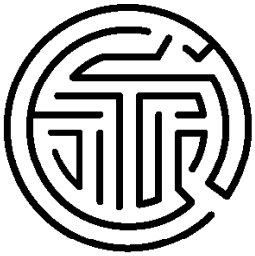

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WHAT FACTORS INFLENCE TEACHERS' LEVEL OF FOLLOW UP ON THEIR TRAINING?

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

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EXECUTIVE SUMMARY

This report is an addendum to a previous report summarizing teacher responses to a survey administered to U.S. Classic Master and Participant Teachers in April 2003. It specifically examines the factors that influence whether and to what degree teachers follow up on their experience with Intel Teach to the Future.

The analyses indicate that the program is having an impact on teachers' use of technology in their teaching. The analyses also reveal relationships between implementation and a number of contextual and affective factors. Specifically, the data show the following:

- A large majority of teachers report implementing their unit plans in the 2002-2003 school year.
- Teachers continue to implement their unit plans two years after participating in the training.
- A majority of teachers report implementing some other technology-integrated lesson with their student once a month or more.
- No meaningful relationship exists between demographic variables, such as race, gender, subject taught, grade-level taught and rates of implementation.
- A strong relationship exists between teachers' feelings of preparedness to implement technology in their teaching, both before the training and after the training, and the rates of implementation.
- A strong relationship exists between teachers' access to technology and their rates of implementation.
- A strong relationship exists between teachers' beliefs about the relevance of the teaching strategies presented in the training and rates of implementation.

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INTRODUCTION

This report examines a key evaluation question for the Intel Teach to the Future teacher professional development program: How, and to what extent, did teachers follow up on their training by using technology to support project-based student work in their classrooms? This question is important to answer for two reasons. First, the literature on professional development indicates that active use in the classroom of materials created or lessons learned through professional development is a necessary first step toward having a sustained impact on teacher instruction. Second, this evaluation of the Intel Teach to the Future program has repeatedly demonstrated that teachers who participate in this program do have a high level of follow up to their training experience, making it particularly important to understand what factors keep some teachers from doing so, and what factors support particularly extensive or sustained implementation.

This report builds on those previous evaluation findings by looking more extensively at a new wave of survey data that confirm and extend the findings of our prior work. The data used in this report are drawn 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 program participants.

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.

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 ICT 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 allows 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. (For more information about Intel Teach to the Future, see 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 (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 applications to participate in the program made by respondents to the 2003 End of School Year survey. 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 examines 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." Chi-square tests were conducted on all categorical data and ANOVA analyses were conducted on continuous data. Unless otherwise noted, all reported findings are statistically significant, with a P value of $< .05$.

A comparison of the matched pool with the entire group of teachers represented in the application data and End of Training pools (n=51,031; these two data sources cover an equivalent population) shows that the matched pool is generally consistent in professional background and demographics with the larger survey population. Specific points of variation include the following:

- Teachers in the matched pool tend to be from higher SES schools than the overall total: 59% were from schools with less than 50% of students receiving free or reduced price lunch, as compared with 54.3% of Application/End of Training respondents.
- The matched pool includes a slightly smaller percentage of women (74%) than the Application/End of Training survey respondents (78.3%).
- The matched pool had a higher percentage of respondents who identified themselves as White (89.1%/82.7%).
- The matched pool includes fewer early elementary grade teachers (20%) than in the Application/End of Training group overall (26%).

Findings

The primary goal of Intel Teach to the Future is to help teachers understand how to integrate technology effectively into their teaching. From the point of view of the developers of the program, technology is most effectively integrated into teaching when it is used in association with project-based teaching strategies. In order for the program to have the kind of impact intended by the program developers, it is important not only for teachers to be able to implement technology-integrated lessons in their classrooms, but also for teachers to implement these lessons in the context of a project-based pedagogical framework. This report focuses on the first of these concerns, presenting a variety of analyses that look specifically at the impact of Intel Teach to the Future on teachers' implementation of technology in their teaching. The second is addressed in Martin, Kanaya & Crichton (2004), and will be the focus of a future addendum report as well.

Teachers' implementation of technology in their teaching

In order to assess whether teachers followed up on what they learned in their training, the initial question that needs to be explored is whether or not teachers are implementing their unit plans or technology-integrated lessons with their students after participating in the training, and then to identify the factors that might have an influence on whether teachers implement. The following section examines these questions.

Implementation of the unit plan and other technology-rich lessons

As was presented in Martin, Kanaya & Crichton (2004), a large majority of Intel Teach to the Future participants did implement their unit plans once they returned to their classrooms. In the 2003 End of School Year survey, 79.1% of respondents reported that they had implemented 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 doing their unit plans more than once, 25.8% reported that they had done so once, and 10.8% reported that they had never implemented. This indicates that a majority of respondents who were trained in previous years are not only trying out their unit plans once, 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, this survey asked whether and how often respondents have implemented other technology-integrated lessons that are new in some way, compared with their use of technology prior to their training. More than a quarter of respondents reported that they were implementing other, new technology-integrated lessons more than once a month (29.3%), 22% reported doing so about once a month, 30.8% said they did this less than once a month, 10.6% had only implemented their lesson plan and 7.3% had not done either their lesson plan or a technology-integrated lesson.

Possible sources of variation in implementation

It is important to understand not only whether teachers are implementing their unit plans or other technology-integrated lessons, but also to examine what factors are influencing whether or not teachers are integrating technology into their teaching after their training. An analysis of the implementation data was conducted to examine whether a number of variables were related to rates of implementation reported by teachers. All of these analyses were conducted using the matched pool data set (N=1,347). The results of these analyses are reported below.

Implementation and demographics. Cross-tabulations demonstrated that none of the following variables plays a role in determining how likely an individual respondent is to have implemented either a unit plan or another type of technology-integrated lesson: sex, race/ethnicity, SES of school, grade level taught, or subject taught. No meaningful relationships were found between any of these demographic items and rates of implementation.

Implementation and training cohort. Members of the 2002-2003 cohort were no more likely to have implemented their unit plans during the 2002-2003 school year (80.6%) than members of the 2001-2002 cohort (80.9%), and only marginally more likely to have done so than members of the 2000-2001 cohort (74.6%). Members of the 2000-2001 cohort were most likely to have implemented a unit plan more than once (67.8%); 53.9% of 2001-2002 participants reported having done this. These data suggest that not only do a large number of teachers implement their unit plans, but that a substantial number continue to implement their unit plans, even two years after they have completed the training.

Implementation and preparedness to integrate technology. An analysis of reports of implementation as compared to reports of preparedness to integrate technology (both before and after the training)[1] show that feeling prepared to do this work significantly influences the likelihood that a teachers will follow up on their Intel Teach to the Future training by using their unit plan or another technology-rich activity. Specifically, teachers who implemented their unit plans more than once felt significantly more prepared to integrate technology before the training than those who implemented once or who never implemented a unit plan (mean difference for both was 1.3 on a 0-20 point scale, $p<.01$). Similarly, teachers who never implemented a unit plan felt significantly less prepared before the training than teachers who implemented more than once (mean difference was -1.3 on a 0-20 point scale, $p<.01$). These distinctions held true for feelings of preparedness after the training as well: teachers who never implemented their unit plan also felt significantly less prepared after the training than teachers who implemented once (mean difference was -1.2 on a 0-20 point scale, $p<.01$) or more than once (mean difference was -1.7 on a 0-20 point scale, $p<.01$), and teachers who implemented more than once felt significantly more prepared to integrate technology after the training than those who implemented once (mean difference was 0.5 on a 0-20 point scale, $p<.05$) or who never implemented (mean difference was 1.7 on a 0-20 point scale, $p<.01$).

[1] This analysis used a composite measure of "preparedness" that drew on five items probing teachers' feelings of preparedness to use technology in their teaching in the ways emphasized by the Intel Teach to the Future curriculum.

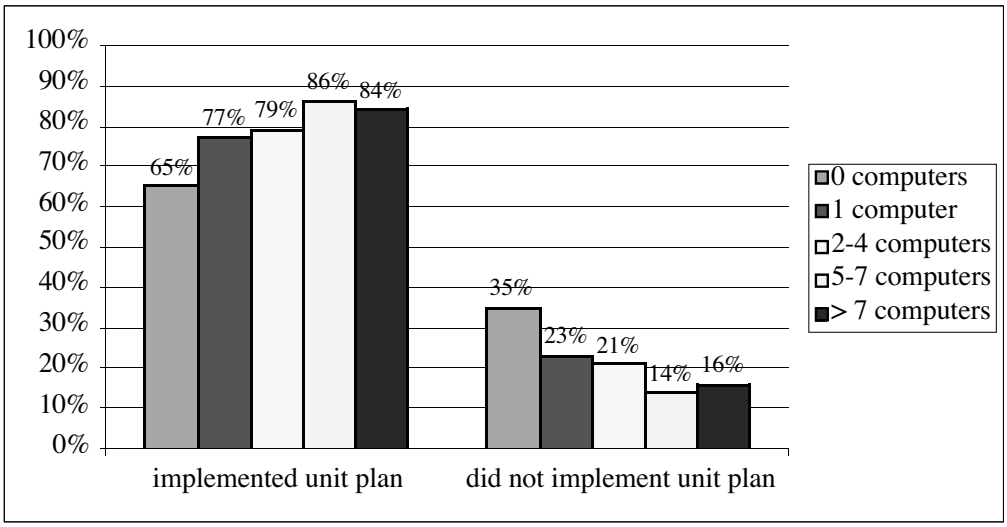
This finding is important because of the substantial increases teachers report in their feelings of preparedness to integrate technology after participating in the training. Findings from the End of Training survey for Participant Teachers, for example, show a 36.7% increase in the percentage who say they feel "very prepared" to integrate educational technology into the grade or subject they teach after participating in the training. Because rates of implementation are related to teachers' feelings of preparedness, an increase in the number of teachers who feel prepared to integrate technology results in an increase in the number of teachers who actually implement a technology-integrated lesson in their teaching.

Implementation and access to computers. In order for teachers to prepare for and to implement technology-integrated lessons and activities in their teaching, it is essential for them to have regular and easy access to computer technology. The End of School Year survey asked respondents to provide information about the access conditions they experience in their work environments, both in their classrooms and their schools in general. 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%). Meanwhile, 14% stated they had 5-7 computers available, and 17.4% reporting over 7 computers in the classroom (so that almost a third of respondents have five or more computers in their classroom). A large majority (74.4%) reported that all of their classroom computers had access to the Internet, and 22.2% more 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. The analysis of the data showed that of those 8.6% of teachers who reported not having access to computer labs, 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 had neither access to labs nor classroom computers. Because so many teachers reported having access to a computer lab, and because a substantial percentage of those teachers who did not reported having classroom computers, the evaluation team used access to classroom computers, rather than access to computer labs, to analyze the relationship between implementation and access.

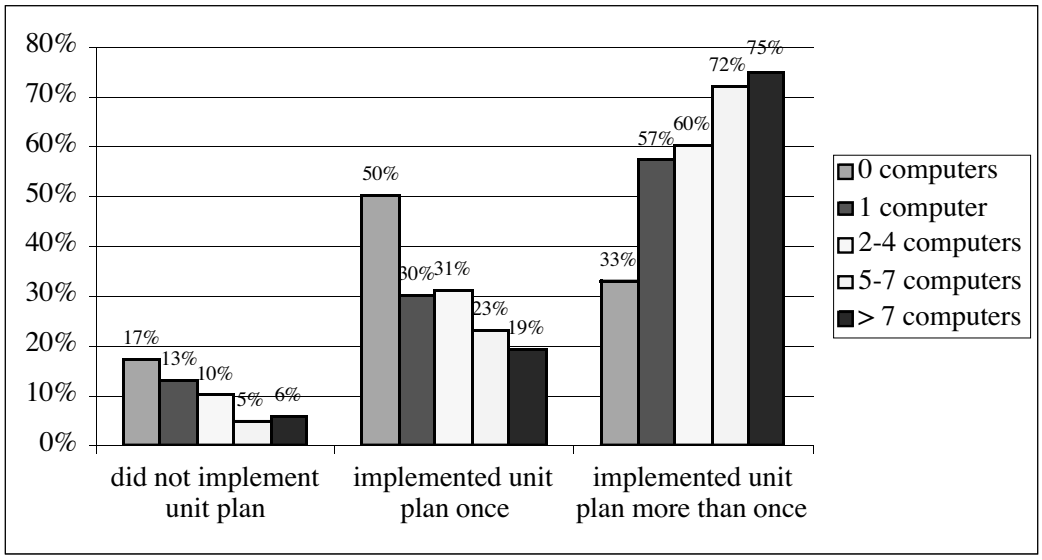
The analysis of the matched pool respondents (n=1,347) demonstrated a strong relationship between classroom computer access and implementation of the unit plan or technology-integrated lessons in general. Overall, there were statistically significant patterns ($p<.01$ for all of the following access/implementation analyses) toward greater implementation based on greater access to classroom computers. For example, 20% more teachers who had 5 or more computers in their classroom reported having implemented their unit plan in the 2002-2003 school year than teachers who reported having no computers in their classroom (see Figure 1).

Figure 1. Implementation of Unit Plan in 2002-03 School Year by Classroom Computers



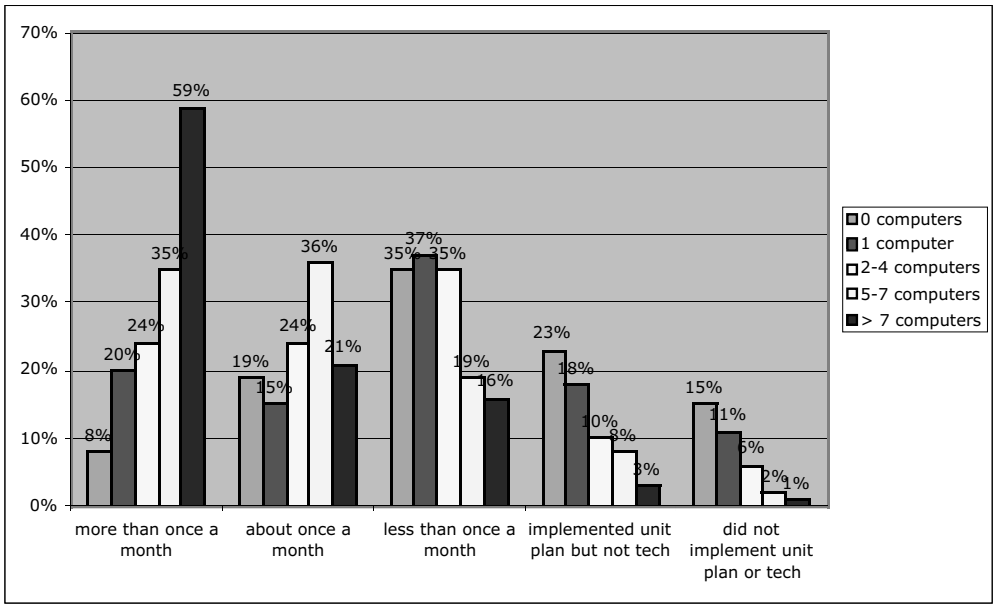
Classroom computer access also influenced frequency of use of the unit plan. Close to three-quarters of the teachers (74.6%) who had more than seven classroom computers, and 71.6% of teachers with 5-7 classroom computers reported doing their unit plan more than once, while only 33.3% of teachers who had no classroom computers said they implemented their unit plans more than once. Interestingly, even having one classroom computer increased the likelihood that teachers would repeat their use of the unit plans. Among those teachers who reported having one computer in their classrooms, 57.3% said that they had implemented their unit plan more than once (see Figure 2).

Figure 2. Frequency of Unit Plan Implementation by Classroom Computers



Access to computers in the classroom also made a significant difference in how frequently other technology-integrated lessons were used. More than three quarters (79.3%) of teachers with more than 7 computers in their classrooms had implemented another technology-integrated lesson once a month or more, and 70.9% of teachers with 5-7 computers had done so, too. Conversely, only 26.9% of teachers with no classroom computers had implemented another technology-integrated lesson once a month or more (See Figure 3). These findings are particularly telling. In order for teachers to gain enough confidence to expand on what they learn in their training, they need to have the time to experiment and practice. Those teachers whose computer access is limited to school labs may not feel they have the freedom to experiment with new ideas and develop new activities for their classroom teaching.

Figure 3. Implementation of Technology-Integrated Lesson by Classroom Computers



Implementation by relevance of teaching strategies. Access to classroom computers can be a significant factor in determining whether teachers are able to take what they have learned and created in the Intel Teach to the Future training back to their classrooms. However, the choices that teachers make about whether they will integrate technology are not only based on access. Teachers need to understand how these technology-integrated lessons and the teaching practices associated with them will help them achieve their teaching goals.

The Intel Teach to the Future training discusses how technology can be an integral part of a larger project-based pedagogical strategy. The End of School Year survey includes questions about the teaching strategies presented in the training, asking respondents first whether these teaching strategies were new to them, and then if the teachers felt the strategies were "relevant to [their] teaching goals." It also asks whether these strategies would help them to "understand how to integrate technology into [their] teaching." The data show that for most teachers the teaching strate-

gies presented were not entirely new. Only 20.1% said that it was "very true" that the teaching strategies were new, and 62.7% said that this was "somewhat true." However, many did feel that the 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%) 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."

As with the analysis of classroom computer access, there was a strong relationship in the matched pool responses (n=1,347) between teachers' perceptions of the relevance of the teaching strategies presented in the training and their choices about implementation ($p<.01$ for all of the following relevance/implementation analyses). Teachers who felt that the teaching strategies presented in the training were very relevant to their teaching goals were more likely to give positive responses across all of the implementation categories. For example, on the question that asked whether they implemented all or part of their unit plan in the 2002-2003 school year, 85.3% of teachers who said that the teaching strategies were "very relevant" reported implementing, while only 57.1% of those who said the strategies were "not relevant" reported implementing their unit plan (see Figure 4). When asked whether they had implemented their unit plan once, more than once or never, 70.2% of teachers who said the teaching strategies were very relevant to their teaching goals implemented more than once, while 39.1% of those who said the strategies were not relevant implemented more than once (see Figure 5). When asked whether and how often they used other technology-integrated lessons in their teaching, 60.9% of teachers who felt the teaching strategies were very relevant said they did so once a month or more, and 42.9% of those who felt the strategies were not relevant used other technology-integrated lessons in their teaching once a month or more (see Figure 6).

Figure 4. Implementation of Unit Plan in 2002-2003 School Year by Relevance

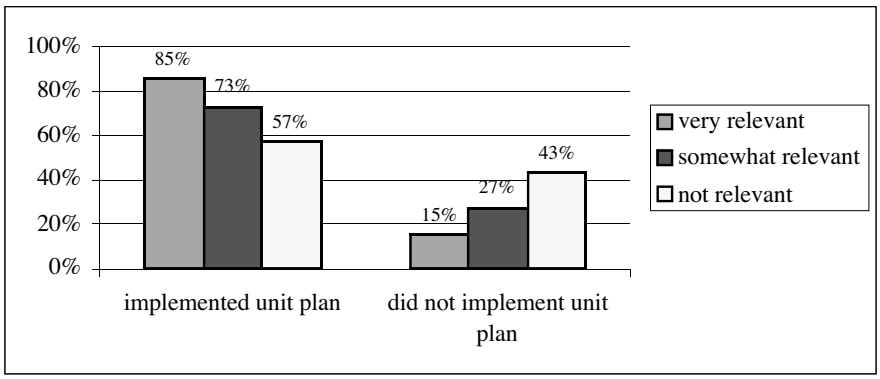


Figure 5. Frequency of Unit Plan Implementation by Relevance

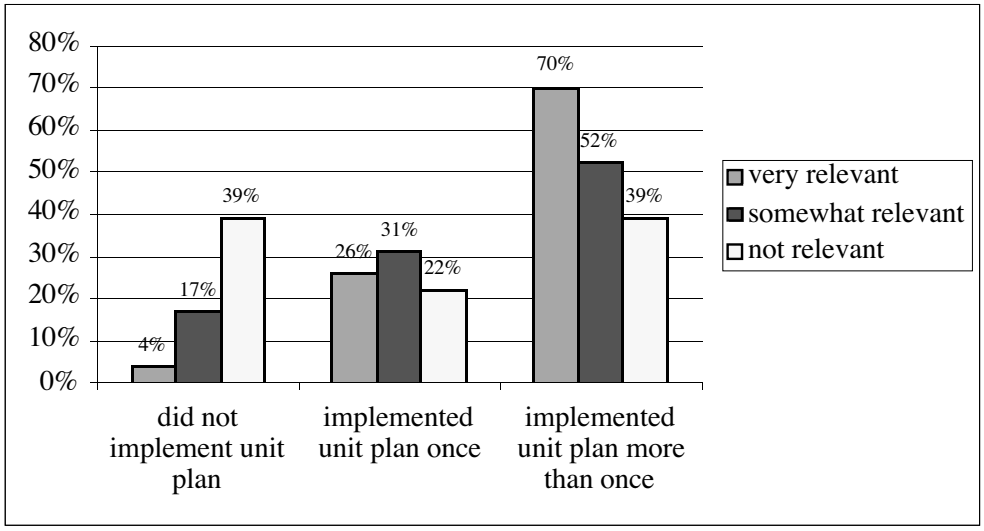
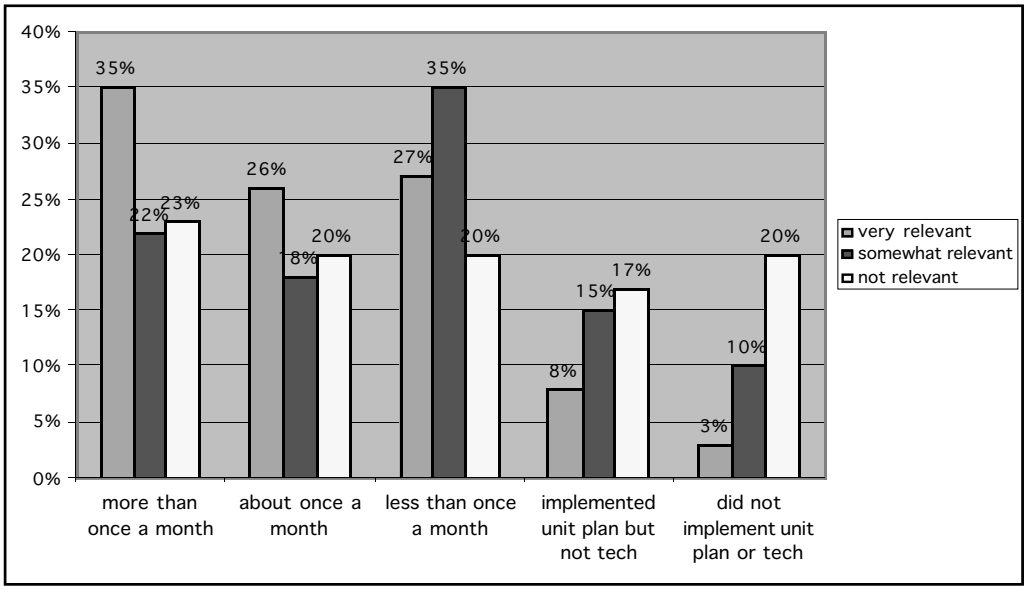


Figure 6. Implementation of Technology-Integrated Lesson by Relevance



DISCUSSION

The goal of most professional development programs is to have an impact on what teachers actually do in their classrooms. However, as educational researchers have discovered, this goal often goes unrealized (Cuban, 1990; Elmore, 1995b; Tyack & Cuban, 1995). Because of the conditions under which many teachers work (limited planning time, limited flexibility within the curriculum, and limited technical skills), making substantial changes in day-to-day activities can be difficult. These circumstances make Intel's efforts to tie the goal of increasing teachers' use of technology to increasing their use of project-based pedagogical techniques all the more ambitious. However, our analyses suggest that tying these two goals together may, in fact, have been one of the keys to the program's success.

The analyses presented here demonstrate that teachers are reporting a very high level of follow up to their training experiences and that they are sustaining that follow up over time. They also show that teachers trained one and two school years ago are almost as likely to implement their unit plans in the most recent school year as those teachers who just received their training. Further, these analyses show that teachers' implementation of their unit plan or other new technology-integrated lessons is not influenced by their sex, race/ethnicity, the SES of their school's student population, or the grade level or the subject area they teach. Finally, they demonstrate that the following factors have a positive influence on teachers' likelihood of following up on the training:

- Feeling prepared to integrate technology into teaching, either before or after the training
- Having access to relatively higher numbers of classroom computers
- Finding the pedagogical strategies discussed in the training to be relevant to their work

Two of these issues, feelings of preparedness and finding the pedagogical strategies to be relevant to one's teaching, are individual variables that may be useful for teachers to consider when making a judgment as to whether or not to participate in this course. The third, the amount of hardware available in the classroom, is not easily addressed either by the program or by the participant, but is worth mentioning because it documents teachers' continuing need for adequate in-classroom access to computers.

It is important to note that teachers who found the pedagogical strategies discussed in this training to be relevant to their teaching goals were not only more likely to implement their unit plans and other technology lessons, but also more likely to implement repeatedly. This finding reinforces not only the importance of describing to teachers the appeal or value of a given professional development offering's content, but also the importance of explaining how the program may address a need for support or improvement in their practice that teachers already perceive. In order for teachers to make the efforts necessary to try new things in their teaching, they have to see a reason to do so. Linking new ideas to existing pedagogical needs helps teachers to identify where and how they can begin applying the strategies advocated in a professional development

program to their daily practice. Intel Teach to the Future's technique of helping teachers' enhance their existing curriculum with project-based technology lessons gives teachers something familiar to build on and something tangible to use when they return to their classrooms.

However, as we mentioned in the findings section of the 2003 End of School Year Survey Report, it is important to understand that changes in practice take time, especially in environments as resistant to change as schools. There are many contextual factors that limit what teachers are able to do in their classrooms. Some teachers do not have the flexibility to alter or enhance the curricula they are required to teach; some are faced with accountability pressures that do not allow them to take the time required to do inquiry-based technology activities; and some teachers may simply feel their practice is successful already and does not need to change. The findings presented here suggest that most teachers leave the training with the desire and ability to start using technology more to support them in their work.

CONCLUSION

During the four years in which EDC has been conducting an evaluation of Intel Teach to the Future, data from both surveys and case studies have indicated that the program is having an impact on both teachers' use of technology in their teaching and their teaching practice in general. This report attempted to explore more fully what that impact is and the factors that might have an influence on the extent of that impact.

The analyses of the 2003 End of School Year survey, the application data and End of Training surveys of these respondents (Martin, Kanaya & Crichton, 2004), illustrate the many ways in which teachers are bringing the lessons they learn in the training back to their classrooms. Not only are teachers using the unit plans they develop, but they are also creating new technology-integrated lessons for their students. Not only are they using the software applications they learn about in the training, but they are also experimenting with different software applications. Not only are participants introducing technology into their teaching, but many are also experimenting with other pedagogical strategies presented in the training, such as the use of rubrics and essential questions. These data suggest that the Intel Teach to the Future experience is serving as a catalyst for teachers' engagement in a variety of activities that extend beyond the implementation of the specific unit plan developed in the training.

This addendum report demonstrates that these effects are widespread among many different types of teachers who have participated in this program. Teachers at every grade level, in schools with different proportions of low-SES students, and teaching in every content area are equally likely to follow up on their training. This report also shows that inadequate access to technology, lack of prior experience with technology, and a poor connection between a teacher's existing practices and the pedagogical strategies discussed in the training are the most significant obstacles to follow up on after the training. These findings suggest that in order to serve all teachers equally well, Intel may need to address more directly those levels of the school or district leadership that can best respond to these challenges. These administrators may need to learn more about the importance of adequate access, basic technical skills, and support for a project-based pedagogy to ensuring high-quality technology use within their school or district.

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