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Using Technology to Improve Learning in Cerrito

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Using Technology to Improve Learning in Cerrito

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Using Technology to Improve Learning in Cerrito, Paraguay

An Interactive Qualifying Project
completed in partial fulfillment of the
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Executive Summary

Background
The schools in rural Paraguay have limited access to technology. However, the use of technology in education is vital in today's world. When students use technology they gain digital literacy and access to more educational material.

Project Goals
The team created awareness of how current applications can be used for education. For example, most students can use Smartphones. These access learning applications, and can serve both within and beyond the classroom.

Deliverables
The team delivered
1. A baseline inventory of each school’s technological resources of the schools for Fundacion Paraguaya.
2. A guide on how to use five applications for educational purposes. These include Khan Academy, Qom Application, Facebook, WhatsApp, and Microsoft Office.
3. A Facebook page with the directors and teachers from each school in Cerrito to serve as an exchange network for educational ideas and practices

Methods
To create the inventory, the team used online research, in-person interviews and on-site classroom observations at each of the ten schools. To develop the workshop, the team identified five applications with educational potential and utilized everyday workshop design principles. The team followed up with each school with activities that served as guides to creating lesson plans using the applications that appealed to them most.
Results
There are many results that influenced the work of the team and final recommendations. Some relate to hardware and software while others pertain to the professional community within the schools. It was found that almost every student in Cerrito has access to a smartphone. The non-indigenous students tended to have their own smartphones while the indigenous students shared with their family. It was also discovered that only two of the schools provide wifi access to students. Regarding interaction between teachers and students, facebook and whatsapp are used for social purposes. Teachers do not usually have professional conversations amongst themselves. It was also found that indigenous schools tend to teach in their native languages, but avoid improving upon writing skills. Using these results and more from the inventory, five main solutions were created. Different applications were identified based on their compatibility with the schools’ resources. These applications were discussed in the workshop held at the Escuela Agricola. Each school selected one or two applications that intrigued them most. The team followed up with each school to demonstrate the potential uses of the applications for education. 50 teachers participated and created lesson plans with the assistance of the team. 70 students were also trained in Microsoft Office and its uses for school work. Of these students, 12 volunteered to continue to teach younger classmates how to use the software.

Recommendations
The team has recommendations for two populations; these being teachers and administrators, and future intervention teams:

1. For teachers and directors, the team suggests that they continue to use the facebook page as a means of discussing educational ideas and practices and encourage other instructors and students to join the group as well.

2. For future interventions, the team suggests that they clearly state work will entail use of technology that is already available. They will not be supplying new or modified resources. The team also suggests that future interventions focus on helping teachers fully implement applications into their practices.
Resumen ejecutivo

Fondo
Las escuelas en el Paraguay rural tienen acceso limitado a la tecnología. Sin embargo, el uso de la tecnología en la educación es vital en el mundo de hoy. Cuando los estudiantes usan la tecnología, obtienen competencia digital y acceso a más material educativo.

Objetivos del proyecto
El equipo creó conciencia de cómo se pueden utilizar las aplicaciones para la educación. Por ejemplo, la mayoría de los estudiantes pueden usar Smartphones. Estas pueden accesar aplicaciones de aprendizaje, y pueden servir dentro y fuera del aula.

Entregables
El equipo entregó:
1. Un inventario base de los recursos de tecnología educativa de las escuelas para la Fundación Paraguaya.
2. Una guía sobre cómo usar cinco aplicaciones para propósitos educativos. Estos incluyen Khan Academy, la aplicación Qom, Facebook, WhatsApp y Microsoft Office.
3. Una página de Facebook con los directores y maestros de cada escuela en Cerrito para servir como una red de intercambio de ideas y prácticas educativas

Métodos
Para crear el inventario, el equipo usó investigación en línea, entrevistas en persona y observaciones en el aula en cada una de las diez escuelas. Para desarrollar el taller, el equipo identificó cinco aplicaciones con potencial educativo y utilizó principios de diseño de talleres. El equipo siguió con cada escuela con actividades que sirvieron como guías para crear planes de lección usando las aplicaciones que más les atrayen.

Resultados
Hay muchos resultados que influyeron en el trabajo del equipo y las recomendaciones finales. Algunos se relacionan con el hardware y el software, mientras que otros pertenecen a la comunidad profesional dentro de las escuelas. Se encontró que casi todos los estudiantes en Cerrito tienen acceso a un teléfono inteligente. Los estudiantes no indígenas solían tener sus
propios teléfonos inteligentes mientras los estudiantes indígenas compartían con sus familias. También se descubrió que sólo dos de las escuelas ofrecen acceso wifi a los estudiantes. En cuanto a la interacción entre profesores y alumnos, Facebook y WhatsApp se utilizan con fines sociales. Los profesores generalmente no tienen conversaciones profesionales entre ellos. También se descubrió que las escuelas indígenas tienden a enseñar en sus idiomas nativos, pero evitan mejorar las habilidades de escritura. Usando estos resultados y más del inventario, se crearon cinco soluciones principales. Se identificaron diferentes aplicaciones en función de su compatibilidad con los recursos de las escuelas. Estas aplicaciones fueron discutidas en el taller realizado en la Escuela Agrícola. Cada escuela seleccionó una o dos aplicaciones que más les intrigaban. El equipo hizo un seguimiento con cada escuela para demostrar los usos potenciales de las aplicaciones para la educación. 50 profesores participaron y crearon planes de lecciones con la ayuda del equipo. 70 estudiantes también fueron capacitados en Microsoft Office y sus usos para el trabajo escolar. De estos estudiantes, 12 se ofrecieron como voluntarios para continuar enseñando a los compañeros más jóvenes a usar el software.

**Recomendaciones**

El equipo tiene recomendaciones para dos poblaciones; estos son maestros y administradores, y futuros equipos de intervención:

1. Para los maestros y directores, el equipo sugiere que continúen utilizando la página de Facebook como un medio para discutir las ideas y prácticas educativas y alentar a otros instructores y estudiantes a unirse al grupo también.

2. Para futuras intervenciones, el equipo sugiere que indiquen claramente que el trabajo incluirá el uso de la tecnología que ya está disponible. No proporcionarán recursos nuevos o modificados. El equipo también sugiere que las intervenciones futuras se centren en ayudar a los maestros a implementar completamente las aplicaciones en sus prácticas.
Abstract

This project inventoried technological resources in ten schools of Cerrito and provided training to administrators and students in the use of applications for educational purposes. The evaluations were conducted using online research, interviews, and classroom observations. It was discovered that almost all instructors and students had access to smartphones. This guided the team in identifying potential applications that instructors could use to enhance their pedagogies and student learning. The proposed applications were discussed in a forum with directors and teachers from the schools. Participants identified the applications that appealed to them most and follow-up training was provided on how to use the resources for academics. A Facebook page was created to connect the schools and provide a platform for the discussion of ideas. The team recommends that the schools continue to use this page to collaborate and assist each other in using technology to enhance teaching practices and learning of students.
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1. Introduction

The state of education in impoverished areas has improved, but there is much room for progress. Fundacion Paraguaya is an organization that focuses on developing impoverished communities. The foundation transforms the youth of rural communities into entrepreneurs through education. It provides microloans to help the poor work towards their goals of improvement.

A strategy for the development of impoverished communities is to implement technology in schools to improve education. This also helps increase digital literacy. Traditional lessons have students copy notes instead of using critical thinking to solve problems on their own. This leads to less retention of information. With simple adjustments, students can be more actively engaged and develop more practical skills. Technology in classrooms stimulates interaction, creativity, and adaptation to new environments. It provides more effective learning than traditional methods.

The goal of the project was to improve digital literacy in students and teachers as well as enhance education with the use of technology. Schools in Cerrito that were interested were evaluated regarding current understanding and use of technology, and available resources. A workshop was held with directors and professors to discuss how to use technology to facilitate interactive learning. Ideas of interest were identified for each school and more specific training sessions were held to show professors how they could use technology to teach. Social media groups were created amongst the schools to promote sustainability through an interactive, self-sufficient network.
2. Background

This section discusses the state of education in Paraguay as well as the benefits of using technology in education.

2.1 Education in Paraguay

In Paraguay, the academic year for all students starts February 21st and ends November 30th for a total of 184 days of class (MEC, 2017). They use a 6-3-3 formal education structure. Primary school starts at the age of six and spans six grades. Secondary school is divided into two sections, lower secondary and upper secondary. Lower secondary school consists of grades 7 through 9, ages 12 - 15. Upper secondary school consists of grades 10 through 12, ages 15 - 18. Basic education includes primary and lower secondary school. By law, basic education is compulsory and free of charge (IBE, World Data on Education, 2010). Classrooms in countries such as Paraguay have roughly a 20 to 1 pupil to teacher ratio (Bruns, 2014).

For the first three years of primary school, students are required to meet a specific number of hours in different subjects each week. Students should spend eleven hours on communication, eight hours on math, four hours on social life and work, four hours on natural environment and health, and three hours on a community project. At this level students are still enjoying recess in the warm Paraguay climate. An example of one
of these classrooms, particularly in Cerrito is shown in figure 2.1.2. For the second three years of primary school, the weekly curriculum is as follows: eleven hours for communication, thirteen and a half hours for science and humanities, three hours for a community project, and two and a half hours for recess. For lower secondary school the weekly curriculum consists of twelve hours for communication, twenty-three hours for science and humanities, three hours for a community project, and two hours for recess (IBE, World Data on Education, 2010).

The educational infrastructure in Paraguay is poor. In a survey of 30 schools in the Asuncion area, most did not have fully functional bathrooms. Additionally, many of the schools had deteriorating walls and were in need of new blackboards. These issues stem from the lack of budget for infrastructure and basic educational needs. As a result, schools are forced to operate at a minimum level (Insumos Escolares Básicos en Paraguay, 2013).

2.2 The Importance of Technology in Education

The current use of resources is not enough to keep up with modern day education. Technology is an important part of modern-day life. It is involved in work, family, and community. However, many schools do not have the means or resources to implement technology into their lessons. These students fall behind while students from other institutions develop more skills. This creates what is commonly known as the digital divide. Effective use of technology in the classroom has become an essential element of learning. The use of technology in the classroom inspires motivation and creativity. Students are often “more engaged, and their
achievement increases when technology is used appropriately” (Roden, 2011). Some positive aspects of technology usage include enhanced creativity, knowledge of interdisciplinary learning environments, and the ability to adapt to changing environments. Technology helps emphasize or introduce topics such as collaboration, presentation, and communication. It also familiarizes students with career skills in technology and communication. With correct implementation, technology can help students discover and acquire new skills that are necessary for a society that is increasingly technology-dependent (Bordón, 2013). It is not necessary to have the most high-tech tools to learn and teach effectively. A study in Argentina showed that students who used simple science kits learned as much as students who used sophisticated science equipment and materials (Martinez, 2012). More important than the technology itself is its use and instructor response to change. Teachers need to be confident and comfortable with the technology for it to be impactful (Holden and Rada, 2011). The effective use of technology relies on multiple factors such as the maintenance of technology, teacher training, and reliability of power (Grace/Kenny, 2003). Technology, such as social media, can also be beneficial for student learning. Technologies that connect people “can alleviate urban-rural educational discrepancies, providing all students with access to modern pedagogical methods and knowledge” (Grace/Kenny, 2003).

Technology can also benefit administrators as it can help provide data that tracks student progress. (Halverson & Smith, 2010). It can also help highlight students’ weaknesses so teachers know where to focus. Technology is also flexible enough to “aid in learning being more tailored to specific learners’ needs”” (Nelson, Palonsky, & McCarthy, 2010).
3. Methodology

This section discusses methods that were used to inventory the use of technology for academics and to enhance its use among staff and students. To begin the inventory discussions took place with members of the Fundacion Paraguaya and school personnel. These discussions revealed a list of schools that wanted to participate. The interested schools were contacted by the team, and the team followed up with visits. The follow ups included classroom observations, interviews with administrators, and conversations with students to document the knowledge and use of educational and social applications for teaching. Following, the team used this information to develop an informational workshop that highlighted the teachers knowledge and practices, and suggested ways to enhance it. Facilitated discussions among teachers promoted their awareness and enhanced articulation of their own practices. From these discussions action items emerged to try new approaches. The team promoted the action items by guiding teachers through the creation of sample lesson plans that utilized one or more of the applications.

3.1 Inventory

To insure a complete inventory given the time restriction the collection of information was broken up into four phases. Connections were first made with schools to develop relationships and introduce the concept of the project. Interviews were then conducted with administrators and students to document their knowledge of and access to technological resources. Classroom observations then allowed the team to compare information obtained through previous discussions to the actual situation of the classrooms. Results from this inventory were used to develop five solutions for the schools.
3.1.1 Connections

The first step of taking the inventory was making connections with the schools in Cerrito through counterparts Celsa Acosta and Alma Perez of Fundación Paraguaya. Celsa sent letters to local schools to gauge interest in the project. Ten schools showed interest and these connections were reinforced through personal visits with the team assisted by Alma. Forming these relationships with members of the schools allowed for more comfortable communication and collaboration as the project continued.

3.1.2 Interviews

Semi-structured interviews with directors and professors allowed for the gathering of valuable first-hand information. Interviews were conducted with Directors and Teachers. Directors informed the team of the school’s access to resources and relationships with the Ministry of Education. Teachers relayed more specific information regarding the resources they used in their classes and what the students had access to. To collect responses promptly, the team split into two groups of two. Each group had one volunteer for assistance in traveling and communicating. During interviews, one person would ask questions while the other recorded responses via notebook. The environment in each school was slightly different so the questions were slightly modified for each.

After interviews were completed, key points were reviewed with the volunteers to ensure that the information was clearly understood. The team then discussed the recorded information that was learned and next steps.
3.1.3 Observations

The team observed lessons to identify teaching methods and student behavior in an actual classroom setting. Observations were approximately an hour at each school. The team sat in the back of the classroom to minimize distraction. Notes were taken throughout the class regarding teachers’ use of lesson time, use of materials, and ability to engage students. Use of technological resources for both teachers and students was also noted.

3.1.4 Group Discussions

Another means of gathering information was group discussions with students. The discussions were casual so as to not pressure or intimidate the students. The volunteers were more involved in communicating with students that were not comfortable with Spanish.

3.1.5 Summary of Technological Resources

All of the information collected regarding the schools’ technological resources had to be organized for Fundacion Paraguaya. The team organized the data of each school’s available resources using excel. This information was then reviewed and summarized in the form of a memo to be delivered to the team’s Fundacion Paraguaya sponsor Celsa Acosta.

3.2 Informational Workshop

The informational workshop was planned based on what was learned from the resource inventory of the schools. The inventory revealed that several applications were already being used by both students and teachers with educational potential. Thus, the workshop was designed to promote awareness amongst directors and teachers of the potential of these applications for
academic use. The workshop was divided into three parts. First the team summarized the resources identified from the inventory. Group discussions were then conducted to show how to utilize the applications for academic purposes. Participants interested in using the same application were put together to discuss their ideas. One member of the team was assigned to each of the four groups to facilitate discussions. The workshop then proceeded with a summary of each discussion and brainstorming session. This part of the workshop was essential as it allowed participants to hear what other groups had discussed. A representative from each group was also selected to relay the key points recorded as a way to promote a feeling of ownership amongst the group members.

3.3 Guided Action Items

To guide teachers through the action items established two resources were created. The first is a technology resource guide that stepped through how to use each application. The second is a Facebook page containing relevant examples of the applications in use. This section describes the creation of those resources.

3.3.1 Application Resource Guides

To demonstrate the potential use of social and educational applications in learning, the team developed and shared presentations with directors, teachers, and students in each school. Presentations were developed to explain the potential for each of these resources in more detail.

After the discussion forum, the team visited each school and spoke about the idea that intrigued the participants most. Team members went through step-by-step lessons demonstrating
how to use the resources for academic purposes. Pictures and videos were included to visually
guide participants through the use of the applications as well. While the staff downloaded the
application, the team showed instructional videos and shared more information about the
resource could be used. The team then assisted the participants through each step of using the
applications. The training meetings that involved teachers stepped through the creation of a
lesson plan of their choice utilizing the application of their choice. While training with the
students focused on how to use the application for homeworks and projects. Those that did not
have access to the necessary devices shared with others. Once the activities were completed,
contact information was collected from participants. The activity guides were then shared with
the instructors and students via whatsapp and Facebook for future reference and use.

3.3.2 Facebook Page

The team used social media to promote communication and sustainability for the project.
A Facebook page was created and titled “Tecnologia en las Escuelas - Cerrito”. The idea of the
page was to create an environment in which directors, teachers, and students could communicate
and share their ideas and progress using technology for education. Links to examples on the use
of the applications were posted. The page was created so anyone following could comment and
post their own ideas or questions.

4. Results

This section discusses the results that were found through the methods mentioned above.
Through the inventory it was discovered which schools have access to internet and which have
access to smartphones. The inventory also highlighted whether or not they were utilized for
academic purposes. We also recorded what other technology each school possessed. The team reviewed the results of the inventory to generate possible solutions to enhance the use of technology in education. Each solution focused on an application that is easily accessible to both students and teachers in Cerrito. These solutions were then presented in the information workshop. Through this workshop, guided action items were created based on ideas that were presented by participants. Based on each school’s action items guides were created for implementation and shared via the facebook page. As a result of the project schools became more aware of the potential for the use of applications in education.

4.1 Inventory

The results of the inventory can be analyzed in two sections: hardware-software and the professional community. The ten schools that were evaluated in Cerrito were a mix of private and public schools and also indigenous and non-indigenous schools. Each school was evaluated using the methods described above.

4.1.1 Hardware and Software

Pertinent resources documented through the evaluation included access to reliable internet, Smartphones, and other technology as well as the use of such resources.

A. Internet Access

Internet access was an essential factor to consider. Schools may have technological resources, but the extent to which they use them depends on reliable internet access. Half of the
schools the team evaluated had no internet. Only two schools had wifi that students could use while three schools had internet that only administrators could use.

B. Smartphones

The team observed that most of the instructors and students had access to smartphones either at school or home. Three of the ten schools reported that most, if not every, student had his or her own smartphone by the time they reached “Tercer ciclo” (this is between the ages 10 and 13). Five schools reported that some students had their own smartphones, whereas all students in the school had access to one at home. Three schools reported that few to no students had their own smartphone and only some had access to one at home.

C. Other technology

Access to other technology, such as computers or projectors, was also assessed. Three out of the ten schools had a computer room for student use. However one of these rooms did not have internet access. These computer rooms primarily consisted of five to ten desktops. The exception being that of Escuela Agricola San Francisco which included 20 Samsung laptops. While access to computers is rare, access to projectors is more common. Five of the schools have projectors, but none were regularly used to teach curricula. They were used more for guest presentations or watching movies.

4.1.2 Professional Community

The team observed the teacher-student communication network both within and among the schools of Cerrito. Teachers use Facebook and Whatsapp to communicate with each other but more often for social than professional purposes. Between each other, teachers do not often communicate about teaching strategies. However, they are willing to when prompted. In each
school at least some teachers have social connections with students through Facebook or WhatsApp. The indigenous schools face a significant language challenge. The students speak their native language at home, Guarani with friends from other communities, and Spanish - the language of instruction - in school. This forces teachers to use as many as three languages in a given lesson. As a result, instruction slows and students never master any language.

4.2 Identifying Applications for Educational Enhancement

Using the results of the inventory, the team identified five applications that schools could use to enhance pedagogy and student learning. The technological conditions in Cerrito greatly influenced which applications were chosen. The applications are WhatsApp, Facebook, Khan Academy, Toba Qom, Microsoft Office. WhatsApp and Facebook were both selected because they are commonly used by students and teachers alike. Khan Academy was selected because teachers mentioned a lack of access to materials for education without wifi in the classroom. Khan Academy fulfills this need because it is a free application that allows the user to download educational videos in a range of materials to view offline. The Toba Qom application was selected because teachers of Qom students struggle to show them how to write in their own language. A Peace Corp. volunteer Mark Lobin, created the application and worked closely with the team to promote its use. The last application, Microsoft Office was selected because several schools have the program, though nobody seems to know how to use them effectively.
4.3 Informational Workshop

The purpose of the workshop was to encourage teachers and directors to open their minds to resources that can be used for education. When the group was asked to split up into the resources they found most interesting, WhatsApp and Khan academy received the most attention. This may have been because WhatsApp was a resource that almost everyone used frequently. Khan Academy intrigued them because it has many educational videos for multiple levels, in Spanish for free. Throughout the workshop, each person actively participated. Everyone asked at least one question while in the large group and also contributed thoughts to the smaller group discussions. At the end of the workshop, several participants thanked the team for opening their minds to the possibility of using social and educational applications for learning.

4.4 Guided Action Items

Schools were guided through the creation of a lesson plan using personal training sessions at each school. The team considers the results of the guidance to be participation and responses in the training sessions. Guides were written in spanish and complemented with pictures of each step. The training sessions followed these guides. All ten schools participated in the training. In each school three to eight teachers participated along with the director. Considering the small size of the schools, having three or more participants means that
50% or more of the staff at each school was trained. At the end of each training program, teachers had developed a sample lesson using a platform and subject of their choice. While the intent was to have each teacher create his or her own lesson plan, the activities usually resulted in groups of instructors sharing resources and working together. This was found to work better in practice as teachers helped each other in the creation process.

The student training sessions were often done with an entire grade, 20-40 students. The lessons were modified for each school to be relevant to the students. It was also found that students knew more than initially expected. As a result the lessons were adapted quickly to teach more advanced skills. At the end of each student session volunteers were gathered to be their schools’ “experts”. The names of volunteers were shared with the school directors. If any student or teacher has questions they can go to the trained student volunteers.

4.5 Facebook Page

The Facebook page connects people in the community over the subject of technology in education. The director of each of the ten schools has followed the page. Directors have started posting and/or commenting on the page. The team has responded to such comments and facilitated the communication and collaboration between schools that the page promotes. After the team leaves, the facilitation of this page will be left to the Fundación Paraguayas volunteer Alma Perez and the Escuela Agricola’s school director Romina Godoy. As stated in the methodology, all the guides created were posted on the page for everyone to access along with additional resources. Since members from each school have access to the page and its resources, the creation of the Facebook page is a successful way to share information. However, the team could have done a better job encouraging activity on the page.
4.6 Overall Awareness

The evaluation identified that one of the main reasons that schools were not utilizing more social and educational applications in the classroom was lack of awareness. The focus of the project was to help schools realize the potential of the applications they already had access to. While not all ten schools participated in the workshop, staff and students from each school did engage in some discussion about using applications for education. Through these discussions, each school has gained valuable insight as to how they can use what they have to enhance their quality of teaching and learning.

5. Success and Sustainability

The success of the project is assessed on two levels. The first level looks at each deliverable. The second level looks at the project as a whole. For a deliverable to be considered successful, it must have met the expectations set by Fundacion Paraguaya and by the team at the beginning of the project. These expectations are explained in the “Deliverables” section within the methodology. The first deliverable is the inventory of resources for the schools in Cerrito. The team successfully interviewed teachers and directors in all ten schools along with some students. Teachers in the indigenous schools provided most of the information of each school’s resources, making the inventory a success.

The next deliverable was the set of technology resource guides. These were created using information gathered from teachers and directors regarding their level of skill and familiarity with the applications that were discussed. The guides outlined how to use the five applications: Khan Academy, Toba Qom, Microsoft Office, Facebook, and WhatsApp. These guides were
used during the training sessions to detail each step in creating the lesson plans with visuals and brief descriptions. The guides proved to work well, and teachers were able to follow the visuals easily with verbal assistance from the team. The team posted the resource guides on the facebook page making them accessible to every school. Considering the response to these guides, they have been considered to be successful.

The last deliverable was a way to connect the schools so they could communicate on the topic of technology in education. A Facebook page was created to serve this purpose. Each director of the ten schools has followed the page, as well as most of the teachers. Directors, teachers, and even some students have liked, posted, and commented on the page. Observing that pictures and thoughts are already communicated, the team has considered this page to be a success.

For the project as a whole (the second level of assessment), the team believes that they were successful given that each deliverable was met.

Support and sustainability are important issues to address before leaving Cerrito. It is important because it helps insure that all the work done here does not go to waste. The team created a Facebook page and a WhatsApp group for the administrators and teachers to join throughout the term. While the WhatsApp chat seems to be dependant on the group, the Facebook page has taken a life of its own. Professors have started posting about the visits of the team and commenting on tutorial links within the Facebook group. This will ensure that communication will continue between schools after the team leaves. The team also created guided tutorials for five applications: Khan Academy, Toba Qom application, Facebook, WhatsApp, and Microsoft Office. These were shared on the Facebook page. This will ensure that
they have access to these tutorials after the team leaves. The Facebook page also contains links to examples and lessons that were taught in the schools previously. Administration of the Facebook page has been shared with two locals to ensure it is kept up to date and shared with the next IQP team.

6. Discussion

Although the project was successful in the end, there were many obstacles that were overcome. Many of the original goals were not executed according to plan. Upon arrival, the team realized that the initial intentions of the project were not communicated clearly. Members of Fundacion Paraguaya sent memos to schools in the area to gather interest. From these memos, some schools understood that the team was sent to supply new technology resources. The team had to then personally explain to school directors that this was not the idea of the project. This led to some disappointment and confusion amongst the directors. After explaining the project more clearly, they still showed interest in participating.

Several issues were encountered with communication. For one, no one communicated virtually. Everything, including asking questions and planning events, was more effective in person. To account for this the team had to walk to each school almost everyday to make sure the project ran smoothly. The team also encountered issues when interviewing indigenous students. Most of the group interviews with students yielded little to no information as they were usually silent. When students responded to a question, the response usually consisted of few words being mumbled quietly. One reason for this behavior is that part of the indigenous culture is speaking less when strangers are present. Another issue with communication was the language barrier. Even after becoming familiar students would still not fully respond to questions because they
barely understand Spanish and the team does not know Guarani or Qom. Therefore, teachers were asked more questions about students than initially planned and the team spent more time watching students to gather information.

The culture and infrastructure in Cerrito proved to be very different than the team was used to. Because of such obstacles, the team learned a lot beyond the scope of the project. There was also an unexpected benefit that arose. While working to implement the Toba Qom application, interest on helping it grow as an application was generated. The Peace Corp. volunteer was able to connect with more people willing to him with the application through the teams workshop.

7. Conclusion

Fundacion Paraguaya identified the need for more modern education in rural Cerrito as well as the need to increase digital literacy in the community. The project team found that each school’s situation is different; therefore, multiple solutions were proposed. Even though implementation at each school varies, they can still learn from each other. This is why creating a network for schools to discuss and collaborate is important. While all the deliverables where successfully met, the most impactful part about this project was starting the conversation about improving education with what is available. The Fundacion Paraguaya made a good decision giving this particular project to WPI students. For most students in the US, using technology in education is common, so each team member had first hand experience. This experience helped when discussing the different possibilities for implementation. With all of this in place, the team is confident that Cerrito has the tools needed to improve its education.
8. Recommendations

In order to continue the progress made by the team recommendations have been made for two parties. The first set is for the members of each school the team worked with. The second is for future teams that will pick up where this team left off.

8.1 Recommendations for Teachers and Directors

1. The team recommends that the schools of Cerrito utilize the applications that intrigued them most.

2. Administration and students must continue to keep an open mind for the potential of technology in education.

3. Those that encounter difficulties should communicate with others within the academic network of Cerrito to learn and improve upon ideas.

4. Those that have success with implementing technology into their pedagogies should also share their ideas and experiences with others.

8.2 Recommendations for Future Intervention

1. Before arriving, the team ensures that the project goals are clearly communicated to all schools.

2. Revisit the ten schools to check if their use of technology has changed.
Appendices

Interview Script

Gracias por tomarse el tiempo para reunirse con nosotros. Somos estudiantes de WPI en los Estados Unidos. Estamos muy contentos de trabajar en Paraguay, este país es hermoso. Estamos aquí para aprender más sobre la educación aquí en Paraguay, específicamente cómo se usa la tecnología. Esperamos que pueda ayudarnos a enseñar más sobre este tema. Estamos trabajando con varias escuelas en Benjamín Aceval y con nosotros para aprender sobre su escuela. Antes de comenzar, solo queremos informarle que cuando hablamos de tecnología, no solo hablamos de computadoras y grandes equipos. También tenemos curiosidad sobre el uso de teléfonos inteligentes, proyectores y cualquier otra herramienta en su escuela. Todo será confidencial y su nombre no será parte del registro. También es importante saber que participación es voluntaria no necesitas responder a una pregunta si no quieres.

Principals/Directors

How long have you been working at this school?
¿Cuánto tiempo llevas trabajando en esta escuela?

We understand that some directors and teachers work at multiple schools. Do you work at any other schools or just this one?
¿Trabajas en otras escuelas?

Can you describe the experience you have had working here?
¿Puedes describir la experiencia has tenido trabajando aquí?

Can you describe a typical school day?
¿Puedes describir un día típica en su escuela?
Can you describe a typical class in your school?
¿Puedes describir una clase típica en su escuela?

What kind of technology is used in a class?
¿Qué tipo de tecnología se usa en una clase?

How do you think teachers feel about the technology?
¿Cómo crees que se sienten los profesores sobre la tecnología?

Does your school have a mission?
¿Su escuela tiene una misión?

Are there any specific goals you want to reach in the future?
¿Tienes algún objetivo para el futuro de tu escuela?

Are there schools nearby that use technology?
¿Hay escuelas cercanas que usan tecnología?

How did they get the equipment?
¿Cómo consiguieron el equipo?

Do you have someone to go to if you have any questions about technology?
¿Hay alguien que pueda responder preguntas sobre tecnología?

Is there any technology that you don’t think is being used to its full potential?
¿Hay alguna tecnología que no piense que se está utilizando en todo su potencial?

Would you be open to using more technology in the classroom?
¿Estaría dispuesto a usar más tecnología en las aulas?

How reliable is the wifi and electricity?
¿Qué tan confiables son el wifi y la electricidad aquí?

Do you mind if we talk to the teachers and students?
¿Podemos hablar con los profesores y estudiantes?
**Teachers**

How long have you been a teacher?
¿Cuánto tiempo has sido maestro?

Can you describe the experience you have had working here?
¿Puedes describir la experiencia has tenido trabajando aquí?

We understand that some directors and teachers work at multiple schools. Do you work at other schools?
¿Trabajas en otras escuelas?

What classes do you teach?
¿Qué clases enseñas?

Can you describe a typical class?
¿Puedes describir una clase típica?

What methods do you use to teach your students?
¿Qué métodos usas para enseñar a tus estudiantes?

Have you participated in any teacher training?
¿Has hecho alguna formación docente?

Have you participated in any training for technology?
¿Has hecho algún entrenamiento para la tecnología?

Are you comfortable using technology?
¿Estás cómodo usando tecnología?

Do you know how to plug in all the cables for the computer and projector?
¿Sabes cómo enchufar todos los cables para la computadora y el proyector?

Do you know how to use technology to communicate with other teachers or parents to distribute classroom information?
¿Sabes cómo usar tecnología para comunicar con otros profesores y padres para distribuir información de la clase?
Do you know where to find online resources?
¿Sabes dónde encontrar recursos en línea?

If so where do you go?
¿Si es así, ¿a dónde vas?

How do you use it?
¿Cómo los usas?

Do you use technology outside of class?
¿Utilizas tecnología fuera de clase?

Do you use technology in the classroom?
¿Usas tecnología en el aula?

Do you ever have problems with the technology?
¿Alguna vez has tenido problemas con la tecnología?

Who do you go to for help with these problems?
¿A quién acudes en busca de ayuda con estos problemas?

Would you be open to using more technology in the classroom?
¿Estaría dispuesto a usar más tecnología en las aulas?

**Students**

Do you like coming to school, why or why not?
¿Te gusta venir a la escuela?

Can you tell us what a normal day at school is like?
¿Puedes decirme qué es un día normal en la escuela?

Can you describe what a typical class is like?
¿Puedes describir cómo es una clase típica?

What is your favorite class?
¿Cual es tu clase favorita?

What do you think of when you hear the word technology?
¿De qué piensas cuando oyes la frase tecnología?

Do you use ever use technology in school?
¿Utiliza alguna vez la tecnología en la escuela?

Do you use technology outside of school?
¿Usas tecnología fuera de la escuela?

Do you like using technology?
¿Te gusta usar la tecnología?

Would you like to use technology more in your classes?
¿Te gustaría usar más la tecnología en tus clases?

Do you have internet at home?
¿Tienes internet en tu casa?

Do you have good cell service at home?
¿Tienes buen servicio celular en tu casa?

What do you use your phone for the most?
¿Para que usas tu celular más?

Do you use social media like facebook and instagram?
¿Usas medios de comunicación social como facebook y instagram?

Do you know how to share pictures and files?
¿Sabes cómo proteger fotos y archivos?
One Page Summary of Inventory Results

Schools Demographic

<table>
<thead>
<tr>
<th>School</th>
<th>Internet Access</th>
<th>Projector</th>
<th>Access to Computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Padre Domingo Massi</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>San Francisco Javier</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Baha’i</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Escuela Agrícola de Cerrito</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Schools that already use technology in education

Four out of the ten schools already use technology in education.

**Padre Domingo Massi:**
This school has a computer room and use it for occasional research on google and to watch videos on youtube.

**Baha’i:**
Teachers at this school already used WhatsApp to share information with students and parents.

**San Francisco Javier:**
This school has a computer room and recently got Microsoft Office.

**Escuela Agrícola de Cerrito:**
This school has computers for students. They are used for the final third year project.
Evaluación del Conversatorio

Por favor devuelva este formulario al organizador al final del conversatorio. Gracias.

<table>
<thead>
<tr>
<th></th>
<th>Totalmente de acuerdo</th>
<th>Muy en desacuerdo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>El conversatorio fue aplicable a mi trabajo</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2.</td>
<td>El programa tuvo un buen ritmo dentro del tiempo asignado</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3.</td>
<td>Los instructores fueron buenos comunicadores</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4.</td>
<td>El material fue presentado de manera organizada</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5.</td>
<td>Los instructores estaban bien informados sobre el tema</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7.</td>
<td>Me interesaría asistir a un seguimiento, más conversatorio avanzado sobre este mismo tema</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11.</td>
<td>Por favor califique lo siguiente:</td>
<td>Excelente</td>
</tr>
<tr>
<td>a.</td>
<td>Visuales</td>
<td>❑</td>
</tr>
<tr>
<td>b.</td>
<td>Acústica</td>
<td>❑</td>
</tr>
<tr>
<td>c.</td>
<td>Espacio para reuniones</td>
<td>❑</td>
</tr>
<tr>
<td>d.</td>
<td>El programa en general</td>
<td>❑</td>
</tr>
</tbody>
</table>

12. ¿Qué fue lo que más apreciaste / disfruté / pensaste fue lo mejor del curso?

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

13. ¿Alguna sugerencia para mejorar?
Informational Workshop Agenda

Length: 1 hr 30 m
Purpose: facilitate discussion with schools about technology resources

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 - 8:40</td>
<td>Settle in, get food</td>
</tr>
<tr>
<td>8:40 - 9:00</td>
<td>They introduce themselves</td>
</tr>
<tr>
<td>9:00 - 9:05</td>
<td>Introduction of ourselves, our school, project</td>
</tr>
<tr>
<td>9:05 - 9:10</td>
<td>Open for ideas they have thought of beforehand</td>
</tr>
<tr>
<td>9:10 - 9:20</td>
<td>Describe Ideas - pick ideas</td>
</tr>
<tr>
<td></td>
<td>Facebook, Mark’s app, Khan</td>
</tr>
<tr>
<td>9:20 - 9:50</td>
<td>Split up into groups and have a discussion on ideas</td>
</tr>
<tr>
<td>9:50 - 10:00</td>
<td>Cierre y refrigerio</td>
</tr>
</tbody>
</table>

Application Lesson Plan Agenda

Length: 1 hr
Purpose: facilitate activity with schools about using tech for class lesson

**Khan Academy**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00 - 0:30</td>
<td>Descarga</td>
</tr>
<tr>
<td></td>
<td>Mostra videos sobre khan</td>
</tr>
<tr>
<td>0:30 - 0:35</td>
<td>Busca un video interesante</td>
</tr>
<tr>
<td>0:35 - 0:40</td>
<td>Mira video por cinco minutos</td>
</tr>
<tr>
<td>0:40 - 0:45</td>
<td>Escribe tres preguntas sobre el video</td>
</tr>
<tr>
<td>0:45 - 0:50</td>
<td>Cambia y mira otro video para contestar preguntas</td>
</tr>
<tr>
<td>0:50 - 0:55</td>
<td>Personas pueden corregir respuestas</td>
</tr>
<tr>
<td>0:55 - 0:00</td>
<td>Discusion y preguntas</td>
</tr>
</tbody>
</table>
### Qom App

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
</table>
| 0:00 - 0:05 | Descarga  
Habla sobre app un poco |
| 0:05 - 0:15 | En parejas o grupos: escribe una conversación usando qom frases de la aplicación |
| 0:15 - 0:25 | Cambie con otro grupo y lea conversación, cambiando quién dice cada frase |
| 0:25 - 0:40 | Una persona pregunta la clase/grupo como decir una palabra (spanish to qom qom to spanish)  
Escribe palabras en pizarra, estudiantes pueden escribir también si quieren |
| 0:40 - 0:55 | Crucigrama/Sopa de letras con frases en qom |
| 0:55 - 0:00 | Discusion y preguntas |

### Facebook

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
</table>
| 0:00 - 0:05 | Descarga abre app  
Habla sobre app un poco |
| 0:05 - 0:10 | Crea un grupo |
| 0:35 - 0:40 | Mira video por cinco minutos |
| 0:40 - 0:45 | Escribe tres preguntas sobre el video |
| 0:45 - 0:50 | Cambia y mira otro video para contestar preguntas |
| 0:50 - 0:55 | Personas pueden corregir respuestas |
| 0:55 - 0:00 | Discusion y preguntas |

### Whatsapp

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
</table>
| 0:00 - 0:05 | Descarga  
Hablar sobre app un poco |
| 0:05 - 0:15 | Hacer un grupo  
- Si hay alumnos, invitalos  
- Si no, invitanos |
<p>| 0:15 - 0:20 | Piensa en un tema/ una pregunta para su clase y encontrar una imagen relevante, propios visuales |
| 0:20 - 0:30 | Mostrar cómo editar una foto |</p>
<table>
<thead>
<tr>
<th>0:30 - 0:40</th>
<th>Mostrar que pueden hacer una pregunta en el chat y que alumnos del grupo pueden responder</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:50 - 0:55</td>
<td>Mostrar que puede usar un mensaje de voz</td>
</tr>
<tr>
<td>0:55 - 0:00</td>
<td>Discusion y preguntas</td>
</tr>
</tbody>
</table>

### Office

| 0:00 - 0:05 | Abrir PowerPoint  
Habla sobre app un poco  
- Que saben?  
- Vamos hacer un poster |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0:05 - 0:10</td>
<td>Cambia el fondo(Color)</td>
</tr>
<tr>
<td>0:15 - 0:20</td>
<td>Escriben su nombre - Cambiar tamaño y color</td>
</tr>
<tr>
<td>0:20 - 0:25</td>
<td>Poner imagen y formas</td>
</tr>
</tbody>
</table>
| 0:25 - 0:30 | Haz una nueva pagina                                        
- mostrar cómo hacer transiciones |
| 0:35 - 0:40 | Abrir excel y pregunta cual fruta prefieres?                  |
| 0:45 - 0:50 | Ponga numeros en excel y crea un grafico                      |
| 0:55 - 0:60 | Haz una calculadora F=MA                                       |
References


