6. Change in Producing Multimedia Products Using the Computer (pre-post)

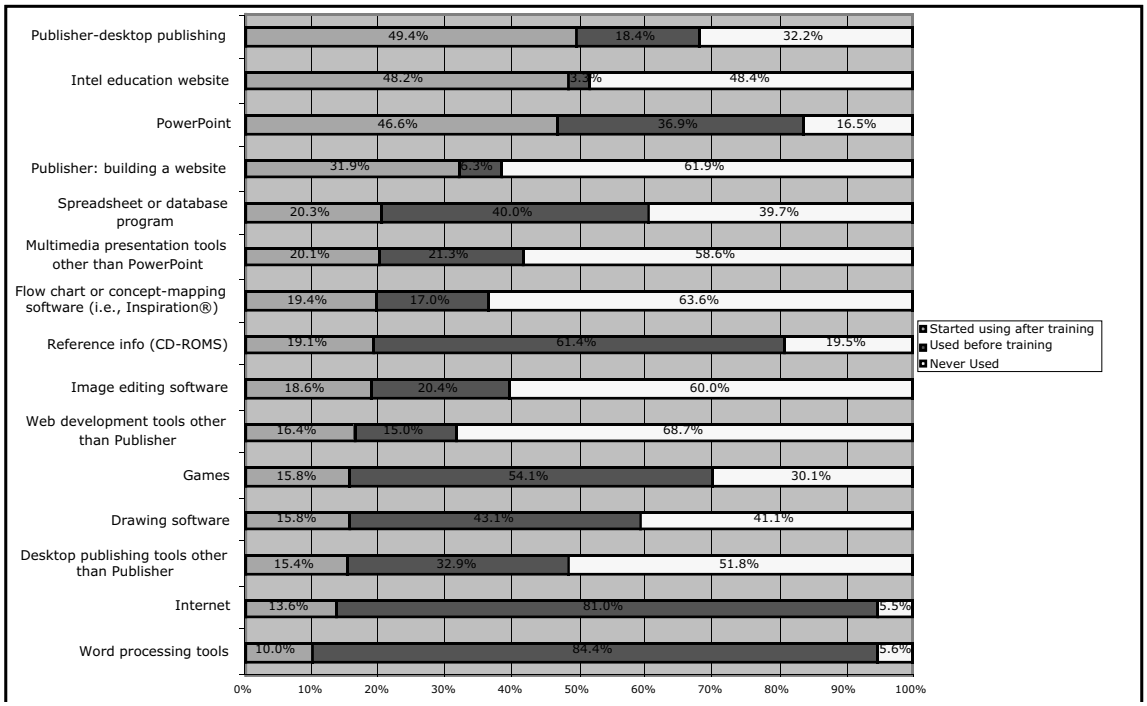


Use of specific software and related technologies with students

The Intel Teach to the Future training focuses primarily on the use of Microsoft PowerPoint, Microsoft Publisher and the Internet. However, one of the goals of the training is to help teachers better understand how to support students in using technology in general to create work products that represent their knowledge. The End of School Year survey asked respondents about the specific kinds of software they were using with their students, and whether they were using these tools more often since their training than they had before. As Figure 7 shows, the software tools that most respondents reported using more often since the training were, not surprisingly, PowerPoint (46.6%), Publisher for desktop publishing (49.4%), Publisher for building a website (31.9%) and the Intel Education website (48.2%). Only 13.6% of respondents reported using the Internet more since the training, mainly because such a large number of them (81%) reported using the Internet with their students already.

Teachers also reported having their students use a wide variety of other kinds of software that had not been addressed specifically in the training more often since their participation. For example, 20.3% of the respondents said they were using spreadsheets or database programs with their students more often since the training; 20.1% reported using multimedia presentation software other than PowerPoint more often since the training; 19.4% said they used flow chart of concept mapping tools more often and 19.1% said they used reference information, such as CD-ROMs, with their students more often since the training. Although no individual software tool other than those presented in the training was being used more often by more than one-fifth of respondents, collectively, these findings show a 10-20% increase in the use of a wide array of different software tools by teachers. This suggests that a substantial number of teachers have moved beyond the material covered in the training and are experimenting with new kinds of software in their teaching practice.

Figure 7. Use of Software and Related Technologies



Use of Intel Teach to the Future training materials

Along with their use of multiple software applications with their students, the End of School Year Survey also asked whether respondents were making use of the Intel Teach to the Future materials provided to training participants. The survey asked how often teachers used the Intel Teach to the Future manual and CD-ROM after their training. The findings indicate that teachers are referring to these materials, but not extensively. The largest percentage of teachers used the manual and CD-ROM 1-3 times after their training had ended (44.6% and 40.7%, respectively) (see Figure 8). About a fourth of respondents used the manual and CD-ROM 4-10 times since the training (26.9% and 23.1%, respectively). More teachers reported never using the CD-ROM (24.7%) than the manual (16.4%) once the training was over (see Figure 9). Because the pool of respondents includes teachers who were trained over the course of three years, it is not surprising that there would be a wide variation in usage of the Intel Teach to the Future materials.

Figure 8. Respondents' Use of Intel Teach to the Future Manual

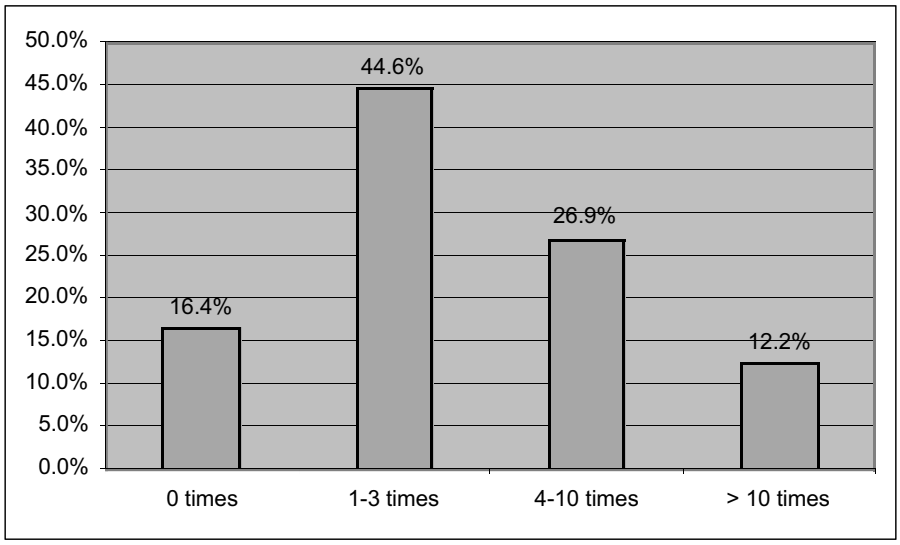
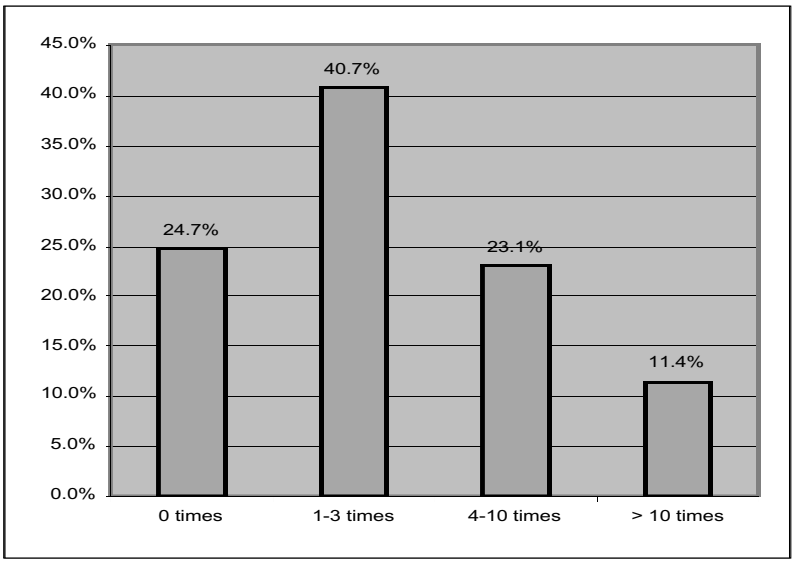


Figure 9. Respondents' Use of Intel Teach to the Future CD-ROM



Impact on Teaching Practices

The Intel Teach to the Future training encourages teachers to use technology with their students in the context of project-based pedagogy. The End of School Year survey asked teachers a number of questions about their teaching practices and the activities they have students engage in, in order to explore whether the training was having an impact on teacher practice. The survey also asked about possible changes in respondents' roles in their schools, in order to examine whether their participation had an impact on their professional and collegial activities.

Relevance of teaching strategies

The Intel Teach to the Future training not only addresses technology skills but also discusses how technology can be an integral part of a broader project-based pedagogical strategy. The End of School Year survey asked teachers about the teaching strategies presented in the training to find out, first, whether these teaching strategies were new to the teachers and, second, if the teachers felt the strategies were "relevant to [their] teaching goals." The survey also asked them whether these strategies would help them to "understand how to integrate technology into [their] teaching."

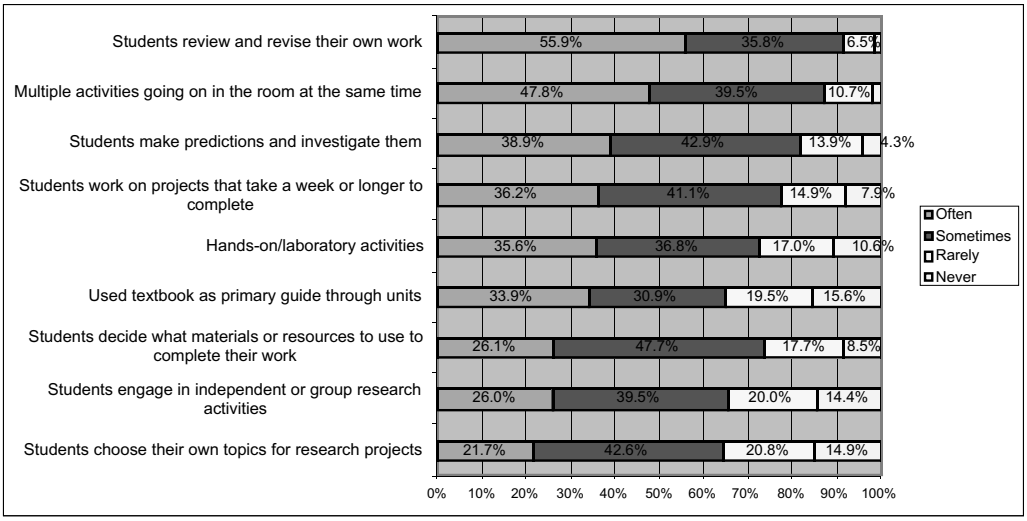
For most teachers the teaching strategies presented were not entirely new but also not entirely familiar. Only 20.1% said that it was "very true" that the teaching strategies were new, and 62.7% said that this was "somewhat true." Many teachers felt that these strategies were relevant to their teaching goals; 59.4% said that this was "very true" and 37.7% that this was "somewhat

true." Only 2.9% did not feel the teaching strategies were relevant to their teaching goals. Most teachers (60.6%) also said that it was "very true" that the teaching strategies would help them to "understand how to integrate technology into [their] teaching," while only 3.4% said this was "not true at all."

Use of project-based instructional strategies

The End of School Year survey also asked teachers how often they used a number of instructional strategies in their teaching, and then whether they used these more often, less often, or the same amount since the training. Figure 10 shows that a large number of teachers reported using teaching strategies that are associated with project-based learning "sometimes" or "often" in their practice. For example, 55.9% reported that they "often" have "students review and revise their own work," and 47.8% "often" have "multiple activities going on in the room at the same time." More than a third of teachers reported "often" having their students do "hands-on/laboratory activities," having "students work on projects that take a week or longer to complete" and having "students make predictions and investigate them." However, a third of teachers also reported that they "often" use "a textbook as the primary guide to instruction."

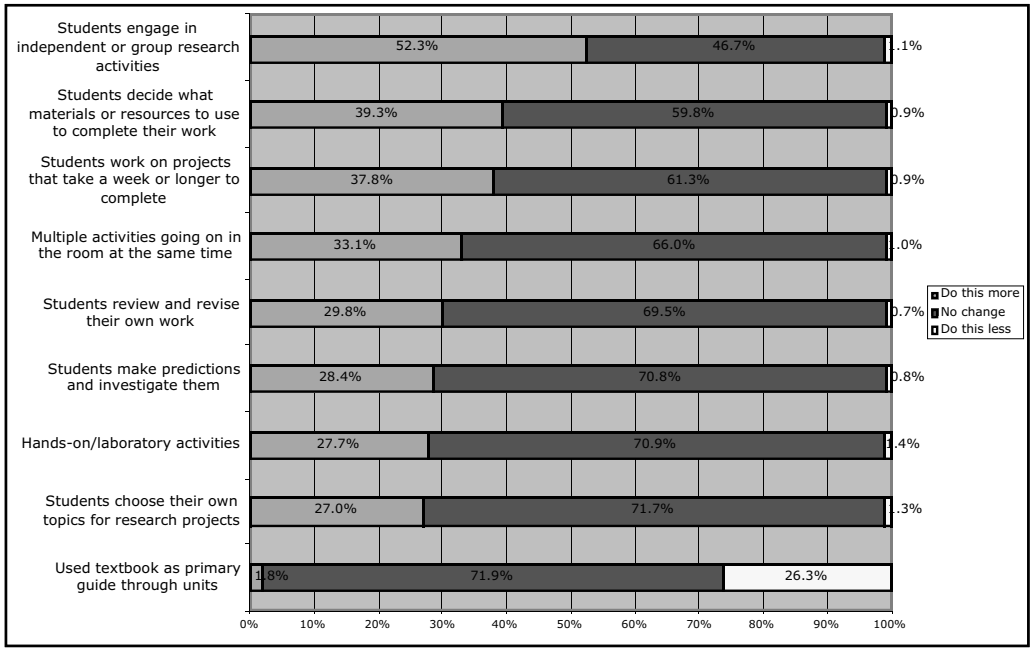
Figure 10. Frequency of Use of Instructional Strategies



Although the question represented in Figure 10 provides information about the kind of teaching practices that Intel Teach to the Future participants use, it does not demonstrate whether the training had an impact on the use of those practices. For this reason, the End of School Year survey asked teachers whether they felt their use of these instructional strategies had changed as a result of their training experience. As Figure 11 illustrates, about a fourth to a third, and in one case a half, of teachers reported using a number of project-based teaching strategies more often since the training. The instructional strategies that the largest number of respondents reported using more often since the training are having "students engage in independent or group research activities" (52.3%) and allowing "students to decide what materials or resources to use to com-

plete their work" (39.3%). The only instructional strategy that a substantial number of teachers reported using less often is using "a textbook as a primary guide through instruction" (26.3%), which is the only strategy on the list that is not associated with project-based pedagogy.

Figure 11. How Often Teachers Use Instructional Strategies since the Training



Use of technology to support teacher practice

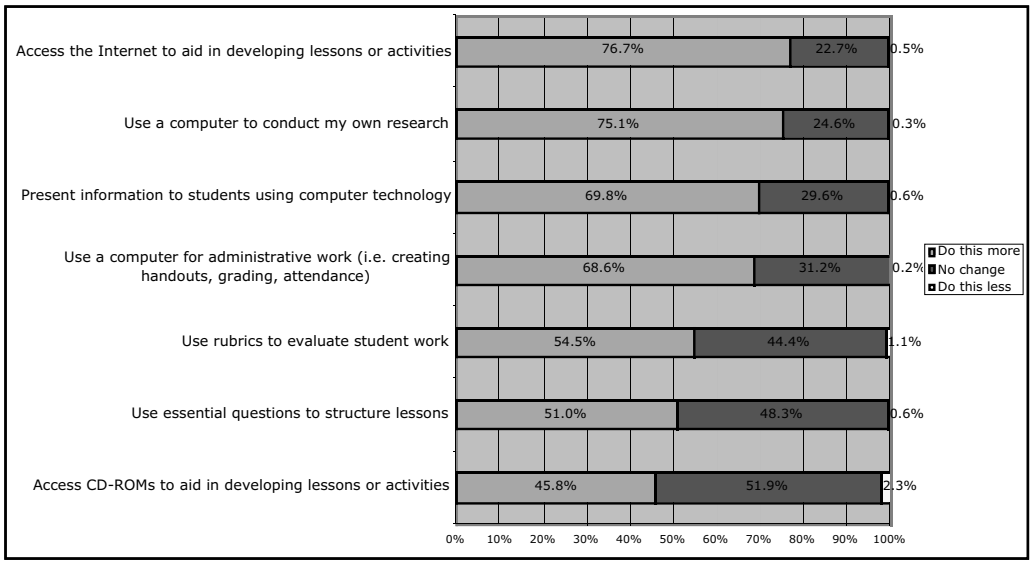
It is often difficult for any professional development program to have an immediate impact on what teachers do in their classrooms. Change in teacher practice is a multi-stage process that occurs over time. Often, teachers must first integrate new ideas into familiar forms of practice before they can be expected to substantially alter what they do in the classroom. For example, teachers often integrate technology into their own work (such as developing lessons and communicating with colleagues) before they begin using technology directly with their students.

In order to understand whether teachers were moving through a process of change, the evaluation team identified some indicators of stages of change, some of which are more closely aligned to traditional pedagogy, and some of which are reflective of more project-based pedagogy. All of the indicators were derived from elements of the Intel Teach to the Future curriculum.

As Figure 12 shows, in all but one case, the majority of teachers reported using technology to support their practice more often since the training. The largest number of respondents said that they were "accessing the Internet to aid in developing lessons or activities" more often (76.7%), "using a computer to conduct [their] own research" (75.1%), presenting "information to students using computer technology" (69.8%) and using "a computer for administrative work (68.6%). For the

most part, these items are illustrative of an initial phase of change. Teachers are using technology to assist them in familiar tasks, including planning lessons, doing research, presenting to students, and doing administrative work. Fewer respondents reported increases on using rubrics to evaluate student work or using essential questions to structure lessons. These items are associated with practices that may be less familiar to many teachers. Nevertheless, roughly half of the survey respondents do report doing these things more often since the training, which indicates that teachers are finding even these more innovative activities applicable to their practice.

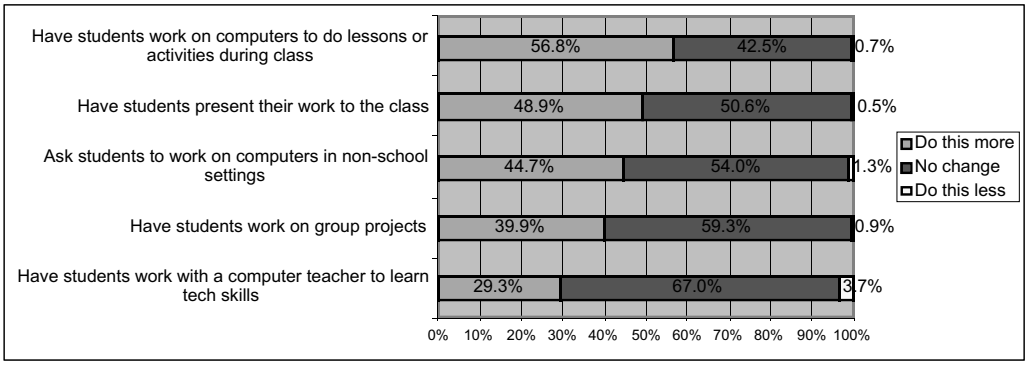
Figure 12. Practice-Related Activities Teachers Engage in since the Training



Student response to technology-integrated lessons

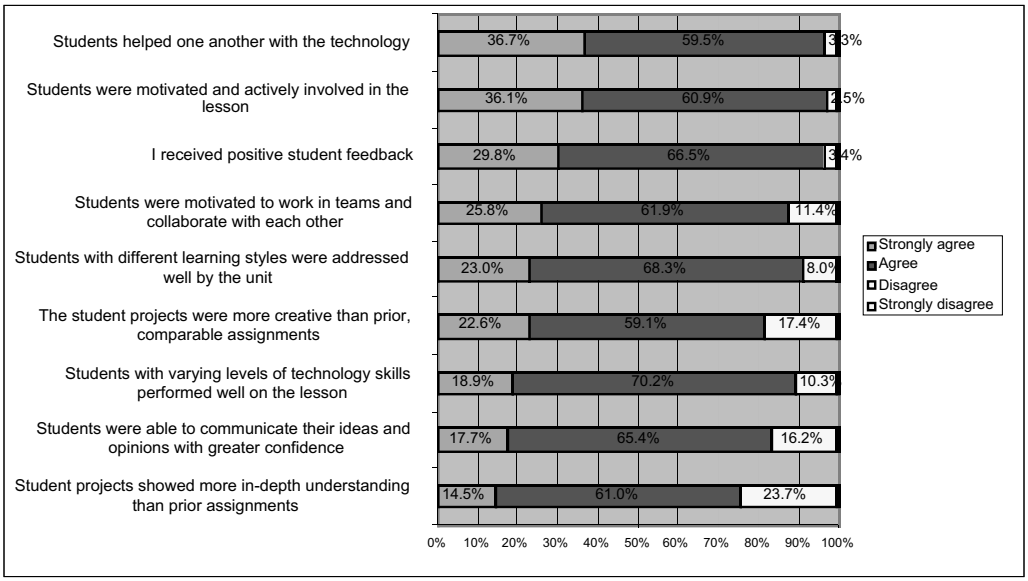
In addition to asking about their own professional activities, the 2003 End of School Year survey contained questions about the kinds of activities respondents have their students engage in, and whether they do this more often, less often or the same amount since the training (see Figure 13). Responses to this question suggest that teachers are coming away from the training able to act on some of the core lessons they took away from the experience. For example, Intel Teach to the Future encourages teachers to have students use computers to do class or subject work, rather than using computers only to learn technology skills in computer class. More than half (56.8%) of the teachers reported that they "have students work on computers to do lessons or activities during class" "more often" since the training. In addition, 48.9% of teachers stated that they have their students "present their work to the class" "more often" since the training. This not only suggests that teachers are using the specific software tools presented in the training more often, but that they leave the training with an appreciation of key elements of project-based learning, such as the importance of having students take an active role in shaping and communicating what they are learning.

Figure 13. Activities Teachers Have Students Engage in since the Training



According to the training participants, student response to these activities was very positive. The End of School Year survey asked respondents to think of a technology-rich activity they engaged in with their students, and to report how their students reacted to this activity. As Figure 14 illustrates, teachers felt their students benefited from engaging in these lessons. In particular, a large majority of teachers "agreed" or "strongly agreed" that "students were motivated and actively involved in the lesson" (97%), that "students with different learning styles were addressed well by the unit" (91.3%), and that "students helped one another with the technology" (96.2%). Slightly smaller but still substantial majorities agreed that student work was more creative (81.7%) and showed more in-depth understanding of the content (75.5%) than other assignments, and that "students were able to communicate their ideas and opinions with greater confidence" (83.1%).

Figure 14. Student Response to Technology-Integrated Lessons

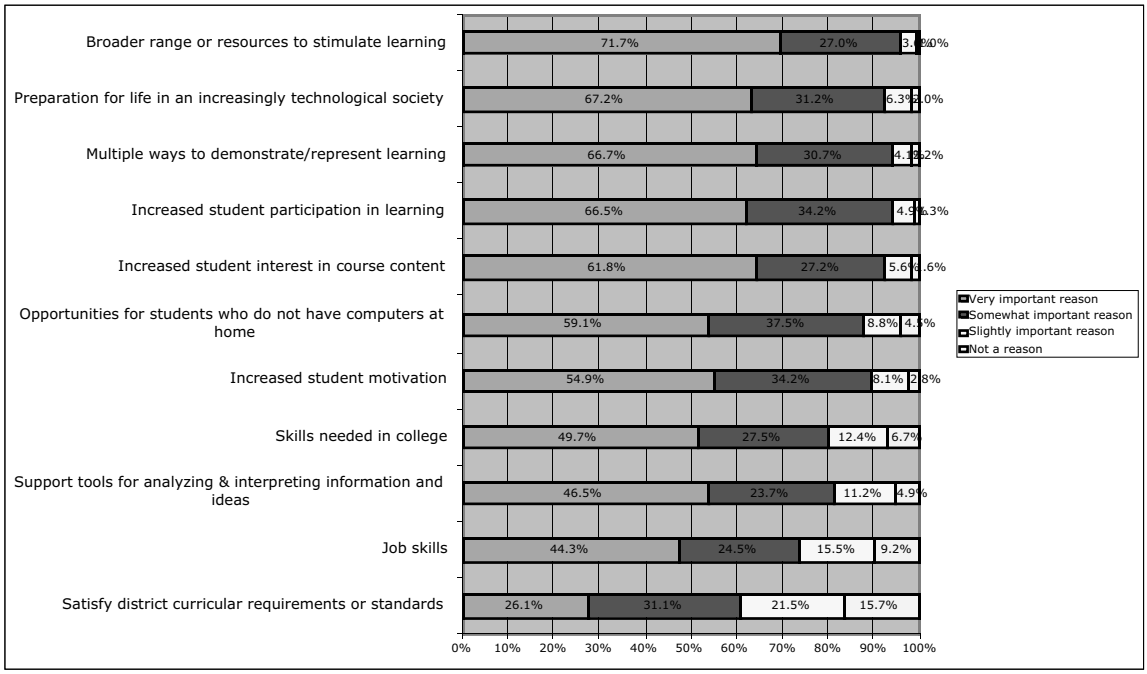


Reasons for using technology with students

In order to interpret teacher responses to the training and their experiences integrating technology in their teaching, it is important to understand what motivates them to use technology with their students. If their primary motivation is to satisfy requirements imposed on them from policymakers or administrators, teachers may be less likely to value the training or see any educational benefits of technology use. However, if teachers believe that technology integration can help them achieve their teaching goals and support their students' learning, they may be more positively disposed toward Intel Teach to the Future and the process of integrating the materials they develop in the training into their teaching.

When asked on the End of School Year survey why they were interested in using technology with their students, teachers' responses reflected their desire not only to help students gain technical skills, but also to provide them with tools that can enhance their learning experience (see Figure 15). The item that the largest number of respondents "strongly agreed" with was: "to provide students with a broader range of resources to stimulate their learning" (71.7%). Other items that many teachers "strongly agreed" with included: "to prepare students for life in an increasingly technological society" (67.2%), "to provide students with multiple ways to demonstrate or represent what they have learned" (66.7%), and "to increase students' participation in their own learning" (66.5%). Fewer teachers reported that they wanted "to give students job skills" (44.3% "strongly agree") or that their motivation was "to satisfy district curricular requirements or standards" (26.1% "strongly agree"), although even on these items a majority of respondents did agree that these were reasons for using technology with their students.

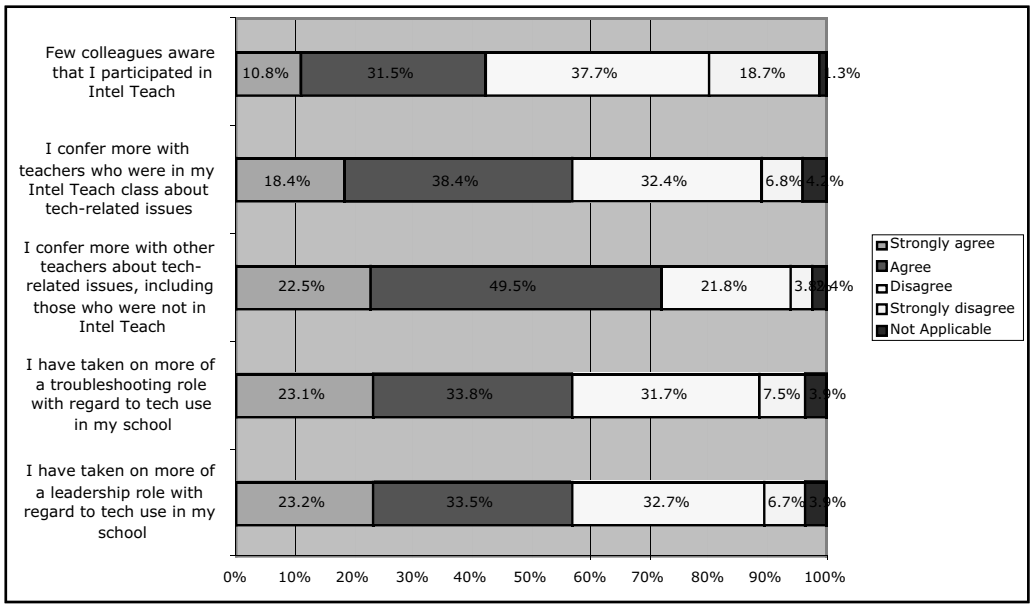
Figure 15. Teachers' Reasons for Using Technology with Students



Participant role in school

Past evaluations of a range of technology professional development programs have shown that when teachers gain greater confidence in their ability to use technology as a learning tool, they can become enthusiastic about sharing their knowledge with their colleagues, and may start taking on increased technology-related responsibilities in their school (see, for example, Henriquez & Riconscente, 1999). The End of School Year survey asked teachers if their role in their school or their collegial activities had changed at all since they participated in the Intel Teach to the Future training (see Figure 16). Over half (56.8%) "agreed" or "strongly agreed" that they confer more with colleagues who had participated in the training about technology related issues, and an even larger number (72%) of respondents "agreed" or "strongly agreed" that they confer more often about technology issues with colleagues in general, even those who had not taken the training, about technology related issues. In addition, over half of the respondents reported assuming greater technology-related responsibilities since participating in the training. More than half (56.9%) "agreed" or "strongly agreed" that they "have taken on more of a troubleshooting role with regard to technology use" in their schools and 56.7% "agreed" or "strongly agreed" that they had taken on more of a leadership role with regard to technology" in their school.

Figure 16. Change in Teachers' Role in School



DISCUSSION

Intel Teach to the Future has been providing professional development in technology to teachers in the United States for four years. EDC's evaluation of this program has demonstrated that the program has a definite impact on its participants. Teachers have always given positive feedback about the program, but the analysis this year provides some information about how Intel Teach to the Future fits into the overall educational environment in which teachers work, and why participants may be responding so positively to this particular professional development program.

One of the most interesting findings in this analysis is how few respondents felt that they lacked administrative and other kinds of support to integrate technology into their teaching. Even those who had not used technology in their classroom felt that lack of support was not one of the major obstacles they encountered. Broad implementation of Intel Teach to the Future has coincided with significant changes in the U.S. educational system's understanding of the role that technology can play in teaching and learning. States and districts are increasingly demanding that teachers be able to use and teach "21st Century skills," specifically the use of technology to support complex problem solving, information management, and communication, so as to participate successfully in the modern world and workforce. In the face of such expectations, administrators are increasingly focused on making technology integration a central component in their overall approach to improving instruction for their students. In turn, administrators are likely to be allocating funds to provide support personnel, such as technology coordinators, IT specialists and staff developers, people whose presence in the school system might make teachers report that they do not consider a lack of technical and instructional support they need to integrate technology to be a significant challenge to technology integration.

Despite these changes on the support level, access to technology and time for planning and sustained project work persist as challenges, though they are clearly not prohibitively problematic for many U.S. teachers who participate in the training. Although this analysis found that many of the teachers who completed the survey had reasonable access to classroom computers and school labs, infrastructure and time issues continue to be cited as the biggest obstacles and challenges to technology integration. At least two possible explanations can be advanced for this finding. First, teachers' expectations for the amount of hardware and time they need in order to do the work they want to do with their students are rising in response to their growing expertise in this domain. Second, although the attitudes of many administrators and decision-makers may be changing regarding the importance of technology integration, they are likely to be unable to make all of the organizational and structural changes in infrastructure and scheduling that would be necessary to fully support effective technology integration in all classrooms.

This analysis of the End of School Year survey took three perspectives on the question of how and whether Intel Teach to the Future participants were following up on their training experience: whether respondents were implementing their unit plans in the current school year, whether they had implemented them more than once, and whether/how often they were implementing other

technology-integrated lessons. Across each of these questions, majorities of respondents said that they were not only integrating technology but also doing so regularly. It is important to note that all of these questions refer to uses of technology that did not occur before the training. These findings clearly demonstrate that teachers are doing something different in their classrooms after their Intel Teach to the Future experience.

Looked at in conjunction with the surprisingly low level of challenges to integration identified by those who report implementing technology in their teaching, these findings paint an encouraging picture not only of the changing environments in which teachers are working but also of the role that this program has played in enabling teachers to capitalize on those changes. Taken together, the high-quality training and usable technology-integrated instructional materials teachers take away from Intel Teach to the Future, and the increased administrative and technical support teachers report experiencing in their schools and districts, are helping participants from this program to meet important new expectations of the educational system.

Another hypothesis that may be suggested by these findings is that teachers' increased implementation of technology projects is in some way helping to drive improvements in administrative and technical/instructional support. This hypothesis is supported by other findings from the evaluation of this program (see Light, Nudell, & Culp, in process). If administrators are exposed to concrete examples of the positive impact that technology integration can have on the work teachers and students do, they may become more supportive themselves of these activities, and may allocate instructional and technical resources to help teachers in these endeavors.

CONCLUSION

Overall, the findings from the 2003 End of School Year survey and the matched survey analysis suggest that Intel Teach to the Future is having a distinct impact on teachers' use of technology in the classroom and on their instructional practices overall. Majorities of teachers are reporting that they are implementing both the units they create in the training and other technology-integrated lessons, and many of these teachers are doing so repeatedly. Teachers also report that they have made changes in both their use of technology and in their overall teaching practices since their participation in Intel Teach to the Future. Teachers are using technology more to support their own professional practice, and many are using project-based instructional strategies more often since their participation in the program. The survey respondents also tell us that their students are responding positively to these changes, showing increased motivation when engaged in technology-integrated lessons, producing more creative and thoughtful work through these activities, and working more collaboratively with their peers. Taken together, all of these findings provide strong evidence that Intel Teach to the Future is making substantial progress toward its goal of helping K-12 teachers integrate technology effectively into their teaching.

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Henriquez, A., & Riconscente, M. (1999). Rhode Island Teachers and Technology Initiative: Final summary report. New York: EDC Center for Children and Technology. Available for download at: http://www2.edc.org/CCT/publications_report_summary.asp?numPubId=64