n Cambodia, as with many countries, computers are not well integrated into classroom learning. The cost of equipment is high, electricity costs can be prohibitive, and maintaining the equipment can be problematic. In addition, the machines are abused or attract viruses, teachers aren’t trained in use or maintenance, and quickly they stand idle. A new system, one with many self-contained computers run off one central processing unit (CPU)—thin client labs—is enabling Cambodian children to learn on computers and prepare themselves for achievement in the 21st Century.

BACKGROUND

Despite its constitution’s declaring that every child has the right to a basic education (Grades 1-9), Cambodia’s low net enrollment rates—dropping as low as 35% by the Lower Secondary Level—demonstrate the numerous deficiencies that afflict the country’s education system and contribute to families putting a low value on education (EMIS 2012). Low educational relevance and poorly equipped educational facilities adversely affect enrollment and retention. Faced with such challenges as severe teacher shortages, incomplete schools, over-age enrollment, and a low perceived value of education, Cambodia is working to make improvements to its education system.

World Education, Inc. has been working in Cambodia since 1991. Since 2005, the organization has received funding from USAID to improve access to and the quality of education in Cambodia over three consecutive projects. From 2005-2008, World Education implemented the Educational Support for Children of Underserved Populations (ESCUP) program to improve the educational opportunities and experiences of underserved groups. The Schools for Life (SFL) program (2008-2009) then expanded on the strong practices and lessons learned from ESCUP, and Schools for Life worked with 245 schools to improve school management and educational capacity. World Education continues to build on the solid experience gained through ESCUP and SFL to manage and implement the Improved Basic Education in Cambodia Project (IBEC).

IMPROVING BASIC EDUCATION IN CAMBODIA

Launched in 2009, IBEC has been working in Kampong Cham, Kratie, and Siem Reap Provinces. World Education targeted these provinces based on numerous factors, including their high poverty rates; the fact that they are major sending areas for youth migrating to Phnom Penh; their high female retention rates for basic education, which at the time of province selection were all below 20%; and their remoteness and minority representation.
IBEC works to address issues of educational access and quality in these three provinces through holistic programming, stakeholder-driven development, and improved educational relevance and management through four programmatic components:

1) Local NGO & Government Capacity Building and Advocacy for Sustainability: World Education works through local NGO partners and is assisting those project partners in strengthening their overall organizations to improve services to basic education through capacity building programs that are designed by the partners themselves and focus on management and governance. Throughout the project, World Education has helped its local partners work towards achieving certification of compliance with the Code of Ethical Principles and Minimum Standards for NGOs from the Committee of Cooperation in Cambodia. Additionally, assessments of commune councils that have received capacity building support since the beginning of IBEC indicate that they are ready to administer matching grants to schools.

2) More Equitable School Access: IBEC provides needs-based scholarships to vulnerable children at both the primary and secondary level. Additionally, the project provides grants to schools based on annual school improvement planning. These school grants are supplemented by centrally administered grants to improve schools through drilling wells, constructing water systems, improving general infrastructure, and setting up IT and science labs.

3) Improved School Management and Community Engagement: This component addresses both access (Component 2) and quality (Component 4) through various strategies such as capacity building support for both school planning and Technical Support Groups, leadership training, and identification of model education practitioners.

4) Improved Educational Relevance: IBEC improves the relevance of educational programming through life skills development, teacher education guided by Child Friendly School methodologies, and improved access to information technology (IT) by establishing computer labs using innovative thin client technology.

PROMOTING IT ACCESS THROUGH THIN CLIENT TECHNOLOGY

World Education is a leader in promoting digital inclusion and enhancing teaching and learning through thin client technology in Cambodia. Rather than each computer in the labs having a central processing unit (CPU), they run through a single CPU that is encased in a dust-proof container to protect it from the elements, which the instructor controls. Thin clients are compact and self-contained, with few moving parts. This cuts down on computer hardware costs, makes classroom management and computer instruction easier, and eliminates many of the typical breakdowns that occur in other
more traditional computer labs in Cambodia. For example, because thin clients are self-contained devices that are networked to a central CPU rather than to individual CPUs, thin clients are essentially virus and student proof. Students cannot upload software—particularly software that may contain viruses—since they do not have access to the CPU. This makes it easier to manage individual students’ computer usage and minimizes the networks’ exposure to damage.

Furthermore, since many areas in Cambodia have limited electricity—and many schools cannot afford the electricity costs that conventional labs require—IBEC installs solar panels to run each of the labs. The low energy consumption and solar panels reduce energy use and minimize running and maintenance costs, making the thin client labs not only cost-effective, but also a sustainable solution to providing students with access to technology. Under IBEC, World Education has established 23 thin client labs (365 workstations) in Cambodian schools that benefit an estimated 30,675 students to date. This is in addition to the 13 thin client labs established under other World Education Cambodia projects, bringing the total estimated student beneficiaries across all 36 labs to 36,526.

While thin client labs are cost-effective, they still represent a significant investment: Each lab costs approximately $12,000 to set up. Thus, the capacity of the schools’ management to support and facilitate school improvement planning and implementation is a critical factor in the successful implementation of thin client labs.

### Thin Client Labs Established by World Education

<table>
<thead>
<tr>
<th>Province</th>
<th>Labs Established</th>
<th>Estimated Student Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Kampong Cham</td>
<td>18</td>
<td>17,623</td>
</tr>
<tr>
<td>Kratie</td>
<td>5</td>
<td>3,683</td>
</tr>
<tr>
<td>Siem Reap</td>
<td>10</td>
<td>14,084</td>
</tr>
<tr>
<td>Mondulkiri</td>
<td>1</td>
<td>102</td>
</tr>
<tr>
<td>Prey Veng</td>
<td>2</td>
<td>1,034</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>36</td>
<td><strong>36,526</strong></td>
</tr>
</tbody>
</table>

Through prior programming, World Education had found that when schools lacked sufficient management capacity, development investments were often at serious risk. In an attempt to mitigate these risks, World Education has initiated a system to carefully assess (and when necessary, reject) prospective schools before implementing interventions under IBEC.

Through a multi-tiered approach initially introduced under Schools for Life, IBEC classifies schools based on their management potential. Project personnel gather data on project schools’ performance and management from multiple sources and sorts schools into three categories. Tier 3 schools are at a preparatory stage of development and struggle with meeting certain school needs (e.g., reasonable class
sizes, community engagement, and basic infrastructure). Tier 2 schools are at an intermediate stage in which they have potential to become quality schools but still need additional support. Tier 1 schools are advanced and are ready to receive interventions designed to promote excellence in learning and teaching, such as thin client labs. Interventions at all tiers are combined with properly designed capacity building activities to improve schools’ management potential. Through this tiered approach, IBEC can carefully assess which schools are capable of effectively establishing labs in order to maximize their use as well as impact student learning.

While establishing the thin client labs is a core activity, IBEC takes additional steps to ensure school directors, teachers, and students get as much use out of the labs as possible. The IBEC IT Team has trained 79 IT teachers since project start-up; these teachers are critical to helping the labs run successfully. Furthermore, to encourage teachers to use technology to enhance student learning, the IT Team also has trained 351 regular classroom teachers. In these trainings, teachers learn how to use the thin client labs and various IT programs, as well as how they can incorporate them into their courses to enhance teaching and learning.

In particular, IBEC promotes the Project Method of instruction to form links between classroom learning and IT. The IT labs have also been used for subject club activities, such as conducting research and creating PowerPoint presentations to present at province-wide fairs with other IBEC schools and producing school newsletters. Project assessments of thin client lab utilization revealed that students had high access to the labs and that the labs were satisfactorily maintained.

**LIMITATIONS OF CONVENTIONAL LABS**

In December 2012, World Education conducted a survey of conventional labs established by a different international NGO in 11 schools in the same provinces where IBEC operates. In these labs, four were still in operation, and seven were not. Of the four still in operation, three labs had over half—but not all—of their workstations still functioning, and one had less than half still working. Upon visiting one lab, World Education staff found that there were birds’ nests on many of the computers and desks, as well as water damage from rain, suggesting that the lab had not been used in some time. Labs in two of the schools with over half of the workstations still in operation used the labs only one or two times per week. At the time of the survey, the remaining lab with computers still in use claimed that it was used daily; however, it was currently closed while the school committee determined how much to charge students for energy costs.

In revealing problems the schools encountered with the labs, every school surveyed cited maintenance problems and energy costs as the top two problems. Similarly, among the closed labs, each gave those same reasons for closure. Two of these schools also noted that there were no
teachers available to teach the IT courses, and six of the schools indicated software problems. Ten of the surveyed labs cited their energy source as the electric grid, while one lab ran off of a generator and fuel. To run their labs, seven schools paid over $100 per month in energy costs (sometimes as much as $300 if the labs were open every day), and the remaining schools paid $51 to $100 per month. All schools surveyed only used the labs to teach computer skills: None used the computer labs to enhance teaching and learning as IBEC-supported schools do.

In contrast, all thin client labs that World Education has established are still in use and operating smoothly. World Education believes that thin client labs are more successful because of their low energy and maintenance costs. Since thin client labs inherently use substantially less energy than conventional labs and the labs established under IBEC use solar energy, schools with thin client labs do not see the significant increase in their electricity bills – often an increase that they cannot afford or sustain – that are common with conventional labs. Furthermore, IBEC invests in the teachers and school directors so that they understand the value that technology can add to the classroom. The training that IBEC provides teachers and school directors enables them to use the labs. With IBEC’s thin client labs, schools are able to significantly enhance student learning and digital literacy without significantly increasing their monthly operating budgets.

**ONGOING CHALLENGES**

While thin client labs have been successful in promoting digital literacy and enhancing student learning, they have also faced their own unique challenges. One of the most significant challenges has been retention of trained IT teachers to manage the thin client labs. The high rate of teacher turnover in schools is a pervasive issue within Cambodia’s education system and other components of IBEC: IT teachers are no exception. This continuous movement of teachers and managers to other schools greatly hinders capacity building efforts.

Another challenge relates to the Ministry of Education Youth and Sports (MoEYS) policy forbidding the use of licensed software in schools’ computer labs when open source software is available. While the policy was put in place due to the MoEYS’ inability to pay for licensed software for schools and to avoid legal issues that could arise if schools use unlicensed software, it may actually impede efforts to expand information and
communications technology (ICT) education. For example, in 2012, a private sector agent was interested in partnering with World Education to promote digital literacy and provide licensed software to participating schools at no cost to the government. Unfortunately, this partnership was not realized due to the open source software policy. Because of this, IBEC lost a valuable opportunity to collaborate with a leading software developer who would have made significant strides in introducing cutting-edge technologies to state schools. IBEC will need to continue to collaborate with MoEYS in order to reach compromises that are still aligned with MoEYS’ policies surrounding ICT access in schools but also allow for the continued expansion of technology access and use in Cambodia’s schools.

CONCLUSION

Despite these challenges, it is evident that thin client labs hold considerable potential in providing students with valuable access to ICT. Not only do their low energy and maintenance costs make them a cost-effective option, but they have proven to be an extremely sustainable solution. When coupled with IBEC’s model of choosing recipient schools using a tiered approach, providing training to teachers and school directors on how to use the labs effectively, conducting regular spot-checks, and providing additional capacity building and maintenance support following initial set-up, they are highly effective.

While IBEC will conclude in September 2014, World Education’s commitment to expanding student access to ICT will not. World Education is exploring public-private partnerships and sharing its results and expertise on establishing thin client labs with other agencies. The hope is that the establishment of thin client labs in schools will continue to expand across Cambodia as well as to other countries that may benefit from this model. Indeed, the thin client model has already generated substantial interest in several other countries, and other agencies are also picking up the model. This is a testament to the effectiveness, sustainability, and replicability of thin client labs and their capacity to drastically improve the learning landscape through ICT. Through thin client labs, World Education is promoting digital literacy and improving access to technology in order to enhance student learning and provide them with the skills they need to obtain better and broader life opportunities.
SUCCESS STORY: IT Integration Activities and Project Work Fairs Promote Constructivist Learning

Each year, IBEC-supported schools come together at one site in each province for an annual fair that displays students’ work through their Subject Clubs and Project Work presentations. “Project Work” enhances classroom learning by connecting the thin client labs with class work. This enables students to utilize the computer labs to conduct research on selected projects and prepare presentations using Word documents and PowerPoint presentations.

As a result, students strengthen both their research and computer skills, while also creating linkages between their classroom learning and the outside world. Teachers supervise these projects using guidelines they learned from IBEC-supported workshops on the Project Method, an important strategy IBEC uses to encourage the use of computers in teaching and learning.

Student presentations have reflected in-depth projects undertaken on various topics of relevance in their local communities, such as how plastic bags damage the environment, local history, the usefulness of sugar palm trees, and Khmer poetry. The range of topics explored and the research methods used are both innovative and stimulating. The students used open source resources on their thin client computers, such as Encarta, and conduct field research and interviews, to research topics and then utilize their newly developed skills with PowerPoint to present their research and findings to the audience—their fellow students and teachers.

These project demonstrations exemplify IBEC’s strong focus on “constructivist learning,” in which students create their own knowledge through research and then share them with their peers. Not only do these presentations serve as a source of accomplishment and pride for the presenters, but they also serve as a platform for students to raise important issues in their communities. For example, one group researched and presented on How Plastic Destroys the Environment. They had learned about the harmful effects of plastic in the classroom, which enticed them to pursue more information on the topic. Through their research using the thin client labs, they discovered both the harmful effects and potential solutions to the disposal of plastic.

This group was able to share this information at the Project Work fair, and they plan to take it even further: The group would like to start a campaign that integrates the lessons learned from their project into their schools. Their ideas include banning sellers from selling plastic bags in their schools, putting up posters or slogans describing the harmful effects of plastic, and attempting to carry out recycling initiatives. The students are committed to exploring and deepening their own learning, while also leaving an impact on the community. In all, six schools participated in Project Work fairs in the first year of IBEC (2009-2010), 16 schools in the second year (2010-2011), and 33 schools in the third year (2011-2012).
World Education is a nonprofit organization dedicated to improving the lives of the poor through integrated literacy programs, and economic and social development.

This series of technical briefs highlights program approaches that are breaking new ground and achieving results for populations where implemented.