Integrating Computers into Teaching:
Findings from a 3-Year Program in 15 Developing Countries

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Abstract

For more than three years, World Links for Development (WorLD) has been building computer labs and bringing Internet connectivity to schools in developing countries around the world, helping teachers and students obtain the skills necessary to integrate technology into their classrooms.

In 1997, when the program began as an initiative of the World Bank, WorLD's primary objective was to pilot educational technology in developing countries. Now in over 350 schools in 18 countries in Africa, Latin America and the Middle East, the program is moving from a pilot to a catalyst. WorLD is now positioned to work directly with governments, educators and businesses to define models for the sustainable growth of educational technology at the national level.

This chapter describes the characteristics of the WorLD Program that have led to its success, provides results from a third-party evaluation of the program, explains WorLD's vision for expansion, and explores opportunities for the future of educational technology worldwide.

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1. INTRODUCTION

Rapid developments in information and communication technology have been a defining feature of the 1990s in middle- to higher-income countries. In fact, many would argue that the term "basic education" has taken on a new meaning in the Information Age. In a rapidly changing world of global market competition, automation and increasing democratization, basic education must contribute to an individual's capacity to access and apply information. As the Economic Commission for Africa stated, this ability to access and effectively use information is "no longer a luxury, it is a necessity for development."

Unfortunately, many developing countries have been left behind in the information revolution, particularly in the field of education. Yet the concerns expressed about introducing technology -- and particularly computers -- into the classroom have been many: high costs, unquantifiable benefits and the danger of increasing the gap between rich and poor within these countries. Put simply, why should a country invest in bringing computers and "connectivity" to their classrooms when it can scarcely afford chalk and textbooks?

The government of Paraguay asked this question when World Links for Development (WorLD) introduced computer labs, Internet connectivity and teacher training to 12 secondary schools in 1997. To the ministers of education, computers simply were not a priority when many of their schools lacked electricity, textbooks -- even bathrooms. Two years later, students from a WorLD participant school won a nationwide Internet competition, beating out 35 far better-endowed private schools. The winning students demonstrated that access to Internet technologies can equalize education opportunities like little else

Internet connectivity can make education an enabling force not just the individual, but for society as a whole. According to a recent report on the state of the world's children by UNESCO, schools that encourage critical thinking and democratic participation foster a better understanding of the essence of human rights. (UNESCO, 1999).

The "E" Economy. The growth of worldwide networks such as the Internet is part of the new global economy. This global economy requires a higher level of education and an intimate knowledge of technology, for all types of workers. Even in agrarian societies, farmers require modern technologies to be competitive in international markets.

Unfortunately, a "Digital Divide" exists, excluding most of the world's population from participating fully in this networked economy. In most developing countries, not even the brightest students - the future leaders, businesspeople and educators - have the rudiments of basic education, such as trained teachers, libraries and current textbooks. Access to technology necessary to enter the Information Age is virtually nonexistent. Already marginalized by poverty and geographical remoteness, these students are falling farther behind with every technological advance. The economic and human implications of the growing digital divide are enormous. It is no longer a question of the "haves" and "have nots," but the "cans" and "can nots."

Bridging the Digital Divide. Technology has become a critical tool for achieving success in education. Unfortunately, officials in some countries are still unaware of its potential. Yet when they see examples of the possibilities that can be created for their students, their minds can be quickly changed (Firpo, 1999). When the minister of education in Mauritania, a former biology teacher, was introduced to various scientific Web sites, he was impressed enough to persuade the Ministry of Finance to finance leased-line Internet connectivity for every secondary schools in the country.

Governments around the world are not only beginning to recognize the need for technology in their schools, they are also making an effort to bring these tools to their students --

even in the poorest regions. *(Box 1. Voices from Around the World).* The government of Turkey recently agreed to a $1 billion loan from the World Bank to finance education development and reforms. Almost 20 percent of that amount has been allocated to introduce new technology to thousands of schools. The funding will cover computers, Internet connectivity, software development and teacher training.

Improving the accessibility and quality of basic education (grades 1-9) remains the highest priority in many developing countries, as well it should. Basic literacy and **numeracy** are preconditions for using educational technology effectively. However, for those countries wishing to improve the quality of learning, particularly at the secondary and tertiary levels, educational technology can be a powerful and cost-effective tool.

2. WorLD PROGRAM DESIGN AND IMPLEMENTATION

The WorLD Program is the World Bank's first major initiative in the area of educational technology. The World Bank was established by the United Nations in 1944 to provide postwar reconstruction loans to the governments of Europe. Over the past 50 years, its mission has evolved to focus on improving global living standards by promoting sustainable growth in developing countries. Serving 4.7 billion people through $22 billion in annual lending, the World Bank is the leading lending institution dedicated to strengthening economies, expanding world markets and reducing poverty.

Begun in 1997, WorLD has already initiated programs in 18 countries in Africa, Latin America, Eastern Europe and the Middle East. More than 350 schools are currently participating, serving an estimated 230,000 students and 13,000 teachers. *(Figures 1, 2. & 3. Photographs)*

Providing Internet connectivity and technology training, the program links schools around the world in order to improve education, enhance cultural understanding and develop skills that youths need for obtaining jobs in the 21st century. In turn, these investments should make an important contribution to developing countries' economic and social advancement. Because every country is different, WorLD adapts its model to respond to each country's needs and objectives.

Country Selection. A country's participation begins with a request submitted by the Minister of Education. Once funding sources and key partners have been identified, a feasibility study is conducted to clarify the country's educational objectives, survey the local telecommunications infrastructure and establish a Steering Committee. It is the Steering Committee's job to administer the WorLD program and strategize for future growth. The Steering Committee is one of the key factors to WorLD's success because it is a locally based group composed of leaders from government, business, and community sectors.

In Uganda, one of WorLD's more established programs, the Steering Committee evolved to the point where it spun off into a separate local nonprofit organization. Now called Uganda SchoolNet, the former WorLD committee is dedicated to extending educational technology throughout Uganda

School Selection. One of the Steering Committee's most important responsibilities is deciding which schools will participate. To some degree, schools self-select because they must submit a proposal for consideration. As part of the proposal, schools need to identify at least one teacher to be a program "champion" and they must demonstrate the support of administrators and parents. Even with these criteria, far more schools apply than can be accepted. The Steering

Committee must evaluate applicants based on equity concerns such as gender, geography, and the socio-economic makeup of the student population, as well as the availability of telecommunications services.

Parental involvement is a critical component of the WorLD Program, as it is in any child's education. In almost all participating countries, parents are so excited about the opportunities their children are gaining through the WorLD Program that they set aside parts of their meager incomes to help the school pay its monthly connectivity costs.

Technology Component. WorLD explores the most cost-effective and sustainable solutions for connecting classrooms to the Internet. Before a country is accepted into the program, a technical feasibility study is conducted. This study focuses on four broad areas: the telecommunications environment, Internet service providers, domestic equipment suppliers and individual schools. WorLD uses this data to suggest the optimal technology model for that country and to calculate the expected costs for participating schools.

During the first two years of its operation, schools in the WorLD Program received a minimum of 10 used computers **(clients)** networked to a central server which had either dial-up or direct connection to the Internet. In the immediate future, WorLD will continue to provide computer labs of both new and refurbished computers. Since WorLD is interested in finding the most cost-effective and sustainable technology solutions, the program will also explore opportunities to pilot emerging solutions, such as **thin-client labs**. With the knowledge gained from these alternatives, WorLD will be better able to counsel ministries of education on the most effective solutions. *(Figure 4. Classroom Set-Up)*

Establishing reliable, cost-effective connectivity is WorLD's greatest technology challenge. In many client countries there is inadequate infrastructure, particularly in rural areas. In addition, the cost of connection can be extremely high relative to school budgets. This latter point is particularly important because WorLD schools must find a way to support all their recurring costs, including monthly ISP and telephone charges. For these reasons, WorLD is constantly tracking the latest developments in the telecom, satellite and wireless industries, seeking the highest-bandwidth, lowest-cost solutions.

Once equipment has been obtained and delivered to the schools, WorLD works with an array of local partners to install the equipment and provide the necessary ongoing technical support. WorLD establishes partnerships with local Internet service providers, technology experts and university computer science departments.

Professional Development. Although the technology component is an important piece of the WorLD Program, the effective use of the Internet in the classroom has more to do with people. Individuals make the difference. WorLD seeks out and supports these "champions" -- creative and dedicated who can transform the computer from an arcane and mysterious piece of technology into a tool that provides new avenues for learning.

WorLD provides comprehensive technology training, professional development and curriculum integration skills to teachers, administrators and government officials. Through this training, WorLD seeks to help teachers think about their roles in the classroom differently. WorLD introduces new concepts that transform the teaching environment from lecture-based to a more student-centered, constructivist approach. Training is conducted hands-on in small groups, replicating the most likely scenario that teachers will encounter.

WorLD also applies a train-the-trainer approach, encouraging each participant to pass their knowledge on to colleagues. A recent evaluation of the WorLD Program showed that approximately 80% of WorLD teachers had received training from the WorLD coordinator in their country (Kozma, R., et al, 1999). The same report stated that an estimated 28% of the teaching staff at WorLD schools had received training as part of their participation in the WorLD Program.

Collaborative Projects. Teachers in the WorLD Program are encouraged to engage their students in collaborative projects with other classrooms around the world. These projects, which in many cases have a direct connection to the classroom curriculum, are an integral part of the WorLD approach. Teachers are not only exposed to a range of existing Internet-based projects they can join, but are encouraged to create their own projects.

Initially, the WorLD Program encourages new schools to join an existing collaborative project with schools in industrialized countries. Ultimately, the context, scope, and objectives of the projects are determined by the individual teachers. Schools and teachers are also encouraged to expand their school-to-school connections by branching out to find other schools that have similar educational interests and objectives. To date over 1,000 schools in North America, Europe, Asia and Australia have been involved with links to WorLD schools. Experience suggests that collaborative North-South learning using the Internet is improving student motivation and learning for all participating schools (Carlson & Hawkins, 1998).

Even though computers have been in schools in the United States for years, teachers do not always know how to integrate them into the curriculum or how to make them relevant to their students. According to one **U.S.?** teacher, the WorLD Program helped his class discover a real value for the computer -- it connects his students to the world. *(Box 2. Selected Examples of WorLD School Projects in Environmental Issues)*

3. WorLD PROGRAM RESULTS

Given the inevitable controversy surrounding the costs versus benefits of an educational technology program, it is essential to monitor and evaluate the impact of such an investment on learning outcomes. Standard tools for measuring educational outcomes (e.g. standardized tests or exams based on national standards) are insufficient to measure the new types of skills that students will be acquiring through the use of educational technology. Consequently, in 1998 WorLD contracted with SRI International's Center for Technology in Learning to design and implement a comprehensive set of monitoring and evaluation instruments.

The objective of WorLD's monitoring and evaluation component is to provide the World Bank and participating countries with results of the program as well as the challenges faced by students, teachers and administrators. In addition, these evaluations will enable participating countries to assess the effectiveness of WorLD *within* their own education systems and *in comparison with* all other participating countries.

Early results showed that teachers were proud of the positive impact that the WorLD Program has had on their students' reading and writing skills and their awareness of issues facing their own communities and those of other countries. The highest-rated impact of the program was students' ability to get better jobs upon graduation. Teachers also commented on the program's positive impact on their own creative and intellectual satisfaction.

The remainder of this section is adapted from SRI International's first annual report (Kozma, R., et al, 1999). Additional results will be disseminated on an annual basis as the evaluation continues, creating a valuable data history.

Methodology. SRI International conducted a Monitoring and Evaluation survey for the July 1998 - June 1999 operational year of the WorLD Program. This was the first full year of operation for the program, although there were some pilot activities in previous years. The evaluation was conducted in 5 of the current WorLD countries: Chile, Paraguay, Peru, Senegal, and Uganda. In 2000 this evaluation will be expanded to 12 WorLD countries.

In each of the selected countries, 6 WorLD schools were asked to participate in data collection. At each school, both students and teachers were surveyed, along with the headmaster or headmistress and the school's technology coordinator. In total, 26 WorLD schools participated in the evaluation. These schools employed more than 1,200 teachers and served nearly 20,000 students: more than 12,000 girls and nearly 8,000 boys.

A total of 661 WorLD students and 83 WorLD teachers responded to the survey. The response rate was at or above 80% at all schools. Also, 25 administrators and 23 technology coordinators responded. Thus, nearly 800 WorLD participants were surveyed. In addition to those who participated in the WorLD Program, other teachers and students were surveyed to serve as comparison groups, for a total number of 1,900 recipients in 49 schools in five countries.

Case studies were also conducted by World Bank evaluators who were independent of the WorLD Program and who reported to the SRI team. Four countries were studied: Chile, Peru, Senegal, and Uganda. In these countries, evaluators interviewed national staff and visited a total of 23 schools. In these schools, the evaluators observed classrooms in operation and interviewed students, teachers, and administrators. In some cases, parents and other participants were also interviewed.

Evaluation Emphasis. A recent report sponsored by the Milken Family Foundation (Fulton, 1997) analyzed the skills that will be required of students to succeed in the digital age. Their findings stated that students need to:

• Reason with information: to find, organize, analyze, compare and evaluate information and use it to make predications and draw conclusions

• Communicate ideas in a variety of written, oral and graphic forms

• Collaborate with others on complex problems and projects

• Develop skills in the use of a variety of computer hardware and software

• Plan, monitor and regulate their learning

• Cultivate attitudes and behaviors that will sustain learning throughout their lives

In addition to emphasizing these abilities and attitudes, the WorLD Program also strives to develop in students an understanding of other countries and cultures. The SRI evaluation team considered all of these objectives from the perspective of students, teachers, and administrators.

Student Outcomes. An overwhelming 92% of the WorLD students expressed overall satisfaction with their participation in the program. A large majority of the students gave the program the highest possible rating when asked about its impact on their acquisition of a range of skills, knowledge and attitudes. WorLD students reported that their learning was "very much" improved as a result of their participation, rather than "somewhat" improved or "not at all" improved.

The most highly rated impact of the program was on students' ability to get better jobs upon graduation; 77% of the WorLD students rated this very high. A large majority of the students - 60% or more - rated the WorLD Program very high for its impact on their communication skills and their ability to reason with information. They also said that the program had improved their attitudes toward school and their school attendance. Nearly 60% said that they had increased their knowledge about other cultures as a result of their participation, another important goal of the WorLD Program. *(Table 1. Impact of WorLD Program on Students)*

Teachers were equally enthusiastic. More than 80% rated the program very high on its impact on student technology skills and attitudes. More than 70% rated it very high on its impact on students' ability to reason with information, on their communication skills, and on their attitudes toward school. More than 60% rated the program very high on its impact on students' knowledge of other cultures and on their school attendance.

Administrators also gave the WorLD Program high marks. More than 70% rated it very high on its impact on students' communication skills and on their attitudes toward school and toward technology. More than 60% rated it the highest on its impact on students' technology skills and on their ability to reason with information.

At the end of the school year, WorLD students rated their own learning higher as a result of using computers than did two other groups of students. *(Table 2. Impact of WorLD Program on Student Learning)*. A majority of WorLD students gave computers the highest rating on their use to improve information literacy skills; to find, compare and evaluate information; and to plan, regulate and monitor their own learning. These scores were significantly higher than those of the nonparticipating WorLD school students who used computers and non-WorLD computer users.

Gender Differences. Gender differences have been well documented in both computer use and access in a number of studies in the United States (Chen, 1986: Schofield, 1995). Generally, these studies have found that boys have significantly more positive attitudes than girls toward computers, and that both boys and girls generally perceive computers as being predominantly in the domain of males.

There was a particular concern in the WorLD Program that all youths be served, both girls and boys. For almost all outcomes, teachers said that there were no differences between the program's impact on girls and boys.

If teachers felt there were differences, they were more likely to say that girls benefited more than boys. For example, 35% of the teachers felt that the impact of the WorLD Program was greater on girls' communication skills; only 6% felt that it was greater for boys. Similarly, 31% felt that the impact of the program was greater on girls' attitudes toward school, and only 6% felt that it was greater for boys. In both cases, the majority of teachers (59% - 63%) felt that there was no difference. This trend held true for most of the other indicators tested.

Girls reported doing essentially the same as boys in improving their ability to communicate with others and to write reports, to find and to analyze information, and to use computers, software and the Internet. They reported comparable improvements in attitudes toward learning in school, toward academic subjects, toward knowing about other cultures and toward the importance of technology in their lives.

Teacher Results. Many teachers currently in schools - even those in the most developed countries - are not prepared to use technology effectively in the classroom (U.S. Congress Office

of Technology Assessment, 1995). A major component of the WorLD Program is its emphasis on teachers. As a result, students were not the only ones to benefit from the program.

As a result of their participation in the WorLD Program, over 60% of the WorLD teachers felt that they had greatly improved not only their ability to use applications software but their ability to use student groups in their teaching and to design and lead collaborative student projects *(Table 3. Impact of the WorLD Program on Teachers)*.

A majority of teachers felt that the program had increased collaboration among teachers in their school on the development of materials. More than 70% felt that the WorLD Program had greatly improved their ability to use computers and the Internet and had improved their attitudes about both technology and their own teaching. These computer skills helped teachers in a number of ways. For example, in Senegal, teachers used the technology to update their courses with new information from the Internet and to process students' assignments and exams.

A very large number of administrators - 80% or more - felt that the WorLD Program had greatly affected teachers' computer skills, their ability to use the Internet, their attitudes about technology and their attitudes about their own teaching

Classroom Impact. WorLD classrooms were different than non-WorLD classrooms. Along with WorLD training and the availability of networked computers, teachers and their students engaged in new activities in their classrooms. A majority of WorLD teachers reported that their students used e-mail, applications software, and the Internet at least once a month, and many used these technologies at least once a week. Much of this technology was used to support new pedagogical practices, such as collaborative projects that students created. More than 70% of the WorLD teachers said that they designed collaborative projects and activities for students and had students work in groups on these projects.

WorLD students were much more likely than non-WorLD computer-using students to report having used the computer to do a wide range of activities. A student from Uganda illustrates this when she said, "In those days (before WorLD), we would come to class and learn how to do 'Shift F5' or use the Delete key and things like that. We had to memorize everything and it was so boring. But now, it is so much fun. We can explore as much as we can, and we can learn it on our own."

And, WorLD students are more likely than non-WorLD computer-using students to collaborate on projects with other students in their own country as well as in other nations. A father in Peru saw the impact of the WorLD Program on his son and said, "My son feels a sense of responsibility because he works as part of a team and knows that his friends rely on him for the project. He has also become a real researcher!"

Country Comparisons. For the most part, WorLD schools in different countries were similar in their use of computers, and they benefited comparably from their participation in the program. However, there were a few interesting differences between countries in their use of computers and their assessment of the technology's impact. Some of the most interesting differences were between countries in Latin America and those in Africa.

The findings suggest that computers in Latin American classrooms, more than in African classrooms, are helping students become better information users. This may be due in part to more advanced technological infrastructure and in part to the longer history that Latin American teachers have of working with student groups. Nonetheless, African teachers and their students in the WorLD Program are now using computers extensively as information tools. Senegalese teachers are relying on the Internet for this purpose, whereas Ugandan teachers are relying more on CD-ROMs due to significant connectivity constraints.

4. LESSONS LEARNED FROM 3 YEARS IN THE FIELD

Since its inception in 1997, WorLD has implemented its program in over 350 schools in 18 countries throughout Africa, Latin America and the Middle East. The 1998-99 school year marked the first full-term year of operation for WorLD. Throughout this period there have been a number of successes and failures, all of which have helped shape the future direction of the program. The WorLD Program in Uganda demonstrates many of these lessons. *(Box 3. Case Study: School Connectivity in Uganda)*

Local Ownership. Authentic sustainable development depends on the support and involvement of the local population. Any project has a higher chance of success if it is based on the expressed needs of the community and if that community is a key actor in its implementation, monitoring and evaluation (UNESCO, 1999). The WorLD Program starts with an invitation from a national government and works with schools that have applied to be part of the program. In other words, the program is demand-driven, not supply-driven. Even during initial feasibility studies, WorLD teams assess local support and begin identifying local partners.

The first structure put into place in any WorLD country is a local Steering Committee. This administrative body is composed of Ministry of Education officials, school administrators, teachers, local business leaders and development personnel. The Steering Committee is responsible for keeping the program on track, troubleshooting problems and establishing the vision for future growth.

The Steering Committee can have enormous influence on the sustainability of the WorLD program. In Zimbabwe, there was an issue of raising money to finance monthly connectivity charges for WorLD schools. In some WorLD countries these monthly fees can exceed the nation's average annual income, so this was far from a trivial matter. One member of the committee was so committed that he took out his own wallet, laying his money on the table as a challenge to the other committee members for their participation.

During their feasibility studies, the WorLD team also interviews local candidates for the role of Country Coordinator. The coordinator's role includes managing program logistics, organizing professional development workshops and supporting teachers in their efforts to integrate technology into the classroom. The commitment, vision and ambition of this individual play a critical role in the growth of the WorLD program. The importance of an inspired and inspiring individual in this role can not be overemphasized.

The support of parents and the larger community are also drawn upon. In order to house computer labs, schools must have classrooms with concrete floors, window coverings, security features and cooling devices. In those WorLD schools where these basic necessities were non-existent, parents pooled together their money and talents to construct adequate facilities.

Champion Teachers. The success of the WorLD Program within a particular school depends on "champion" teachers, who are willing to push forward in the face of limited technology and untested teaching methods. These teachers appear because the WorLD Program gives them a new perspective, a new joy for their work. As one teacher from Senegal said, "During my 30 years of teaching I have come across many innovations in the field of teaching and learning; the Internet is a unique one. This thing is so amazing to me that I wish I was at the beginning of my career today."

Champions spread their vision to other teachers. A teacher in Paraguay did not attend the WorLD training at her school because she did not see the value of computers. Two of her colleagues convinced her to participate in one of their computer-based projects. Together, the

teachers and their students visited the zoo and the national park in their city – sites the teachers had never been before. Later in the computer lab, they researched the plants and animals they had seen. For the first time ever, they were learning with their students – and they were enjoying it. The project created a dramatic change in the way the teachers interacted with their students. Even the teacher who had been skeptical initially appreciated the value of project-based learning and computer tools.

According to the 1998–1999 WorLD evaluation, 46% of WorLD-trained teachers trained other teachers in their school. They were champions. In some schools as many as two-thirds of the teachers became computer literate. These champions created a ripple effect in the WorLD training that increases impact, cost-effectiveness and sustainability.

Challenge of Technology. The price of computer hardware and software continues to drop dramatically. In the United States, opportunities to buy a leading-edge computing system for less than $1,000 abound. Hardware prices are so low that many companies in the United States and Europe have developed business models in which the hardware is essentially free. Unfortunately, these opportunities do not extend to developing countries. In these limited economies, computers are several times more expensive than they are in more developed countries. Recycled or refurbished products are increasingly available at exceedingly low cost and may prove to be an economically viable alternative.

Due to the fact that most computer equipment was produced for "controlled" environments, WorLD schools have difficulty keeping equipment functioning under extreme weather conditions, in regions with high levels of dust, and in locations with erratic electricity. These environmental realities are difficult to eliminate because fans, sealed rooms and stable electricity are lacking or extremely costly. Until there is more durable equipment or better infrastructure, these problems will remain.

Connectivity is the largest technical hurdle for the WorLD Program. Despite the rapid growth of the Internet worldwide, developing countries continue to face a number of impediments to the rapid diffusion of Internet services. Lack of competition and national telecom monopolies have made access to the international network extremely expensive, especially in relative terms *(Figure 5. Global Internet Prices)*. In addition, ISPs in developing countries often pay the full cost of leased lines to Internet backbones in the United States, Europe or the Middle East, adding even more to an already high cost of access (Petrazzin, B. & Kibati, M., 1999). In its pilot phases, WorLD underwrote the cost of access for its schools, or it worked with partners to provide these service fees. However, as the program moves toward its vision of national rollout, sustainable and economically viable solutions need to be uncovered.

Rural connectivity is even more challenging. In most developing countries, Internet access is rarely available outside a few large urban centers. In Kenya, for instance, over 85% of the country's Internet users are in Nairobi, the capital. Similarly, Moscow accounts for 64% of all Russian users and Buenos Aires for 60% of Argentine users (Arum, G. 1998). When service is available in secondary cities, customers have to pay higher usage fees and often for long-distance dial-up calls to an urban telephone number. Starcom, an ISP in Uganda, for example, charges $30 for e-mail-only services in the capital, Kampala, and $50 in Jinja and Mbale, two smaller cities in the country's interior (Petrazzin, B. & Kibati, M., 1999). Technical support can also be more expensive for remote customers. Swift Global, for example, charges 5,000–20,000 Ugandan shillings ($3.65–$14.60) per half hour of technical support, depending on the user's distance from Kampala (Petrazzin, B. & Kibati, M., 1999).

The WorLD Program must confront and tackle this challenge to meet its mission of connecting students everywhere. The only viable solution is wireless Internet connectivity. Although many development organizations and companies are aggressively addressing the need

for wireless connectivity, models are still being developed and tested. Rural connectivity is a key challenge for WorLD in the coming year and the program will launch a wireless pilot program to compare a range of wireless models in Uganda.

Training and Support. Connecting schools and training teachers on the use of educational technology is not a one-time effort. Several years of on-the-ground training and constant support are necessary to ensure adequate knowledge. Anyone who has worked with computers understands the need for comprehensive training, regular assistance and easily accessible technical support.

Even in the United States, where substantial grants have been provided to train teachers, only 20% report satisfaction with their computer competency, according to a study by the National Center for Education Statistics (Guernsey, 1999). In 1999, the Education Department awarded more than $57 million to 224 education schools, teacher colleges and other institutions striving to build computer training into their programs.

The amount of money spent on teacher training in developing countries is negligible compared to U.S. expenditures. Newly trained teachers in these countries also have the added burdens of limited local support and telephone access to help services. Teacher support must be integrated into and, subsidized by, the WorLD Program. Champions and local technical experts mitigate some of these costs. However, as WorLD extends its program, particularly to rural areas, a more sustainable solution is required.

Curriculum Integration. In many countries there is an open debate about the significance and value of computers in teaching and learning. "We have to move beyond that debate, and think about what we can do to take advantage of this technology," says Andy Carvin, an associate at the Benton Foundation. Real-world solutions to his challenge, however, are not easy to find.

The WorLD Program has its own success stories. In Peru and Chile, two schools were geographically very close - right across the border from each other. Yet, in terms of culture and awareness of the other, the schools were extremely far apart. After participating in a WorLD project, the Chilean school invited their new Peruvian friends to a party in Chile. A bond was created where none had existed before.

Other programs resist an international focus. In Ghana, teachers and parents in WorLD schools are more interested in training their students in basic computing skills then they are in using the Internet to build bridges between their school and other places around the world. The education system is focused on providing students with a solid, well-rounded education and the skills necessary to find jobs. Computer skills will help them find jobs, international collaboration will not.

Even though the WorLD Program has seen its schools and client countries in the middle of this debate, collaborative projects remain a key component of the program. And they remain so because experience indicates that this is an avenue that can open a world of learning for students who have few other channels of access and it is an avenue that can challenge teachers to think in new ways.

Many teachers that are approached to participate in collaborative projects or computer integration will resist because it seems like more work. In some cases, interdisciplinary projects that involve teacher teams can be effective. In Peru, teachers traditionally managed their own departments and did not work together. As a result of an interdisciplinary WorLD project, a biology teacher is studying local flora and fauna with her class. The literature class is researching references to their research in national literature. The English class is translating the

reports that other students are writing so they can be posted on their web site. The collaboration has transformed the way the teachers think about each other, their subjects and their teaching.

To be truly effective, collaborative projects and integrated learning activities need to be sustainable and that means supporting policies are required at the school level. If teachers are expected to put out-of-school hours into the preparation of computer-based lessons, only the most passionate will fully utilize technology. Until school administrators enable all teachers to develop their computer skills during regular hours, technology integration will not be sustainable, nor will it become pervasive. With limited budgets and understaffed teams, most administrators are unlikely to adequately empower their teachers. Ultimately, integration at the class level will require policy from the national level.

Leverage Through Partnership. For decades, the World Bank, other development organizations and the donor community have been attempting to eradicate poverty and bring more nations toward economic and political stability. Even with their best efforts, the gap between rich and poor nations is increasing, and now will be exacerbated by those that have access to information technology, and those that do not. It is becoming increasingly apparent to many within these organizations that partnerships and unified objectives are required to meet their ambitious goals.

Donor organizations around the world are focusing more intently on partnerships with the private sector. However, corporations are more likely to be interested in development projects with a large enough scope and vision that the project can help develop markets and business opportunities. Development objectives can be significantly enhanced if companies see valid business opportunities as a result of development efforts.

In Uganda, WorLD has formed an alliance with Schools Online, a California-based nonprofit; the United States Agency for International Development (USAID); the Leland Initiative, an Africa-focused USAID initiative; LearnLink/AED, a Washington DC-based nonprofit; and I*EARN, a nonprofit based in New York *(Box 4. Partnership Roles)*. Together, this partnership will be addressing educational technology needs at primary, secondary, and tertiary levels. Their work will focus on rural wireless connectivity, integrating technology into classroom curriculums, teacher training at a national level, school-to-school collaborations, comprehensive program evaluations and national policy. Through the alliance, WorLD will be much more likely to realize its vision of national support for educational technology.

Costs. Although the prices of most information and communication technologies have declined dramatically in recent years, they are still too expensive for most developing country public sectors to support. While encouraging private/public collaboration is part of the solution to this concern, it is also important to look at many other opportunities to recover costs, in particular recurrent costs. For example, school computers can be made available to the community on a cost-recovery basis after school hours and on weekends. A key factor here is lowering the cost of telephone and Internet access, by allowing open competition among Internet Service Providers, liberalizing the provision of telephone services and moving toward wireless solutions.

Sustainability. The WorLD Program has been funded primarily through development funds and contributions from governments, foundations and corporations. With over 25 countries on the waiting list for the program, WorLD recognizes that in order to expand, all aspects of its program have to move toward self-sufficiency and sustainability.

For schools that have already achieved Internet access, sustainability means the ability to survive economically without benefit of donation but through means of commerce. For governments and industry, sustainability requires national policies to provide a business climate

that will attract viable connectivity and infrastructure solutions. For training institutions, sustainability translates into skill and knowledge transfers that enable ongoing, localized training. For Ministries of Education, sustainability equates to an appreciation for the value of educational technology and a commitment to integrate computers into national education plans.

The significance of this realization cannot be understated. Without an eye toward sustainability, WorLD and its partners will not be able to guarantee the continued success of their base, nor can they hope to realize their vision of reaching from thousands of recipients to millions.

5. REACHING FROM THOUSANDS TO MILLIONS

The most important challenge facing the WorLD Program is to turn early local successes into sustained progress at the national level. In taking the next steps toward its vision, WorLD hopes to directly impact more than 3 million students in 30 countries with a multidimensional strategy that builds capacity at local and national levels. The core objective of WorLD's expanded vision is to demonstrate educational technology models that can catalyze widespread adoption and further acceptance by local authorities.

Building the Information Infrastructure. The disparity between people with access to technology and those without is shocking. The United States has more computers than the rest of the world combined -- and while a PC costs less than one month's wages for a U.S. citizen, the same computer takes 8 years' income from an average resident of Bangladesh (Longworth, 1999).

Even though the Internet is referred to as "global," less than 2% of the world's population actually has access. While communication and information technology is transforming the industrialized world, developing nations are largely cut off from this revolution. To change this situation, we need to think in new ways about building the information infrastructure.

Recycled Equipment. Purchase a computer today and in 18 months it will no longer be leading-edge. In 3 years it will be seriously outdated. Rapid turnover of computer equipment is a hallmark of the technology industry. For those with assets, acquiring new equipment on a regular basis is part of doing business. For those less fortunate, the price of a new computer puts technology completely out of reach.

In the United States, literally thousands of used computers, many of them Pentium-class, are replaced every month. This equipment often ends up sitting idle in warehouses or destroyed. In Massachusetts, obsolete electronic components are being turned into filler for potholes. (Eliot, 1999).

In 1997, John Perry Barlow took a trip to Africa to assess the level of technology and Internet connectivity. In Uganda he visited Mengo Secondary School, a WorLD school. He wrote in "Wired" magazine, "Even though it was a Saturday afternoon and no one was compelled to be there, the little room was packed with painfully shy kids, clustered five or six to a machine, designing Web pages in PageMill with 386 processors and floppy disks. Everything was taking forever, but they waited for the screens to redraw, pixel by pixel, with the patience of angels." WorLD has achieved many of its successes with labs composed of 486 machines.

Recycled computers present a viable alternative for developing countries. To substantially expand the computer base, these systems need to be brought into developing countries in numbers that far exceed WorLD's current ability as a non-profit organization. Where governments cooperate by reducing import duties, it should be possible to establish a business model that encourages trade in recycled equipment and that prompts the next wave of customers to get involved in the information age.

Distributed Computing. Price has kept the number of computers in developing countries relatively small. Details vary from country to country. However, the basic problem remains. Computers are simply too expensive for most people and in developing countries that is true even for middle and upper classes. Recent findings indicate that low-end computer prices in the United States are stabilizing around $700 - $800. If this is true, the price of personal computers may not continue to drop as many have predicted. And that price is still too high for many countries.

Recycled computers are one alternative. Distributed or networked computing may be another. Vendors such as Hewlett-Packard, Sun Microsystems, Oracle Corporation, and Cisco Systems are predicting the advent of digital devices - simple, inexpensive units that can access the Internet and applications across phone lines, cables or wireless connections. Examples of these devices are already entering the market.

Although distributed computing is still an early market and lacks the infrastructure required to make it widely applicable, the concept holds great promise. If it succeeds at the level industry leaders predict, distributed computing could have an enormous impact in developing markets. These devices will be easy to use, simple to maintain, and truly cost-effective, all of which makes them applicable to a much larger percentage of the world's population.

Telecom Reform. The greatest impediment to the use of the Internet in developing countries is the high cost of telephone service. Monopolistic or government-controlled telecom services do not allow for the competitive environments that reduce telephony rates. In Ghana, where competition prevails, ISPs pay approximately $2,500 for access to the international network infrastructure. By contrast, Kenya maintains a telecom monopoly and ISPs pay approximately $8,000 for the same service (Petrazzin, B. & Kibati, M., 1999). *(Figure 6. Leased-line prices)*. An OECD study published in 1996 showed that the penetration of Internet hosts is five times greater in competitive than in monopoly markets, and Internet access in countries with telecommunication competition has grown six times faster than in monopoly markets (Paltridge, S. 1996).

Telecom reform is a key component of WorLD's strategy.   In most developing countries, the education sector is among the most influential politically. While most Ministers of Education do not typically understand telecom issues, they do understand the potential benefits of schools connected to the Internet. Parents, too, are aware of the need for their children to have access to technology to succeed in life. Business leaders are keenly aware that for them to survive the forces of globalization, modernization and market liberalization, they have to upgrade the technological and information skills of their labor forces. The critical step is to make these constituencies aware of how existing telecommunications environments are putting a brake on their objectives, and to get them involved in creating change.

WorLD works with its partners to increase the base of potential consumers, test alternative connectivity solutions, and apply political pressure. In those countries where aspects of this approach have been tested, results have been mixed. In Chile, the local telecom company offered all Chilean schools free e-mail accounts and unlimited Internet access for five years. Lease lines were donated to schools in several other countries as well. However, most WorLD schools are still paying connection charges that are too high to be sustainable without assistance. Over the next 18 months WorLD hopes to work more closely with Ministries of Education, policy makers, and business leaders find sustainable, long-term solutions at both local and national levels.

Satellite Communications. In countries throughout the developing world, cellular, satellite and wireless technologies combined with innovative business models are beginning to

answer the telephony demand left unmet by traditional wireline technologies. Despite the tight reins of control that hold back private telecom development in many Arab nations, growth is beginning thanks to satellite technology, which is one of the hottest telephony solutions in both urban and rural areas (Careless, J. 1999). In Latin America, the launching of new satellites and the increased availability of competitive licenses is reshaping the satellite market from isolated national areas into a pan-hemispheric base (Foley, T. 1999). In Africa, where companies are small, the drivers for satellite communications are government mandates, such as health services and education (Kazdoy, A. 1999).

Satellite and wireless technology may be the only sustainable connectivity solution not only rurally, but in urban areas as well. Even in the major cities of developing countries, existing telephony infrastructure is unreliable and extremely expensive. In Uganda, for example, WorLD schools pay "per minute" access fees that result in telephone bills averaging $200 per month for only one hour of connectivity each school day. The situation is equally dire in other WorLD countries.

Through wireless plans currently in place, WorLD hopes to pilot 24-hour, 7-day-a-week Internet access for approximately the same rates schools are currently paying for 1-hour-a-day, 5-day-a week connectivity. Stand-alone VSAT, stand-alone one-way receive VSAT plus dial-up send, wireless LAN, VSAT with wireless LAN, and high frequency radio will all be compared through this pilot. Each option will be tested for its sustainability, costs of operation, usability, maintainability, and access speeds. *(Figure 7. Proposed VSAT and VSAT with WLAN Configurations)*. The pilot will capitalize on the ability of satellite systems to reach a large base of users dispersed across a wide geographic area. Results will be published and will be used by WorLD to bring affordable connectivity solutions to more schools worldwide.

In another model being tested by USAID in Uganda, urban-based ISPs will bid for the opportunity to extend their businesses rurally. Development monies will be used as a venture fund to spur business and market development in rural regions. By covering the initial capital costs of a new business, USAID will help entrepreneurs reduce the risk of rural expansion.

Building Revenue Models. Even in places with unreliable connectivity, schools are moving toward a model that enables them to generate revenue from their computer labs. Schools in places as diverse as Uganda and Peru have begun to provide computer courses, e-mail access and other services for their local communities. In some cases, the schools are able to subsidize their recurring connectivity and lab maintenance costs through these activities.

Transitioning to Telecenters. Victoria, a biology teacher in Uganda, was so thrilled with the capability inherent in the computer lab she managed that she decided to make it available to her students' extended families. She also recognized an opportunity to raise monies that were desperately needed to purchase new equipment. Victoria began offering courses to the community surrounding her school approximately 1 year ago. She is now teaching more than 35 courses on every subject from Computer Basics to Graphic Design. And she raised enough money to buy two new computers and a high-end printer for her school, an extraordinary feat in a country with an average income of only $250 a year.

In Zimbabwe, WorLD is pioneering a "dual-use" telecenter concept that is transforming schools into community-based centers. All WorLD schools in Zimbabwe are currently participating in the project. One school raised $600 in one month by training education officers in their facility. WorLD plans to work with all of its client schools to develop business models that will enable the schools to sustain their computer labs and Internet connectivity long after WorLD subsidies have ended. The final phase of WorLD training focuses on developing management skills, entrepreneurial thinking, and effective business plans.

Building the Human Infrastructure. Ultimately, the impact of any program is measured by the impact it has on people, on how it transforms their lives, their opportunities, and their role in society. Developing countries lack not only information infrastructures, they also lack the human skills and knowledge required to build, support, and maintain the information economy. This is by far the greater tragedy because it is counted in human lives and lost opportunity.

National Teacher Training Institutes. The greatest, long-term contribution of WorLD training lies in transferring its materials and knowledge to Ministries of Education and national teacher training institutes. The first step in this process is to gain the ministries' support of such a knowledge transfer.

In Uganda, WorLD is working with USAID and other partners to customize full-term courses for ITEK, the government-sanctioned Institute for Teacher Education. Once training materials have been developed and tested within ITEK, WorLD trainers will begin working directly with ITEK staff enabling them to deliver, modify and update course materials. WorLD will also work with ITEK until their staff can successfully train teachers at the primary and secondary levels on educational technologies and the integration of computers into classroom teaching.

With this train-the-trainer approach, Uganda will have the capacity to provide all new teachers with extensive computer skills. This will be a benefit even to those teachers who are placed in schools with no computers, because the new teachers will always be able to go back to their training centers where they can continue to hone their technology skills and stay up-to-date in their subject specialties

In Senegal, a geography teacher who had been teaching for many years was providing population statistics when a young student raised her hand and informed her instructor that his data was outdated. She had learned on the Internet that the actual numbers were now much higher. Incensed that a student would correct him in class, the teacher went to the school's computer lab to see what they were teaching his students. As the computer coordinator demonstrated the capability of the Internet, the geography teacher began to understand the power it had to reinvigorate his teaching. He is now a convert and uses the lab regularly.

Transferring Technical Knowledge. The *Computers for Everyone Campaign* in Brazil collected used computers and passed them on to community centers and neighborhood associations. With less than a year's effort, the campaign had two storerooms full of broken computers that needed repair. The campaign director gathered a group of youths from the poorest sections of Rio de Janeiro and began teaching them computer maintenance. Those humble beginnings led to a new organization that transformed the lives of many disadvantaged children.

Bringing the capacity to maintain, refurbish and build technology directly into the mainstream population, and particularly to the youth, is a powerful concept for the advancement of the information economy in developing countries. In many cases, computer vendors do not maintain local service facilities. Computer repairs must either be handled by shipping equipment back to a distant vendor – a virtual impossibility in countries with high shipping costs, inadequate transport infrastructure, and theft – or by local technicians. In most cases, these individuals were trained abroad or have self-trained through an arduous and painstaking process.

As the base of computers grows within developing countries, the need for locally trained workers to install, maintain and support these systems will increase. Corporations, such as Cisco Systems, Microsoft, and Oracle, are already establishing training academies in high schools,

colleges and community centers worldwide. These institutes train and certify students in a variety of computer related skills. Microsoft trains students in application software, operating systems and network administration. Oracle-certified graduates may have database administration, HTML coding, or JAVA programming skills. Cisco provides network administration and management training. All of these skills are highly valued in the markets of developing countries and as the infrastructure expands, they will be highly valued in developing countries as well.

Benefits Beyond the Technology. The WorLD network of schools is composed of a human network of people striving to learn more, communicate more and discover more about the world in which they live. Ultimately, the power of the technology is in the content and the communication.

Software developers, publishers and educational institutions have been struggling since the early days of application software and multimedia to develop effective education-based products. Due to the differences in education standards not only across countries, but also within countries, these products often do not integrate into the curriculum. As a result many computer-based education products find their way into the classroom as ancillary materials supporting a portion of the curriculum rather than as an integral part of the learning process.

The rapid growth of the Internet suggests that the best tools and information sources may be those that are not pre-engineered, but rather that provide an opportunity for discovery. The material on the Internet provides a wealth of information that can be drawn upon to enhance students' learning experience in any curricular area. This is particularly true in those environments in which traditional resource materials are lacking or nonexistent.

In Uganda, a boy's secondary school was given an assignment to study power - between governments, in their country, in their community, at home. The students did research on the Internet, which they supplemented with field research. By combining this information, the students had the ability to study power from several perspectives. In their electronic report, the students concluded that power is not always what it seems, nor does it always reside with the people you would expect. They also concluded that one should always question power - an important lesson for students in a country with a history of dictatorships.

A possible conclusion is that content should be available from many sources. And that students and teachers everywhere should be given the power to develop their own content.

Building a Base of Support. In their client countries, WorLD and its partners plan to leverage their accomplishments to stimulate new reform efforts and to capitalize on those already in place. To be effective, educational change must address all levels and components of the system in a coordinated effort. A vision that attempts to change local practice without including national policy is not likely to result in pervasive or sustainable change.

Integration at the School Level. During the 1998-99 WorLD evaluation, teachers said the greatest barrier to technology integration was the difficulty of squeezing computer-related activities into the school day, given curriculum and testing requirements (Kozma, R, et.al., 1999). The report concluded that "the dissonance between wanting to use computers frequently and not being able to do so represents a broader conflict between the formal curriculum and assessment policies of a country and the intended computer-based innovation." Although this conflict varied between the countries evaluated, two forms dominated. In some cases, teachers perceived no value for computers in the national curriculum. In other cases, national objectives for technology were narrowly focused on teaching students basic computing skills.

Teachers need effective tools, techniques and assistance that can help them develop computer-based projects and activities specifically designed to raise the level of teaching in required subjects and improve student performance on national exams. Since all countries have unique education standards and requirements, tools need to be flexible. However, they cannot be so generic that they overburden teachers with large learning curves, which, unfortunately, has been the case with many "educational" tools.

It has been shown that teachers can compose a tremendous support structure for each other. Teacher support groups have played a critical role in the success of programs like Apple Classrooms of Tomorrow (Sandholtz, Ringstaff, and Dwyer, 1997) and I*EARN. During periodic meetings, participating teachers share their projects, activities, and materials and their strategies for integrating these into their courses, for making do with limited computer resources, and for managing their school day.

Although there is significant value in face-to-face meetings, as I*EARN's annual International Teacher's Conference demonstrates, Internet access can extend assistance to even more participants. Virtual teacher networks are currently being field-tested by a number of software vendors, Internet businesses and education companies. Through these networks, teachers will have the opportunity to share successes, furthering the use of computing technologies in classroom teaching and simplifying the process for new teachers.

Integration at the National Level. The lack of national education policies related to technology is another major barrier to integrating computers into classroom activities. More than 50% of WorLD teachers and more than 70% of WorLD administrators noted this as a barrier to their use of computers (Kozma, R. et.al., 1999). Even simple changes at the national level can have a tremendous impact on computer integration, as a Romanian school found when it attempted to integrate computers into the classroom activities. Teachers and students faced a significant problem because the extra classes they had to add to achieve integration made the students' schedules too intense. The situation began to improve when the Romanian ministry of education included these activities in the national curriculum's list of optional subjects.

WorLD plans to work with its partners, education ministries and national policy advisors to identify ways that technology might be used to address national educational priorities and needs. Through these efforts, additional concerns, such as teacher shortages, professional development for teachers, delivery of education to rural areas, and supplementing meager instructional materials, can also be addressed. The goals of WorLD and its partners could then be coordinated to meet the curricular needs and priorities of each country, strengthening the impact of the WorLD program, leading to more sustainable solutions, and further encouraging national rollouts of educational technology.

Integration at the Community Level. Programs such as *Communities in Schools* and *Neighborhood Networks*, an initiative of United States' Housing and Urban Development, have demonstrated the impact of community involvement in schools and technology centers. *Communities in School's* programs are dedicated to keeping low-income students in school by mobilizing members of the community to share their talents and skills with students and schools. *Neighborhood Networks* assists HUD-subsidized residents to establish computer-based community centers in housing projects. Completely community driven, these centers provide computer job training, General Equivalency Diploma certifications, health care, micro-enterprise development, child care and social services.

In Brazil, the *Committee for Computer Science Democratization*, an outgrowth of the *Computers for Everyone Campaign* mentioned earlier, forms community-based computer schools in low-income communities. The centers, which are initiated, coordinated and staffed by members of the community, are self-funded and self-managed, functioning as social enterprises.

One graduate of the program was able to leave his job as a cook's helper to become a computer programmer. He now hopes to study medicine or school administration.

Integrating schools into the local community is a key element of WorLD's strategy for the sustainability of its program. Potential outcomes might be opening computer facilities during off-hours to train parents in computer skills.   In return they could provide volunteer services to the school. Schools could also collaborate with local businesses to place WorLD students in technology-oriented internships. Or school projects could be designed around issues or topics that address important social and economic needs within the community.

6. CONCLUSION

Programs like WorLD can lead market growth; transform the way teachers think about teaching and students feel about learning; change the way people think about education; and set the stage for a truly global community that builds bridges between people the world over.

Market Development. In many WorLD countries, the education sector represents a very significant market opportunity. Government officials recognize the central role of education in their countries' stability and economic growth. For this reason, an increasing number of ministries of education are obtaining substantial funds to reform their education systems. Programs like WorLD can help these policy makers understand the benefits and value of educational technology. In addition, the program is developing models for sustainability that adhere to the economic realities of their client countries.

Changes in Pedagogy. A focus on integrating technology into the curriculum and collaborative projects produces a fundamental shift in the way teachers teach and the way students learn. The WorLD evaluation shows that students, teachers, and administrators have changed their perspectives about educational technology as a result of the program. And success stories from around the globe confirm that individuals' lives are profoundly affected by their interaction with the program.

Views on Education. Demonstrations of the power of the Internet change the perspective of ministers of education and other government officials. When policy makers understand what is possible with educational technology and the differences it can make in the lives of their students, their perspectives are transformed. This leads to increased education spending and changes in national policy and the supportive infrastructures. In countries with centralized educational ministries, it may be possible to affect national change more easily than in larger, decentralized systems. As a result, it may be possible to help some developing countries leapfrog ahead of their developed neighbors.

Building Bridges. Through these programs, teachers and students in developing countries have access to the incredible wealth of educational resources available on the Internet. Teachers share lesson plans, reference materials and ideas. Students enter virtual libraries, museums, encyclopedias and educational web sites that provide learning opportunities unthinkable through standard teaching methods. Together, teachers and students around the world can engage in collaborative educational projects with peers, using the Internet and e-mail to research, share and present their work. In addition, teachers and students create new educational websites, which share their knowledge, heritage, perspectives and aspirations with the rest of the world, so that others may learn and benefit. In so doing, they can preserve their culture, language and history. For the first time in history, youth in developing countries have a "voice" which enables them to be heard around the world, and to contribute to the body of world knowledge.

WorLD seeks to find innovative solutions in its client countries that will lead to a broader acceptance of computers in education. To do this successfully, the program has to focus on all aspects of technology integration - from hardware delivery to Internet access to professional development to local and national involvement. WorLD has formed a number of alliances with development organizations, nonprofits, and businesses. Together they are demonstrating that a unified vision, shared responsibilities and innovative problem-solving are making a world of difference for students everywhere.