



Case Study

Guatemala

Invigorating Mayan Language, Culture, and Education

Bilingual Education

Andrew Lieberman

Andrew Lieberman was the
Project Director and
Chief-of-Party, El Quiché,
Guatemala

Computer-
Mediated
Professional
Development
Guatemala

This case study about a bilingual education project in Guatemala provides insights and lessons into practical uses of information and communication technologies (ICTs) for training teachers. Though focused on strengthening cultural identity in indigenous Mayan communities by enhancing bilingual and multicultural education, many of the technology applications can be replicated to other geographic settings and cultural contexts.

The pilot project¹ was designed to determine, test, and demonstrate ways in which ICTs can support bilingual education and help preserve and invigorate Mayan language and culture in Guatemala. The project's many objectives included materials creation in print, audio, and CD-ROM for pre-school students; training of pre- and in-service teachers; and ICT support for government agencies, private sector entities, and NGOs.

The project sparked tremendous interest in the uses of technology. Many of the leaders in the bilingual education movement now endorse the need for ICTs. Due to lowering equipment costs and improved telecommunications infrastructure, technology is becoming more accessible, which contributes to the growing interest in applying ICTs as tools to achieve social and educational goals.

This case study shares the lessons and insights learned in Guatemala and focuses on the impetus behind the project and the design and implementation approaches that proved successful—as well as those that did not. Moreover, the study highlights the local production aspect of the activity, an often neglected component of ICT-based initiatives. Based on global experience, the LearnLink project team knew that extending ICT capability in developing countries and



“ We are not myths of the past, ruins in the jungle or zoos. We are people and we want to be respected, not to be victims of intolerance and racism. ”

Rigoberta Mench'u Tum,
winner of the 1992 Nobel Peace Prize



“ [This project] motivates the students... It's important that it is in their native language, which will help them take pride in their language and culture. ”

José Guadalupe Pérez, Center Manager



Computer-Mediated
Professional
Development
Guatemala



communities is most successful when the information and communication results are two-way, both enabling the access and the dissemination of information, knowledge, and wisdom. Through the Guatemala activity, remote Mayan communities produced creative and beautiful materials not only for teaching and learning but also for preserving their culture.

Guatemala: Country Context

Civil war in Guatemala broke out in 1954 when a military coup unseated the country's popularly elected president. Under the military rule that lasted until the mid-1980s, plantation development escalated, especially on lands formerly held by Maya. Rural, indigenous, and mostly illiterate populations suffered from systematic disappearances and massacres, scorched earth practices, and forced migration that resulted in social dislocation and abandonment of cultural traditions and rituals.

Following the end of the war in 1996, the Peace Accords defined a new vision for the country's development process, particularly with regard to the inclusion of the Maya. The Accords respond directly to the historical neglect and under-investment in education for this indigenous population, highlighting the government's new role in fostering economic opportunity, democratic participation, social inclusion, and multicultural understanding.

The objective of LearnLink's work in Guatemala was to contribute to the peace process by strengthening access to quality intercultural bilingual education in the Department (state) of El Quiché. Located in the western highlands of the country, 95 percent of El Quiché's population is rural and indigenous. In 1996, the school enrollment rate was 9.4 percent, compared to 31.2 percent for the whole country and 67 percent for the Department of Guatemala, the national capital. Promotion rates in El Quiché are slightly under 50 percent.

Guatemala is multiethnic, multicultural, and multilingual, with 23 indigenous languages spoken throughout the country. The challenge is to ensure that the country's multilingualism and cultural pluralism is in line with education planning and policy, particularly in the areas most affected by years of armed conflict and social exclusion. Despite important yet limited interventions, many teachers in indigenous areas have little understanding of the local culture, much less ability to communicate in the local

language. Even Mayan teachers operating in areas with high indigenous population density still possess limited written language skills and are essentially ill prepared to teach Mayan children in their own languages or using bilingual education pedagogy.

Historically, pre- and in-service teacher training has been inadequate, particularly within the context of active learning and intercultural understanding. Students prepared in Guatemala's teacher training institutions received virtually no training in Mayan language literacy, first and second language learning and bilingual pedagogy, multigrade teaching methods, outreach techniques to bridge the gap between home and school educational environments, pedagogical understanding of Mayan cultural concepts, or operational notions of interculturalism. In addition, there were few educational support materials written in Mayan languages, and those that had been developed were not readily available to teachers or other educators working in the indigenous regions of Guatemala.

In the past few years, a tremendous effort has been made to address some of these shortcomings in the Guatemalan education system. LearnLink is one of those efforts. Using ICTs, LearnLink developed and applied tools for the effective use of educational and communication technology to better prepare bilingual teachers in the Department of El Quiché.

Box

Profile of Juanita

1

On Juanita's first day of school, she is frightened and does not understand what people are saying. They are speaking Spanish, and she only speaks K'iche,' the Mayan language spoken in Zacualpa, her village in the western highlands of Guatemala. Juanita's parents were reluctant to send her to school, fearing that—as occurred with her older brother and sister—she will learn to favor Spanish over her native language. With no other school in the community, however, they defer to the mainstream Spanish-speaking world to help ensure a better future for their daughter.

Where are the bilingual teachers?

Based in Santa Cruz del Quiché, LearnLink's Proyecto Enlace Quiché, as the activity is known locally, began working in early 2000 to prepare teachers to teach in the local languages of K'iche' and Ixil. Among other activities, four teacher training schools in the region were selected based on their inclination and commitment toward bilingual education. Educational technology centers were installed in these schools — one in Santa Cruz del Quiché and three in the rural villages of Joyabaj, Nebaj, and Cunén. Each center contains at least 12 computers with software and supporting peripherals (printers, scanners, and a CD writer), as well as a digital camera, TV/VCR, video camera, cassette recorder, and a photocopier.

The centers are open before, during, and after school hours so that others in the community may take advantage of the ICTs. Initially supported by project funds provided by USAID and a member of the project's staff, the centers are now financially and administratively independent. Students pay a small annual fee in addition to their other school costs, and outside users are charged an affordable fee for specific services. The schools have integrated the centers into their school budgets and have established funds for expendable supplies, future computer upgrades, and other expenses.

Eventually, as outreach and marketing activities take hold, members of the community at large also will use the education technology centers for personal and professional development purposes.

Together, the activities associated with the Proyecto Enlace Quiché are designed to help preserve and invigorate indigenous languages and culture while paving the way for rural communities to move into the modern, information-based world

Developing Culturally Appropriate Mayan Language Materials

Project staff began their work by collecting, analyzing, and cataloging existing core educational and didactic materials for teaching K'iche' and Ixil. They established a network of individuals and institutions — schools, local NGOs, government institutions, and other USAID projects — to provide the resources. A library of more than 300 books, magazines, journals, and other materials was established in the project office, which forms the foundation for the multimedia

learning and reference resources that are being disseminated to the teacher training schools.

Although some educational materials did exist, obstacles such as printing and dissemination costs kept the materials from reaching those who need them most. Too often, the materials remained in warehouses, forgotten and unused. After analyzing the materials they collected, project staff identified gaps in the quality and quantity of information and began working to fill them with a series of CD-ROMs for use in the project's bilingual educational technology centers and other education institutions.

CD-ROMs offer a means of disseminating large quantities of information at low cost (approximately \$1 per CD in rural Guatemala). In addition, CD-ROM technology facilitates reproduction of materials because exact copies can be made of the entire contents at very low cost and with equipment that is continually becoming more available in rural Guatemala.

In the interest of reaching the most remote populations, the project's CD-ROMs and other materials have no copyright limitations — anyone may copy and distribute them freely, identifying the sources: USAID/AED/LearnLink/El Quiche project.

Collecting, compiling, and digitizing resources

- *Conociendo Nuestro Idioma – Knowing Our Language*
To address the problem of dissemination, several existing and original pedagogy and grammar manuals were put into digital format. This CD-ROM contains a total of six books that support improved bilingual and intercultural education and teacher training, specifically in the languages of K'iche' and Ixil, as follows:
- *Escribiendo K'iche' and Escribiendo Ixil*. These two books, by the Universidad Rafael Landívar's Instituto de Lingüística/RODIPMA, are classic works for teaching Mayan language literacy to Mayan speakers. They cover the alphabet, grammar, punctuation, and dictation exercises and are a key resource for Mayan language teachers. In electronic format, they are used as self-study guides.
- *Gramática Pedagógica Ixil*. Because no teaching guides of this type existed previously, this Ixil grammar book was created by project staff. The electronic format makes it unique among

teaching guides in Guatemala, including 36 interactive exercises that users can work through at their own pace, practicing and conducting self-analysis tests on content comprehension as they progress.

- *Kaqetamaj usik'ixik, utz'ib'axik ri K'iche' Ch'ab'al and Q'ab'il u'j tetz sik'le - tz'ib'uj Ixhil.* DIGEBI, the government agency dedicated to bilingual and intercultural education, is using these books in its current literacy training program for in-service bilingual teachers. In CD-ROM format, they can be used for self-study and to review specific portions of DIGEBI's training program.
- *Manual de Sugerencia de Dinámicas que Apoyan mi Trabajo.* This manual, written by the Proyecto de la Niña/World Learning, was designed to help monolingual and bilingual teachers engage in more participative teaching methods in their classrooms, with a special emphasis on involving girls. Because it is in digital format, the user has the advantage of being able to review the entire content, adapt it to the specifics of his or her classroom, and print only those sections that are needed.

Engrandecemos Nuestro Pensamiento – Let's Broaden our Thinking

Designed by the project's creative materials and multilingual education specialists, this CD-ROM is rich in fun and informative interactive games, making it one of the most popular multimedia packages for learning K'iche' and Ixil in the centers. Its main objective is to help bilingual (Spanish and K'iche' or Ixil) pre-service teachers improve their reading, writing, and listening comprehension skills in their own Mayan language. A series of games and exercises include introductions to the K'iche' and Ixil alphabets and pronunciation guides of all the sound combinations with visual and aural examples. The games also contain listening samples comparing K'iche' and Ixil sounds with Spanish sounds. A vocabulary list of the colors includes games that become progressively more difficult. Lastly, a series of games covers letters and sounds that are specific to each language. Designed for individual, self-paced instruction, the CD also includes a teacher's guide, which helps Mayan language teachers use it as an integral part of a complete course. In-service teachers also can easily replicate the content and use it in their primary school classrooms, designing their lesson plans and selecting specific games depending on the needs of their students.

Box Teacher Training Schools: Joyabaj and Nebaj

2

Joyabaj

Joyabaj encompasses not only the ancient town that pre-dates Spanish colonization, but also several hamlets and farms in the surrounding countryside. With a population of approximately 45,000, the area is located in the rugged mountainous area just west of the departmental capital of Santa Cruz del Quiché. Founded in 1993, Joyabaj's teacher training school—Instituto Privado Mixto Joyabaj—was established to address the scarcity of qualified primary school teachers in the area. Only 13 students attended the school during the first year, but by 2001, enrollment had reached 140.

Nebaj

The town of Nebaj is in the northwest of El Quiché, due north of the departmental capital. Unlike the other towns in which the project has worked, Nebaj is primarily Ixil speaking rather than K'iche'. With a population of over 56,000, the Nebaj region includes small villages, hamlets, and farms and is reachable only by dirt road. The terrain is mountainous, and the area receives abundant rainfall, making it lush and green year-round.

The Instituto Mixto Diversificado Ixil was founded in 1998 to try and meet the growing educational needs of the area, with a special focus on bilingual and multicultural education. During the school's first year of operation, 64 students were enrolled. Since then, enrollment has grown at an ever increasing rate, with 288 students by 2001.

Así se Ilustra mi Palabra – Illustrating my Words

When project staff and pre- and in-service teachers began the task of designing original educational materials to meet the needs of bilingual and intercultural instruction, they found that illustrating their materials with existing clip-art was inadequate. The project hired a graphic design firm to illustrate a database of culturally relevant vocabulary words in K'iche', Ixil, and Spanish. This CD-ROM contains 3000 illustrated vocabulary words, including those describing traditional Mayan rituals, foods, beliefs, clothing, and more. A valuable resource for educators involved in bilingual and intercultural teaching in these languages, the database can be used by individual teachers to create illustrated worksheets for teaching spelling to primary school students. Government agencies like DIGEBI can use the database to illustrate existing and future pedagogical guides. Moreover, the same illustrations can be used for all 23 Mayan languages throughout Guatemala.

Teachers and students create their own educational materials

As part of this activity, the teacher training schools were tasked with creating their own set of culturally

appropriate educational materials. These assignments seemed daunting at first. Teachers and school administrators, already overworked, were reluctant to take on the extra work of learning how to use the computers and other technology tools. Several teachers expressed feelings of intimidation toward the technology and initially thought they would have to spend an entire school year only learning basic software. In addition, they were uncomfortable with showing their lack of computer knowledge in front of their students. They were assured by project staff that learning to manage the computers and software would come naturally as they launched their materials creation projects. After a series of workshops providing hands-on learning, this temerity all but vanished, and the teachers and their students dove into their projects with great enthusiasm

1. Florezcan las Palabras de los Hombres de Maíz (Pre-school Materials) One of the project's objectives was to enable Maya children from the region to begin their schooling in their native language, an unprecedented opportunity in the history of Guatemalan education.

BOX

Teacher Training Schools: Cunén and Santa Cruz del Quiché

3

Cunén

In the 17th century, the town of Cunén grew out of a number of scattered farms and hamlets into a municipality that functioned largely as a governing center for the Spaniards. The town is located northwest of Santa Cruz del Quiché and is accessible only by dirt road. A highly mountainous region, the actual town is nestled in one of the region's many shaded valleys. Founded in 1998 to develop a bilingual education curriculum, the school Colegio Mixto Bilingüe Intercultural Hermano Oscar Asmitia opened, after two years of negotiations, with the support of the municipal government and local education officials. Nearly 125 students have been involved in the project, with over half speaking only K'iche'.

Santa Cruz del Quiché

Santa Cruz del Quiché is the capital city of the department, with a population of 20,000. Located approximately 164 km from the national capital, Santa Cruz is considered the major metropolitan area in this rural department, complete with markets, restaurants, hotels, a public transportation hub, and an Internet café.

Unlike the other three schools, Instituto Normal Mixto Juan de León Juan is owned and operated by the government and has large student body of over 800. Founded in 1960, the school's mission is to train primary school teachers. Juan de León does not have a strong bilingual education program, but the technology centers have provided the school with a good introduction to the concept.

Computer-
Mediated
Professional
Development
Guatemala

“ We now have a book on local traditions, which we never expected to have. We want to move forward and create more books... with games, poems, and other Mayan literature. ”

Miguel Ángel Camajá Cabrera, School Principal, Cunén



Bilingual illustrated storybook in Spanish and Mayan languages in Guatemala.

Recognizing that cultural identity, like other fundamental learning, is developed in the early years, a key component of the El Quiché activity is the production of early childhood development materials in K'iche' and Ixil. Specifically, the project called for researching, collecting, preserving—and thereby validating—traditional Mayan language stories, songs, and poems by producing packaged radio programs for young children for airing on local stations. Audio CDs of the programs also have been produced and distributed to pre-schools throughout El Quiché, thereby enabling a multimedia educational experience for children even where there is no electricity. (Battery-powered CD players are readily available.) Accompanying the audio collection is a set of illustrated print storybooks that were produced by the pre- and in-service teachers at each of the teacher training schools.

With assistance from project staff, pre- and in-service teachers began by documenting oral histories from the elders in their communities and, with the technology tools in the centers, using these stories to create educational materials for pre-school children. As a first step, the pre-service teachers and their instructors received a series of training sessions in computer use, audiovisual production, desktop publishing applications, and most important, field research and interviewing techniques.

Armed with digital cameras, cassette recorders, and great enthusiasm, the students split up into groups

and went into surrounding villages to seek out elders who would share their stories. A great number of stories were recorded, and then began the challenging work of transcribing them onto paper and translating them into Spanish. By mid-year the students had completed their field investigation for the storybooks, but they were not sure how to proceed in creating usable pre-school materials from this oral tradition. Project staff and consultants conducted a series of workshops for the students and their teachers on the practical principles of graphic design and layout as well as techniques for capturing oral history and converting it into a printable format.

The students began creating original illustrations for the stories and continued the difficult job of transcribing and translating these stories, which had previously never been put to paper. The best stories were selected, and staff from the project and each school worked with professional editors in Spanish, K'iche', and Ixil to polish the content. Using Microsoft Word and Adobe PageMaker, the students learned to design and format the books, not only ensuring that they would have a professional look and content, but also giving the schools a sense of ownership and pride in their accomplishments. The students decided to entitle their books “Florezcan las Palabras de los Hombres de Maíz” or “The Blossoming of our Ancestors' Words.” The final layout was completed at the end of the school year and 1000 copies of each book were printed in 2002, and disseminated throughout the department.



While the storybooks were being written, edited, illustrated, and designed, project staff and consultants were preparing for another, related task. Using existing equipment and resources, the students and teachers launched another challenging activity to turn their bilingual educational technology centers into recording studios. With support from the project, groups of students and teachers at each school wrote scripts based on the stories. They acted and recorded each part—in Spanish and K'iche' or Ixil, depending on location—and added sound effects, then mixed and edited the programs on the center computers. The finished products were recorded on CDs, and accompanying lesson plans were developed for use by pre-school teachers. DIGEBI, the government agency dedicated to bilingual and intercultural education, recommended local bilingual pre-schools where the programs could be piloted.

[The project] is good because it's enriched by a number of technical elements such as sound effects, voices, dramatization, and radio acting that allow the children to imagine and visualize the scenes. This enables them to learn more efficiently and effectively since, at that age, a child's mind works more through imagination and fantasy.
Osmán Ariel Girón, School Principal

By late summer the radio programs were completed and reproduced on CD, and agreements

were made with Radio Quiché and Radio Ixil for transmission. The first of the programs were broadcast in early 2002, backed by enthusiastic DJs, pre-school teachers, and parents.

The stories are interesting and will hold the students' attention because of the sound effects. They sound like they are live stories. The students will be more motivated to attend schools because not in all schools do they teach with stories. The technology helps tremendously because without it, it wouldn't have been possible to include the effects.

Pedro Alexander Tuluxan Grijalva, 11th grade student who translated a story from Spanish to K'iche' and recorded the voices

On February 6, 2002, the Proyecto Enlace Quiché presented all of its completed educational products and materials to more than 100 participants, which included USAID and local Ministry of Education officials, school principals and faculty, and, most important, many of the students and teachers who put in all the long hours and hard work to create their masterpieces. Students from the 10th, 11th, and 12th grades smiled proudly as representatives from their schools spoke to the audience and presented their works. The same sentiment was repeated many times by both students and teachers: "It was a lot of hard work, but now that we see the fruits of our labor, we know that it was worth it."



Student teachers in Joyabaj taking a break from school work

2. *El Pensamiento de Nuestros Abuelos — Capturing and Re-living Cultural Traditions*

To practice applying their newly acquired skills, the students also produced multimedia CD-ROMs containing local cultural information. Each school chose a traditional activity to research, from courtship and marriage to textile weaving traditions. For the storybook project, the students interviewed community elders about customs that were no longer practiced. They re-enacted many of these customs and recorded them using audiocassette recorders and digital still and video cameras. The result is a CD-ROM entitled “El Pensamiento de Nuestros Abuelos,” or “Our Grandparents’ Thoughts,” which tells about these traditions in a multimedia format, including text in the local language and Spanish, photos, video clips, and audio segments containing music and narration.

The project had a significant impact on the students; they're very creative kids, very participatory, and they're even more motivated with the computers. . . .

Miguel Ángel Camajá Cabrera, School Principal, Cunén

Lessons

Neither prior technological skills, large sums of money, nor sophisticated infrastructure is needed to implement an effective educational technology activity. The most important lesson that can be gleaned from this experience is that original educational materials can be created at relatively low cost even in the most remote

and resource-poor areas of the world. This type of activity could be replicated easily in almost any context.

Mastering educational technology is empowering. The Guatemala experiences have taught pre- and in-service teachers not only a valuable set of technology-related skills, but also a true sense of empowerment that motivates them to become more involved in their teaching.

Constructivist theories of education lend themselves to educational technology. This activity has employed the constructivist education theories of John Dewey, Jean Piaget, and others, which focuses on student-centered learning, where the teacher acts as facilitator and guide. The theories call for learning to take place in the context of students’ actual experiences and realities, making newly acquired knowledge more meaningful and increasing motivation to learn. Increasingly, education scholars are suggesting that technology is integral to constructivism. Multimedia programs are highly visual and interactive, which help motivate students and encourage creativity through the use of graphics, layout, and sound. Moreover, supporters of educational technology believe that teaching in these highly visual, problem-solving environments ensures knowledge transfer to higher order skills.

Technology integration takes time and thorough planning. Due to contractual constraints, the project was carried out in 20 months. Most of the first year

was spent in hiring the staff, planning, training, procuring and installing equipment, leaving just one full school year in which the project worked with the schools. This may not have been sufficient to create lasting change in teachers' behaviors or develop a sustainable administration. Moreover, installing, administering, and making good use of technology centers are complex tasks, and the people involved require continual training and support. The project provided numerous training sessions for project staff, center managers, and participant teachers, which proved essential for success.

Some suggestions to overcome these obstacles include

- incorporating technology at the annual planning stage;
- providing a series of short training sessions at each center;
- keeping a focus on pedagogy and not technology;
- granting awards to teachers who pioneer efforts in technology integration;
- designing simple activities with tangible products;
- buying multimedia laptop computers to take technology into the classroom;
- creating an Intranet site in each school; and
- forming a support network among different schools.

Technology centers must be selected carefully and expectations must be clear. The activity was designed to create four technology centers in four bilingual teacher training schools in the Quiché department. The technology centers were offered to the schools without defining the reciprocal commitment. While a memorandum of understanding (MOU) was written and signed, it was vague. A better approach would have been to carry out a more thorough diagnostic of the schools and develop a more detailed plan in coordination with the teachers. This plan should include the actions to be carried out by the school to prepare for the arrival of the center, the actions to be carried out once the center is installed, and the actions that will be carried out to allow for sustainability and permanent donation of the center. In this way, there is a stronger commitment and less need for negotiation once the center has been created.

The schools were required to provide the building, electrical connections, security, furniture, operating costs, and one computer teacher. These

conditions were easily met in all schools. To meet recurring operating costs, each school is charging \$3/month per student, and these funds are being set aside solely for the technology center. This amount also can be used to cover the cost of consumables such as paper and toner, as well as the salary of the center manager.

While the original budget specified that eight computers would be purchased for each school, procurement was carried out so that each school had laboratories containing at least twelve computers. However, with class size of 40 to 50 students, it is impractical to hold class in the technology center. Therefore, access to the center is limited. Ideally, future centers should have twenty to twenty-five computers so that an entire class can work in the laboratory at once.

Materials creation projects make good use of the technology but are complicated. The teachers and students were very enthusiastic about the projects organized to create a book and CD-ROM during the 2001 school year. The teachers coordinated actively with each other and the students, and each school carried out its fieldwork and digitized the resulting information (transcribing and translating interviews, digitizing photos, etc.). However, to translate this raw material into finished educational material, many other steps were required. In some cases the schools did not have the specialized skills, such as in radio script writing, editing in both Spanish and Mayan languages, and advanced use of software such as PowerPoint or FrontPage. The project provided some training through workshops, consultants, and the center managers. Unfortunately, in the final production of both the book and CD-ROM, most of the work ended up being done by the project center managers, with the support of the project specialists. Due to a lack of time and skill, students generally were not involved in these final phases. This posed a serious risk to their ability to be able to replicate these activities without direct support from the project.

A technology center can be a financial asset to a school if administered correctly. The project encouraged formation of a technology committee in each school, development of a technology plan, strict control regarding equipment loaned to

students and teachers, financial record-keeping, and preventive maintenance. The center managers worked with principals in these areas, and monitoring visits were made by project staff and USAID personnel. Despite these constant efforts, only one school (Nebaj) showed a real capacity and interest in most of these areas. To institutionalize these changes, the project needed more time and more consistent training and monitoring. This also could help schools create their own strategies to finance the purchase of more computers and other needed accessories rather than hoping that the project will donate more. Building local capacity in preventive and corrective maintenance is especially important to make best use of the center and protect the investment. Obviously, the principal cannot be solely responsible for these issues. The key person is the center manager, who should be a strong facilitator and have a competitive salary and perks, such as the use of a laptop. To avoid overload, the center manager needs an assistant who can carry out many of the routine tasks, including teaching classes.

Community access may not be a priority for schools.

The memorandums of understanding signed by each principal included a clause specifying that the schools had to give the community access to the centers and that the fees charged would be used for maintenance of the centers. In Nebaj, this was put into practice, and they have provided valuable services to appreciative community members and generated important funds. In the other centers, the principals' attitudes indicated that they felt this was more of a risk than a benefit. Since their current needs were being met by what the project was giving and what the students pay, there was no need to risk the equipment by bringing in "outsiders." This resulted in sub-utilization of the equipment and less benefit to the community than desired. If a specific project objective is to provide community access, it can be handled in several ways: the center can be managed by a community group other than the school itself, or a more explicit agreement regarding community access should be made at the outset. Also, the project can generate more demand for access in the community by applying social marketing and/or using vouchers for target groups to get them in to the centers.

Because the students occupy the center during most weekdays, the only time left for community access and extra student and teacher access is evenings and weekends. These time slots were seldom used. In two of the centers, voltage drops make the centers unusable during the evening hours. This problem could be solved, but the investment in a generator is high. Weekends easily could be used by staffing the center adequately. In Nebaj, this is being done successfully as the center manager works Saturdays and the assistant works Sundays, keeping the center open seven days a week.

CD-ROM production is complicated on many levels.

- *Platforms should be chosen carefully.* Each of the three CD-ROMs developed by the project specialists used a different platform. "Engrandezcamos Nuestro Pensamiento" is a flashy, visually rich, and highly interactive series of exercises for Mayan language learners. However, since it was developed in VisualBasic, programming time was significant and portability is limited. Moreover, only the project specialist could add more functionality. Even translating the system to another language or refining vocabulary would have to be done by an experienced programmer. In addition, this product cannot be incorporated into a web page. A product of equal or better quality could have been created more quickly and easily using a more favorable environment such as Macromedia Director. A product almost as good could have been developed using Java, which would have greatly increased portability and permitted web access. "Conociendo Nuestro Idioma," a collection of six digitized books, was developed in HTML using FrontPage. In some cases, materials were scanned, others were keyed, and still others were copied and pasted from Word and PageMaker. This was an efficient platform and provided significant flexibility, including the capacity to add interactivity and modify the content. The alternative, Adobe Acrobat, would have permitted faster development but would have limited interactivity. "Así se Ilustra mi Palabra" is a collection of clip-art in .JPG format. It is structured in such a way that end-users can extend or translate to other languages as needed.

- *Interactivity is key.* While CD-ROMs allow storage of large amounts of information on one CD, this is of little benefit to target populations who have limited access to technology and where the body of relevant information is limited. However, the value-added interactivity feature was well received — the relatively simple, multiple-choice and fill-in-the-blank exercises included in the Ixil grammar introduction are the highlight of that CD-ROM.
- *Each CD-ROM should be accompanied by a teachers' guide and training on its use.* While a brief teacher's guide is incorporated into each CD-ROM, the guides fall short of providing a full vision of how these products can be used. Teachers experienced in technology integration easily will think of creative and natural ways to incorporate these CD-ROMs into their courses, but teachers new to technology need more guidance.
- *A computer-based system for learning Mayan languages is prestigious to Mayan speakers.* The visual richness and complete multimedia learning experience of "Engrandezcamos Nuestro Pensamiento" has generated much interest. It helps to legitimize K'iche' and Ixil as important written languages and sparks interest in learning the written form. Speakers of the other Mayan languages are anxious for this product to be translated for their languages as well.
- *The most difficult part of the design phase is standardizing the language, vocabulary, spelling, pronunciation, and methodology.* The project included one of the most problematic Mayan languages, K'iche'. It is the most widely spoken, but there is little consensus as to rules for writing the language. The revision process, carried out in coordination with the Academy of Mayan Languages and DIGEBI, the government agency concerned with the bilingual education, produced opinions on translations that contradicted each other as well as the project specialist's views, which caused some discord. Future projects must be better coordinated at the outset, and all content should be prepared, reviewed, validated, and approved before beginning the programming.
- *CD-ROM creation requires significant time and effort.* Each CD had its special challenges. In the case of the electronic books, all the text and links had to be revised. The clip art CD required careful

scanning, naming, and organizing of each file. The interactive game CD, "Engrandezcamos Nuestro Pensamiento," required careful recording of thousands of sound files. It was a challenge to find people with the necessary patience and attention to detail to develop acceptable products. Despite a number of revisions, there are still some errors and weaknesses.

It may be that the project should not produce CD-ROMs. Instead, the project could support this capacity in other institutions. Ideally, permanent groups with external expertise in Mayan languages, such as the Academy of Mayan Languages, could create the CDs, with the project helping them through the process. When they have ownership of the product, they will be able to translate to other languages, update as necessary, and so on.

Building a library requires a librarian. The project was charged with building up a resource library in the project office and, later, with providing resource materials to the schools participating in the project. While some materials are readily available, many of the most beneficial are not commercially available, and seeking and acquiring them requires a series of visits, letters, and telephone calls. It is necessary to have one person who actively organizes the material and promotes its use. While these tasks were included as part of the Multilingual Education Specialist's functions, she did not actively tend to the library because work with the centers and the materials creation projects consumed all of her time.

A project web site is a necessity but requires effort to keep up to date. As a demonstration pilot project, it was important for the project to continually promote itself. The web page was an ideal forum to provide basic information and news, both nationally and internationally. The creative materials specialist designed an attractive web site and kept it up to date in addition to her other responsibilities. Project staff did not voluntarily contribute as much information as hoped for. A rule was made that after every event or significant activity, the person responsible would generate some content for the web page. However, this rule was not enforced. With more discipline and organization, the web page easily could become a repository for all project products.



Inauguration of an educational technology center attracts all ages



Mayan student teacher participating in a computer training class



Schools without Internet access can still design a web page and an Intranet site. Each school created a web page, which was published as part of the project's main web site. However, since the schools did not have access to the Internet, they could not see the page and, therefore, were not interested in updating or expanding it. The project considered creating an Intranet site in each school, which would have made the web page available to all students and teachers, but time did not permit implementing the activity.

Brochures and case studies are useful for marketing.

The projects created simple brochures every six months or so, describing the project and recent activities. These provided a low-cost means of selling their ideas of integration of technology and bilingual education. The case studies also provided more detailed data. Having these materials available facilitates responding to the numerous requests for information about the project.

Participation at conferences (including presentations and exhibits) can give exposure to the project and create prestige and demand. While these events signify an investment in time for preparation, mobilization, etc. they are highlights of the project. They bring recognition to the project, donors, and participants, and they create demand for the services of the project.

Looking Ahead

Since the initial trepidation on the part of the teachers and school directors when the bilingual educational technology centers were first installed, a true blossoming has occurred. A great deal of time and effort has been put into the development of the centers, and there are challenges still to come,

including the complete integration of technology tools into all aspects of the curriculum. Yet the outcome of this project is more than a series of CD-ROMs, books, and radio programs. It is an experience that has revolutionized the way these students and instructors learn and teach. These same students will graduate in a year or two and become teachers in rural primary schools. What better teacher than someone who has had the experience of creating learning materials in several forms of media from scratch, materials that are culturally relevant and meaningful to his or her students?

Footnotes

¹ The Guatemala activity is part of a seven-year Indefinite Quantities Contract (No. HNE-I-00-96-00018-00) of the US Agency for International Development (USAID). It was funded by the USAID Bureau of Economic Growth, Agriculture, and Trade (EGAT) and Office of Energy and Information Technology (EIT), and other USAID Bureaus, offices, and missions. It was operated by the Academy for Educational Development.

Computer-
Mediated
Professional
Development
Guatemala

