

Intel Teach to the Future: An international perspective on a technology professional development program

Since March 2003, [the evaluation coordination team] has helped guide and coordinate evaluations being conducted in thirty countries taking part in the Intel Teach to the Future program, an intensive, technology professional development experience. The goals for this international evaluation project are to:

- Support the individual programs in establishing evaluations of Intel Teach to the Future in their countries;
- Collect standardized survey data across countries;
- Synthesize data across countries so that the international program staff can better understand how the program is working around the world.

This paper presents data from twenty of these countries from four sources—an Impact Survey, administered 6 months to a year after teachers participate in the training; the country-specific reports submitted by individual programs; conversations with program staff and evaluators worldwide; information gathered from site visits; and findings from evaluations of the U.S. Intel Teach to the Future program. This paper is structured to present the following:

- Data from Impact Surveys administered in ten of the participating countries: Italy, Russia, Taiwan, South Korea, Japan, India, Pakistan, China, Brazil, and the U.S. (It is likely that more countries will submit their Impact Survey data by April, and these data will be included in the paper.)
- Themes derived from analysis of the evaluation reports submitted to the evaluation coordination team from some of the above countries (Russia, India, Pakistan, Brazil, the U.S.) and additional countries (South Africa, Australia, U.K., Ireland, Chile, Thailand, Germany, Costa Rica, Jordan, and the Philippines, and Israel); site visits in five countries; and interviews with education managers and evaluators. The paper also presents programmatic and evaluation recommendations that address these themes.

The preliminary results from the Impact Survey suggest that Intel Teach to the Future has an impact on the teaching practice of participants. Not only did a large percentage of teachers report implementing a new technology-integrated lesson or activity since their participation in the program, but many also report experimenting with the project-based teaching strategies promoted in the training. These preliminary findings also suggest strong relationships between 1) access to technical resources and rates of implementation, and 2) teachers' perception of the relevance of the project-based teaching strategies presented in the training and rates of implementation. Some key findings from the Impact Survey administered in ten countries include:

- A majority of teachers report implementing a new technology-integrated lesson or activity since the training.

- Teachers who did not have access to computer labs were more likely to report not having implemented than those who had access.
- Teachers who had classroom computers were more likely to implement technology-integrated lessons than those who did not, and the more classroom computers teachers had, the more often they implemented.
- The challenges to implementation most commonly cited by both teachers who implemented and teachers who did not were those related to lack of access to technology and lack of time. Among those who had not implemented, lack of administrative and technical support were cited frequently as obstacles, while those who had implemented did not cite these as frequently.
- Teachers who felt that the teaching strategies presented in the training were relevant to their teaching goals were more likely to implement technology-integrated lessons than those who did not.
- Nearly all teachers who implemented a technology-integrated lesson reported that their students were motivated and actively engaged in the lesson.
- A majority of teachers reported presenting lessons to students using technology, conducting research on the Internet, and accessing Internet resources for lesson planning *more frequently* since the training.

The evaluation reports and the data collected through site visits were analyzed using a theoretical framework that addressed the factors typically facilitate or impede the implementation of technology-based applications in K-12 educational environments (Mandinach & Cline, 1994). These factors proved to be pervasive across a broad range of applications, innovations, and programs. The processes by which Intel Teach to the Future is being implemented, and the obstacles and opportunities associated with them, is examined through the framework of these factors.

Infrastructure. Technology-based programs, such as Intel Teach to the Future, cannot be implemented without the necessary technological infrastructure. There are two interrelated components to infrastructure. First there is the need to have enough *hardware and software* to meet the pedagogical objectives of the schools. More often than not, schools must make do with less than optimal numbers of computers or with setups that do not correspond to the school's stated curricular goals. Nevertheless, there must be a minimal level of computer access. Some schools prefer to cluster computers in a laboratory while others prefer to distribute the computers across individual classrooms. There is no single right or wrong model, only what matches the specific needs of the school and its instructional goals and that provides the best possible physical access to the hardware. The second infrastructure issue is *connectivity* or access to the Internet. Programs such as Intel Teach to the Future require connectivity. The principles that underlie the program and the project-based learning it seeks to support necessitate Internet access. Without access, Intel Teach to the Future will have limited impact. There are varied levels of quality and reliability of access to the Internet that teachers may have. However, the type of robust, high-speed access familiar to professionals working in office settings is still rare in classrooms. For example, teachers who nominally have Internet access may have to share a single phone line with the building administrator. This level of access is not adequate for their instructional needs.

Professional development. Intel Teach to the Future addresses teacher professional development through the introduction of technology-based applications to support project-based learning. The implementation of technology requires that teachers at both pre-service and in-service levels acquire new technical knowledge and skills, as well as reflect on and adapt their instructional practices. Effective technology professional development must help teachers identify and meet specific educational needs, and should be ongoing rather than generic and short-term. One-shot training frequently leaves teachers frustrated because it does not provide them with the chance to think through, explore, and reinforce the concepts being covered. Equally important in professional development is for training to address the paradigm shifts and pedagogical changes often associated with the use of many technology-based applications. In Intel Teach to the Future, as in some other high-quality professional development programs, the pedagogical emphasis is on constructivism and the creation of active, student-centered learning environments. Training must prepare teachers to deal with the fundamental philosophical and practical changes that emerge when shifting from the “sage on the stage” or the imparter of facts and information to the “guide on the side” or facilitator/coach in which teachers assist students to actively construct knowledge and engage in learning processes.

As Papert (1997) and Salomon & Almog (1998) have noted, the more creative and broad-based the particular application, the greater potential for paradigm shifts and discernable outcomes. However, the greater the paradigm shift, the more difficult the implementation and transition from previous instructional methods. By contrast, though more easily integrated applications often show less dramatic impact, they often get implemented more broadly. Salomon & Almog (1998) state:

The more a technology, and its usages, fits the prevailing educational philosophy and its pedagogical application, the more it is welcome and embraced, but the less of an effect it has (p. 224).

Intel Teach to the Future’s strength lies in its broad applicability. From our perspective, the program does not take direct aim at paradigm shifts in practice, but rather finds appropriate niches in the curriculum to introduce project-based learning and technology-based instructional activities.

Administrative support. The implementation of any new professional development program, not just one involving technology, requires a certain level of buy-in from various levels of administration. Principals or headmasters can either facilitate or impede program implementation. It is always optimal to have not only approval, but also the active support and engagement of the administrator in any program that seeks to cause real change in teachers’ practices. Lack of support from administrators is nearly always problematic. In some instances, however, innovative programs can be effective despite a lack of administrative support. A grass roots or bottom-up model led by the teachers can succeed under certain circumstances, even when there is no support from the administration, but only if teachers have significant flexibility in implementing the curriculum, and can easily access technology on their own. However, the significance of administrative support in technology implementation is closely tied to the political and cultural realities of the particular educational system. In countries, states/provinces,

regions, educational systems, and schools that have more tightly hierarchical structures, administrative support may be the key factor in determining whether technology can become a part of the teaching and learning process. In areas with a more decentralized educational system, where teachers have greater control over what they do with their students, administrative support may not be as crucial.

Time. Teachers need time to be trained, acquire necessary knowledge and skills, assimilate new concepts, and practice with new technology. They must have sufficient time and resources to develop new curricula and instructional strategies, and integrate them into classroom practice. Such integration and implementation requires patience, skills, and the ability to perceive cues about what works effectively or does not and then use such feedback to further improve pedagogical practices.

Taken together, the preceding factors—infrastructure, professional development, administrative commitment, and time—form an interacting set of variables that play a significant role in determining whether technology can become a significant learning tool in complex systems called schools. Intel Teach to the Future directly addresses one factor: professional development. The governments and educational systems in the participating countries are primarily responsible for addressing the other three factors: infrastructure, administrative support and time. Regardless of where responsibility lies, the evaluations of Intel Teach to the Future explore how all four factors influence the effectiveness of the program.

References

Mandinach, E. B. & Cline, H. F. (1994). *Classroom Dynamics*. Hillsdale, NJ: Laurence Erlbaum Associates.

Papert, S. (1997). Computer criticism vs. technocentric thinking. *Educational Researcher*, 16(1), 22-30.

Salomon, G., & Almog, T. (1998). Educational psychology and technology: A matter of reciprocal relations. *Teachers College Record*, 100 (1), 222-241.