Intel® Teach to the Future:

A Worldwide Teacher Professional Development Program Combining Inquiry-Based Education with Technology Integration

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Abstract:

In this chapter, the authors describe the Intel® Teach to the Future program. This forty-hour teacher professional development program is offered free to all districts in the US and to pre-service educators. A program overview is given and evaluation data on the first two years of the program are presented.

Statement Of Need:

In the early 1990's, a decade after the first microcomputers appeared in U.S. classrooms, effective staff-development programs that focused on how teachers could use computers to enhance student learning were in short supply. In the absence of practical technology training, those teachers who were trying to use this new tool in their classrooms were often self-taught. (West, 1990). In the decade that followed, increased research and hypotheses of what would constitute effective use of technology circulated throughout pockets of academia, but few changes occurred in the typical classroom. Jackson of Classroom Connect (1999), in a discussion about teacher professional development, clearly defines the problem:

> Since the installation of microcomputers in the schools, professional development on technology has primarily focused on how to use the new hardware and software. Most companies who trained educators to use their products did so without a clear instructional focus. This emphasis on equipment over instruction has left many teachers questioning the value of computers in the classroom. …If we look at predictions by the U.S. Bureau of Labor Statistics, in our not so distant future 70 percent of jobs available will be knowledge jobs. By the year 2010, 90 percent of those jobs will go unfilled. If we don't make this leap of faith in teaching and preparing our students, we put the future at risk. Clearly, the need for quality professional development has never been greater.

The National Center for Educational Statistics (NCES) administered a survey of public school teachers in 1999 that included items on teachers' use of computers and the Internet. According to that survey, only a third of the nation's teachers felt prepared for, and comfortable with, using computers and the Internet for classroom instruction. "Half of teachers reported feeling 'somewhat prepared' to use these technologies for instruction (53 percent), and 13 percent reported feeling 'not at all prepared' to use these technologies for instruction." (NCES, 2000, p. 75).

Today's teachers and their students have access to an incomprehensible amount of information and incredibly powerful technological tools. These resources and tools can provide students with bridges to real-life experiences and worldwide resources. In order to become leaders of tomorrow, students around the world need to learn how to sift through this immense amount of

information, bring meaning to it, be able to make informed decisions and conclusions, and communicate those ideas to others.

Teachers, and society as a whole, understand that technology is a powerful tool, but many are still struggling with how it can best be used in the classroom to support and meet curricular objectives and standards and to prepare their students for tomorrow's world. Intel Corporation, long a supporter of innovative education programs, saw this growing need for teacher professional development that would help teachers integrate the use of computers into their existing curriculum. Over the past five years, Intel's teacher training programs have helped to bridge the gap between how to simply *use* various technology and how to create meaningful learning experiences for both teachers and students.

The Beginning of a Teacher Training Program

In 1998, Intel Corporation, with the support of Hewlett-Packard Company and Microsoft Corporation, created the Intel® ACE (Applying Computers in Education) Project, a teacher training program that focused on:

- Using computers as learning and productivity tools for both teachers and students
- Using the types of computers and software that are widely available in both schools and industry
- Creating lessons through "hands-on" learning that teachers can effectively use in their classrooms
- Encouraging teachers to work in teams, problem-solve, and participate in peer review of their lessons

In 1998, over 1,200 K-12 teachers in six western states were trained on technology integration through the Intel ACE Project. Training in 1999 expanded to three more states, and an additional 2,400 teachers were trained. As Intel ACE wrapped up in 2000, over 670 teachers were trained, for a total of over 4,270 teachers trained in three years.

Evaluation data was impressive: 97% of the participants indicated that they developed new skills that would assist them in integrating computer technology into the curriculum. 94% of the participants thought the training they received would benefit their students during the next school year.[1] Because of the success of the Intel ACE program, Intel, with the support of Microsoft, decided to dramatically expand and revise its teacher training program with the goal of training 100,000 teachers in the United States in three years, and an additional 400,000 teachers worldwide, investing $100 million in cash, equipment, curriculum development, and program management. This successor of the Intel ACE Project was the Intel Teach to the Future program.

Overview of the Intel® Teach to the Future Program

The Intel Teach to the Future program is a worldwide initiative designed to help in-service and pre-service teachers integrate technology into their classrooms, or future classrooms, to enhance student learning. It is intended to move teachers beyond the task of learning how to use computers to helping them think about how technology can be used to support

"The scope of this program represents our industry's recognition that all the educational technology is worth nothing if teachers don't know how to use it effectively. ***Computers aren't magic, Teachers are."***

–Craig Barrett, Intel CEO

[1] Evaluation data from 1999 Intel ACE participants

student-centered, inquiry driven teaching and learning activities.The in-service program is for K-12 teachers and provides 40 hours of in-class training and 20 hours of take-home activities. The Intel Teach to the Future pre-service curriculum, specifically designed for use with pre-service teachers, is used in the instruction of pre-service educators who then use the materials in their teacher-preparation courses.

Through this program, teachers work collaboratively to plan a technology-enhanced unit that develops their students' higher-level thinking and problem-solving skills, while meeting topic-specific curricular goals. Along with a detailed unit plan aligned with district, state, and national learning standards, teachers create examples of technologically-enriched student projects that "demonstrate the [student's] ability to reason, solve problems, apply knowledge, and write and communicate effectively" (National Education Goals Panel, 1999). Other unit materials are created to support the learning process, and authentic evaluation tools are developed to measure their students' success. Participants continually collaborate and share with peers throughout the development of their unit portfolios, culminating in a showcase event.

Intel Teach to the Future Goals

- Train more than 500,000 teachers worldwide (100,000 in the United States) by the end of 2002, focusing on how technology can be used as an effective tool to enhance student learning through research, communication, and productivity strategies and tools
- Provide hands-on learning for teachers to create standards-based, technologically-enhanced curricular units, student project samples, support materials, and evaluation tools, which address state and national academic and technology standards
- Encourage teachers to utilize challenging, essential questions in the development of their units to promote student-centered, in-depth learning
- Provide the opportunity for teachers to work in teams, problem-solve, and participate in peer review of their units

The Curriculum

The curriculum and companion CD-ROM are created by current and former classroom teachers employed by the Institute of Computer Technology (ICT), working closely with the Intel Corporation. ICT is a non-profit public agency that provides technology training and planning services to both schools and industry.

As teachers progress through the ten training modules, they have the opportunity to develop a specific unit integrating the use of the Internet, Microsoft Encarta Encyclopedia, Microsoft Word, Microsoft PowerPoint, Microsoft Publisher, and if desired, Microsoft Excel. The unit will be based upon either material they are currently teaching or material they would like to teach in the future. The goal in the end is not only for teachers to create a technology-enhanced unit portfolio that they can take back to their school, one that allows them to raise the level of excellence in their classroom, but also to understand how technology can be infused into other units throughout the year.

The Unit Portfolio

Through the Intel Teach to the Future program, each teacher will complete a Unit Portfolio that consists of:

- A unit plan with student learning objectives aligned to state standards
- Student sample projects:
    - A student multimedia presentation sample
    - A student publication sample (newsletter, brochure, or poster)
    - A student Web site sample
- Evaluation tools for assessing student learning:
    - A multimedia evaluation tool
    - A publication evaluation tool
    - A Web site evaluation tool
- A teacher presentation, newsletter, brochure, or Web site to support the unit
- Handouts, templates, worksheets, or tests to support the unit
- A unit implementation plan
- Classroom management documents
- Works Cited document

Brainstorming, Collaborating, and Planning

The first module of the curriculum introduces the teachers to the Intel Teach to the Future program and what to expect in the ensuing modules. Teachers view and discuss sample unit portfolios on the companion CD-ROM, as well as discuss the Portfolio Rubric, a tool they will use throughout the training to evaluate their unit components to ensure that they meet student learning objectives and use technology effectively. Module 1 is also a time for brainstorming, collaborating, and planning on unit ideas. Teachers work individually or in groups to lay the foundation of their unit. A critical component of this planning is time spent discussing and collaboratively creating essential and unit questions.

Essential and unit questions, together called “curriculum-framing questions,” are important components of the Intel Teach to the Future unit plan and help to encourage sustained exploration of curricular content and provide strategies for focusing the entire unit. These questions help teachers, and later their students, to employ higher-level thinking skills and to help them fully understand the unit’s essential concepts. “To get at matters of deep and enduring understanding, we need to use provocative and multilayered questions that reveal the richness and complexities of a subject. We refer to such questions as ‘essential’ because they point to the key inquiries and the core ideas of a discipline” (Wiggins and McTighe, 1998, p. 28). One very important quality of these curriculum-framing questions is that they do not have only one obvious, correct answer. They are questions that require students to understand the facts, but then call for an evaluation and synthesis of that information to focus their learning and to develop a deeper understanding of the subject. The following are examples of age-appropriate essential questions that teachers have created to use with their students:

- Why do some organisms survive and others don’t?
- What is a community?
- Why do laws change?
- How does conflict produce change?
- Why do we still read Shakespeare?

A variety of resources are made available for the participants to understand this often new concept, including a Master Teacher presentation, Internet resources, a video of a teacher and her students who use essential questions in their classroom, and an excerpt of Wiggins and McTighe’s *Understanding by Design* that discusses how to “engage and focus student inquiry.”

As Wiggins and McTighe point out, “Without such questions to focus instruction, teaching easily falls into superficial and purposeless coverage” (1998, p. 27). Throughout the subsequent modules, teachers reflect on and often revise their questions, learning objectives, and standards, creating a well-thought out unit plan.

Student Sample Projects and Evaluation Tools

In three of the modules, teachers create sample student projects as if they were students themselves, creating a presentation, publication, and a Web site just as they would expect of their students. This new role can sometimes be a challenge for teachers, but through the creation of the projects themselves, they become more aware of the critical elements of the learning process and are better able to evaluate whether learning objectives are truly being met. In addition, through the creation of the projects, teachers are able to determine if their expectations are unrealistic—whether too low or too high—and can add or discard requirements as they create the project, which makes the creation of this unit a much more dynamic and authentic learning experience for the teacher. After creating each sample project, teachers reflect upon questions based upon the Portfolio Rubric to assess whether their sample provides adequate evidence of student learning and effective use of technology.

Along with the creation of sample student projects, teachers develop evaluation tools to assess whether the student project has met the learning objectives. To assist with this process, teachers view and discuss possible evaluation criteria, sample rubrics, and scoring guides that have been developed by other teachers. During and after the creation of the evaluation tool, teachers reflect on the learning objectives, essential and unit questions, and grading criteria that they have developed to assess the effectiveness of the evaluation tool and whether it reflects an authentic measurement of student learning. The student sample is also assessed again, using the newly-created evaluation tool, to test the accuracy of the evaluation tool, as well as to determine the student project’s level of excellence.

Unit-Support Materials

There is more to a unit than simply student projects. Several of the modules are devoted to creating unit support materials, which can take the form of teacher multimedia presentations for direct instruction, a teacher or class Web site, a parent newsletter or other publication, templates for students to use, worksheets, directions on how to use equipment or software, posters, etc. The companion CD-ROM provides a variety of different types of sample unit support materials, and, with planning guidance, teachers create whatever would best assist in the implementation of their particular unit.

Pedagogical and Management Issues

Besides the hands-on creation of unit materials, teachers discuss a variety of pedagogical and management issues surrounding the use of technology in the classroom. Participants develop strategies for locating and evaluating information on the Internet, discuss copyright and legal issues related to using Web-based resources in the classroom, and discuss ethical issues such as digital equity and assuring the safety of their students as they use the Internet. Ideas for providing accommodations for diverse learners and supporting math learning across the curriculum are also discussed and integrated into the teachers’ units. These practical strategies are used throughout the development of their unit portfolios and are easily implemented in other units as well.

Companion CD-ROM

Along with the curriculum, each participant receives a companion CD-ROM that provides important resources to assist in the unit creation process. In addition to the wealth of templates, additional background information, Internet resources, and samples, the companion CD-ROM provides links to each state's curriculum and technology standards. This allows teachers easy access to the information they need to ensure that the unit they are designing supports appropriate state and/or national standards.

Program Implementation Process

The Intel Teach to the Future program uses a train-the-trainer model. The program provides Senior Trainers who conduct Master Teacher trainings or faculty curriculum review workshops for those who want to use this curriculum in the instruction of others. Those Master Teachers or faculty members, in turn, use the curriculum with either their colleagues in the K-12 setting or with their pre-service teachers. Senior Trainers are current or former K-12 teachers and Master Teachers, or college of education faculty members who are using the Intel Teach to the Future curriculum in their teacher-preparation courses. Senior Trainers are chosen based upon their experience in implementing technology-enhanced lessons in their own classrooms, evaluation data from previous trainings, and their understanding of inquiry-based learning. Besides their previous experience in Intel Teach to the Future, they also attend an engaging, three-day, Senior Trainer workshop consisting of hands-on activities, role-playing, and sharing of best training practices.

In-Service Program

For K-12 teachers who want to participate in the program, their Local Education Agency (LEA), either a school, district, school consortium, or state agency, must first apply online at the program's Web site (http://www.intel.com/education/teach). The LEA is an organization willing to take a leadership role in implementing the Intel Teach to the Future program. LEA's are selected on the strength of their commitment to program requirements, such as demonstrating how the Intel Teach to the Future program aligns with their current technology plan, goals, and priorities; committing at least one Master Teacher to be trained who will in turn train a minimum of ten participant teachers; and ensuring that participant teachers will have appropriate computer equipment and software in their classroom to implement the unit that they create. Once accepted into the program, LEA's recruit, support, and evaluate Master Teachers; provide training facilities for a Master Teacher training or pay their Master Teachers' travel-related expenses to attend a training held elsewhere; and later help recruit participant teachers.

Master Teachers attend a free, train-the-trainer, 40-hour, intensive training in which they create a unit, just as their future participants will, as well as receive instruction on facilitating their own training. After successful completion of the Intel Teach to the Future training, each Master Teacher is then responsible to help recruit and train ten teachers in his/her school district or consortium. All participant training materials are provided free of charge, including Master Teacher presentations and other training resources, curriculum manuals, and companion CD-ROMs. There are ten four-hour modules in the Intel Teach to the Future curriculum, which can be split or combined to fit a variety of training schedules. Some Master Teachers choose to conduct their trainings in a two-week, one-module-a-day format; others split a module per week to provide two, two-hour trainings per week after school for ten weeks; and others may choose to combine two modules for an eight-hour training held over five Saturdays.

Teachers train teachers, not only on how technological tools and resources can enhance their lesson plans, but also on ways to stimulate student inquiry, interest, and in-depth exploration.

Pre-Service Program

In 2001, 22 universities participated in pre-service curriculum review workshops, including California State Universities, Portland State University, Texas A&M, University of Central Florida and the University of New Mexico. The program is now available to all interested college of education faculty who are interested in adopting the Intel Teach to the Future curriculum into their teacher-preparation coursework. The college or university must first apply online at the program's Web site (http://www.intel.com/education/teach/preservice.htm). Once accepted, one or more faculty members will attend a curriculum review workshop. A college or university may choose to host a curriculum review workshop that is comprised of its own faculty members, as well as faculty from other universities. If faculty members attend a workshop at another location, travel-related expenses are the responsibility of their university.

Faculty members attend this free, hands-on, four-day, technology-integration workshop, creating unit materials just as their pre-service teachers will. Each faculty member attending the training commits to using the Intel Teach to the Future curriculum with a minimum of 40 pre-service teachers over a two-year period. Curriculum manuals and companion CD-ROMs are provided free of charge for the instructor and each of his/her students. The Intel Teach to the Future curriculum must be integrated into a graded pre-service course offering at least one credit, and can be adopted into a single, stand-alone course, or can be spread out over several pre-service courses.

Worldwide

Countries around the world are very interested in providing quality technology training for their teachers with the end result of enhancing student learning. Some countries are just beginning to focus on basic computer literacy; others are ready for pedagogically-based training that builds on their teachers' basic technology skills and focuses on integrating technology into classroom lessons and student projects. Intel Teach to the Future fits both requirements. To date, Intel Teach to the Future has been adapted by and is in various stages of implementation in 24 countries, both in-service and pre-service.

Many countries partner with the national and local government to implement the program. Typical curriculum adaptations consist of: language translation, cultural adaptation and terminology, pedagogical discussion topic adaptation, country-specific content (Web site resources, take-home activity modification if technology is not available outside of class, etc.), translation of unit samples, and creation of new samples and other CD resources. Several countries have added additional software resources or basic computer skill training to the program, depending on the educational need and other partnerships. Some countries are using the Intel Teach to the Future training as a catalyst for educational reform to move towards a more constructivist, student-centered learning. In all countries where Intel Teach to the Future has been implemented, teacher interest and enthusiasm have been high. Countries involved in the program meet together annually in the United States to discuss strategies, implementation plans, challenges, and solutions.

Lessons Learned

Part of the success of this program is due to the fact that all trainers and curriculum writers are current or former classroom teachers who can draw upon their own experiences of how technology can enhance student learning. Thus, the credibility of the program is enhanced, as well as the quality of discussions and instruction that occur in the trainings.

Another reason for success is the required support of the participant teachers' schools, districts, and/or local education agencies. In the Intel ACE Project, teachers applied directly to participate in the training. However, a significant number of teachers indicated in follow-up surveys that they were not able to implement their unit because of lack of equipment, software, or other support from their school. In the Intel Teach to the Future program, teachers do not apply directly to the program; instead, the program requires a more systemic approach to ensure that its future participants' technology-integration plans have the best chance for success. LEA's are accepted into the program only when they commit to fully supporting their participating teachers by providing appropriate tools and technological support.

At the very beginning of Intel's teacher training programs, one concept was clear: learning technology in isolation of its intended use is not effective. Teachers appreciate this program because it allows them to learn how to use the technology while they are creating something meaningful for their own classroom. Technology should not be taught in isolation because it should not be used in isolation. DeCoker (2000) echoes an often-repeated position: "Educators need to view technology as a means to an end rather than as an end in itself." That concept is reinforced throughout this training. Teachers are continually asked to think about what would be the best tool for the job—with the goal of improved student learning. This focus on pedagogically-based technology integration is an essential piece of Intel Teach to the Future's success.

Although student learning has always been a priority, the curriculum has undergone tremendous changes since the first edition under the Intel ACE program. Initially, teachers had their choice as to whether they would create teacher productivity materials or student samples. The resulting unit portfolios focused predominantly on how the teacher would use technology in presenting lessons, rather than how students would use technology to support their learning. In each new edition of the curriculum, the student focus and the emphasis on higher-level thinking skills became more pronounced in order to promote in-depth student learning through the use of technology. In the most current version of the Intel Teach to the Future program, activities for planning, creating, and reflecting all focus on developing meaningful student-centered learning. Through the creation of technology-enhanced projects, students have the opportunity to

> work in groups, express their knowledge in multiple ways, solve problems, revise their own work, and construct knowledge. Students have the opportunity to learn and apply real-world skills. They learn the value of teamwork; the impact and importance of different media, including design issues, media appropriateness, and copyright laws; the challenges of communicating to different audiences; the importance of research, planning, and organization skills; the significance of presentation and speaking skills; and how to accept and provide constructive feedback (Ivers & Barron, 1998, p. 3).

To help focus student-centered learning even more, curriculum-framing questions were introduced in the 2001 edition of the curriculum. When teachers use these questions throughout the unit creation process to reflect on higher-level thinking requirements, they significantly improve the quality of unit design and student projects. "…Such questions render the unit design more coherent and make the student's role more appropriately intellectual. Without asking and pursuing such overarching questions, the student is confronted with a set of disconnected activities, resulting in minimal understanding of important ideas" (Wiggins & McTighe, 1998, p. 27). Although the creation of such questions is often difficult for teachers who are more accustomed to the who-what-when, fact-finding questions, more often than not, through this unit-creation process, they begin to realize what a powerful impact such questions can have in their classroom.

Evaluation Findings

Since its launch in 2000, the Intel Teach to the Future program has now trained more than 300,000 teachers in 24 countries[2] and is expected to train more than 500,000 teachers worldwide by the end of 2002. Evaluation of the U.S. implementation of the program indicates that teachers have consistently positive responses to the training, that they feel significantly more prepared to integrate technology into their teaching after being trained, and that they are bringing much of what they learn from the program back to their classrooms. In this final section of this chapter, we review some of the key findings to date from the evaluation of the program.

The Education Development Center/Center for Children and Technology (EDC/CCT) is the external evaluation partner to the U.S. implementation of Intel Teach to the Future. EDC/CCT has used surveys, observations, interviews, and classroom case studies to examine teachers' responses to the training; the contextual school- and district-level factors that are shaping teachers' ability to act on what they learned in the training; and the influence of the training on how teachers are using technology with their students.

In the United States in-service program,

- 97% of participating teachers reported that the ideas and skills learned from the Intel Teach to the Future program helped them successfully integrate technology into their students' activities.
- 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.
- 99% of teachers who had implemented their lesson plans reported students were "motivated and involved in the lesson."
- 80% reported "student projects showed more in-depth understanding" than other, comparable work.[3]

A separate study, conducted by the Institute of Computer Technology, indicates similarly positive results for the more than 80 college of education faculty who participated in the initial pilot of the Intel Teach to the Future pre-service program:

- 99% of participating faculty agree or strongly agree the Intel Teach to the Future pre-service curriculum is appropriate and relevant to the courses they teach.
- 96% of participating faculty agree or strongly agree the Intel Teach to the Future pre-service curriculum will help their students understand how to integrate technology effectively into their future teaching.[4]

More broadly, the EDC/CCT evaluation has found that if teachers are to follow through on the core ideas embedded in the Intel Teach to the Future training a number of factors need to be in place, many of which are often not fully established in school districts. Specifically:

> Teachers are best prepared to translate their experience with this training into concrete changes in their classroom practices 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. (Culp, Shankar, Gersick, and Pedersen, 2001)

[2] As of January, 2002
[3] Evaluation data from 2000-2001 Intel Teach to the Future participants
[4] Evaluation data from 2001 Intel Teach to the Future pre-service faculty members

The pace, intensity and focus of the Intel Teach to the Future training have challenged existing expectations for technology use in many districts. On-going evaluation research is indicating that some of these conditions, particularly technology access and support for technology-focused innovation and experimentation in the classroom, are improving in districts where large numbers of teachers are receiving this training. This suggests that Intel Teach to the Future is not only succeeding in exposing a large number of teachers to new ideas about how to use technology in instructionally meaningful ways, but is spurring school districts to make the changes that are necessary in order for teachers to act upon what they learn in these trainings (Martin, Culp, Gersick, and Nudell, forthcoming).

Finally, comments from Master Teachers, teacher participants, and pre-service faculty reinforce the message of this program's positive impact.

> "*The Intel Teach to the Future training was the best I've had in 30 years of teaching – professional, engaging, grounded in the curriculum, and energizing*." – Master Teacher and Director of Gifted & Talented Education, California
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> "*The Intel program had more direct impact on instruction in our district than any course I have been involved with in the past 23 years*." – Master Teacher and High School Science and Computer Science Teacher, Colorado
>
> "*The Intel Teach to the Future program marries student-centered curriculum development with digital learning resources. Students learn how to think and interact with technology that shapes new approaches, invites new thinking, and offers new communication avenues. These are life-long learning strategies that students need in the 21st Century. It really is teaching to the future*." – Senior Trainer, Master Teacher, and 7th Grade Teacher, California
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> "*The Intel Teach to the Future program has given me a new concept of teaching and learning. It reinforces the idea that all children will learn given the opportunity to explore in their own way.*" – Participant, District of Columbia
>
> "*Creating actual products was most effective. It forced to see the 'assignments' through the eyes of my pre-service teachers and their future students. Also, I now have my own models to use when I teach and can talk about the challenges I experienced while creating them*." - Pre-Service Instructor, Texas
>
> "*I thoroughly enjoyed the opportunity to work with other professionals in a setting that allowed us to refreshen our skills in implementing solid technology-connected activities in a unit plan. The information has been tremendously useful. I know I will be able to implement most facets of the program in my work*." - Pre-Service Instructor, Louisiana

How to get Involved

The Intel Teach to the Future program is available throughout the United States. If you are interested in becoming involved in the Intel Teach to the Future program as an LEA, Master Teacher, or participant, information is available at http://www.intel.com/education/teach. If you are interested in participating in the Intel Teach to the Future pre-service program, visit http://www.intel.com/education/teach/preservice.htm.

Intel Teach to the Future is part of the Intel Innovation in Education initiative, a global, multi-

million dollar effort to help realize the possibilities of technology in science and math education.

Intel develops and supports programs that help meet the needs of students and communities

worldwide by improving science and math education; increasing the effective use of technology in classrooms; and broadening access to technology and technical careers. For more information, visit http://www.intel.com/education

References

Culp, K. M., Shankar, S., Gersick, A., & Pederson, S. (2001, December). *Key findings from year one of the EDC/CCT evaluation of Intel® Teach to the Future*. New York: Education Development Center, Center for Children & Technology.

Culp, K.M., Martin, W., Gersick, A>, Nudell, H., & Pederson, S. (forthcoming). Key findings from year two of the EDC/CCT evaluation of *Intel® Teach to the Future*. New York: Education Development Center, Center for Children & Technology.

DeCoker, G. (2000, May). Keeping teaching fresh: Heads-up technology [electronic version]. *Educational Leadership, 57*. Online: http://www.ascd.org/otb/el/2000/may/decoker.html

Institute of Computer Technology. http://www.ict.org

Ivers, K. S., & Barron, A. E. (1998). *Multimedia projects in education: Designing, producing, and assessing*. Englewood, CO: Libraries Unlimited.

Jackson, R. (1999, March). Just in time: Web delivered professional development. *T.H.E. Journal*. Online: http://www.thejournal.com/magazine/vault/A2102.cfm

National Center for Educational Statistics (NCES). (2000, September). *Teachers' Tools for the 21st Century: A Report on Teachers' Use of Technology* [electronic version]. (NCES Publication No. 2000–102). Washington, DC: U.S. Department of Education. Online: http://nces.ed.gov/pubs2000/2000102.pdf

The National Education Goals Panel. (1999). *Goal 3: Student achievement and citizenship.* Online: http://www.negp.gov/page3-1.htm

West, P. (1990, May 9). Teachers' computer skills self-taught, not a result of training, survey finds. *Education Week*. Online: http://www.edweek.org/ew/ewstory.cfm?slug=09390010.h09&

Wiggins, G., & McTighe, J. (1998). *Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.

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