About ITEST

The Information Technology Experiences for Students and Teachers (ITEST) program was established by the National Science Foundation in direct response to the concern about shortages of IT workers in the United States. The ITEST program funds projects that provide opportunities for both school-age children and teachers to build the skills and knowledge needed to advance their study and to enable them to function and contribute in a technologically rich society. The ITEST program also funds a National Learning Resource Center to support, synthesize, and disseminate the program's learnings to a wider audience.

In This Issue

Equity in On-line Professional Development:

A Guide to E-Learning that Works for Everyone

Introduction

*E*quity in education refers not only to equal access or equal treatment, but to education that addresses the differing needs of different populations and that produces equitable outcomes, regardless of gender, race, ethnicity, disability, and class. While numerous literature articles and assessment instruments refer to the degree of equity found in face-to-face instruction, on-line professional development is a newly burgeoning phenomenon. Equity within this context remains only vaguely defined.

The Gender, Diversities & Technology Institute at Education Development Center, Inc., recently completed a three-year project, funded by the National Science Foundation, titled Gender Equity in Mathematics and Science (GEMS): Learning On-line©. In this Brief, we share a summary of the research results of the GEMS project. To explore the roles that gender and diversity play in on-line learning, the project used the design, participation in, and facilitation of an on-line course titled Engaging Middle School Girls in Math and Science. The research included on-line surveys, interviews, site visits, and discourse analysis.

Questions

1 What is the role of on-line learning in teacher professional development?

On-line professional development opportunities have become ubiquitous. But is distance learning the right way to present your material? When deciding whether to use an Internet-based professional development course, it is important to determine whether the Internet is the appropriate choice of delivery system, not merely the popular choice. Advocates of on-line courses tout the prospect of "anytime, anywhere" learning; opponents bemoan the lack of face-to-face meetings for participants and instructors. Each of these poles is an extreme compared to teachers' realities.

After all, "anytime" does not guarantee that a course fits in a teacher's already busy schedule, and "anywhere" must be a place with a reliable Internet connection. On the other hand, reducing direct contact does not necessarily mean participants lack opportunity for interaction; some successful professional development programs combine on-line discussions with one or more scheduled face-to-face meetings.

As a delivery system, the Internet offers alternatives to several of the longstanding difficulties that come with traditional professional development for educators. For example, via the Internet, teachers can deepen and contextualize their knowledge of a topic over a long period of time, geographically distant teachers can collaborate with colleagues who would otherwise be too remote, and consistent content can be delivered cost-effectively to large numbers of people. In addition to the advantages, however, going on-line raises new challenges.

The effectiveness of any professional development hinges on equity in several aspects. Potential participants must have access to the professional development. The design of an offering must take into account differences in learning style, and the possibility of varying cultural norms among participants. Good professional development must also prepare teachers to apply their new knowledge in ways that support diverse student populations.

On-line professional development has the potential to increase participant access (e.g., for rural teachers) and accommodate multiple learning styles through creative computer interfaces and multimedia. Moving professional development on-line, however, may limit access for others. Whether an on-line course can relate its content to successfully teaching diverse students is dependent on the course developers. Course developers and consumers must be aware that a well-designed, equitable, on-line course requires attention to all its components, from platform selection to recruitment to pedagogy and facilitation.

Supporting Reference Materials:

- Loucks-Horsley, S.; Love, N.; Stiles, K.; Mundry, S.; & Hewson, P. (2003). *Designing professional development for teachers of science and mathematics* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Resources:

- International Society for Technology in Education (2002). Successful on-line professional development. *Learning & Leading with Technology, 30*(1). Available on-line at http://www.edtechleaders.org/Resources/articles/SuccessfulOPD.pdf.

- National Staff Development Council & National Institute for Community Innovations (2001). *E-Learning for educators: Implementing the standards for staff development.* Available on-line at http://www.nsdc.org/library/authors/e-learning.pdf.

Spotlight on: New Mexico Adventures in Modeling

ITEST Project Location: Greater Santa Fe area, New Mexico
http://education.mit.edu/pda and http://education.mit.edu/aim

New Mexico Adventures in Modeling trains middle and high school teachers to integrate computer modeling into their curricula using StarLogo and Palm Participatory Simulation software. Amongst other equity issues, two important ones that have arisen are access to technology and teachers' risk-taking behavior. In the first case, despite a rich professional development structure and very adaptable modeling applications, some participants in the public schools found it difficult to coordinate and implement program activities due to reasons beyond their control, i.e., antiquated equipment that was often located in a centralized computer lab and lack of technology support. In the second case, at the beginning of the year, some teachers voiced concerns about how these new technologies might add to classroom management difficulties and were initially reluctant to try them with their classes. Our challenge was to make program activities adaptive to these situations. From several data sources, we compiled a list of affordances and barriers to implementation and created resources that might, for example, serve to raise their comfort levels. A sample of one of these PD resources can be found at http://education.mit.edu/~nordruje.

—Susan Yoon, Ph.D., Project Coordinator

Resource Used:

Open-source bulletin board program from PNphpBB Group available on-line at http://www.phpbb.com.

❷ What are the equity implications of on-line professional development components?

Equity issues are pervasive, affecting all stages of an on-line professional development offering.

Recruitment and enrollment

Data shows that women, people of color, persons with disabilities, and those from lower socioeconomic groups are less likely to have access to computers or to be as computer literate as males, Caucasians, able-bodied persons, and those from higher socioeconomic groups. This inequity in access is called the "digital divide." As long as the divide persists, persons developing and sponsoring on-line professional development activities must be especially alert to issues of diversity in recruitment and enrollment. It is critical that they understand who their target audience is, what diversity exists within that audience, and what must be done to recruit participants.

Language and participation patterns

Language exerts a powerful influence on the on-line learning environment. Conflicting communication styles, flaming (messages using hostile and/or demeaning language), and ineffective or inappropriate attempts at humor, are three examples of how language may keep participants from experiencing an on-line course equitably. Further, research indicates that men and women tend to exhibit the same gendered language patterns on-line as they do in face-to-face communication. For example, men's language tends to be characterized by strong assertions and challenges to others. In contrast, women's language tends to be more tentative—to include apologies, justifications, and questions. Cultural differences in language also play a role. Certain culturally based terms and perceptions about the level of "correctness" of grammar, spelling, and punctuation can attract or repel users.

Learning context

Learning is very much determined by the contexts in which it takes place. These contexts are established by the constellation of learner characteristics, the medium, and the task. Some examples of learner characteristics include prior learning, learning style, and motivation to learn. Some characteristics of the medium include communicating in writing (usually asynchronous) rather than face-to-face through speaking (synchronous), real or perceived anonymity, and availability of the medium. Characteristics of the task include the subject matter, the structure of the course, and the instructional design and pedagogy used. All of these factors create a learning context that may affect persons differently depending on their race, gender, ethnicity, or disability. Thus, an equitable course must take into account the characteristics of the learner, the medium, and the task, as well as the way these groups of characteristics affect the learner.

Facilitating issues of equity on-line

Traditionally, frank discussions of gender, race, ethnicity, disability, and social class have been difficult, especially in a mixed setting. Since many of the traditional social cues are absent on-line, communication about these issues may be even more difficult. That is not to say, however, that discussion of gender, race, ethnicity, disability, and class should be avoided or that on-line professional development on these topics is inappropriate. The facilitator is responsible for helping participants explore a topic while maintaining a safe and respectful learning environment.

Platform design, course design, and adaptive technology

Course platforms or delivery systems may be structured in ways that negatively affect equity. For example, data collected on usage may not be broken out by gender, race, ethnicity, or disability, thereby making analysis difficult. The course platform may contain graphic images that are neither respectful nor inclusive of users. In addition, the course information may be presented primarily in text with few charts, diagrams, or other forms of conveying information that are helpful to people with different learning styles or levels of experience with on-line learning. Further, on-line courses may require persons with disabilities to adapt their hardware to achieve access. These factors all point to the need for instructional designers and educators to work together to achieve Web-based instructional tools that meet the needs of all users.

Supporting Reference Materials:

- Kinner, J., & Coombs, N. (1995). Computer access for students with special needs. In Z.K. Berge and M.P. Collins (Eds.), *Computer mediated communication and the on-line classroom, Volume One: Overview and perspectives* (pp. 53–68). Cresskill, NJ: Hampton Press..

- Pinkard, N., & Marra, T. (In preparation). *Examining gender and technology: A formative study of students' computer interests, self-image, and software preferences.*

3 What are the equity criteria for these components?

The equity criteria outlined below are samples of considerations from the GEMS research report. For access to the full report, please see the Additional Resources section.

Criteria for equitable recruitment and enrollment

The target audience for an on-line professional development activity is diverse in terms of gender, race, ethnicity, disability, and class. On-line course enrollees should be representative of the larger population from which the course is drawing.

Recruiting methods yield the diversity desired. If people in the target audience have had little experience with on-line courses or limited access to technology, it may inadvertently restrict enrollment if the course recruits exclusively through the Internet. It may be necessary to reach users through other means, such as by working with organizations that represent women, people of color, or persons with disabilities.

Recruiting materials appeal to the target audience regardless of gender, race, ethnicity, disability, and class. Materials, for example, Web sites or brochures, are designed to appeal to a diverse group, and are free of bias or stereotyping (e.g., pictures reflect racial and ethnic diversity).

The interests and concerns of women, minorities, and persons with disabilities are addressed. Prospective participants are more likely to sign up for a professional development activity if they see that it is relevant to their circumstances.

Criteria for equitable language and participation patterns

The language of those enrolled in the on-line professional development activity is such that all feel comfortable and supported in their learning. People will not risk learning if they do not feel safe. Language and language patterns that hinder communication detract from the learning.

Men and women, people of color, and persons with disabilities participate in the discussion in approximately the same proportion as their representation in the course. For example, if the number of men and women in an on-line course is about equal, the postings in discussion forums or chat rooms should be about equal. This is an indication that everyone has equal opportunity to participate in what they perceive as a safe environment.

All on-line text and discourse is free of exclusionary, sexist, racist, and inflammatory language. This guideline covers discussion boards, chat rooms, electronic discussion lists, e-mails, and any other channel for exchanging information on-line.

Criteria for ensuring an equitable context for learning

The course itself and the facilitator communicate high expectations for all participants. Expectations are not influenced by participants' gender, race, ethnicity, physical disability, or social class.

The professional development activity is designed to challenge all participants. The increased demands on educators for accountability and higher student achievement for all students require high quality, job-embedded, challenging professional development.

Spotlight on: Eyes in the Sky

ITEST Project Location: Tempe and Tucson, Arizona

http://eyesinthesky.terc.edu/

Eyes in the Sky combines a 12-week distance learning course, a face-to-face Summer Institute (with students), and a mentoring electronic mailing list, into one geospatial, information technologies professional development program that enables teachers to implement community-based research projects in their classrooms. The Principal Investigators all have extensive experience developing and facilitating online courses and teleconferences.

Online-learning was a natural choice for this project as so much of the data that teachers and students want to analyze with geospatial information technologies can be obtained via the Internet. Our distance-learning course didn't include any fancy videoconferencing software, and we didn't meet face-to-face before the course. Everyone was treated equally and expected to achieve the course goals. When the participants finally met us and each other at the summer workshop, we knew one another only from our discussion comments, and it wasn't easy to guess who everyone was in person.

We reached our target audience by recruiting teachers and students from schools that serve mostly minority populations. 60 students, roughly half girls and half boys, attended our Summer Institute. Though the males were initially more enthusiastic about the outdoor activity using GPS units, staff and teachers coached all the students through the course so everyone gained new skills. Evaluation data from students indicated that both girls and boys felt they had successfully learned to use geospatial information technologies.

—Carla McAuliffe, Ph.D., Co-Principal Investigator, TERC

Subject matter is examined from a variety of cultural perspectives. Participants should feel comfortable in raising alternative perspectives and having those respected and honored by their peers.

Criteria for facilitating issues of equity on-line

Facilitators model the behavior they want to see in participants. These include, for example, deep exploration of the issues, inclusive discussion and interactions, applications to the job, and openness and sensitivity to what are commonly perceived as difficult issues.

The content of the equity issues is accurate and comprehensive. Complex issues should be fully explored and different areas of equity (race, gender, ethnicity, disability, and social class) should be dealt with as necessary.

The equity issues are presented in a context that is relevant and practical to participants. Participants will be more inclined to delve into equity issues if they see the relationship between the issues and their jobs. How can this information help them be more effective in their jobs?

Participants and facilitator freely raise issues of gender, race, ethnicity, disability, and social class as relevant to the topics at hand. Everyone is free to raise issues related to gender, race, ethnicity, disability, and social class without fear of negative response from their peers.

Criteria for ensuring equity in the course platform, course design, and adaptive technology

The platform and course design are friendly to new users and persons with disabilities. The courseware and course design are easy to access and use. Ease in navigation is critical for users with motor and cognitive disabilities.

The platform provides data that can be broken out by gender, race, ethnicity, and disability. Having these numbers by gender, race, ethnicity, and disability (assuming participants have disclosed such data), enables facilitators and researchers to monitor rates and types of participation, dropouts, and other important data.

Graphic representations used in the platform and in the course itself include images of diverse peoples. Visual portrayals of people reflect diversity in terms of gender, race, ethnicity, and disability. Inanimate objects portrayed reflect the cultures and experiences of a diverse audience.

Resources:

- Specific guidelines for ensuring that Web content is accessible to people with disabilities are available from the *World Wide Web Consortium* on-line at http://www.w3c.org and from the *Center for Applied Special Technology* on-line at http://www.cast.org.

4 How can different stakeholders ensure equity in the creation and delivery of on-line professional development?

The guidelines outlined below are samples of considerations from the GEMS research report. For access to the full report, please see the **Additional Resources** section.

General guidelines for course platform developers

Ensure that the platform and course structure are free of bias and stereotypes; that issues related to gender, race, ethnicity, disability, and social class are accurately portrayed; that the graphics include tasteful images of diverse peoples; and that the language used is inclusive, nonsexist, nonracist, and noninflammatory.

Other suggestions:

- *Design a delivery system and course structures that are user-friendly.* Platforms or programs that are complicated to use will negatively affect users, especially new users and persons with cognitive disabilities, and may cause them to drop out.

- *Specify the minimum hardware and software requirements in recruiting materials.* Before participants sign up for e-learning, they should know what they will need to access the site. Suggest alternatives for individuals who do not have the minimum requirements.

- *Provide a tutorial before the professional development program.* Walk participants through the steps for accessing the site. A tutorial increases the likelihood that everyone will get on board quickly and at approximately the same level.

General guidelines for course developers

Identify, know, and design for the target audience. A course is more likely to be appropriate for, and attractive to, the designated audience if course developers keep the users' vantage points in mind from the onset of the design process. As far as possible, involve potential users in the design process.

Other suggestions:

- *Make decisions regarding the technical requirements of the course in light of what potential users are most likely to have available.* When determining the "floor" and the "ceiling" of a course's bandwidth, keep in mind the type of equipment the target audience is most likely to have available.

- *Provide a source for technical assistance at a range of levels with maximum availability.* Be prepared to help participants download a file, access a hyperlink, or fill out a registration form. Make sure this assistance is offered at a variety of times for maximum accessibility.

- *Pay close attention to the context of learning in developing the course or other on-line professional development.* Provide opportunities for all to explore the subject matter from different

cultural perspectives. Build on participants' prior knowledge and use a variety of instructional and assessment vehicles and strategies.

- *Make sure that the level of anonymity afforded by the course is a conscious design decision.* Anonymity is so important that it cannot be left to chance. Does it matter if participants assume an alternate identity, or should they present themselves as they are? Make such decisions with the goal of supporting the learning of participants, taking into account characteristics of the participants, the medium, and the task.

- *Make trust-building an underpinning of the course.* Consciously incorporate activities into the course to build trust. Gear the instruction to the level of trust that is likely to exist at any point in the course. Schedule less threatening activities to occur earlier in the course; more intense activities to take place later.

General guidelines for facilitators

From the outset, the facilitator should establish an environment that enables participants to be safe and secure. For example, include a ground rule about the right to ask questions and provide examples for how to respond in a respectful way. Establish appropriate guidelines regarding language and participation. For example, are abbreviations, acronyms, slang, and emoticons acceptable or not? How often are participants expected to post, and what kind of postings are expected?

Other suggestions:

- *Review the language used on discussion boards, and in chat rooms, e-mails, or other vehicles for communication to see if it is exclusionary, sexist, racist, or inflammatory.* Make it clear to the

participants that offensive language will not be tolerated.

- *Monitor the participation rates and make appropriate interventions if the participation of women or men, people of color, or persons with disabilities falls below their representation in the total group.* Once the contributing factor(s) to under-participation are clear, the facilitator can address the issue with the group or privately with the individuals involved.

- *Monitor the level of anonymity to determine if it is negatively affecting either individuals or one or more groups of participants.* The effects of anonymity are difficult to predict. Sometimes anonymity provides a climate that encourages hostile behavior or bigoted opinions. Other times, it allows people to express more of their true thoughts and feelings.

- *Intervene, as necessary, to keep the discussion on track.* Intervene if participants contribute inaccurate information, become disrespectful of each other, or engage in flaming. Modeling effective conflict resolution strategies can provide a learning experience for all of the participants.

Additional Resources

- *Equity in On-line Professional Development.* Provides comprehensive guidelines for effective and equitable course design, facilitation, and interactions. Published by the Gender, Diversities & Technology Institute, EDC, 2004. Available on-line at http://www2.edc.org/gdi/publications_SR/equity6_04_FULLBOOK.pdf.

- *Making the most of on-line learning.* Offers clear step-by-step guidance for anyone considering an on-line course. Published by the Gender, Diversities & Technology Institute, EDC, 2004. Available on-line at http://www2.edc.org/gdi/publications_SR/making_FULLBOOK.pdf.

- *Center for Applied Special Technology (CAST).* CAST conducts research into ways of using technology to make education more accessible to all, particularly to those with disabilities. Available on-line at http://www.cast.org.

- *Center for On-line Professional Education (COPE),* COPE is an EDC center that researches effective on-line learning practices. Available on-line at http://www2.edc.org/COPE/.

- *Course platforms:*
  Blackboard: http://www.blackboard.com/
  Caddie.net: http://iesl.mit.edu/web/default.aspx
  HTMLeZ: http://learn.aero.und.edu/pages.asp?PageID=21000
  WebCT: http://www.webct.com/index.html

Blackboard, Caddie.net, HTMLeZ, and WebCT are all platforms designed to host on-line courses, and vary with respect to price, technical support, and customizability.