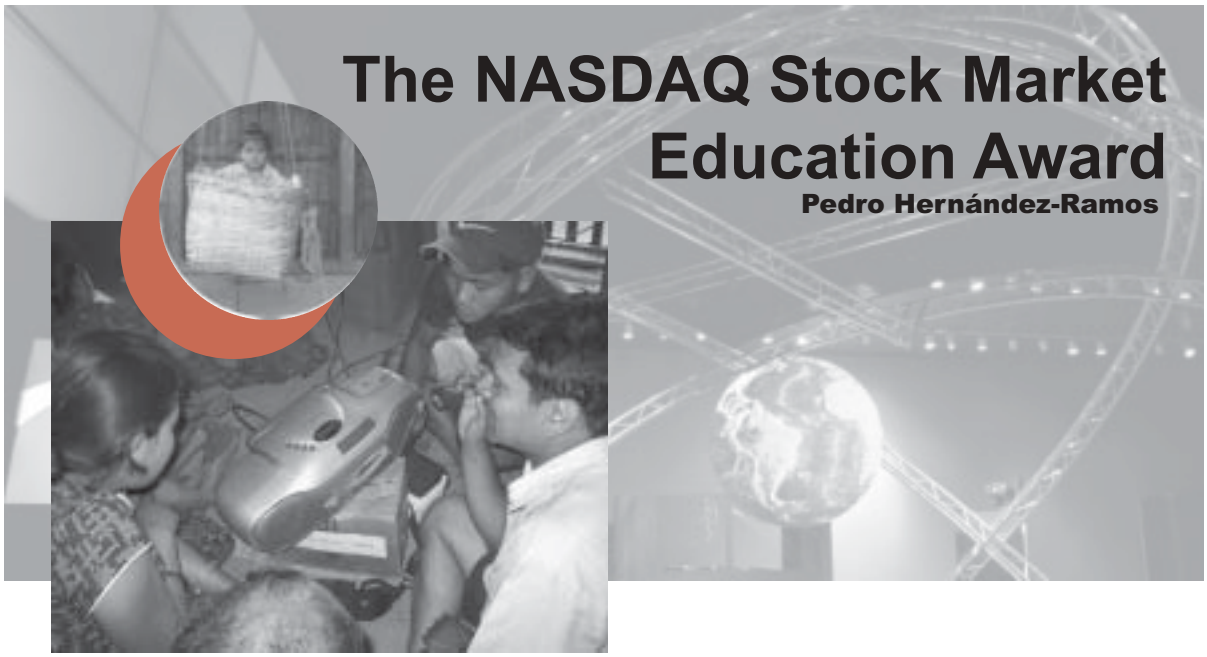
The NASDAQ Stock Market Education Award

Pedro Hernández-Ramos



Introduction

As technology continues to evolve at a frenetic pace, advances in educational thinking on how to best integrate it into everyday practice are emerging in many parts of the world (Kozma, 2003). Many of the applicants for this year's NASDAQ Stock Market Education Award have worked for several years on projects and programs that reflect their passionate commitment to innovation and to the populations they serve. Their applications also are indicative of increasing sophistication in their approach and uses of technology to address the problems they wish to overcome, for the most part still centered on access to technology—and through it, information and education—but increasingly on the opportunities for deep transformations that the introduction of technology brings with it.

The 108 applicants represented 26 countries, an increase over last year in both the number of applicants (88) and countries (17). The panel of judges used a rubric comprising seven categories to evaluate each application. Submissions had to (1) identify the problem, (2) describe their application of technology, (3) Give an explanation of how their use of technology was a breakthrough, (4) provide evidence of contribution, (5) report on measurable results, (6) address potential negative consequences of their use of technology, and (7) describe the potential for replication and/or the long-term sustainability of their endeavor. In addition, as in all human efforts, the judges discussed their own preferences and expectations as they reviewed the applications. Projects that include technology in creative, innovative, and systemic ways were highly regarded, and there were enough of these among the 108 applications to make the selection process quite challenging.

The multiplying effects of technology use also were a factor as judges looked for projects that benefited significant numbers of people, ideally in a participatory way—that is, the intended beneficiaries are intimately involved with the project as participants, not just as "recipients" of the project's work. The project's potential to be replicated in a different context was highly valued, as was the "novelty" of the application.

The Applicants

Beyond their numbers and places of origin, the range of projects in this year's pool of applicants is reason for optimism. Individuals, non-profit organizations, academic institutions, commercial entities, and government agencies are represented. Efforts that started with the goal of solving a problem for an individual student were considered along with programs designed to transform the education systems of entire countries. Projects created to address short-term obstacles to education delivery with the help of technology contrasted with programs aiming for long-term implementation and result cycles. Some projects were based on a straightforward yet sound educational premise that leveraged simple, well-known and easily available technologies, like electronic mail, while others were creating or beginning to implement cutting edge technologies or adaptations of multiple technologies, such as digital broadcasting.

A common thread that could be found in many applications was the interest in getting technology that would create, enhance, or sustain specific communities of learners, whether they be school children and the towns they live in, indigenous populations marginalized by majority rule, individuals with

physical or learning disabilities, or people in critical stages or periods of life (such as prospective adoptive parents). In a few cases the applications were from community institutions such as museums that are doing very innovative and fun things with new technologies to help their visitors learn better. In other cases, the applicants have amassed huge amounts of information and have turned to technology-based solutions in order to both manage the information and make it easily accessible to their target populations and the world.

The Internet and the World Wide Web in particular continue to be seen as tools with enormous potential for improving and even transforming education and learning. Many projects were focused on providing access in settings as varied as schools and refugee camps, or to overcome the movement restrictions imposed by the SARS outbreak in Hong Kong. Others aimed to translate their innovative pedagogies into Web-based environments that expand their reach significantly, thus addressing some of the challenges involved in "scaling up" small-scale or local practices. However, basic access to the infrastructure (electricity, telecommunications) and devices (most often computers) required in Internet-based projects and programs remains a problem for more than half of the world's population.

The Laureates

These are the five Laureates in this year's Education category: Computers for Youth; Equal Access; Brij Kothari, Indian Institute of Management-Ahmedabad; Alexander E. MacDonald, NOAA Forecast Systems Laboratory; and the Omar Dengo Foundation.

Computers for Youth, New York, New York

The "digital divide" is principally a question of access to technology tools, and data suggest that income is a critical factor in computer ownership and access to the Internet. While the costs of computers may be declining, for most low-income people computer ownership and Internet connectivity are a luxury they cannot afford, no matter how much they may understand the benefits to be derived from them.

Computers for Youth's name is somewhat of a misnomer, since the beneficiaries are not just the children from the participating middle schools in low-income neighborhoods in New York City. Computers for Youth (CFY) has developed a holistic approach to the infusion of technology in their partner schools, by granting a computer with Internet access to every student and their families as well as their teachers. Students take the computer home, and thus the learning and information benefits spread to every member of the family. In addition, CFY created training and support programs that enhance the viability and

sustainability of the program at each of the sites, including training students themselves to offer technical support.

To date, CFY has distributed more than 3,000 computers and trained over 6,000 students and family members. The low-cost model that CFY created benefits students, teachers, parents, and the entire community. From refurbishing the donated computers, to training, to a community Web site, and for technical support, CFY involves students at every stage, generating and sustaining their interest in learning and allowing them to develop practical skills that will help them be successful in school and in life. For more information on Computers for Youth, see: http://www.cfy.org/.

Equal Access, San Francisco, California

Education is a social process that relies on communication and access to information as key components of successful learning experiences. The numbers of people around the world who lack access to education are staggering, and it has become increasingly clear that this is no longer a problem of "scaling up" the current education systems—in most countries, limitations on financial resources, human resources (e.g., teachers), facilities, and materials make it unlikely that all those who should have access to education will get it. New approaches must be found and developed, and this is one of the motivations for Equal Access, a non-profit organization working to create both the technological infrastructure and the information and education supports to address the needs of hundreds of millions of people around the world.

The strategy pursued by Equal Access lever-

Brij Kothari/Alexander E. MacDonald

ages advanced technology like Digital Satellite Radio (DSR) to reach mainly rural populations that have been traditionally underserved and thus lack most types of infrastructure, not just access to education. Focusing on Nepal in the development stage, Equal Access collaborated with local groups and international organizations to distribute the DSR receivers, create "listening groups" in over 400 communities in 14 districts, and develop relevant and culturally-respectful content on issues such as HIV/AIDS and women's empowerment. By establishing additional partnerships with local FM radio stations and providing them with content free of charge, the audience reached grows significantly. Also, because it is already a digital system, as computers and connectivity become available other types of content and services—including access to the Internet—can be made available over the DSR system.

The technology itself and the programmatic efforts around it make it easy to see how other countries could benefit from the work of Equal Access. Plans are advancing to launch similar services in India, Laos, and Afghanistan. By continuing to work with international organizations, respecting and listening to the communities they serve, and using sophisticated but appropriate technologies, Equal Access has started to see significant benefits from their efforts. For more information on Equal Access see: http://www.eqaccess.org/.

Brij Kothari, Indian Institute of Management-Ahmedabad, Ahmedabad, Gujarat, India

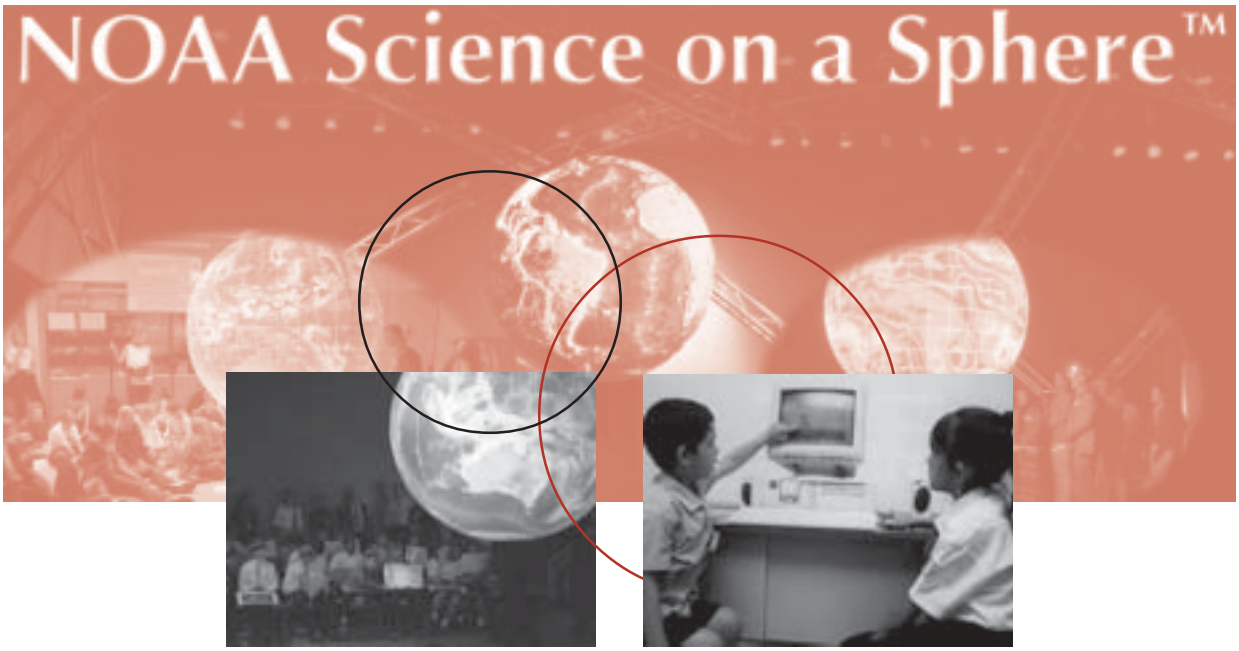
Can technology be paired with cultural practices to address seemingly intractable, large-scale problems like illiteracy? As an answer to this question, professor Brij Kothari at the Indian Institute of Management-Ahmedabad, India, has been working for several years on the seemingly simple idea that "Same Language Subtitling" (SLS) of television broadcasts of musical programs could be an effective way to enhance the literacy skills of millions of viewers.

Recognizing the mass appeal of television programs that showcase Indian music and songs, Kothari and his team convinced the producers of some of the most popular programs to add same language subtitling to their broadcasts. The addition of subtitles is easy and relatively inexpensive to accomplish with existing technologies, but in order to be more effective as a learning tool, synchronization of the lyrics and the subtitles is critical. With support from government entities and international organizations, SLS has been added to broadcasts in several of the major languages spoken in India, and results from studies of its effectiveness are very encouraging. Future plans include the creation of a "digital jukebox" of subtitled songs available through the Internet, and an expansion of services to address the literacy needs beyond India and its languages. For more information on the Indian Institute of Management-Ahmedabad see:
http:/www.iimahd.ernet.in/~brij/brj-rser.htm.

Alexander E. MacDonald, NOAA Forecast Systems Laboratory, Boulder, Colorado

The benefits of visualization as a learning tool are well known in fields like mathematics, physics, chemistry, and biology. People seem to understand difficult concepts better (or for the first time) when they are able to see them represented in a meaningful way, whether it's a mathematical formula, chemical reaction, or any other concept or process.

Alexander MacDonald, Director of the National Oceanic and Atmospheric Administration's (NOAA) Forecast Systems Laboratory, started grappling with the challenge of how to convey the human impact on the Earth around 1995, and over the years the ideas crystallized into what is now known as "Science on a Sphere," a system comprising computers, projectors, and a sphere used to project time-based data onto a spherical surface with minimal distortions and possibilities for interactivity. The technical challenges involved in translating numerical data into visual images, projecting successfully out of computers and onto a spherical surface took MacDonald



and his NOAA team several years to figure out. Now that they have succeeded, the possibilities are enormous. Climate change, an area of specific interest to MacDonald, can now be visualized effectively with the system, offering opportunities for sophisticated analyses by scientists, better decisions by policy makers, and new types of learning opportunities. For more information on NOAA Forecast Systems Laboratory see: www.fsl.noaa.gov/sos.

Omar Dengo Foundation, San Jose, Costa Rica

In the last 20 years of the twentieth century, many countries issued statements declaring their intentions to infuse technology throughout their societies, particularly in education, as part of their plans to be successful in the "information economy." Few countries had the clarity of purpose and the ability to define and follow a plan as successfully as Costa Rica, the small Central American nation with just under four million people. A large measure of their success is owed to the Omar Dengo Foundation, the non-profit organization chartered by the government to transform the country's education system with the introduction of information and communication technologies.

Since the late 1980s, the Omar Dengo Foundation has installed technology in practically all schools in Costa Rica. Perhaps more importantly, it also trained (on an ongoing basis) thousands of teachers not just on the use of the computers but also on integration strategies designed to maximize the learning benefits for students *and* teachers. Through an active program of research, it has continuously improved its methodologies and practices, leading to many invitations to serve as consultants for national educational technology programs around the world. Partnerships with domestic and international organizations allow the Foundation to work with and serve practically every sector of the population, since they also have programs focusing on services to communities as well as an Online Learning and Digital Production Center that supports Internet-based learning opportunities.

In their own words, "The introduction of digital technologies to Costa Rican schools has been accompanied by a re-conceptualization of teaching and learning, by the preparation of the children and the teachers to transcend traditional teaching methods and to work in ways that are more productive, interactive, meaningful, and integrated." Their results to date indicate that their strategies are being successful, and that the Costa Rican model should be studied closely by all countries. For more information on the Omar Dengo Foundation see: http://www.fod.ac.cr/.

Conclusions

The promise of technology to benefit education and learning does not come from the hardware or software alone, but from the creative and concerted efforts of individuals (rarely the same people who developed the technology) to transform and improve upon the status quo. Overcoming technical challenges in the development of any new technology is only a fraction

of the battle toward their eventual assimilation into everyday use in educational settings. Four of the five recognized technologies were invented by someone else. The success of the fifth depends to a large extent on how others (museums, schools) contribute to its dissemination and effective use. Historically, educational technologies stand a much better chance of being successfully adopted when there are support systems and training available to aid the intended users in transforming their practices—in the basic case, to go from not using technology to becoming effective users and better teachers and learners because of it.

The applications and Laureates that explore new or different ways to provide access to technologies supporting the teaching and learning process are keenly aware that, along with the new technologies, new practices must accompany the introduction of these technologies to really observe the transformational impact that technology can have on individuals, organizations, and communities. Three of the Laureates (Computers for Youth, Equal Access, and Omar Dengo Foundation) explicitly address the cultural issues surrounding change induced by technological innovations in three very different contexts. The India Institute of Management-Ahmedabad starts with a cultural practice and leverages technology to expand the impact of technology in order to address a major problem like illiteracy.

The trend toward more comprehensive educational technology programs most likely will continue, as the lessons from these Laureates and many others clearly indicate that technology in and of itself is not enough. Access and "digital divide" focused programs will include not just the hardware or software, but also perhaps the electrical power, the Internet connectivity, and the training needed to make effective use of technology. Technical innovators will (or *should*) aim to include the needs of a wider variety of potential users in the early design and planning stages, to minimize the costs and effort required to make the technologies useful in contexts other than where they were created. The Internet will continue to grow in influence and richness of offerings as our ability to design learning environments that make the most of the potential for communication and collaboration bears fruit. Finally, the vision and dedication of the Laureates and all other applicants to improve education and learning will be a significant source of inspiration and encouragement to everyone involved in educational technology around the world. •

Reference

R. B. Kozma. *Technology, Innovation, and Educational Change: A Global Perspective*. (Eugene, OR: International Society for Technology in Education, 2003).

The Panel

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About the Author

Pedro Hernández-Ramos has a joint appointment at Santa Clara University as Assistant Professor of Education and Program Director (Family and Community) at the Center for Science, Technology, and Society. His research interests are in staff development, student expectations, and international aspects of the "digital divide." He has worked as a consultant on usability research for high tech companies including Microsoft and Sun Microsystems. At Apple Computer he was the Education Manager for Latin America & Caribbean, then served as Education Business Development Manager for Apple Pacific, and finally as the Research Manager for the Apple Classrooms of Tomorrow (ACOT) program. He also has held education marketing positions at Acer America and Cisco Systems, as well as Director of Market Development for the IMS Global Learning Consortium, a non-profit organization dedicated to creating technical standards for online, distributed learning. He has a B.A. from Universidad Iberoamericana (a Jesuit institution) in Mexico City, and a Ph.D. in mass communication research from Stanford University.