2000–2001 EVALUATION REPORT

INTEL© TEACH TO THE FUTURE

CENTER FOR CHILDREN & TECHNOLOGY

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EXECUTIVE SUMMARY

This report presents findings from an evaluation of the Intel Teach to the Future professional development program, conducted from June 2000 – June 2001. This evaluation provided a rare opportunity to examine closely an ambitious, large-scale professional development initiative and to study a diverse population of teachers and administrators as they experienced and implemented this program.

The goals of Intel Teach to the Future are to improve the integration of technology into K–12 classrooms, and to improve mathematics and science education in particular. The program seeks to achieve this by using a highly structured delivery model, a train-the-trainer approach, and a well-designed and extensively piloted curriculum to create meaningful impact at the classroom level for teachers across the country teaching in widely varying circumstances. To evaluate the program's success in meeting these goals, we have paid careful attention to three topics in the first year of this evaluation: teachers' responses to the training; initial evidence of the impact of the program; and the efficacy of the implementation model. The second year of this evaluation will examine the impact of program participation on the classroom, examining changes in teachers' curricula and teaching strategies and the impact of those changes on students' math and science learning.

Teacher Responses to Intel Teach to the Future

Teachers who responded to a survey about Intel Teach to the Future were extremely positive about their training experience. Highlights include:

- 97% of these teachers reported that the ideas and skills they learned through the program would help them to successfully integrate technology into their students' activities.
- 94% of these Participant Teachers said they would "definitely" recommend the Intel Teach to the Future training to a friend or colleague.
- 91% of these teachers reported that after completing their training, they felt "well prepared" to integrate educational technology into the grade or subject they teach.

Of the 8,008 teachers who completed end-of-training surveys, 7.7% are math specialists and 6.8% are science specialists; 27% are generalists who teach some math and science. 48% of these teachers work with grades K–5; 25% teach grades 6–8; and 27% teach grades 9–12.

Initial Evidence of Program Impact

Fifty-one percent of survey respondents reported that they had implemented the unit plan they developed in their Intel Teach to the Future training. Over 75% of those who had not implemented their unit plan expected to do so in the next school year. Teachers who had implemented their unit plans felt very strongly that their unit had been effective in helping them meet their learning goals for their students. Specifically:

- 99% reported students were "motivated and involved in the lesson."
- 89% reported "student projects were more creative" than in other, comparable work.
- 80% reported "student projects showed more in-depth understanding" than in other, comparable work.

Efficacy of the Implementation Model

Truly effective implementation of Intel Teach to the Future depends on districts' willingness and capacity to:

- appropriate the program's structures and goals,
- effectively position the program within a process of building local capacity for high-quality use of educational technology, and
- establish a coherent relationship between the program structures and local priorities, resources, and constraints.

Intel Teach to the Future is designed to provide training that moves beyond offering technical skills training to inviting teachers to think about how technology can be used to support a student-centered, inquiry-driven curriculum. This evaluation demonstrates that its role as a transitional training is most effectively realized when teachers, and the districts they work in, have certain preconditions in place to provide a foundation for the training, and can reasonably expect to be able to build upon the experience with further experimentation and professional development in the future.

Teachers are best prepared to translate their experience with this training into concrete changes in their classroom practice when they have adequate technology available in their classroom (multiple computers for student use), confidence that their school and district administration is supportive of experimentation and innovation in the classroom, and a belief that project-driven curricula and student-centered pedagogy are valuable teaching strategies.

To support a well-planned alignment of Intel Teach to the Future with local priorities for technology use as well as existing plans for professional development and hardware allocation, school districts need to have already invested substantial human and financial resources in advancing their educational technology program.

Intel Teach to the Future is a highly ambitious program and can help school districts meet one of their most urgent professional development needs. The program will come closest to meeting its goals when districts integrate the program into a larger sequence of professional development that engages teachers in the use of technology with students as well as student-oriented pedagogical and curricular approaches. We conclude this report with recommendations for supporting this process in districts adopting the program, as well as for focusing program impact on mathematics and science teachers.

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INTRODUCTION

This report presents findings from an evaluation of the Intel Teach to the Future professional development program. We believe these findings contribute significantly to our growing understanding of the importance of sustained and in-depth professional development to effective integration of educational technology into the nation's K–12 classrooms. Our evaluation (as implemented between June 2000 and June 2001) provided a rare opportunity to closely examine an ambitious, large-scale professional development initiative, and to study a diverse population of teachers and administrators as they experienced and implemented this program. Our research has relevance not only to Intel Teach to the Future specifically, but to the larger project of supporting the nation's vast investment in technology infrastructure with a complementary investment in professional development.

We begin by reviewing Intel's programmatic goals and the Education Development Center/Center for Children and Technology's (EDC/CCT) evaluation objectives. The main body of the report presents an analysis of early indicators of the program's impact on participating teachers and districts, and discusses the factors at the training and district levels that affect participants' experiences of Intel Teach to the Future. Appendices present an overview of Intel Teach to the Future and a summary of our methodology.

Intel Teach to the Future was designed to address the overarching goal of the Intel Innovation in Education initiatives: to improve math, science, technology, and engineering education worldwide. To achieve this end, the program focuses on two of the four more specific goals of the Innovation in Education initiatives: promoting the effective use of technology in the classroom, and improving science and math education in K–12 schools. Our evaluation focuses on the U.S. implementation of this international program, and this first year of the evaluation has focused primarily on understanding the extent to which the program is meeting the first of its goals: promoting the effective use of technology in the classroom. During our second year of evaluation work we will look more closely at the impact of Intel Teach to the Future on science and mathematics education in schools participating in the program.

The Intel Corporation chose to operationalize these broad goals in a concrete objective of training 100,000 U.S. teachers over three years. This numeric goal emphasizes Intel's concern with reaching a "critical mass" of teachers.[1] It also reflects their hope that by bringing a high-quality training program to large numbers of teachers, clustered within specific schools and school districts, the concepts and practices emphasized in the Intel Teach to the Future curriculum will spread within local and regional networks of teachers and eventually extend its impact to a national level.

This first year of evaluation research has focused on understanding how and whether this program is likely to lead to improved technology integration in K–12 classrooms, and on identifying mediating issues or influences that might either support the program in achieving this goal or obstruct its progress.

[1] 100,000 teachers represents roughly 3.6% of the nation's approximately 2.8 million K–12 teachers.

This evaluation examines the challenges of disseminating a rigorous, high-quality curriculum to a broadly dispersed and heterogeneous (in their teaching specialties) population of teachers. A range of research has demonstrated the importance of local ownership of educational innovations to their long-term effectiveness (McLoughlin, 1978; Sabelli & Dede, forthcoming); on the other hand, the need to identify promising programs and practices and bring them to scale is great. Can a highly structured delivery model, a train-the-trainer approach, and a well-designed and extensively piloted curriculum, result in meaningful impact at the classroom level for teachers across the country teaching in widely varying circumstances? To help answer this question, we paid careful attention to two key topics: the efficacy of the implementation model of Intel Teach to the Future, and initial evidence of the program's impact on teachers who participated in it.

We understand *efficacy* here to refer not just to a smooth and well-run administrative process, but to a larger goal. Because we know that large-scale implementations of educational innovations work most effectively when they allow for local adaptation and tailoring of the innovation (Culp & Honey, 2001; Culp, Honey, & Spielvogel, forthcoming; Fishman, Best, Foster, & Marx, 2000), we looked to see whether this program was being adapted to meet local needs; whether the local adaptations improved the delivery and impact of the program; and whether the program's administrative structures supported that process of local adaptation.

Regarding program impact, during this first year of evaluation research we identified two issues that drove our data collection and analysis. First was the teachers' classroom implementation of the unit plans they created during their Intel Teach to the Future training. These unit plans are intended to serve as the bridge connecting teachers' training experiences with their work in their own classrooms. This feature is consistent with much of the research on effective professional development (National Foundation for the Improvement of Education, 1996), which indicates that teachers learn best when they create materials in professional development contexts that they can bring back to their classrooms to use with their students. Therefore, whether or not teachers who participate in the program implement their lesson plans could be defined as a baseline indicator that the training had some effect on teachers' classrooms, even if implementation was limited to a one-time use of the unit plan.

The second issue related to program impact that we investigated was the broader topic of teachers' pedagogical approaches, and the interaction between those various approaches and the emphasis in the Intel Teach to the Future curriculum on project-based learning and original student inquiry. In prioritizing this issue, we followed the growing body of research establishing strong connections between the degree to which teachers embrace a constructivist pedagogy and their willingness to use technology as a tool to support student inquiry and substantive project-based work (Becker, 2000; Becker & Ravitz, 1999; Ravitz, Becker, & Wong, 2000; Riel & Becker, 2000). Because the Intel Teach to the Future curriculum invites teachers into a process of thinking through the relationship between these pedagogical strategies and this type of use of technology, it was important to determine whether or not participating teachers were following patterns established in other research — that is, whether more constructivist-oriented teachers were also the teachers most inclined to use technology with their students in the ways promoted by the program, or if some other relationship was emerging between personal pedagogical approach and appropriation of the program's goals for technology use. If teachers relate to Intel Teach to the Future in ways that are consistent with other research, it is possible that the program could be most successful if it attracted constructivist-oriented teachers and invited them to make more extensive use of technology. Or, it could also be very successful if it proves to be attracting, and having a similar or greater impact on, teachers with other, more teacher-centered and/or textbook-centered pedagogical approaches.

Finally, we link these two issues (unit plan implementation and pedagogical beliefs and practices) by examining how teachers' experiences with the program and their follow-through are related to the school- and district-level contexts in which they teach. Other research has established that teachers who use constructivist pedagogical approaches are most likely to work in districts that support extensive collaboration among teachers, and where teachers perceive themselves to have significant autonomy and control over how and what they teach (Becker & Riel, 2000). We know, however, that not all teachers are able to work in districts that provide this environment of professionalism, and a large-scale program like Intel Teach to the Future must reach teachers working in a much broader range of district contexts. Therefore, it is important to invite district administrators to use this program as a lever, or catalyst, to establish new opportunities for teachers to do the kinds of sustained, collaborative thinking and exploring about their teaching practices that Intel Teach to the Future invites them to do. What we already know about teaching with technology, and about this program, tells us that Intel Teach to the Future is well positioned to be well used by strong teachers working in supportive districts. But it will have far more impact if it also allows itself to be used as a lever to move districts less conducive to constructivist teaching toward making this sort of teaching more viable.

Our findings on program impact are discussed below. During the second year of this evaluation, we will be conducting case studies at the district, school, and classroom level to learn much more about the impact this program is having on districts' and schools' long-term approaches to supporting educational technology and, most importantly, the program's impact on how teachers are teaching and what students are learning.

OVERVIEW OF INTEL TEACH TO THE FUTURE

See Appendix A.

METHODOLOGY

See Appendix B.

RESULTS

This section first summarizes the demographic and teaching profiles of our survey respondents as well as our data about teachers' responses to the program. We then discuss our findings related to two key features of the implementation model for Intel Teach to the Future: reaching teachers who work in low-socioeconomic-status schools (relative to their district context), and creating a critical mass of teachers in individual school buildings within participating districts. We discuss our preliminary findings related to program impact, drawing on both survey data and analysis of our qualitative research. The final three sections summarize our findings about effective training practices; district-level implementation issues having major impact on how training is delivered and received; and contextual factors at the district and school level that are shaping teachers' experiences of the program. Throughout this section, we draw on evidence collected through survey responses, site visits, and interviews with Lead Education Agency (LEA) liaisons.

Who are the Teachers Being Reached by this Program?

Teachers who participated in Intel Teach to the Future were surveyed twice – once at the end of the training and once at the end of the school year. The sample resulting from the end-of-training survey consisted of 8,008 teachers who had completed Intel Teach to the Future training (as of June 1, 2001). Just over 2% (N=173) were participants who were trained as Master Teachers (MTs), and the rest were Participant Teachers. Most teachers who participated in the training evaluation were women (80%, N=6385). The sample was also predominantly White/non-Hispanic (84%, N=6713). Hispanic or Latino(a) teachers constituted 8% of the training survey sample (N=663), while less than 5% of the sample was Black/non-Hispanic (3%, N=268) or Asian (2%, N=141). This distribution includes proportionally more Hispanic teachers than in the U.S. teaching population as a whole: the national profile is 90.7% White/non-Hispanic, 7.3% Black/non-Hispanic, and 2.0% other racial/ethnic groups (National Center for Education Statistics, 2001).

Survey participants varied widely as to the extent of their teaching experience. Some were just beginning their teaching careers, while others reported almost 50 years of teaching experience. The respondents have an average of 13 years of teaching experience (SD=9). Most teachers (64%, N=5103) reported that less than 50% of the students in their schools were eligible for reduced or free lunch, which is consistent with the national range (68% of schools nationwide have less than half of their students eligible for reduced-price/free lunch).

The largest plurality of teachers who completed end-of-training surveys were Generalists (primarily elementary school teachers who address all subjects), who accounted for 27% of respondents to the end-of-training survey. These teachers and language arts/English teachers (19% of respondents) accounted for a near-majority of program participants, while all other teaching categories lagged significantly behind (e.g., math – 7.7%; science – 6.8%; ESL – 5.4%). About one-third (32%) of these teachers work in the early elementary grades (K–3); 16% teach upper elementary (grades 4–5), one-quarter teach middle school (grades 6–8), and 27% teach in high schools (grades 9–12).

The end-of-school-year survey elicited responses from 1,905 teachers. Nearly all participants taught at public schools (N=1858, 98%). The demographic characteristics of the end-of-school-year survey participants were very similar to those of the end-of-training survey sample. Most respondents were women (81%, N=1538), and most were Caucasian (87%, N=1660). As in the end-of-training evaluation, Latino(a) teachers constituted 6% of the end-of-school-year sample (N=115), while African Americans (3%, N=49) and Asian Americans (2%, N=37) each made up less than 5% of the sample. This group also averaged 13 years of teaching experience (SD=9).

Thirty percent of teachers in this sample taught self-contained classes (N=554) while most of the remaining two-thirds of the sample taught humanities courses, including English, language arts, or literature (23%; N= 423), or math, science, and computers (27%, N=507). Teachers were drawn for training from all grade levels, including early elementary school (Pre-kindergarten through third grade, 23%, N=439), upper elementary school (4th through 5th grade, 22%, N=424), middle school/junior high (6th to 8th grade, 26%, N=493), and high school (9th through 12th grade, 29%, N=544).

Responses to the Program

Responses to the program from both Master Teachers and Participant Teachers were extremely positive. The majority of teachers who participated in Intel Teach to the Future trainings reported an extremely high level of satisfaction with the training itself, both in surveys and in one-on-one conversation with the evaluation team.

In their responses to the end-of-training survey, Participant Teachers were very positive about their experiences with Intel Teach to the Future. Virtually all (97%) of Participant Teachers reported that the ideas and skills they had learned would help them to successfully integrate technology into their students' activities. More specifically, 91% of Participant Teachers reported that after completing their training, they felt "well prepared" to integrate educational technology into the grade or subject they teach; 91% also felt "well prepared" to support their students in using technology in their schoolwork; and 90% felt "well prepared" to evaluate the technology-based work their students produce. Participant Teachers were also very enthusiastic about the Master Teachers who led their trainings: 76% of respondents rated their trainer "very effective" in facilitating their training experience. Finally, 94% of responding Participant Teachers said that they would "definitely" recommend the Intel Teach to the Future training to a friend or colleague.

Teachers who had implemented their unit plans were also very positive about that experience. In their survey responses, these teachers overwhelmingly indicated their belief that the units had a positive impact on their students: 99% felt that "students were motivated and involved in the lesson," and 97% said they "received positive student feedback," on the unit.

When asked about the helpfulness of various forms of professional development, participants tended to rate Intel Teach to the Future more positively than other forms of professional development they had experienced in the past year. Eighty-six percent of respondents felt that the Intel training was "somewhat" (33%) or "very" (55%) useful to them as they worked on improving their use of technology. Fifty-five percent rated Intel Teach to the Future training as "very" useful to them in dealing with pedagogical and classroom management.

In interviews, LEA coordinators expressed satisfaction with the program thus far and offered rich anecdotal evidence that their teachers were pleased with the training. When asked if he had received any feedback from Master and Participant Teachers about the curriculum, a typical LEA coordinator replied:

> *"I met with their principals the other day to see what the general reception has been on the campus, and the feedback has been excellent, excellent. The principals said that exciting things are happening with those students [of Participant and Master teachers]."*

Key Program Features and Their Relation to Program Implementation

Socioeconomic Status of Participating Schools

The overwhelming majority (97.8%) of Intel Teach to the Future participants are public school teachers, with only a small minority coming from private, parochial, or charter schools (2.2% total). Within these schools, our survey data show that Intel Teach to the Future is currently finding its greatest audience among relatively higher-SES schools, as indicated by the percentage of students they serve who receive free or reduced-price lunch.[2] Sixty-four percent of program participants work in schools where 0–50% of students qualify for free or reduced lunch, while only 36% work in schools where 51–100% of students qualify. The largest group of participating teachers work in schools where 0–25% of students qualify for free or reduced lunch (37%).

Several characteristics of the teacher population participating in Intel Teach to the Future are associated with the socioeconomic status of the students in their schools. Specifically, African American and Latino(a) teachers are more likely than others to be working in schools serving low-SES communities (at least 75% of students eligible for reduced price/free lunch), while White teachers are more likely than others to be working in higher-SES communities (less than 50% of students eligible for reduced price/free lunch). High school teachers are more likely to work in higher-SES schools, while elementary grade teachers are more likely to work in low-SES schools. Finally, teachers from low-SES schools are significantly less experienced than other teachers, averaging one year less experience than teachers in schools with less than 75% of students eligible for reduced price/free lunch.

Our qualitative research found no evidence that districts were targeting their Intel Teach to the Future recruitment in low-SES schools. Indeed, relatively higher-SES schools often received the most attention from LEA coordinators, usually because high-SES schools had more robust or up-to-

2 Percentage of students receiving free/reduced price lunch was taken from Master Teacher reports when more than one MT and/or PT from a single school was included in the data, as reports from multiple teachers in individual schools varied.

date technology infrastructure to support teachers' use of what they learned. LEAs did commonly include schools serving students from a wide range of socioeconomic levels, but these schools were seldom well integrated into the district's implementation of Intel Teach to the Future.

This phenomenon extended to unit plan implementation as well. Although Participant Teachers from low-SES schools were just as likely to implement their unit plans as other teachers, their likelihood of experiencing a number of logistical challenges to that implementation (such as lack of adequate hardware access) tended to rise as their home schools' free/reduced lunch eligibility rose.

Clustering of Participant Teachers within Schools

One goal of the program is to develop a "critical mass" of Intel-trained teachers within individual schools. This feature is intended to maximize the impact of the program by creating environments within schools where teachers share a common perspective on technology integration, and have experiences and vocabulary in common that will make it easier for them to support one another as they try new, technology-rich activities in their classrooms. Our research suggests that clustering can produce this type of effect. During visits and interviews, Participant Teachers (and their Master Teachers) from schools with multiple participants cited the opportunity to network outside of the training – both with each other and with other colleagues – as an important aid in both designing and implementing their unit plans. We also saw evidence that teachers from a single school who were training together sometimes coordinated their unit plans, and often strategized together about how to address logistical and technical problems they were all familiar with in their school. Participant Teachers consistently reported that having colleagues in their home schools who were also participating in Intel Teach to the Future made it easier to work on their unit plans and help one another outside of training class time. Some Master Teachers said that strong word-of-mouth about the program was circulating in these schools among teachers who were already interested in technology.

However, we found that this kind of clustering of Participant Teachers and/or the creation of a critical mass of teachers in selected schools was rare, and that when it did happen it was generally serendipitous. A few LEA coordinators and Master Teachers did have very concrete visions of the long-term effects of clustering Participant Teachers in schools and were working toward this end. One illustrative LEA coordinator spoke explicitly of his desire to build a "critical mass" in certain schools:

> *"I want each of these people [Participant Teachers] to be an expert. They support each other in a place, and become a significant force for change. They have a common language, they rub off on others."*

Another Master Teacher thought about critical mass at the district level. She took a long-term view of the potential impact of Intel Teach to the Future once the district was saturated with trained teachers. She felt that the program's effects would be felt, *"by the end of the three years.... The district as a whole will benefit from getting a group of PC-proficient teachers out of this program. One hundred people will be trained through Intel Teach this year. This should create a critical mass of teachers interested in acquiring and using technology."*

In those cases where clustering of program participants was happening, it generally happened for one of two reasons: either because certain schools had a special interest or investment in technology (such as an enthusiastic principal or a new building with new hardware in place), or because Master Teachers were primarily responsible for recruiting their participants, and they primarily recruited teachers from their own home schools. These groups were rarely established because district-level personnel wanted to target a school in need of a boost in technology training.

Most LEA coordinators and Master Teachers were inconsistent in their approach to distributing Participant Teachers within districts. Recruiters (whether LEA coordinators or Master Teachers) we spoke to were as likely to seek a uniform distribution of Participant Teachers across schools as they were to pursue a "clustering" approach, and often had no systematic goals for their recruitment efforts.

It should be noted that even when recruiters do encourage clustering of participants within schools, the potential school-wide impact of Intel Teach to the Future is tied to the quality of any preexisting structures for collaboration in the schools. In both survey responses and interviews, Participant Teachers who said they were sharing what they had learned with colleagues tended to be those who cited a broader school and district culture that supported collaboration among teachers. In other words, news and ideas about Intel Teach to the Future tended to travel along already-established lines of communication, and in schools where teachers were used to sharing with one another. In schools where teachers felt relatively isolated from their colleagues (which were at least as common as more collaborative environments), Participant Teachers found few opportunities to communicate with others about Intel Teach to the Future, regardless of the number of Participant Teachers working in their school.

Preliminary Evidence of Impact on Participating Teachers and Their Classrooms

Our evaluation took implementation of the unit plan as a minimum, indirect indicator of impact of the program on a teacher. We also looked at evidence from surveys and site visits to tell us about what impact the experience (of both the training and implementing of the unit plan) might be having on teachers' classroom practices and, in particular, their use of technology with students. Sustained changes in these areas are necessary if there is to be impact on students.

This section presents evidence related primarily to the first of these two indicators of program impact – who implemented unit plans and who did not, and the factors that hindered some participants from implementing (timing in school year, applicability to curriculum, technology access, time, perceptions of students, etc.). We also examine available evidence of the impact of training and implementation on participants. During 2002 we will be investigating, through case studies, whether and how more sustained changes are occurring in participants' classrooms, and the impact of these changes on students.

Implementation of the Unit Plan

Overall, 51% of teachers surveyed said that they implemented unit plans (this includes 78% of Master Teachers responding to the survey, and 48% of Participant Teacher respondents). The classes in which unit plans were implemented averaged 26 students (SD=14.41). Unit plans were implemented in all grade levels (22% early elementary, 23% upper elementary, 25% middle school, and 31% high school).

Over half of the teachers who implemented a unit plan reported being "very satisfied" with the experience (53%), and another third were "somewhat satisfied"(33%). As mentioned above, teachers felt very strongly that the unit had been well received by their students, and they themselves perceived it as an effective lesson that met learning goals. Specifically, these teachers reported that their students were "motivated and involved in the lesson" (99% agreed or strongly agreed); that "students with different learning styles were addressed well by the unit" (96% agreed or strongly agreed); that "students' projects were more creative" than other, comparable work (89% agreed or strongly agreed); that "student projects showed more in-depth understanding" than other, comparable work (80% agreed or strongly agreed); that they received positive student feedback (97% agreed or strongly agreed); and that they saw positive affective feedback from their students (98% agreed or strongly agreed).

Obstacles to effective unit plan implementation included not having enough time to complete the entire lesson (42% agreed or strongly agreed), and not having enough computers available (47% agreed or strongly agreed). These teachers did not generally feel that their students' or their own computer skills were an obstacle to implementation, or that technical problems kept them from implementing the unit.

Just over a third of these teachers reported that their students did most of their work for the unit in their own classroom (37%). Nineteen percent said their students worked primarily in a lab, 1% said they worked primarily at home, and 43% reported that students worked in some combination of these settings.

Reasons for Not Implementing the Unit Plan

Participants did not implement the unit plan for many reasons. The most common were that the plan was created too late in the school year to be used (n=334, 38.6%) or that the teacher planned to use the lesson later in the school year (n=171, 19.7%). These responses have obvious implications for our evaluation: first, we must reserve judgment on implementation rates to a degree, as it is possible that many teachers who had not implemented their units at the time they were surveyed will go on to do so later in the school year or in the next school year; second, our Year Two evaluation may need to revisit these first-year participants, to see if they did indeed implement their units.

Technology access. Despite the fact that many non-implementers may implement their unit plans in future months, regular differences persisted between the implementing and non-implementing teachers, most related to the extent and quality of teachers' access to the necessary technology. Most importantly, teachers who implemented their unit plans averaged significantly more computers in their classrooms (7.42, SD=9.32) than those who did not (4.77, SD=7.42). Teachers who implemented unit plans were also significantly more likely to have at least some of their classroom computers connected to the Internet (chi-square(2)=47.06, $p<.001$).3

Not having enough computers available was the fourth most commonly cited reason for not implementing a unit plan (the two obstacles cited above and "not having enough time" were cited more frequently). Other frequently cited reasons for not implementing the unit included lack of technology access in the classroom, inadequate software in classroom or lab, and lack of flexible classroom time. Further, when all teachers were asked to describe how significant various obstacles were to their use of technology in their teaching in general, the non-implementers reported significantly more obstacles than the implementers. Those who implemented a unit plan saw an average of 2.5 (out of 5) moderate or major obstacles, while those who did not saw 3.15 moderate or major obstacles to technology integration. The obstacles were: lack of technology access in my school, lack of technology access in my classroom, inadequate software in classroom or lab, lack of planning time, lack of flexible classroom time, lack of administrative support, lack of technical support, lack of instructional support, and inadequate opportunities for professional development related to technology.

Our observations of Participant Teachers' classrooms were consistent with our survey findings concerning the impact of in-classroom computer access on successful unit plan implementation. We found that teachers with different levels of technology access (varying by quantity, location, ease of access, level of technical support, and quality of hardware) faced different logistical and pedagogical challenges. These findings are consistent with Hank Becker's recent survey work (Becker, 2000; Becker & Riel, 2000). Becker demonstrates that both frequency and type of technology use with students, particularly in middle and high school grades, grow to meaningful levels only when classrooms achieve at least a 1:4 ratio of computers to students. He also reports that frequent computer use is twice as likely for teachers with five to eight computers in the classroom than it is for teachers with four computers, even if those teachers have access to a lab with as many as 21 computers available. These numbers demonstrate that a critical mass of technology access needs to be in place for teachers to feel comfortable managing substantive and ongoing computer use by their students.

Time constraints. Teachers repeatedly raised time constraints as an issue when they discussed the difficulties of implementing their unit plans, although they were not as prominent as technology-related issues. In their survey responses, many (42%) agreed with the statement "time con-

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[3] One variation in the data that should be noted is that upper elementary school math and science specialists reported having many more computers than other teachers at this grade level: they averaged 12 computers per classroom, while other teachers at these grade levels averaged 4 computers per classroom.

straints prevented me from completing the entire lesson," although the majority (58%) disagreed or disagreed strongly.

When teachers spoke about time constraints in interviews, they were referring to several different issues. One was the amount of class time that would need to be dedicated to covering a full unit. Many of these teachers do not usually do project-based work with their students and face pressures to use structured curricula or to prepare students for high-stakes testing, leaving little time for projects like those typically created during Intel Teach to the Future. Another issue was getting their students adequate time on computers to do the necessary work. This was particularly challenging for teachers with very few or no computers in their classrooms, who relied on lab access to give their students time to work on products like PowerPoint presentations. Computer labs are often heavily booked, and teachers with little experience with technology-rich projects often find it difficult to create continuity for students as they move between the lab and the classroom from day to day. Teachers often reported having students continue to work on completing these projects even though in class they had moved on to another topic. For other teachers the most prominent time issue was finding time for themselves to do further curriculum development to improve or complete their unit plan.

One Master Teacher offered an interesting twist on the issue of time constraints. He pointed out that the Intel Teach to the Future program, while it touches on "real-life" classroom constraints, generally invites teachers to imagine and create ambitious unit plans that might not mesh well with the realities of their school or classroom. In his view, this is "good in a way, because they [Participant Teachers] can get away from having a sense of time, and focus on ideas and on learning." On the other hand, he sees the program as not offering an adequate opportunity for teachers to think through how they will translate these ideas back into the limited time and resources available to them in their classrooms.

Testing pressures. Across the charter Regional Training Agencies (RTAs) represented in this report, standardized testing and other competing classroom agendas affected implementation. Teachers who have not implemented their unit plans are more likely than those who have to report that standardized testing has changed how and what they teach.

Interviews with teachers and observations from trainings support this survey finding. Often, teachers focus on the project-oriented nature of the Intel Teach to the Future curriculum, and say there is little opportunity to do this sort of open-ended and student-directed teaching when test preparation is a high priority in their school or district. Other teachers explain that they spend much of the school year emphasizing the subject areas being tested in their state, and turn to other subjects only at the end of the year, after testing is complete. These teachers often create a unit plan that addresses the non-tested subject area and plan to use it during the last part of the school year when testing pressures are over. This scenario occurred particularly frequently with science projects, and sometimes with social-science-oriented projects, because language arts/English and mathematics are the most commonly tested subject areas.

Applicability of the unit plan. In addition to logistical obstacles to implementation, teachers frequently described what they perceived to be a poor fit between the program's emphasis on student use of the technology and inquiry- and research-oriented projects, and their own existing curriculum and learning goals. Many of these teachers anticipated that they would not be implementing their unit plan. These comments were made most often by early elementary grade teachers. Specifically, these teachers often felt that they could not expect their students to create original work using the available software tools. These teachers were often uncomfortable with the idea that they might not meet "Intel's expectations" if they designed unit plans that were less student-centered than those modeled by the Intel curriculum, but they also were not convinced that the units would be useful for the age group they work with.

Our survey data suggest that early elementary teachers did adjust the content of their unit plans and their implementation of the units to suit their perception of students' needs once they returned to the classroom. Early elementary school teachers were slightly less likely than teachers at other grade levels to implement a unit plan. Among those early elementary teachers who did implement unit plans, it is evident that many modified those units to suit their perceptions of what would work for their students: they were the least likely group to have their students actually use any of the relevant software in the course of teaching their unit. These teachers indicated that students used, on average, only 0.77 of the three software options (PowerPoint, Publisher for newsletter creation, and Publisher for web design). These numbers indicate that a majority of early elementary school teachers did not have students use the software at all in the course of their unit; instead, we infer from our observations at trainings, the *teacher* used the software. The most commonly used piece of software within this cohort was PowerPoint, suggesting that these teachers often used PowerPoint to present information to their students.

This trend toward implementing teacher-oriented unit plans among early elementary teachers becomes more significant when we consider that these teachers make up the largest plurality of Intel Teach to the Future participants – 32% of all teachers, as opposed to high school teachers (27%), middle school teachers (25%) and upper elementary school teachers (16%). Early elementary teachers' concerns seem not to have been adequately addressed in this year of training – they continue to need guidance or reassurance about how they might support their students in using these programs themselves, opportunities to see examples of what young students are capable of with these tools, and strategies for making use of Intel Teach to the Future concepts and strategies in classrooms that are likely to be equipped with particularly old computers, or with Macintoshes, which are more likely to be in early elementary classrooms than in other grade levels.

Impact of Program Participation on Teaching Practices

As the above sections report, half the teachers who completed Intel Teach to the Future training have implemented their lesson plans, and their overall reactions to the experience have been extremely positive. However, that body of evidence does not allow us to determine the extent to which these teachers' implementations of their lesson plans capture the intentions of the Intel

Teach to the Future training program. In this section, we look more closely at two issues that our research suggests are playing a major role in constraining the transfer of the ideas about pedagogy and technology embedded in the Intel Teach to the Future curriculum from the training context to individual classrooms and students. The first concerns variation from teacher to teacher, and the varying pedagogical approaches of teachers participating in the program. The second concerns variation from one software application to another, and the importance of drawing clear distinctions among the different software programs introduced in this program and their potential utility for teachers seeking to meet wide-ranging learning goals.

Teachers' Pedagogical and Classroom Management Practices

We chose to follow Becker and Riel (1999) in examining teachers' pedagogical beliefs and practices, and the relationship between those beliefs and practices and their uses of technology – specifically, in this case, the impact of Intel Teach to the Future on their teaching. As this section will show, our findings are largely consistent with Becker and Riel's research, and suggest that a constructivist approach to teaching is strongly related to a willingness to embrace and experiment with the types of technology use promoted in the Intel Teach to the Future curriculum.

It is not yet possible to tease out the causal relationships between teachers' pedagogical approaches and their participation in Intel Teach to the Future – that is, we cannot yet answer the question "Is the program helping some teachers take a more constructivist approach, which helps them achieve the technology-related goals we have for them, or does the program simply work most effectively for teachers who already have this approach?" Further survey work during Year Two of our evaluation will help us to answer this question. For now, we will follow Becker and Riel's argument, which corresponds with our observations during site visits to trainings and classrooms, that productive, student-centered technology use follows from constructivist beliefs and practices about teaching. This implies that rather than causing changes in teachers' pedagogical beliefs and practices, Intel Teach to the Future should be understood as building on those beliefs and practices, and hence working most effectively for teachers who bring a constructivist perspective into the training with them. This raises the possibility that it is particularly important, then, not only to recruit teachers with these beliefs and practices in hand, but to continue to explore how other teachers might be invited to engage with these ideas and begin to adopt them in their teaching. Both this evaluation and Becker and Riel's research suggest that this will be a key step in eventually promoting more sustained, high-quality use of technology with students in the classroom.

To identify the different pedagogical beliefs and practices of our population of teachers, we clustered teacher responses to relevant survey questions. This process yielded five distinct profiles, that is, teachers who consistently gave similar answers to questions about their preferred teaching methods, their assessment practices, their goals for their students' learning, and how they hope technology will support or improve their students' work.

The five groups are organized around three qualities, which combine in different ways in the different groups. These qualities are:

- **Text-based learning:** This refers to teachers who use textbooks as primary learning tools, and frequently have students respond to questions in textbooks or workbooks, either individually or in groups.
- **Project-based learning:** This refers to teachers who frequently conduct multiple activities in their classroom at once, have students engage in inquiry-oriented types of work, have students do work that extends over a long period of time, and frequently have students work in groups.
- **Collaborative use of technology:** This refers to teachers' orientation to technology as a set of tools that can support more collaborative relationships among teachers and students. This includes expectations that technology will help students review and revise their own and each other's work, that teaching will become more interdisciplinary and oriented toward "the real world" and current events, and that more assignments for students will be more open-ended.

The five groups generated in the cluster analysis are:

- **Project-Based/Collaborative:** These are teachers accustomed to doing project-based work with their students all the time, although they sometimes rely on texts as well. They have high hopes for using technology to support their students' work.
- **Some Project-Based:** These teachers do a moderate amount of project-based work with their students, but rely very little on texts. They have moderate expectations for using technology with their students.
- **Text-Based/Teacher-Led:** These teachers use both project-based and text-based approaches, but have low expectations for using technology with their students.
- **Teacher-Led:** These teachers rely primarily on text-based learning and do a little project-based work with their students. They have low expectations for using technology with their students.
- **Text-Based:** These teachers rely on text-based approaches and do not do project-based work with their students. They have low expectations for using technology with their students.

In summary, the Text-Based, Teacher-Led, and Text-Based/Teacher-Led profiles include teachers who tend to employ more traditional, teacher-centered classroom management, and to focus on textbook, rather than project-based learning. The "Project-Based/Collaborative" and "Some Project-Based" profiles include teachers who are more inclined to a collegial classroom-management style and project-based teaching.

See Tables 1 through 3 for the percentage of teachers falling into each of these categories, and their breakdown by grade level and subject taught.

Table 1: Teacher profiles (N=566)[4]

Profile	Total	Total %
Project-Based/Collaborative	145	26%
Project-Based/Minimal text	119	21%
Teacher–Led	50	9%
Text-Based	145	26%
Text-Based/Teacher-Led	107	19%
Total	566	

Table 2: Teacher profiles, by grade level (N=566)[5]

	GRADE LEVEL				
Profile	**Early Elementary**	**Middle Elementary**	**Middle/ Junior High**	**High School**	**Total**
Project-Based/Collaborative	49	34	30	32	145
Project-Based/Minimal Text	33	16	34	36	119
Teacher-Led	16	5	14	15	50
Text-Based	30	24	49	42	145
Text-Based/Teacher-Led	39	19	30	19	107
Total	167	98	157	144	566

Table 3: Teacher profiles, by subject taught (N=564)

	SUBJECT TAUGHT				
Profile	**Self-Contained**	**Humanities**	**Math/ Science**	**Other**	**Total**
Project-Based/Collaborative	58	29	31	26	144
Project-Based/Minimal Text	18	27	46	33	124
Teacher-Led	11	12	17	8	48
Text-Based	43	39	40	20	142
Text-Based/Teacher-Led	48	18	27	13	106
Total	178	125	161	100	564

4 Only teachers responding to the long form of the end of school year survey could be included in this analysis.
5 Only teachers responding to the long form of the end of school year survey could be included in this analysis.

Teachers in the Project Based/Collaborative and Project-Based/Minimal Text groups were more likely than teachers in the other groups to implement their unit plans.[6] We interpret this to mean that teachers who see a continuity between their own existing beliefs and practices and the concepts emphasized in the Intel Teach to the Future curriculum are likely to build on that connection and feel comfortable implementing their unit plan, while teachers who see a conflict between their own approach and that of the program are systematically less likely to be willing to, or to see value in, implementing the unit plan they create during the training.

Further, teachers in the Project-Based/Collaborative group felt more strongly than other teachers that their students' work produced in this unit was "more creative than work produced for other, similar assignments," and teachers in both this group and the Project-Based/Minimal Text groups were more likely than other teachers to feel that their students' work on this unit showed a deeper level of understanding of content than work done on other, similar assignments. Both of these findings are indications that teachers with more constructivist approaches to teaching are not only more likely than others to make use of their Intel Teach to the Future unit plans, but that they are more likely to perceive significant educational value in the experience.

In our observations and interviews, one particularly prominent difference between these groups of teachers was the variation in their beliefs about what their students are capable of accomplishing or learning. Across grade levels, we found teachers who were dubious about whether their students would be able to "handle" independent projects or extended computer-based creative work. Hence the following similar comments, the first from a first-grade teacher in California, the second from an eighth-grade teacher in Texas:

> *"My first graders can't even find the space bar… This [unit] will be for the students, not by the students."*

> *"We do a lot of hands-on activities where the kids have to do research on their own, but they're low-skilled. The Gifted and Talented kids might eventually be able to build a PowerPoint."*

Of course many other teachers were much more positive about their students' abilities. One teacher who was developing a project blending music composition with mathematics explained that his focus was on having his students "teach the community" by creating products that would display their work to the public, and that this was a "better way for them to learn than book learning." This sort of comment suggests a teacher confident in his students' ability not only to master the necessary technology tools, but to achieve higher-quality work now that they were using better tools to express their ideas.

Our survey data show that a clear majority – 70% – of teachers who implemented their unit plans

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6 Membership in the Project-Based/Collaborative and Some Project-Based/Minimal Text profiles was associated with a higher likelihood of implementation than would be expected based on chance variation. Membership in the Teacher-Led and Text-Based profiles was associated with a reduced likelihood of unit implementation.

did believe that their students had the technology skills needed to do the work assigned, while 30% of teachers did not feel their students had adequate skills.

We hypothesize that teachers who view their students as very limited in their ability to work with technology tools fall into the Text-Based and Teacher-Led groups, while teachers who have higher expectations of what their students can do with these tools fall into the two Project-Based groups. We plan to test this hypothesis in the 2002 end-of-school-year survey.

Our observations during trainings indicate that group interactions during the training are not likely to be effective in shifting teachers' beliefs without significant investment in carefully structured opportunities for observation of other teachers' classrooms and exploration of exemplary student work. We observed that teachers are hesitant to challenge one another's beliefs about student abilities: the presence of teachers who had already had positive experiences using technology with students did not usually lead to a spreading of this perspective to more skeptical teachers within the same training group. We found that it was relatively common for a single training group of 20 Participant Teachers to contain some teachers who say, for example, that their fourth-graders "learn this stuff ten times as fast as adults do" and others who say, "my eighth graders just aren't ready to use PowerPoint," and for these two perspectives to not be brought into contact with each other during either formal or informal discussions.

Variation in Perceived Relevance of Software Applications

In addition to its emphasis on student-centered, project-based classroom practices, Intel Teach to the Future places a strong priority on exploring and exploiting the distinct learning opportunities provided by various software tools, which, as the curriculum explains, can support students in creating very different kinds of work products representing different dimensions of their learning. We understood this emphasis on thinking about matching software to appropriate learning goals and student work as a key opportunity, within the training, to invite teachers into new ways of thinking about matching their teaching practices and their curricula with technology. Consequently, we paid particular attention during site visits to observing how teachers thought about the choices they made in matching software with student activities, how Master Teachers discussed these issues, and how the various applications were, in fact, used in the unit plan samples. Our survey data also allow us to look at which applications were actually used during teachers' implementations of their unit plans in their classrooms. Some findings – the low rate of student use of the software during early elementary teachers' implementations of their unit plans – have already been discussed, above.

More broadly, we found that teachers typically had difficulty acting on suggestions to think critically about the differences among the software tools and tailor their student work products and learning goals accordingly. We interpret this as being, in large part, a reflection of the relatively low level of experience most of these teachers had with the relevant technologies. With little of their own experience as users of these technologies to draw on, it was difficult for many of these teachers to appreciate distinctions among the capabilities and distinctive strengths of different software applications, particularly those they were least familiar with. Consequently, rather than acting as a catalyst to incite teachers to think about how to match technology tools to learning goals, the multiple pieces of the unit plan template (presentation, newsletter, and web page) very often became make-work activities used only as opportunities to develop technical skills with the various programs. The exception to this pattern was teachers' common perception of the web design component of the curriculum as the most confusing and least useful part of the training. Teachers often reported that they didn't "see the point" of this part of the class.

Few teachers in the trainings we observed seemed to have enough prior experience as creators of technology products to make clear distinctions among the content and goals of their presentations, newsletters and web pages. Teachers' unit plans most often integrated the different products in a single investigation or report by students, which would then be reported separately, but identically, in a PowerPoint slide show, a Publisher brochure, and finally a web page. Most Participant Teachers and even Master Teachers did this anticipating that they would not have to use all of the software options in a real-life implementation of their unit plans. One Master Teacher commented that she would "be surprised if anyone actually uses the whole thing."

How, then, did these teachers understand the purpose of the multiple student work examples they were asked to create? Many teachers expressed a perception that by creating the three work products, identical in content, they were fulfilling their "obligation to Intel" (or "giving Intel what they want"), even though most of their unit plan was not actually of use to them. Whether because the Master Teacher did not emphasize adequately the parts of the curriculum that address these issues, or because those curriculum pieces are inadequate to the task, many teachers moved through the training without examining a key concept of the Intel Teach to the Future curriculum – that different programs can provide distinct learning opportunities to their students.

Our observation during trainings that teachers were not expecting to have students create multiple work products when they implemented their unit plan was borne out by our survey data. Teachers who did implement reported that, on average, their students used only one (SD = .99) of the three software products during unit implementation. As discussed earlier, this number was somewhat lower for early elementary teachers, who reported that their students used an average of 0.77 of the software products during unit implementation.

Recent revisions to the Intel Teach to the Future curriculum were designed to address this exact problem by providing teachers with more explicit evidence of the unique capabilities of each type of software, and it remains to be seen whether trainees using the revised curriculum will have experiences similar to those described here. However, our observations indicate that the issue for teachers may be less about understanding the qualities of each piece of software (i.e., PowerPoint is best for live presentations, the web is best for creating materials for others to use over time) than about articulating more clearly the kinds of learning goals that might be associated with these different types of work products.

In our observations, the likelihood that a teacher would use a piece of software in a carefully focused way seemed to be inversely proportional to the degree of "newness" that software would bring to their students' learning experience. For example, many teachers are comfortable having their students do oral presentations, and can easily see a match between that format and PowerPoint. Consequently, they can incorporate PowerPoint into a type of lesson that is familiar to them with little adjustment. Hence, this program is the most frequently used in implemented units: 56% of implemented unit plans included PowerPoint.

Publisher (for newsletters) is slightly more novel: lessons in which students create written materials for an audience other than their teachers are less common than oral presentations. Still, the basic skill area being addressed – one-way written communication – is familiar, and this is the second most commonly implemented piece of software: 33% of implemented units included a newsletter.

Web design brings distinctly new learning opportunities to the classroom, ones unfamiliar to most teachers. The skills that can be a part of a web design lesson — nonlinear composition, interactivity (e.g., creating surveys), and communication aimed at a wide audience — are less commonly addressed in typical classrooms. Thus, teachers would have to design genuinely new lessons to take advantage of the learning opportunities offered by this technology. Unsurprisingly, we found that Publisher (for web design) was the least used software: only 16% of implemented units included student-produced web pages. Furthermore, we found in our interviews that Participant Teachers who did create web design segments commonly planned to have students merely transpose the work they did in PowerPoint or Publisher (newsletter) onto a web page, without altering it to take into account the unique affordances of the format.

The challenge here is not simply that Participant Teachers do not recognize the possibility for interactivity or nonlinearity in web design work, but that they may not have been invited to think about how these qualities might intersect with learning goals that are relevant to them. Although many of these ideas are embedded in the curriculum, our data suggest that they are rarely made explicit during training.

Conclusion

Our findings to this point make it clear that to achieve its goals, Intel Teach to the Future must address many different types of teachers. Although the large majority of these teachers enjoyed their training and found it valuable, our data indicate that the depth of the program's impact on teachers will vary widely because they themselves vary in the pre-existing beliefs they bring to the class and in their willingness to think deeply about how to match technology tools to learning goals.

Individual differences among teachers do not, though, fully explain how and why Intel Teach to the Future is more or less successful for different teachers. The quality of their training experience is also enormously important. The next section of this report shifts from looking at individual differences among teachers to ask what elements of the training experience may be particularly important and have the most influence on teachers' outcomes from the training. This section poses the question, What training conditions can best support the propagation of the core concepts underlying the Intel Teach to the Future curriculum? We answer this question by describing variations in some key qualities of trainings, as well as how the quality and style of a training is influenced by certain characteristics of host districts.

Training-Level Issues

We define as "successful" an Intel Teach to the Future training that concludes with a positive reception by participating teachers and that establishes a substantive alignment between the goals of the program and the teachers' perceptions of what they are taking away from the course and intend to make use of in their classrooms. We found that successful trainings depended on two sets of factors:

- Participant Teachers' relationships to their Master Teachers and LEAs
- Participant Teachers' interactions with the Intel Teach curriculum.

In other words, training success depended on both the social *context* within which the training played out, and on Participant Teachers' experience of the *content* of the course. The participants most likely to bring real benefits back to the classroom were those who saw a clear compatibility between their teaching goals and the training curriculum and *also* felt well supported by their Master Teacher, their colleagues, and their school and district administrators. Our observations indicated that success in one of these areas alone was not sufficient to foster a truly effective training.

The following sections evaluate some of the main contextual and content-related factors that influenced Participant Teachers' experience of the Intel Teach to the Future training.

Influences on Participant Teachers' Training Experiences

Choosing to Enroll. Participant Teachers' motives for enrolling in Intel Teach to the Future had a lasting effect on their eventual experience with the course. Their reasons for taking the training covered a wide range of responses to both external and internal incentives. For the majority of the Participant Teachers we spoke with, a well-defined sense of how technology could support their teaching was not part of their decision to enroll. The most common reason cited for enrollment was to earn a computer or the software package, or other incentives such as graduate course credits, movement up the salary scale, or laptop computers. Sometimes, the interest in material incentives was coupled with the pursuit of personal learning goals, but this was relatively unusual.

Teachers who did enter the Intel Teach to the Future training with personal learning goals seemed ideally situated to have a positive experience. One teacher, for example, felt that he had not been integrating much technology in his teaching: "I use it myself, and I do it with individual students, but I hadn't found ways to really use it with the whole class." Coming into the course with the explicit desire to learn more about managing whole-class technology-based activities contributed to this teacher's feeling of satisfaction with the course as he neared the end of the training. His comments indicated that it is highly likely he will go on to implement his unit plan: "I really met the goals I had when I signed up, because this lesson incorporates new programs [in meaningful ways]."

For teachers who enrolled without clear personal goals, material acquisitions were the primary incentive, and these incentives were double-edged swords. On the one hand, material incentives clearly functioned to pull teachers into the training. On the other hand, teachers often entered the training with their sights set on these incentives as the ultimate goal of their attendance and began the training with little motivation to engage with the content of the training. Quite often, teachers who said that they had come to the class for the free computer retained this material reward as the key benefit they perceived. This was the case for a Participant Teacher in Arizona whose friends had not taken the training: "…once they see the nice new computer [I'm] getting," she said, "they will be more interested in taking the class themselves." For this participant and others like her, the material reward was the most enticing outcome of Intel Teach, and the one she planned to share with her fellow teachers.

Some participants who had enrolled for material reasons did come to appreciate the value of the course content. An LEA coordinator who closely monitored the online exchanges on her Participant Teacher listserv felt that "at the outset, some Participant Teachers were just in the program to get the free computer, but over the course of the trainings the mindset…changed and the group [became] truly interested in technology integration."

In the most negative cases, teachers saw their forty hours in training as a sort of fee to be paid for a new computer. This sense of professional development as something to be endured out of obligation rather than something to be pursued for its benefits clearly stemmed from teachers' previous experiences in tedious professional development seminars. In these cases, the heavy workload was seen as punitive — an unfair amount of labor demanded by the district in exchange for a modest reward. Said one teacher, in an urban district where many participants told us they were attending the course only to get the free computer: "I dread having to spend my time like that. I want to learn what I need to learn [and be done with it]."

Master Teachers. Participant Teachers characterized many of the trainings that CCT researchers visited as unusually positive professional development experiences, involving close-knit, collaborative groups. The presence of a sense of community seemed largely dependent upon the Master Teacher's skill as a trainer.

Participant Teachers often conflated their feelings about the Intel Teach training with feelings about their Master Teachers. "It's only because of Miriam that it works," one said of her Master Teacher, in a typical statement. Indeed, we found that in districts where they were given the option, Participant Teachers tended to select trainings by Master Teacher, opting to attend classes run by Master Teachers with whom they were familiar, or Master Teachers with reputations for being good staff developers. Successful Master Teachers were those with the patience and training skills to address the diverse needs of teachers at varying levels of experience, and to instill teachers with a sense of the larger value of learning to integrate technology into their students' learning.

Participant Teachers praised Master Teachers who gave them "time to work" independently, while at the same time expressing gratitude for the kind of one-on-one tutoring that helped less-experienced Participant Teachers with lower technical skill levels adjust to the technology. One Participant Teacher spoke for many when she mentioned how thankful she was that her MT was "very patient." "Everyone in the class is at so many different skill levels," she said, "and that makes the class difficult at times." She felt that her Master Teacher's ability to respond to the demands of less-experienced Participant Teachers without drastically slowing the progress of the class enabled a successful training.

In addition to creating a feeling of mutual support, it was important for Master Teachers to foster active conversation about the larger value of technology integration and its potential impact on students. Master Teachers varied widely in their commitment to spending time on these broader discussions and exercises, and we found that these elements were important to a truly successful training. Because the Intel Teach to the Future model aspires to move beyond mere skills training to having an impact on how teachers use technology with their students and think about the interaction between curriculum and technology use, teachers need opportunities to think and talk together about the value their individual unit plans will bring to the classroom. These discussions are necessary if teachers are to begin to reflect on their current teaching practices, think critically about their use of technology with students, and begin to reformulate their ideas about what their students can accomplish using these tools.

Collaboration. Another forum in which Participant Teachers could push each other to expand their ideas about teaching was one-on-one collaboration, either through working together on unit plans or through Pair-and-Share activities.

Collaboration on unit plans was not the norm in the training classes we visited, but a significant minority of Participant Teachers we spoke with were collaborating on the design of unit plans. These Participant Teachers almost always described the experience in very positive terms. Whether the teachers involved were collaborating across grade levels, across subject areas, or even across schools, they were excited about the opportunity to share ideas with colleagues and to experience curriculum design as a collaborative undertaking. This opportunity to engage in a substantial piece of collaborative work was particularly appreciated as Participant Teachers ventured together into the unfamiliar territory of technology integration. As one Participant Teacher put it, "Part of the reason for the success of this program — a lot of us felt overwhelmed at first, but now we feel like a family and we all help each other."

This feeling of solidarity and mutual support among teachers, which they typically described as a rare commodity in their professional lives, sometimes compromised the effectiveness of the stages of the training process that involved critical feedback. Most prominently, Participant Teachers and their Master Teachers almost universally used Pair-and-Share activities to view each other's work and to offer general support and encouragement. However, teachers almost never acted as "critical friends" for one another, offering suggestions for improvement or asking questions to elicit reflection or push a colleague to reevaluate or refine their work. We interpret this hesitancy to raise criticisms or hard questions as also being a sign of many teachers' limited experience with the kinds of products they were creating in this training. In part, these teachers simply needed the opportunity to see more student work examples, and to get a broader view of what kinds of work can be created, to be able to formulate useful, insightful questions for one another. Master Teachers as well seemed to be either unwilling or unable to structure Pair-and-Share activities in ways that would both push teachers to provide critical feedback and make the process feel safe and valuable.

Because substantive feedback among Participant Teachers was rare, the assumptions underlying teachers' unit plans were seldom challenged by anyone but their Master Teachers. While recent revisions of the Intel Teach to the Future curriculum targeted this issue, we found that the pattern was perpetuated at the Senior Trainer Training in February? 2001, where, even after they were encouraged to offer criticism during their tours of each other's work, senior Master Teachers offered consistently positive comments and asked few questions other than those of a "How did you think of that?" variety.

Time Commitment/Workload. The curriculum suggests that participating in Intel Teach to the Future requires 40 hours in class and about 20 hours of work at home. Participating Teachers typically found that far more time was necessary. Their reactions to the time-intensive nature of the course were mixed. On the one hand, many teachers cited the time commitment as a difficult strain, and wondered aloud if the course designers were aware of how many hours teachers already work. On the other hand, many teachers appeared to feel that the unusual time commitment involved was a positive quality — a sign of the unusually substantive (and therefore valuable) nature of the course. Those teachers who held clearly negative views about the scope of the training seemed not to have been adequately prepared or warned when they were recruited, and often felt ambushed by the great demands placed on their time. Intel Teach to the Future is a much larger time commitment than teachers are used to making for professional development, particularly during the school year, and this feature of the program needs to be made clear at the outset to avoid having teachers become frustrated or discouraged by the pace and intensity of the training.

Technology Literacy. Variation in pre-existing technology literacy among participants was one of the most significant factors shaping the pace and character of individual trainings. Trainings commonly included teachers with a wide range of levels of experience with technology, from novices to very experienced teachers who sometimes acted as informal co-leaders or extra tutors who helped troubleshoot and guide teachers through their work.

A variety of factors led LEAs to place Participant Teachers with minimal technical skills in Intel Teach to the Future trainings. In some cases, the need to fulfill Participant Teacher quotas (to place at least 20 teachers in each training) forced Master Teachers to accept inexperienced Participant Teachers whom they would not ideally have admitted to the course. In other cases, LEAs were using Intel Teach to the Future as their sole technology-related professional development offering, and thus expected their Master Teachers to help Participant Teachers at all levels of experience to learn to use the relevant software. Finally there were those LEAs where recruiters simply did not choose to filter out Participant Teacher applicants based on technology literacy.

Master Teachers were therefore often faced with classes composed of students who ran the gamut of previous experience with technology, and had to adjust their presentation of the Intel Teach to the Future curriculum to suit this varied audience. Though this was consistently cited by Master Teachers as a challenge, it was not typically considered insurmountable. When Master Teachers had the time and the teaching ability to attend to less-experienced Participant Teachers, both parties found the training a success. As one participant put it, "Several of us were very intimidated at the beginning, but I left after the first class feeling, 'Ok, I can do this.'"

One of the most effective strategies for adjusting to the needs of Participant Teachers with less technology-related experience was to highlight the concrete classroom applications of the training. Master Teachers who focused on the *applicability* of the technology to teachers' existing goals for students were particularly successful at setting less-experienced Participant Teachers at ease. Thus, the same teacher quoted above remarked that she and her colleagues became comfortable in the training once they understood that technology was not its own arcane subject area, but rather a new set of tools for teaching: "We three are not super technology-oriented, but we know writing." Another Master Teacher commented that Participant Teachers need not be comfortable with technology, as long as they were "hard workers who love their curriculum."

Trainings with a good balance of more- and less-skilled participants seemed to go smoothly, with participants reporting that the more comfortable Participant Teachers assisted their Master Teacher in troubleshooting. The farther a training population deviated from this balance, the more the Master Teacher had to adjust the curriculum to suit participants. Trainings with significant numbers of low-skilled Participant Teachers were hard work for their Master Teachers, and the quality of the experience did tend to suffer in these cases. One LEA commented on her Master Teacher's low-skilled class:

> *"I think that one teacher teaching 20 to 22 people was too much. There wasn't enough one-on-one time. People that needed a lot of help got the majority of the teacher's time and other people didn't get enough attention and didn't get their questions answered."*

Thus a healthy mix of skill levels can make for a successful training, while a high concentration of low-skilled Participant Teachers seems to present too much work for a single Master Teacher.

The potential of the curriculum to serve less-experienced trainees has positive implications for the many districts trying to use the program as their sole professional development offering. However, lower-skilled Participant Teachers tended to create a slower-paced training and to have more modest expectations for their own technology use coming out of the training. One Participant Teacher who described herself as "not very computer savvy" said, "I'm using [the technology] right now just so I can know how to do this and then little by little I can go back and teach the kids how to do things." Fluctuations in the skill levels of Participant Teachers are an inevitable challenge, given the fact that different districts are using Intel Teach to the Future to fill different professional development needs.

Positive Practices during Training Sessions

While the Intel Teach to the Future curriculum cannot impose a sense of community or purpose on participant teachers, a number of activities undertaken by individual Master Teachers seemed to have a uniformly positive impact on group morale. It may be worthwhile to explicitly promote these kinds of activities:

Knowing where they're headed. As one Master Teacher pointed out, "At the beginning of the training, there's too little of a roadmap to show Participant Teachers where they'll be at the end." Finding that this lack of a roadmap caused confusion on the part of her trainees, this Master Teacher and others like her opted to show her own completed unit plan to Participant Teachers during the first session of her second training class. She found that this step "improved the class dynamic — PTs knew why they were there."

Robust group discussion. Another chance for classes to build a sense of common purpose was group discussion time. In a strong group, we might see a Master Teacher calling on one Participant Teacher to record all of the group's thoughts on the overhead projector, calling on all of her teachers to participate, and challenging the group to propose solutions to some of the problems that arise in discussion. Master Teachers who were familiar with these kinds of techniques for managing group conversation tended to generate much more productive discussions. Those classes where group discussions were granted low priority, or where only a few Participant Teachers dominated the conversation, seemed to have a weaker sense of the purpose of the training.

Participant Teacher participation in the teaching process. When appropriate, many Master Teachers had their more experienced Participant Teachers serve as teaching assistants, either by demonstrating certain skills to the group or by providing one-on-one help to slower Participant Teachers. Master Teachers also extended these teaching-assistant duties to lower-skilled Participant Teachers whenever possible. The following excerpt from our site visit notes describes one instance of Participant Teacher leadership employed by a Master Teacher with a low-skilled class:

> *"For the most part, people work unassisted, but routinely ask for help. People continually call out to John [the Master Teacher]: 'John, can we download a film into our PowerPoint presentation?' asks one MT. 'Well, the question is, can I?' replies John. 'Shall we try it?' He goes to the PT and they try to download the clip together. 'How did you make it bigger like that?' asks a watching PT. John does mini-demos for PTs in that row of computers; 'Now you've got to practice to show us all!' he tells one of the watching PTs. Soon after, John announces that*

'Sarah's going to walk us through on how to do a movie clip.' 'From up there?' she asks. 'Yes, come up here [to the front of the room]. If you get lost there are notes in unit three.'"

This kind of encouragement of Participant Teachers — helping them enter into the process of teaching one another — clearly helped establish a sense among training groups that they were working together toward a common goal

Help thinking about hardware management. Many Participant Teachers with limited hardware access had a hard time envisioning how they would make their unit plans work in their classrooms. Master Teachers who were able to work with trainees on strategies for managing student access to a few classroom computers felt that this encouraged teachers' investment in their unit plans.

Conclusions

While highly skilled Master Teachers are generally able to take most of the challenges discussed above in stride, we can no more rely on the uniform excellence of Master Teachers than on the uniform technology literacy of participants. Nor do we need to. Instead, the Master Teacher training could increase its focus on preparing Master Teachers for some of the most-common scenarios they might face. No individual scenario is the best, but districts are going to be using this training in different ways, so Master Teacher training needs to illustrate various approaches that will work effectively with the different types of training contexts in which Master Teachers may find themselves.

The interaction of district context with Master Teacher skill is a topic we plan to investigate in more depth during the Year Two evaluation. This year's work suggests that Participant Teachers who were impressed with the curriculum but hampered by difficult local circumstances took less from the training than teachers who had trouble with the curriculum but were aided by a skilled Master Teacher and a supportive school or district environment.

Because district context plays such an important role in shaping the outcomes of the program, the next section of this report reviews some of the most important elements of that context and describes how they shaped local implementation of Intel Teach to the Future.

How Districts Host Intel Teach to the Future

In this section, we analyze aspects of the district environments in which Intel Teach is implemented. In the first part of the discussion, we examine four broad factors that most prominently influence the delivery of the training: 1) level of existing professional development, which influences what goals the district associates with teachers' participation in the program; 2) technology plan or vision, which also influences the districts' goals for the training; 3) LEA support for Participating Teachers who take the lead in adapting the program to bridge any gaps between the program model and their local priorities and constraints; and 4) Participant Teacher recruitment strategies, which shape who attends the training and the motivations and attitudes they bring to the experience.

In the second part of the discussion, we identify some optimal and challenging district environments, focusing on how aspects such as district size as well as urban, suburban, and rural characteristics affect implementation. In the third section, we conclude with an analysis of many of the district-level issues presented here.

Four District-Level Factors that Shape Local Implementation

Existing Professional Development. One of the most significant factors influencing a district's interactions with the program is the state of that district's preexisting technology-related professional development. The vast majority of the districts we analyzed could be placed in one of three categories:

- **Stage One - Beginning.** At this stage, Intel Teach to the Future is basically the only district-wide program for technology-related professional development. While individual schools in the district may offer more advanced training to their teachers, these opportunities are not uniform across schools. These districts tend to use Intel Teach to the Future as their primary technology professional development program, and to place teachers with widely varying levels of technology literacy into training classes. This variation in skill levels can create a challenging teaching situation for the Master Teacher. Groups of participants in these circumstances are likely to emerge from training with a somewhat different skill set than groups from more "ideal" settings, consisting of more technical skills and fewer ideas about classroom integration. It is important to note that LEA liaisons and MTs in these districts often recognize that they are using the curriculum to meet a less-ambitious set of goals than those set out in the curriculum, but they are often very positive about doing this, as they see increasing teachers' technical skills as their top priority.

- **Stage Two - Intermediate:** Districts at this stage offer ample training in basic applications and skills. Some have even begun to broach the topic of integration into curriculum and teaching but have not yet done so in a widespread or systematic manner. These districts create the most amenable climate for Intel Teach to the Future, as Participant Teachers generally have the necessary skills to work in the applications to develop unit plans, and have already begun thinking about possible ways to integrate technology into their teaching. Intel Teach to the Future is easily seen, in these contexts, as a logical "next step" in technology training. One LEA liaison exclaimed:

  "[I was] thrilled at the opportunity. We were struggling the year before. Everyone was saying 'staff development, staff development' and then this program came along. It was perfect timing for us."

Another explained:

> *"So that's why we've been so excited about Intel — because it's the first thing we've been able to have that requires teachers to think about technology in terms of instruction. As a rule, teachers are using the technology for classroom management, attendance, Internet access — that's a weak thing for us and we need to work on that."*

- **Stage Three - Advanced/Saturated:** These districts have been offering a wide range of technology-related professional development courses at multiple levels, ranging from beginning technology skills to integration and ways to mentor student trainers. While Intel Teach to the Future may be regarded positively in these districts by administrators and teachers who are aware of it, it becomes one of many options and does not take a central place in the professional development process as it does in districts with fewer programs. Recruitment of Participant Teachers becomes more challenging in these districts, as teachers are less willing to commit 40 hours to Intel Teach to the Future when other programs addressing similar issues ask less time and work of them. Additionally, incentive structures are complicated in these districts, as teachers begin to "shop around" among various programs and their relative material benefits.

Technology Plan and Rationale. Stating a rationale for technology integration that goes beyond a drive to acquire hardware and articulates a set of learning goals associated with technology has been shown to be necessary for districts to achieve meaningful technology use in classrooms (Hawkins, Panush, & Spielvogel, 1996). Districts that had a clear vision of technology's utility for teachers and students were better positioned to articulate where and how Intel Teach to the Future would fit in.

Nominally, district technology plans have become commonplace, partially in response to the requirements specified by large-scale funding sources such as the E-Rate and Technology Literacy Challenge Fund. But we found that most districts participating in this program, like most other districts, had technology plans that centered on the acquisition and distribution of hardware, and in some cases provided for professional development without, typically, outlining the goals of such professional development. Setting these goals is an important pre-condition to being able position Intel Teach to the Future productively in a larger sequence of professional development for teachers. One LEA admits, "If we didn't get the money from the state, we wouldn't be spending it on hardware. So that's why we're doing it."

In some cases, Intel Teach to the Future can act as a catalyst for a much-needed revisiting of district-wide goals for technology use and associated professional development needs. In other cases, district personnel may be aware of their professional development needs, but invest little effort in planning because money has been available only for hardware purchasing and not for training. One LEA explained that his district has made many hardware purchases, but has no prescribed use for this hardware and no clear plan — prior to their adoption of Intel Teach to the Future — for how technology should be used in the classroom. He said: "I like that Intel has a course of study, a process. We have no bond money for training. So we're buying machines, but had no required classes [until now]."

The LEA liaison and administrative support. One of the most important drivers of local adaptation of the program is the level and quality of administrative support that the LEA liaison provides to Master Teachers and Participant Teachers. One RTA coordinator explained that in her opinion, the single largest factor in determining the program's success in a given district is the support offered by the LEA liaison. They have a great impact on what the program looks like from district to district. The LEA liaisons are the point of connection for relationships with district technology support staff, with the RTA and Intel program staff, with the Master Teachers and with the central administration, and their willingness and skill in meeting the needs and enlisting the resources of all of these players can greatly influence the quality of the trainings that happen in that district.

The importance of an effective LEA liaison — one who balances providing direction and support to Master Teachers while not treading on their autonomy as trainers — is reflected in responses to the end-of-school-year survey. Teachers who reported feeling supported by their district's coordinator for Intel Teach to the Future were significantly more likely than others to implement their lesson plans. Lack of general support from a teacher's school and district administration is also a significant predictor of whether or not teachers implement their lesson plans.

Examples of logistical forms of program support offered by LEA liaisons that we observed included: assisting with and coordinating technology purchasing; advocating for making the program part of the district's continuing professional development plan; acquiring access to server space for Participant Teachers to save and access their files; allocating lab technology time; providing snacks; providing follow-up classroom support to Participant Teachers to help them implement their lesson plans; putting out a newsletter showcasing teachers' unit plans; and getting financial support for substitute teacher coverage for Participant and Master Teachers. Other LEA liaisons provided support making discretionary decisions about who could be recruited for the program and how, by aligning incentives made available by Intel with existing incentive structures within the district, and by encouraging Master Teachers to experiment with different schedules and structures for delivering the training.

Some LEA liaisons described going to great lengths to support the program. One explained, "We felt that if we're going to commit to this, we have to support our Master Teachers fully, even if that means spending our own bucks." She went on to explain that the district matched the $7,000 equipment grant to Master Teachers from the Gates Foundation, because they wanted their Master Teachers to have certain equipment available so they could model good teaching with technology.

Not surprisingly, the strongest LEA liaisons had prior experience with the district's technology programs and pre-existing relationships with the district's teachers. Weaker LEA liaisons, who did little to shape or support the trainings, were often either administrative staff who were not familiar with on-the-ground teaching issues in the district, or people who had no working relationships with the district technology staff; these liaisons had little leverage to gain access to minor but important resources such as server space and zip disks.

Program modifications introduced by LEA liaisons are not inevitably viewed positively by Master Teachers. In one district, the liaison had Master Teachers partner up and teach both of their trainings together. The benefit is that Participant Teachers have two Master Teachers for teaching and assistance during any given class, and since the two courses run in parallel and are both taught by the same team, Participant Teachers had the opportunity to make up missed classes. The downside is that Master Teachers spend twice as much time teaching, which some of the Master Teachers in the district minded more than others. Another LEA liaison simply chose to double the scope of the program in his district by having his six Master Teachers lead six trainings each, rather than the required three, without offering any further incentives to the Master Teachers.

Participant Teacher recruitment. As this last example points out, goals and requirements for recruitment of Participant Teachers play a major role in shaping the character of individual trainings. Recruitment of a set quota of Participant Teachers is heavily emphasized in the Intel Teach to the Future delivery model, and LEA liaisons and Master Teachers are strongly focused on their responsibility to meet their quotas of teachers.

The requirement that 20 to 22 Participant Teachers register for, and 17 to 22 complete every training was a persistent subject of discussion and stress in many districts. In this section, we look at strategies used to recruit Participant Teachers, the types of screening they undergo, and problems with attrition. Some of the tensions that arose around recruitment issues included taking on more Master Teachers than a district could easily support; having too many programs competing for teachers' time, making Intel Teach to the Future a difficult sell; and a mismatch between available incentives and teachers' needs or interests. Attrition was an especially prominent concern for Master Teachers, sometimes eclipsing engagement with the course content itself. The prospect of having to teach an extra complete training to meet the required numbers hung heavily over Master Teachers' heads, as they could rarely control Participant Teachers' choices about signing up for or continuing with the training.

Although Intel outlines basic technology literacy standards for acceptance into Intel Teach to the Future, we found that this standard is often sacrificed for the sake of "making numbers" (i.e., enrolling the required number of heads in the training). This happened particularly frequently in relatively small districts with fewer than five hundred teachers and between two and four Master Teachers. For example, one district had two Master Teachers and only 180 teachers — if both Master Teachers were to meet their quotas (60 teachers each over three years), not only would they have to convince two-thirds of the district's teaching staff to participate in a non-mandatory training that took place on weekday nights and which offered no stipend, but they would somehow have to ensure that those 120 teachers would already have basic computer skills in hand. Since this district had no other professional development offerings related to technology in place, and the LEA liaison primarily hoped that this training would provide teachers with the basic skills he wanted them to develop, Master Teachers felt that success was close to impossible. Master Teachers in situations like this used strategies such as coaxing friends to participate, petitioning the district administration to make some kind of stipend available for the training, and buttonholing teachers in their own buildings in order to fill each training. In these situations, the baseline technology skill requirements are seen as impossible to enforce and are abandoned, and depending on the skill of the Master Teacher, the training becomes less about technology integration and curriculum development and more about basic technology skill building. In turn, teachers whose skill levels made it difficult for them to engage effectively with the curriculum were more likely than others to drop out, leaving the Master Teachers with an attrition problem even if they had solved their original recruitment problem.

Two final challenges to recruitment are limitations that many districts faced. First is the stipulation that non-certified teachers could not take the course, which is a frustration in districts that, because of budget cuts and shrinking teaching staffs, are using non-certified teachers in many classroom settings. Second is that elementary teachers often are not willing to take the course because their schools are all Macintosh-based and they see no value in taking a PC-focused training.

LEA liaisons are generally well aware of these problems and try to support Master Teachers in recruitment and retention. One LEA described a training program he once worked on, in which some participants thought the computer mouse was supposed to go on the floor and work like the pedal of an electric sewing machine, and said, “Some PTs in the Intel Teach class came in at this level.” Another LEA recounts, “Although Intel says to take PTs who are at the middle of the road in terms of their skill level, we have to take anyone we can get because we need PTs. Many of these teachers require one-on-one training to get people up to the same level, which is hard.”

Districts offer a range of additional incentives to encourage Participant Teacher enrollment and compensate teachers for their efforts, including: credit (college, district professional development, move up pay scale, or credential); a cash stipend (ranging from $100 to $1,000, or an hourly wage); a PC for student use; credit toward laptops and other equipment; and/or substitute teacher days or comp time. The scope of these incentives obviously depends on the size of each district’s discretionary budget, making recruitment more difficult in cash-strapped districts.

Overall, LEAs emphasize the importance of compensation. As one explains, “The exchange of money makes it clear that the professional development is a serious endeavor.” Even giving out training days “is a luxury,” explains one LEA. “It meant a lot to them, because it signified that we took their efforts seriously and they knew that this was the only way we could show that. Two of their training days were on school days so we provided subs. People don’t consider the financial repercussions of that.”

Some LEAs emphasized the importance of incentives from the outset, while others only addressed the issue when enrollment was low. An LEA liaison from one of the larger urban district explains, “First we weren’t offering a PC, but we started to in October. Classes weren’t full, so we offered another round in the spring, and offered PCs. Now, if you finish the training, you get a PC for your classroom. Now we fill up the workshops.” In another district, the district superintendent offered extra incentives such as a CD-burner or digital camera as a last-minute motivator to get people to take the course.

One LEA liaison summarized the recruitment and retention challenges she was facing this way:

> *"People are enthusiastic and sign up, but stop coming due to other commitments. The cancer of education is being overcommitted to things you can't get out of. The Intel program is very intense. We try to let them know what they're committing to, but whenever my MT says, 'I just lost somebody' — they try to do whatever they can when they see somebody slipping — but the PTs didn't sign a contract [the MT did]. So we're trying to make sure we meet our numbers and this summer I may open it up to other districts around us so that my MTs meet their numbers. I'd rather just do [our districts], but the numbers MTs have committed to are a reality."*

Another frustrated Master Teacher simply says:

> *"I have a problem with the PT quota — they say you don't get paid unless you meet that quota. You can't have teachers drop out. But life doesn't work that way. Things come up."*

In response to these challenges, several LEA liaisons made cases for more flexibility in their conversations with us:

> *"The problem we encounter is the distance and the requirement that you have to have 20 — I think that's totally unfair. If that MT has made commitments and you get in your car and drive 60 miles and then only 17 [Participant Teachers] show up and you make that drive and it dwindles down to 12 and you realize that you aren't going to get paid, or that you're going to have to teach another training... My MT is putting in the time and giving the quality of the work and won't get paid through Intel. If she, in good faith, has put in that effort and then we have to pay her locally — if you were to factor in the cost of the gasoline and do the daily rate of what these teachers are contributing, we're [the consortium] contributing a whole lot more than Intel is on this grant. There ought to be more flexibility."*

Another LEA liaison summarized the challenges involved:

> *"We have nine MTs, which is more of a detriment and not an advantage. We have to support them and their PTs. We said we would provide computers — last year alone we spent $200,000. The district is balking. The PTs are very tied to what they will get out of it, they really have to see what's in it for them in this program. There is so much on teachers' plates with raising test scores — we can't tear them away without offering compensation. I believed in the program and wanted to get people trained. I wanted teachers involved to understand curriculum integration. MTs feel overwhelmed with these numbers."*

Optimal and Challenging District Settings. What determines how districts implement Intel Teach to the Future, or how specific trainings in each district are run? This section of the report identifies some factors that are systematically influencing the training and implementation-related issues described in the prior two sections. The list is not exhaustive but includes some of the major differences among districts that, according to our data, are shaping the variation in delivery and reception of Intel Teach to the Future from district to district.

Note that while some factors are fixed (such as the size/density of the community served), they are only relevant because they influence other factors that can potentially be changed or improved. For example, suburban districts may face fewer obstacles than very small rural districts or very large urban districts when they seek to align their hardware purchasing plans with their professional development plans. This is a positive factor that can influence the impact of Intel Teach to the Future. Any district, however, can take on the challenge of working to improve the alignment of their purchasing and professional development plans.

Optimal Conditions: Suburban and Collegial

Suburban and medium-size (5,000–10,000 students) districts are most likely to be optimal settings for hosting Intel Teach to the Future. While they can certainly face common challenges, including geographic scattering and establishing a strong commitment to Intel Teach to the Future among Participant Teachers, they often have material resources as well as a level of coordination across district and school administrations, that enable them to create successful strategies for handling these issues. We elaborate on these below.

When district growth reflects local economic and population growth and development, districts are often able to expand and develop their technology programs and hardware more rapidly than other districts. Several districts we interviewed are undergoing such expansion, becoming bedroom communities for nearby metropolitan areas, or experiencing growth as urban centers grow. These districts reported that improving technology integration was a priority and were investing in improving technology in the schools. These districts usually contain mixed socioeconomic levels and were using Intel Teach to the Future as part of an overall investment in expanding technology use. District administrators were motivated to implement the program carefully — for example, they were likely to align teacher recruitment for the training with hardware rollouts, ensuring that teachers who were receiving new computers would also be receiving timely training.

Medium-size districts are also often (although not necessarily) well positioned to establish a strong culture of collegiality among teachers in their district, and to stress the importance of professional development for teachers. This type of environment is beneficial to the implementation of Intel Teach to the Future (easing recruitment issues, etc.) as well as to its long-term impact, given that teachers need opportunities for follow-up training and informal collaboration with colleagues as they build on what they learn through Intel Teach to the Future. Medium-size districts have more resources — both financial and human — than small districts to devote to planning and delivering professional development, but are also more able than large districts to establish stable personal relationships among administrators and teachers that are important to making teachers feel that professional development is an opportunity being delivered for their benefit, rather than an obligation.

Challenging Conditions: Urban and Rural Districts. It is certainly possible for large urban districts and small rural districts to implement Intel Teach to the Future successfully. Our interviews and visits with administrators and teachers from these types of districts, however, clearly established that each is very likely to face a set of distinctive challenges that make implementation more challenging than intended.

Large urban and small rural districts faced different sets of challenges. Urban districts have large physical, personal, and technical infrastructures across which programs such as Intel Teach to the Future must be coordinated. Although they are usually able to recruit enough Participant Teachers to meet their obligations, they experience extremely varied results across schools of different SES status, usually because of variations in the technology available to teachers in these different schools. Often technology resources, and accordingly the Intel Teach to the Future program, are concentrated in wealthier, technology-saturated schools. We also found that larger urban districts were often unable to follow through with the type of administrative support for each Master and Participant Teacher that was needed to maximize their benefit from the program. Two points illustrate these issues:

Large urban districts embrace a much broader range of schools than do smaller districts — schools that vary in their resource base, their teaching cultures, the quality and depth of their instructional programs, and the strength of their connections to central office services and resources. In these districts, Intel Teach to the Future often seems to be working well for teachers from relatively wealthier schools that are generally rich in technology resources, but is having little impact on lower-SES schools, which are likely to have underdeveloped technology infrastructures. In these large urban districts, Intel Teach to the Future is usually concentrated, training teachers at only a small number of high-achieving schools with special resources in place, although sometimes Participant Teachers in a particular training group come from a range of schools with very different opportunities to implement this program in their home schools. In either scenario, teachers from schools with fewer resources and less administrative support for teacher development and innovation are not likely to have the opportunity to act on much of what they are exposed to through the training.

In small rural districts, particularly those decreasing in size, it becomes increasingly difficult to find enough Participant Teachers to take the class. In several small districts we visited, Master Teachers felt strongly that LEA liaisons had been overly optimistic about the proportion of the district's teaching staff they could realistically expect to recruit for the trainings — for example, a district with fewer than 300 teachers, many of whom had no working technology in their classrooms, had asked for two Master Teachers, which committed them to training almost half of their teaching staff in three years. One Master Teacher found this goal extremely unrealistic, as he felt that the district did not generally treat technology as a priority and teachers didn't feel they had enough resources to use it in their teaching anyway. He was having trouble recruiting enough teachers for his second training and was very dubious that his third training would ever take place. In another district, with 240 teachers on staff, the superintendent requested four Master Teachers, with the goal of training every teacher in the district through this program. These Master Teachers faced similar challenges in the recruitment process.

LEA liaisons in rural communities are often enthusiastic about Intel Teach to the Future but face major logistical obstacles to implementation. Small rural districts often form consortia to create a large enough pool of teachers to support the program. This situation, though, can compound the common problem of geographic dispersal. In one district not participating in a consortium, but where teachers are very spread out geographically, some live up to an hour away from the central training site on winding roads that are treacherous during long winters. One LEA liaison explains that Participant Teachers tell him that they don't have time to make the drive for a 40-hour training, and another explains that "doing it after school is tough, to teach all day at one school, drive here an hour and take the training, and then drive back."

In the best-case scenario, Intel Teach is hosted by a pre-existing consortia that has collaborated before and has a structure in place to administer a program jointly. Even in these situations there are challenges, such as trying to offer centralized support and management for the program when districts often have different calendars, different technology available for teachers, or different policies on issues such as leave time for training and professional development credits that are relevant to program participation. One RTA described an LEA made up of fifteen separate districts: when the grant writer who applied for the program bowed out, none of the school principals involved knew anything about the program. The Master Teachers were "totally unsupported." Also, in these rural areas, several district representatives emphasized the difficulty of finding a central location to hold trainings that would be reasonably close to every Participant Teacher's home district.

Intel Teach to the Future as a Catalyst for Change

LEA liaisons and other district- and school-level administrators viewed participation in Intel Teach to the Future as both a major opportunity and a major challenge. At times, frustrations ran high as administrators tried to balance program requirements with local capacity. Some of their frustrations pointed to legitimate conflicts that were often worked out, over time, through negotiations with RTA coordinators and Intel representatives. But at the same time, we found it important to consider how these tensions may have been signaling larger processes of change that were instigated by participation in Intel Teach to the Future. In this final section of our evaluation results, we discuss several areas in which, we believe, program participation may have been difficult, but ultimately productive, for school districts.

Hardware Allocation

In many districts, we saw participation in Intel Teach to the Future acting as a catalyst that caused districts to rethink their policies on technology distribution, and motivated teachers to push for better technology resources in their classrooms. These positive outcomes were often the consequence of tensions that complicated the implementation of the program and created difficulties for teachers participating in the program.

The essential issue generating change in this area was Participant Teachers' expectation that they would have a computer in their classroom once they completed their training, and more importantly, their desire to have a computer, and often their decision to push for more than one. These new levels of motivation often clashed with existing district-level planning. One frustrated school technology coordinator exclaimed, "the Intel Teach program is upsetting the district's plan for hardware allocation." He related that the district hardware rollout was supposed to proceed on a specific schedule. The elementary schools were supposed to be the last to get computers, yet many teachers signed up for Intel Teach to the Future were from the elementary schools and were now pushing to get moved up on the allocation list so that they could better follow up on their training. In another district, though, the expectations worked in the opposite direction — all teachers had already been promised computers for their classrooms without any stipulations regarding training, but once they signed up for Intel Teach to the Future, they had to "earn" their hardware by completing the course, causing tension because the Participant Teachers perceived the Master Teacher as withholding their hardware.

In other cases, equipping Participant Teachers with computers clashed with the district's original allocation schedules or general policies on technology use. One LEA explained, "We are putting in a student information system for which we plan to buy computers in the next couple of years. We'd prefer to wait and buy newer computers, but we have to offer these [those available through Intel's discount purchasing program] now for Intel teachers." Other LEAs are trapped by district policies and budget constraints. One LEA liaison, who was relying on Intel Teach to the Future to provide basic technology training to the teachers in her small district, explained that although she is enthusiastic about the emphasis Intel Teach to the Future places on student use of computers, it conflicts with her district's policy of placing only one computer in every classroom and reserving it exclusively for teacher use. The LEA liaison reflected, "I had to ask myself, 'What can I do to meet Intel's needs and live within the administration's restrictions?'" Trapped within these obligations and requirements, she had little recourse, and in effect turned a blind eye to teachers who began to use their one computer with their students, risking administrative penalties.

Accessing Participant Teacher work outside class

As intended by the program, all but the most unmotivated Participant Teachers described spending a great deal of time working on their unit plans outside of class. Consequently, across all of the districts, LEAs and Master Teachers had to figure out how to help Participant Teachers access their work from locations other than the labs where classes were being held. This was challenging because after the first session or two, unit plans were too big to fit on a floppy disk, so some larger storage mechanism was needed. This often necessitated giving Participant Teachers access to the school network from home. In many districts, this was the first time that teachers had asked to have this kind of access to online resources, and the needs raised by this training caused new policies or new resources to be put in place that, if institutionalized and made available to all teachers, would significantly improve the functionality and quality of school networks for teachers.

This was not always easily done, however. We witnessed training classes in which Participant Teachers had worked on their projects outside of class, saved them on the storage sites on the web, but were unable to access their files because of district firewalls. In other cases, Participant Teachers had saved work in class on school servers, thinking that they could gain access from home or their classroom (something they had never wanted to do before), only to find out that they couldn't. Now that this was something they wanted to do, they were motivated to push for improved access. Using zip drives was sometimes impossible because teachers were not allowed to install the necessary software on the school computers, and getting authorized personnel to come do the installations took days or weeks. One exasperated Participant Teacher, working on a technology-based curriculum unit for the first time, explained that access to work in progress is "a big problem in their district. She explained that firewalls needed to be removed or restructured, and that teachers needed improved storage capacity and access to the district network from home. This teacher had never been concerned with any such issues prior to her involvement in Intel Teach to the Future. If her district addresses her needs, she will have improved network access for every teacher in her district.

Cross-Platform Issues

Not surprisingly, Intel Teach to the Future's exclusive focus on PC computer platforms raises issues for teachers using Apple computers in their classrooms. This challenge is particularly prominent because Apple computers are most commonly used in early elementary classrooms, and early elementary teachers (K-3) constitute almost one-third of the teachers participating in Intel Teach to the Future.

In some districts, teachers using Macintoshes simply did not participate in Intel Teach to the Future. This contributed to recruitment challenges in some districts, as K–6 teachers are the majority of the classroom-based teaching staff in K–12 districts. As one LEA liaison said, "I could [recruit enough teachers for my training] if elementary school teachers had the equipment, which they don't. Of course they are the majority of the teachers in the district." In other districts, these teachers did enroll in the training. Sometimes these teachers did not understand that the training would be PC-based and were frustrated or confused by the sudden need to learn a new interface (which some found very difficult), and by what they saw as the irrelevance of the curriculum to their classroom context.

However, some Macintosh-using elementary-grade teachers took a more fruitful approach to the PC focus of Intel Teach to the Future. Some we spoke to have been able to bridge the gap and can see how to apply the Intel Teach to the Future curriculum in their Macintosh-based classrooms. While they are obviously unable to follow the curriculum to the letter, they are able to use the same software packages used in the curriculum. A challenge to this approach is gaining access to copies of Microsoft Office for Macintosh, since Intel Teach to the Future does not provide them and the software may be too expensive for their district to buy. Some teachers simply plan to apply the general lessons of the curriculum to other applications they already use with their students.

This kind of creative thinking inevitably leads teachers to think beyond the technical issues involved in the training and to focus on the larger principles being communicated by the Intel Teach to the Future curriculum. For teachers who have previously developed their technical skills, it is possible to focus on these "big ideas" during the training, and they can make valuable contributions to discussions and collaborations during the program. However, in our observations this type of Macintosh-using teacher is in the minority, and many Master Teachers in districts with significant Macintosh-using populations felt that the program itself could move to encourage this kind of cross-platform, "big idea" thinking. As one Master Teacher said, "Don't limit the program to one platform. You're discounting the range of uses [that the training will be put to]."

Concluding Analysis

The vast majority of Participant Teachers we spoke with saw Intel Teach to the Future through the lens of their pre-existing perceptions of and experiences with their district administration and their previous professional development experiences. In many cases, this was beneficial — teachers with positive relationships with their districts took it on faith that the program had been chosen with an eye to their needs. However, when Participant Teachers had reason to doubt the usefulness of training sponsored by their district or their district's ability to support their making use of what they learned in professional development sessions, it was difficult for even the most skilled Master Teacher to communicate the value of Intel Teach to the Future effectively. For example, in one district where teachers felt chronically pressured and unsupported, a Participant Teacher offered the following:

> *"One problem is that the district…doesn't trust the teachers. They gave out the CDs and software [for the course] and collected it during the first class [and during subsequent classes, preventing teachers from working on units outside of class]… The district wouldn't let us keep it until weeks later. It was sad to see that they had no trust in us, even though we are putting in all this time…"*

In contrast, a Master Teacher in another district described his overall goals for supporting teachers in his school, which illustrate his vision of teachers as professionals who should have control of the resources they need to be creative, innovative teachers:

"[I want to] have the technology run transparently, so that when a teacher says 'I want to be able to do X,' they will be able to make it happen. They'll know what resources are available and where to find them. I want teachers to have access to student work in their classrooms and am working on a database system for our intranet to make that happen. I want to make the technology a part of their lives."

The lesson from comments like these is that different districts provide different preconditions for teachers' reception of Intel Teach to the Future, and these preconditions have a real and tangible impact on what teachers take away from the training and in turn, on what impact the training has on their teaching and their students' learning. Optimally, Intel Teach to the Future can act as a catalyst for positive change, encouraging administrators and teachers both to re-examine their practices, policies, or beliefs about technology use, and moving the entire district toward better access, more interesting ideas about student use of technology, and more collaboration and innovation by the teaching staff.

These and other similar examples highlight the importance of effective communication — between RTAs and districts, between administrators and teachers, and among teachers — about the real scope and purpose of this training, beyond earning computers or fulfilling professional development obligations. Especially in districts where constructive professional development opportunities are rare or where technology resources are scarce, it is crucial that teachers be invited to use Intel Teach to the Future as a chance to identify their own teaching goals, reflect on their learning goals for their students, and to begin to engage with the concrete curricular benefits of using technology in the classroom.

DISCUSSION

What does it take to create a school in which students are frequent, comfortable users of technology tools, and teachers are able to make clearly considered connections between learning goals and the technologies they ask their students to use? Hank Becker (2000) suggests that no one factor can create this situation. His research indicates that a majority of teachers in a community will begin to use technology with their students for more than remediation, skill-building, or recreation only when adequate technical skill, a generally constructivist teaching philosophy, and convenient access to a cluster of at least five to eight computers are available in teachers' classrooms. Intel Teach to the Future seeks to connect building teachers' technical skills with an invitation to pursue a more student-centered, research-oriented mode of teaching. The curriculum presents convincing images of how commonly available software tools can support this kind of learning. This bridging of technical training with opportunities to reflect on and practice student-centered, content-rich applications of technology tools is the key quality of this program. Its eventual impact on everyday teaching and learning depends on effectively moving teachers from understanding "technology" as a set of technical skills to master toward seeing various applications as distinct tools to support engaged and creative student learning.

Our research indicates that teachers who have participated in this program are extremely enthusiastic about the experience and have a high opinion of both their trainers and the curriculum. However, as this report has outlined, two major factors stand between the quality of the program and its ability to realize its intended impact at the classroom level. First, teachers' pre-existing beliefs and practices may impede them from engaging with the core concepts of the curriculum. Second, school- and district-level factors frequently militate against the kind of experimentation and innovation that teachers need permission to pursue if they are to build, over time, a real mastery with the technology and the kind of teaching and learning valued by this program.

Further evaluation research will allow us to refine our understanding of many of the issues raised in this report. Priorities for our further research include:

- Documenting how program participants use technology in their classrooms, particularly in their math and science teaching. We will explore how their technology-rich lessons differ from other kinds of math and science teaching that take place in their school buildings, and how and whether their students' technology-rich work is different from other, similar student work produced by similar students in the school.
- Investigating the relationship between pre-existing pedagogical beliefs and practices and the impact of Intel Teach to the Future. Is there evidence that teachers with more traditional, teacher-centered approaches are able to take steps toward more constructivist practice after participating in Intel Teach, or do teachers' beliefs and practices remain stable, with teachers adapting the messages of the training to fit their existing priorities?

- Identifying some of the most successful models for long-term leveraging of Intel Teach to the Future at the district level, and understanding the impact of multi-year involvement in the program on district-wide technology policies and practices.
- Exploring whether the differences among districts that emerge in the process of adopting the program fade over time, or if districts of different sizes, or serving different communities, move along different paths in their long-term appropriation of Intel Teach to the Future.

RECOMMENDATIONS

Based on the findings of our research, we offer the following recommendations:

- Continue to emphasize Intel Teach to the Future as a transitional training that invites teachers to begin the process of becoming fluent, frequent users of technology as an integral part of their teaching. Present consistent messages that locate Intel Teach to the Future as a crucial step in a process of professional development to program participants at all levels (RTAs, district personnel, Master Teachers, Participant Teachers). When this message is clearly communicated, participants are most likely to be prepared to engage with the spirit and focus of the program, and to be well supported by their district both during and after the training with appropriate resources and endorsement of their efforts to try new approaches in their classroom.

- Create, or partner with other organizations to provide, follow-up trainings that focus on more discipline-specific applications of technology, particularly math and science applications. Trainings that engage teachers with more content-specific uses of various applications (such as using Excel in science classrooms) but offer more leeway than Intel Teach to the Future in designing additional curricular material would reinforce the program's position as a mid-level, transitional training and provide pathways for teachers wishing to build on their initial experience.

- Disseminate local models for implementing and integrating Intel Teach to the Future in various local contexts. Just as exemplary unit plans can help teachers understand the focus of Intel Teach to the Future and guide their work in the program, featuring exemplary district practices with the program can guide district personnel in utilizing the program more effectively. Intel websites and marketing materials can be used to share images of how districts have handled implementation issues such as aligning Intel Teach to the Future with other professional development opportunities already in place; establishing "critical mass" cohorts within individual schools; and recruiting teachers who are best positioned to take advantage of the training

- Identify and invest in successful Master Teachers, in collaboration with their school districts. Some Master Teachers are leaders in their districts and are, in connection with their role as an Intel Teach to the Future Master Teacher, taking on additional out-of-classroom responsibilities, such as acting as roving mentors for more novice technology-using teachers, or coordinating district-wide technology-related professional development programs. Because of their expertise and their strong relationships with other classroom teachers, these teachers can be powerful change agents at the district level. Intel could significantly influence the long-term impact of Intel Teach to the Future by establishing a district-based "senior trainer" program providing extra training, access to additional curricular and training resources, and participation in a network of other expert technology-using teachers. These teachers could act as mentors and in-class guides and collaborators for teachers seeking to build on their experience in Intel Teach to the Future.

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APPENDIX A

Overview of Intel Teach to the Future

Launched in 2000, the Intel® Teach to the Future program, with support from Microsoft Corporation, had already reached more than 30,000 U.S teachers by September, 2001. The goal of the program is to provide free training to 400,000 teachers in 24 countries, including 100,000 in the United States, by the end of 2002.

Intel Teach to the Future is offered for both K-12 in-service teachers as well as pre-service educators, with distinct curriculum designed for each audience. The program's curriculum — designed by teachers — aims to help teachers integrate technology more effectively into their classrooms to enhance student learning.

Divided into 10 four-hour modules, the curriculum guides teachers through a process of developing a complete collection of themed lesson plans that engage students in the use of technology to conduct research, compile information, and communicate with others. The program incorporates use of the Internet, Web page design and productivity software. Teachers learn from other teachers how, when and where to incorporate these tools and resources into their work with students. In addition, they are instructed on how best to create assessment tools and align lessons with district, state and national standards.

Intel Teach to the Future uses a trainer-the-trainer model. Districts apply to participate in the program, and send a group of Master Teachers to trainings conducted by Senior Trainers. Master Trainers then conduct three trainings each within their districts over the next three years, each training a total of 60 Participant Teachers.

During its first year of U.S. implementation, Intel Teach to the Future was implemented by Regional Training Agencies in Arizona, Northern California, Oregon, and Texas. The U.S. program is now being run in many states, by Regional Training Agencies housed in a range of universities and non-profit organizations. For more information about the program, go to www.intel.com/education/teach.

APPENDIX B

Methods

Site visits

Between December 2000 and March 2001, EDC researchers visited 11 school districts participating in Intel Teach to the Future, including sites in each of the five charter regions participating in the program — Oregon, Northern California, Arizona, and East and West Texas. During site visits, members of the research team attended Intel Teach to the Future training sessions. Team members also interviewed Master Teachers and Participant Teachers, Local Education Agency (LEA) liaisons, Regional Training Agency (RTA) coordinators, and other relevant district personnel, and visited schools in the district to collect data about the district contexts in which the program was being administered. Structured observations and informal interviews were conducted during training sessions; notes from these observations were written up, as were summaries of all interviews and school visits.

Phone interviews

Phone interviews were conducted with LEA liaisons after site visits were concluded. Site visits had allowed the research team to develop a well-focused interview protocol that helped us to further explore issues that had been prominent during site visits, and to explore the extent of the variation we were seeing in the implementation of the program. Researchers interviewed 24 LEA coordinators, representing four to six LEAs in each of the five charter regions. All phone interviews were summarized in accordance with the standard protocol.

Qualitative Data Analysis

Observation notes and interview transcripts were thematically coded using the Atlas.ti qualitative data-coding software. Coding and clustering this material allowed CCT researchers to examine common threads that emerged from numerous stakeholder comments, and to test researchers' hypotheses against the full weight of the data and to develop warranted conclusions.

Quantitative Data

The initial wave of data collection was targeted toward all teachers engaged in the Intel Teach to the Future (ITTF) training program. Teachers were recruited for training through Lead Education Agencies targeted by Regional Training Agencies in within participating states. Each teacher involved in the training was asked to complete an evaluation survey at the completion of his or her training session. This survey was a brief feedback/satisfaction survey designed to provide information about each participant's satisfaction with the training and his or her prior technology-related teaching practices. Participants were asked to indicate how prepared they felt to engage in a number of technology-related activities with their students, how often they used technology in the classroom in the past, the obstacles to integration of technology they perceived in their schools, and how useful they found the ITTF program.

The resulting sample consisted of 7,835 Participant Teachers (PTs) who completed the training program. Most participants in the training evaluation were women (80%, N=6266). The sample was also predominantly Caucasian (84%, N=6562). Latino(a) teachers constituted 8% of the training survey sample (N=653), while African Americans (3%, N=261) and Asian Americans (2%, N=139) each made up less than 5% of the sample. Survey participants varied widely in the extent of their teaching experience. Some of those receiving training were just beginning their teaching careers, while others reported 50 years of teaching experience (M=13, SD=9). The teachers participating in the training taught primarily in wealthy schools. Most teachers (64%, 5000) reported that 50% or less of the students in their schools were eligible for reduced or free lunch.

The PTs, in addition to a smaller sample of teachers trained as Master Teachers (MTs) who were excluded from the end-of-training survey, were targeted again for survey at the end of the school year following training. Teachers were encouraged to fill out a web-based survey designed to collect information about their experiences implementing the unit plans designed in the ITTF training sessions. Over 1,900 (N=1906) teachers filled out the follow-up survey. MTs represented 15% (N=288) of the end-of-school-year survey respondents. The survey was presented in two forms. The shorter form was completed by 69% of the sample (N=1312) and consisted of 18 items (for PTs) and 19 items (for MTs). This version of the survey gathered information about the teachers, their classrooms, and workloads. It also asked about the unit plan implementation process, including whether or not the unit plan was implemented, each teacher's satisfaction with the unit plan, and challenges faced by teachers attempting to implement their plans. The longer version of the survey consisted of 33 questions tapping classroom pedagogy and school climate, in addition to those described above. Teachers randomly selected to receive the longer form of the survey were entered into a lottery for prizes that could be used in the classroom in an effort to encourage their participation. These prizes included 10 Pocket PC cameras, 10 Intel microscopes, and 5 Sound Morphers (digital sound recording and editing tools.) Of 6,099 teachers targeted for participation in the short form of the survey, 1,312 participated (21.5%). Of 2,000 teachers targeted for the longer form of the survey, 594 participated (29.7%).

Almost half the respondents to the end-of-school-year survey were from the North Texas (20%, N=382) and South Texas regions (25%, N=476). The remainder were evenly distributed among Arizona (20%, N=384), California (15%, N=285), and Oregon (20%, N=382). Nearly all participants taught at public schools (N=1858, 98%) which tended to be located in wealthy neighborhoods. Only one-third of teachers reported that over 50% of students in their school were eligible for reduced or free lunch.

The demographic characteristics of the end-of-school-year survey participants were very similar to those of the end-of-training-survey sample. Most participants were women (81%, N=1538) from Caucasian backgrounds (87%, N=1660). As in the end-of-training evaluation, Latino(a) teachers constituted 6% of the end-of-school-year sample (N=115), while African Americans (3%, N=49) and Asian Americans (2%, N=37) each made up less than 5% of the sample. They averaged 13 years of teaching experience (SD=9). Thirty percent of teachers taught self-contained classes (N=554) while most of the remaining two-thirds of the sample taught humanities courses, including English, language arts, or literature (23%; N= 423), or math, science, and computers (27%, N=507). Teachers responding to the end-of-school-year survey were from all grade levels, including early elementary school (PreK to 3rd grade, 23%, N=439), middle elementary school (4th through 5th grade, 22%, N=424), middle school/junior high (6th to 8th grade, 26%, N=493), and high school (9th to 12th grade, 29%, N=544).