Educational Technology in the Service of GLOBAL LEARNERS

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Introduction: The Applications

One can say that people learn from before they are born until the end of their lives. The scope of the fifty-one applications that we received in the Education category were, indeed, as broad as the learning we experience throughout our lives. Technology was a vital part of each, but the applications spanned everything from a highly innovative imaging technology just emerging from an engineering lab that revealed secrets about ancient artifacts, to a single teacher's efforts to connect parents and teachers in a single school's Web site. Projects also were reported from around the globe: eleven (about 22%) were from countries other than the U.S. (covering six continents) and fifteen (about 30%) had significant applications in other countries, most among populations where technology rarely serves to educate and inform. In short, we had a spectrum of technical applications that served learners from the very young to the elderly on a global basis.

The educational technologies applications for awards fell into four broad categories: hardware, content, productions, and services.

Hardware applicants ranged from computing devices (laptop, hand-held, and pen-based computers) to wireless links for schools, to battery-less radios, to technologies for people with disabilities. Some hardware applications made computing available to people through village kiosks or computers in the home. Other applications focused on providing the delivery of distance education, while others developed tools to aid research.

Content applications included programs that developed content for teaching literacy, art history, business education, and other courseware, even developing virtual schools. Some content developers provided information about schools or aggregated school subject-content in a kids-safe environment. Other nominations highlighted book publishers and the development of digital books. Finally, a number of nominees used technology to promote multicultural exchanges among school-aged children.

A number of applications focused on production: the use of radio for health education, the promotion of video production by indigenous peoples, or the use of multimedia in local communities.

Finally, applicants addressed a whole range of service applications. Some looked to volunteer management or to the use of technology in managing and teaching emergency services or managing technology forecasting. Other groups promoted ways of placing technology in classrooms or bringing classrooms to technology through programs similar to those of The Tech Museum. Still other service applicants used technology in a number of service-learning programs, where students used technologies in service to their local communities.

Each of the applicants highlighted a particular innovative use of technology in education. The very range of applications proves highly informative since it indicates the vitality of technology for educational purposes. As teachers, educators, administrators, commercial providers, and students appropriate various technologies, their imaginations will lead them to explore yet other uses for technology. In the current set of applications, the committee saw some recurrent themes: making technology available, using technologies to link people by fostering communication, using technologies to manage complex situations, using technologies to help people express themselves, and using technologies to develop student enthusiasm for learning.

The Selection Process

Each application included a description of the technology application and the problem that it addressed. In addition, applicants presented evidence of the breakthrough nature of the technology and of the contribution made by the technology to significantly improve the human condition. Finally, applicants described both the possibility of replication of the technology and any unintended consequences of the technology.

The committee judged each application on seven criteria: the identification of a serious problem, the description of the technology application, the explanation of the breakthrough nature of the technology, evidence of a contribution, the presentation of measurable results, the description of potential negative or unintended consequences, and the potential for replicating the technology in other places or contexts. Committee members paid particular attention to the novelty, significance, impact, and replicability of each nominated project, asking how it added value to the learning process.

Educational Technology Finalists

Freeplay Foundation

One of the finalists was not recognized for a new technology at all but for an innovative adaptation of the old technology of radio. What made the entry from the Freeplay Foundation (established in 1998, http://www.freeplayfoundation.org/) attractive was the development by their parent organization, The Freeplay Energy Group, of a wind-up crank or solar powered radio that obviates the need for batteries or access to an electric power grid. This may seem trivial to those of us who have resources and availability of electricity, but to hundreds of millions of the world's poorest people, the constant need to purchase batteries often means being cut off from important information and educational messages. Since the 1960's when battery powered portable radios revolutionized the access of billions to broadcast messages for education and development, radio has been a catalyst for change (Jamison and McAnany, 1978). But batteries have been a critical and expensive component. Now with sixty turns of the crank, someone can listen to forty-five minutes of playing time on his or her radio. Freeplay radios have been manufactured in a rugged and simple format that is not commercialized like their other models but are provided to partner groups that have used them in a wide variety of applications throughout Africa over the past three years.

This technology has been used to help hundreds of thousands of orphans in Rwanda to link to vital radio messages to aid their survival. It has been deployed in community schools in Zambia. It helped 7000 refugees in Mozambique after a flood ravaged the country in 2000. And the technology is in use in Niger to reach poor farmers with agricultural and health information. Plans are being made for expanding the Niger project to five other poor African countries as well. Clearly the project meets important criteria for technology benefiting people. It represents a technological breakthrough; it addresses some basic educational and information needs for hundreds of thousands of Africans; it has demonstrated impacts; and it has been replicated.

There were, in addition to this project, a number of other international applications that share many of the features of Freeplay, including widespread use outside of the United States. For example, one project wired Croatian schools for Internet connection in a country ravaged by civil wars and military intervention. A project in Israel teamed tech savvy youngsters with elders who could tell their life stories to help preserve their traditions on the Web. A school system in New Zealand provided computers for poor schools for two important ethnic groups in their country. Another taught a math/science curriculum on the computer to teachers in Eritrea in East Africa. And there was a project to link schools and isolated communities in Uruguay to promote ecological education and community involvement.

Kids' Space

There were several entries from organizations that focused on Internet use by children in education contexts. A standout among them was Kids' Space (http://www.Kids-Space.org/), a non-profit organization launched in 1995 with the mission to create and sustain a safe environment for children using the Internet.

Many sites and projects with similar goals have come and gone during the years that Kids' Space has been in operation. Some have folded because their creators lost interest or moved on to pursue other goals. Other sites tried to become commercial ventures with limited or no success. Yet others may have been absorbed into larger (usually commercial) sites and thus lost their uniqueness. Through all the changes going on around them, Kids' Space has been evolving into a richer, adamantly non-commercial place where kids (up to about 16 years of age) can interact with peers from around the world in meaningful ways.

Perhaps the key feature that attracted the committee's attention is the fact that Kids' Space is an edited publishing space for children, unlike other sites where children may be free to post whatever they please with little or no supervision. While there is value in the latter approach, the contribution editors for Kids' Space check every submission for the Web site. This provides a high level of confidence not only in the safety of the postings but also in their quality. This, in addition to the other "tips and hints" offered to participants regarding safe Internet use, goes a long way toward helping children become literate in the ways of the Internet and helps ensure that they have a much more productive and pleasant experience.

Kids' Space motto is "of kids, by kids, for kids." By leveraging the global reach of the Internet into structured activities that make it fun and interesting for children (and their teachers and parents) to get involved, Kids' Space is capable of maintaining the delicate balance between a site that really is by kids and for kids, and one that calls attention to the adult supervision taking place. The Web site's ease of navigation and attractive design reflect the adults' interest in letting the children's work be the center of attention. The committee felt that the sustained effort to honor the children's voices, plus the creativity and care evident in the design, were well worth recognition as a finalist in the education area.

Lewis Center for Educational Research

The Goldstone Apple Valley Radio Telescope puts schoolchildren (grades 1-12) in touch with basic scientific research by allowing them access to a 34-meter radio telescope that they can control via the Internet in order to conduct scientific inquiry, observing the solar system, stars, and other astronomical objects. The project (http://www.avstc.org/gavrt/)is a curriculum-driven educational program operated by a partnership between the Lewis Center for Educational Research (LCER), NASA, Jet Propulsion Laboratory (JPL) and the Apple Valley Unified School District. Therefore, in addition to access to the telescope, it provides curriculum materials, teacher presentations, worksheets, and teacher training.

According to its Web site, the project has the following objectives for students: (1) to promote and raise scientific literacy, (2) to provide an opportunity for educationally meaningful interaction between students in different geographic locations and at varying learning levels; (3) to excite students about learning by providing a learning opportunity that takes them outside the classroom using technology; and (4) to provide an opportunity to collect "real-time" data in a situation where true discovery is possible. Similarly, for the teachers, the project seeks to give curriculum support for science education while providing a distance learning opportunity in an interdisciplinary setting. In addition, the Goldstone Apple Valley Radio Telescope demonstrates a business or industry model of team problem solving.

The radio telescope venture, like several other nominees, brings the tools of professional and rigorous scientific literacy into the classroom. However, by using the Internet, it has a worldwide reach. By designing collaborative programs, it connects the students not only with the science but with other students and teachers. By creating classroom materials, it assists the local teachers and helps them in their own professional development. All science education, including this effort, is costly. Though it keeps costs down by sharing equipment, the Goldstone Apple Valley Radio Telescope must still charge for teacher training sessions and for connection time during the school year. In addition, schools must pay for their Internet connection and local computer terminals.

This project differs from many kinds of distance education by providing tools and curriculum materials but not the teacher. In other words, the local classroom teacher retains responsibility for the class and the instruction and uses the radio telescope as an essential supplement. Since the staff pursues ongoing scientific inquiry, teachers can also participate as team members in planning new curriculum units—noteworthy difference from many distance education enterprises.

Other applicants pursued different models for science education. One, for example, brought scientific equipment and experiments to the classroom. Another set up a technology museum to bring classrooms to the science. Both of these, of necessity, faced the limitations of their geographic locations. As mentioned previously, a number of nominees carried computing technology or Internet access into the classroom.

Project Gutenberg

Project Gutenberg, a cooperative, volunteer-supported effort, makes "famous and important texts" freely available in electronic form. Using the most common electronic format, one readable on virtually every computer, Project Gutenberg has published about 5,000 works in the public domain as electronic texts.

Copyright restrictions limit the texts available to the project, but its overall goal is "to make information, books and other materials available to the general public in forms a vast majority of the computers, programs and people can easily read, use, quote, and search," and to do so at a cost so low that price will not constrain anyone.

Project Gutenberg maintains a Web site (http://promo.net/pg/) and an FTP archive (which is mirrored in a number of locations) so that people can readily obtain texts. It deliberately keeps text formatting simple so that its "least common denominator" principles do not exclude any computer types or operating systems. Depending primarily on volunteer work to digitize texts, it hopes "to provide Public Domain Etext editions a short time after they enter the Public Domain."

This enterprise differs from others nominated in that it provides, but does not originate, educational content, and does so freely and with maximum compatibility. It does not develop educational technology but uses existing technology (beginning in 1971) in innovative ways, easily replicated by others. By keeping to small file sizes, Project Gutenberg makes use of multiple distribution channels, from floppy disk to email to the World Wide Web. As an educational endeavor, Project Gutenberg serves the broader purposes of education by putting people in touch with significant documents, thus encouraging literacy and thinking about texts.

Project Gutenberg fits into the broader category of providing digital information. Several other nominees also pursued this same line: seeking ways to publish digital books, making art available digitally to classrooms, or assembling other educational content for schools.

Schools Online

Schools Online (SOL) is a non-profit organization that has its roots in Silicon Valley, where it was founded in 1996 by serial entrepreneur Kamran Elahian. Its mission from the start has been to provide Internet access to schools in disadvantaged locations, initially within the U.S. but for the last few years almost exclusively elsewhere.

One often hears the term "learning organization" applied in a variety of (mostly loose) ways. Schools Online (http://www.schoolsonline.org/) is an example of an organization that has proven to be adaptable and open to change while remaining true to its mission and values. At the beginning, SOL donated set-top boxes (from WebTV, Sega, and others) because of their ease of use and relatively low cost. Feedback from the initial recipients of these systems helped SOL make the decision to change to full-fledged PC systems (now also digital cameras, scanners, and printers), although the emphasis was still on the hardware per se and not so much on the educational applications of Internet access.

In 1999 significant changes in approach and operations started to take place. With three years of experience in the field, SOL realized that giving the hardware by itself was not enough, and that additional resources and support were needed in order for the recipient schools to derive maximum benefits from the donated equipment. SOL acknowledged it did not have the financial resources to address the need for teacher development and educational applications by itself, so it crafted alliances with I*EARN (International Education and Research Network, also an entrant to this competition) and with World Links for Development (WorLD). Each of these organizations complements what SOL does in meaningful ways. WorLD has developed a methodology to prepare teachers in foreign countries to use technology effectively in their classrooms, and I*EARN provides an international network of K-12 teachers and students already participating in collaborative projects in a wide range of subjects.

SOL's willingness to partner with local organizations has also been a key factor in its successful implementations in 19 other countries so far. By assuming leadership but letting local groups and individuals claim ownership of the projects, SOL fulfills its mission and helps create a culture and practices of meaningful connectivity among its participants. By reaching out to places and peoples who would normally not be reached by telecommunications and the Internet, SOL's "Internet Learning Centers" are effectively bringing hope to people who otherwise have every reason to be hopeless.

Summary of the Applications: Lessons Learned

The challenge for educational applications of technology in poor countries or marginalized groups in wealthy ones is twofold: first, how to provide access to technologies and sustain that access with technical support; and, second, to provide content or services that are of genuine relevance for learners. Many successful projects with international funding have been able to provide access for learners through partnerships with local or national agencies who provide a local presence and help in the distribution or maintenance of the technology. The Freeplay Foundation, for instance, works closely with United Nations or bilateral development agencies to make their technology available to local needs, with content developed by locals. Schools Online has begun working closely with partners who see that the variety of school technologies are distributed and teachers are trained ap-

propriately. An interesting Peruvian project develops radio content for health education for a region of Peru and works with local broadcasters to get their messages distributed. In short, the technology can only serve people if it can reach learners in a reliable fashion and respond to their real needs. For this, local partners are often what makes the difference if the technology comes from outside.

Another challenge, from an international perspective, is language. For better or worse, English remains the dominant language of much new technology. In Eritrea, for example, where an innovative, computer-based math and science curriculum has been imported to train teachers, the fact that the local language is not English and that primary schools are taught in six different local languages makes its success problematic. Only one applicant of the fifteen that worked internationally mentioned the issue of language, and it admitted that its attempt to breach the English language barrier for international participants was only partially successful. The longer-term solution is obviously not to enforce English as a world educational language. Rather projects need to develop local content in local languages or to translate English language content into those languages.

While both language and infrastructure describe issues of access, the applicants also encountered the challenges of unintended consequences. In varying degrees almost every applicant struggled with local involvement. Educational technology, particularly in its distance education guise, risks becoming "the expert from out of town" who displaces local enterprise or local knowledge. Some applicants, like the Goldstone Apple Valley Radio Telescope group, explicitly planned for local teacher participation, but others reflected less on this challenge and contented themselves with providing materials. Though we did not see it among the applicants, this could become a struggle for control and end up dis-empowering a local community or school. We feel that all educational technology programs should take great care here since technology itself can serve to mystify its processes and substitute an unquestioned authoritarianism of the machine, much as Jacques Ellul argues in The Technological Bluff (1990).

Another unintended consequence of educational technologies (and one not addressed by the applicants) arises from the bias built into the technologies themselves. Though generations of communication theorists, beginning with Harold Innis and Marshall McLuhan, have identified how certain modes of communication foster linear thinking or individualism or conservatism, for example, few people have asked about the bias of educational technology. Many of the technologies themselves support content that fosters a (western) scientific worldview, which may not be a bad thing, but do they do so at the expense of local or national cultural values? A program like Kids' Space works to counteract this bias by using the technology in a more transparent way in order to foster a connection among its young participants. Other programs seem to assume the neutrality of the technologies and their content and could unwittingly reinforce an unseen bias.

A final challenge to all who use new technologies for learning are the expectations that computers and the Internet bring. Globally schools are investing heavily in hardware and software in the belief that this investment will pay off in student learning. And such an expectation is well founded—in the long term. But the expectation for immediate payoff may be built on looking on computer literacy or a hookup to the Internet as a "magic bullet" to solve all kinds of educational problems that may be embedded in the school system itself or the social system in which students and their families live. The Digital Divide is more than getting access to computers and the net. There may be an educational divide that the high expectations about technology do not recognize. In other words, even with good technology, educational change may be a slow and challenging process.

Conclusion

The good news about our applicant pool is that in the long run everyone needs to become computer and Internet literate to survive in a world that is increasingly dependent on these and similar technologies. The school children and older learners represented in our fifty-one applicants from all over the globe are all potential winners. But success takes time. It may be a matter of adjusting the time line for the real educational benefits to appear. The finalists in the Education category were all contributing to learning in the broadest sense of what education enhanced by technology can mean. Whether it was bringing vital information through wind-up radios for poor populations in Africa (Freeplay Foundation), offering on-line access to a variety of texts in the public

domain (Project Gutenberg), bringing schools on line for the first time in the U.S. and abroad (Schools Online), connecting school children worldwide to share ideas and stories (Kids' Space) or giving science teachers and students a chance to operate a 34 meter radio telescope from a distance (Lewis Center for Educational Research), all brought exciting possibilities to learners who would not have had these opportunities without an intervening technology. The finalists and the other forty-six applicants demonstrated the educational experience of hundreds of thousands of learners. We look forward to new and innovative projects to apply next year.

References

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The Panel

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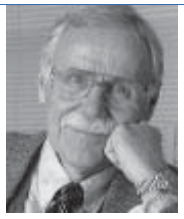
Pedro Hernández-Ramos received a Ph.D. in Mass Communication Research from Stanford University in 1985. He worked as an Assistant Editor in the creation of the "International Encyclopedia of Communications," for which he also co-authored an article. He was a Lecturer at the Annenberg School of Communications of the University of Pennsylvania, and after a return to California, a consultant to several high-tech companies. In 1991 he joined Apple Computer, where for 5 years he served as Education Manager for Latin America & Caribbean, then as Education Business Development Manager for Apple Pacific, and finally as the Research Manager for the Apple Classrooms of Tomorrow (ACOT) program. Subsequently he worked for Acer America, the IMS Global Learning Consortium, and Cisco Systems before joining Santa Clara University in July 2001. He has a joint appointment as Program Director in the Center for Science, Technology & Society and as Assistant Professor in the Department of Education, where his emphasis is on educational technology."



Emile G. McAnany is the Walter E. Schmidt, S.J. Professor of Communication and Chair of the Department of Communication at Santa Clara University. Previously he taught at the University of Texas at Austin and Stanford University where he finished his Ph.D. in 1971. His interests have focused on international communication with special attention to Latin America where he has worked off and on for more than three decades. He is the author or editor of nine books, most recently Free Trade and Mass Media: Cultural Industries in a NAFTA Era (University of Texas Press, 1997) and several on educational technology, including Educational Reform with Television: The El Salvador Experience (Stanford Press, 1976), Radio for Education and Development (Sage, 1978) and The Economics of New Educational Media: Costs and Effectiveness (UNESCO, 1982). He is currently finishing work with co-authors on a book on the demographic and cultural consequences of television fictional serials in Brazil.

Paul A. Soukup, S.J., has explored the connections between communication and theology since 1982. His publications include *Communication and Theology* (1983); *Christian Communication: A Bibliographical Survey* (1989), *Media, Culture, and Catholicism* (1996), *Mass Media and the Moral Imagination* with Philip J. Rossi (1994), and *Fidelity and Translation: Communicating the Bible in New Media* with Robert Hodgson (1999). This latter publication grows out of his work on the American Bible Society's New Media Bible (www.newmediabible.org). In addition, he and Thomas J. Farrell have edited four volumes of the collected works of Walter J. Ong, S.J., *Faith and Contexts* (1992-1999). These volumes have led him to examine more closely how morality-literacy studies can contribute to an understanding of theological expression. A graduate of the University of Texas at Austin (Ph.D., 1985), Soukup teaches in the Communication Department at Santa Clara University.