

Research Article

Is the One Laptop Per Child Enough? Viewpoints from Classroom Teachers in Rwanda

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Abstract

This study examines the implementation of the One Laptop Per Child (OLPC) program in Rwanda from the viewpoint of primary school teachers involved with the program. It seeks to understand how these teachers feel about the program, how they incorporate the low-cost laptops into their classrooms, and their impressions of the laptops' impacts on their students. Results of the study reveal that the teachers like the initiative, but recognize many challenges in adapting the program to their realities. The teachers think of the initiative primarily as a computer literacy and rote learning project, and they report outcomes along these lines. Beyond learning computer skills, the teachers note that the program has had both positive and negative impacts on several students—some have become more empowered as learners, and some have become rude and disruptive in class. Most significantly, the teachers often view themselves, and not their students, as the primary users of the laptops, and they have found ways to employ the laptops for both personal and school-related work.

Introduction

Information and communication technologies (ICTs) are increasingly being viewed as possessing the ability to transform pedagogy and improve educational achievements. Increasingly, low-cost laptops are viewed as a promising tool to reform the educational process—improving the overall quality and efficiency. Since they are portable and rapidly decreasing in cost, proponents believe that the laptops will unleash their transformative power as they become more pervasive, especially in developing countries, where their impact may be felt the most. But just how effective they are at improving education—by making students more effective and engaged learners—is still a subject of debate.

In 2005, Professor Nicholas Negroponte from MIT founded the One Laptop Per Child (OLPC) program to jumpstart the education reform process. This bold initiative aims to fundamentally transform how the world's poor children are educated by delivering into their hands low-cost laptops that are sturdy and suitable for their context. These laptops, called the XO, are based on the premise that the children will use them to learn in a self-directed manner, thereby transforming their learning environments

IS THE ONE LAPTOP PER CHILD ENOUGH?

and ultimately creating better educational opportunities for themselves.

While this model of learning is interesting and has been shown to be promising in certain environments, its effectiveness in developing regions where education systems are chronically underfunded and poorly resourced remains an open question. This study examines the OLPC project in Rwanda from the perspective of affected teachers, to better understand both how they feel about the laptops and in what ways they incorporate them into their educational programs. With the attention and rhetoric of the OLPC program so squarely placed on students, we see a need to tell the teachers' story instead and to examine the on-the-ground reality of the program, which, as we show, is tightly bound up with the motivations and goals of the teachers.

Background

Rwanda is a small, landlocked country in Central/East Africa. It is one of the few OLPC deployment sites designated as a model site, and it hosts a Global Learning Center for Excellence for Laptops and Learning¹ in the capital, Kigali (ITU-D, 2010). As a global learning center, Rwanda is slated to be one of the leading countries to implement the laptops on a wide scale. It planned to buy up to 100,000 of the laptop units by 2010 (Kwizera, 2009). More ambitiously, it wants to give its estimated 2.2 million schoolchildren laptops by 2012 (Rwanda, 2010). This audacious plan would make Rwanda one of the most important test cases for the OLPC program.

At the time of our study, an official of OLPC Rwanda, the local organization responsible for distributing the laptops, told us that they had so far distributed about 8,000 laptops to about 17 schools (mostly in Kigali) and trained about 235 teachers. This account differs from the report published by the OLPC organization, which stated that 10,000 XO laptops "were distributed in late 2008 to a mix of 22 public and private schools across all five of the country's provinces" (OLPC, 2010, p. 4). We found the laptops were not in use in all the schools claimed in the OLPC report. A local news report highlighted this: "So far, about 8000 laptops have been distributed in the pilot phase to less than fifteen primary schools in the country, both public and private" (Kwizera, 2010).

Literature Review

Over the last three decades, the role of technology in education reform has received increasing attention (Campoy, 1992; Kent & McNergney, 1999; Means & Olson, 1997). The recent advances in information and communication technologies and their relative affordability continue to stoke the flame of technology-enabled education reforms. Particularly, the laptop computer as a tool or means of education reform has generated a lot of debate (Elmore, 2004; Jones, Valdez, Nowakowski, & Rasmussen, 1995; Warschauer, 2003). The debate is even more sensitive at the elementary or primary school level, where the learners are still in their formative years of learning. This is especially so because the laptops' impacts are still not well understood—for example, how they impact motivation, learning, teaching, and even social behavior that goes beyond the four walls of the classroom (Becker, 2000; Cuban, 2003; Cuban & Kirkpatrick, 1998; Lepper & Gurtner, 1989; Schacter & Fagnano, 1999; Warschauer, 2003, 2004; Wartella & Jennings, 2000).

The OLPC initiative is probably the best-known laptop program seeking to transform learning at this early age. The relatively low cost of the laptops has helped to support an argument that the XO can and should be deployed on a large scale to transform learning—with particular emphasis on developing countries where there is a vast need for access to quality education at all levels (Bentley, 2007; Butler, 2007; Heeks, 2008; Malamud & Pop-Eleches, 2010). Since education is often viewed as a vehicle for national development, the initiative hopes the laptops will help make learning easier and more efficient, and will ultimately help in bridging the digital divide (James, 2010; Malakooty, 2007; Negro-ponte, Bender, Battro, & Cavallo, 2006).

In spite of the program's considerable goals, many published reports have suggested that the laptops have not had the expected impact. Indeed, the OLPC program has struggled with a number of problems since its advent, including production delays and cost overruns (Malakooty, 2007), cancelled orders, hardware and software problems (Hartel, 2008; Hourcade, Beitler, Cormenzana, & Flores, 2008), and teacher training and acceptance issues (Ebner, Dorfinger, & Neuper, 2011). According to

1. At the time of our study, the learning center was located at Kigali Institute of Science and Technology (KIST).

Kraemer, Dedrick, and Sharma's well-regarded assessment, "the vision is being overwhelmed by the reality of business, politics, logistics, and competing interests worldwide" (2009, p. 66). Nugroho and Lonsdal's (2009) review evaluates some of the program's efforts globally.

While the OLPC vision has often been commended, the realities of its implementation have received the fundamental critiques of most technology-driven education development programs—that is, the rationale that technology itself is an effective shortcut to achieving good educational outcomes is flawed (Cuban, 2003; Cuban & Kirkpatrick, 1998; James, 2010; Kraemer et al., 2009; Leaning, 2010; Toyama, 2011; Warschauer, 2003). Implicit in this criticism is an evaluation of the constructionist philosophy on which the vision is based. This highly influential learning paradigm argues that students learn better when they are consciously and personally engaged in constructing external artifacts by themselves in a happy environment (Papert & Group, 1986; Papert & Harel, 1991). It asserts that knowledge is actively constructed by the mind of the student, and not solely transmitted by teachers. Thus, students can make new ideas (or knowledge) as they actively engage the artifacts (Jonassen, Myers, & McKillop, 1996; Kafai & Resnick, 1996).

A significant literature has developed over-viewing the many technologies in education programs, and many elements of this literature help to inform our study of the OLPC program in Rwanda. For example, in a large-scale technology in education (Internet-connected portable computers and classrooms equipped with interactive teaching boards and video projectors) exploratory study of pupils and teachers in France, Jaillet (2004) revealed that pupils and teachers used the technology less (especially the portable computers) for curriculum learning. Instead, students reported a high level of use of the computers for unrelated activities. Jaillet found that most pupils "considered the educational benefits of the computer and the internet as very few" and "did not often visit sites relating to their lessons" (*ibid.*, p. 120). Thus, his conclusions include support for the old style of "instruction-based teaching" (*ibid.*, p. 127).

Stephen Kessel (2001) evaluated a similar laptop program in a K–12 school in Australia over a longer period (three years) than Jaillet and got widely varied, but still interesting, results. On the whole,

Kessel found that the younger students (and their parents) were "very excited" about the program and believed that it significantly improved their education, while the older students felt that it had limited educational value. As such, the former desired to have the program continued, while the latter advocated for its removal. Kessel attributed this dual outcome to the nature of the students involved. In the first case, he attributed the favorable outcome to the fact that the mode and style of pedagogy was not yet set in those early years, so the classroom environment was more amenable to the flexibility introduced by the laptops. In the second case (regarding the older students), he speculated that the lack of support for the laptops was probably due to the fact that the teachers and students were now more set in their ways, and therefore, they were more reluctant to embrace the change. Thus, Kessel concluded that laptop intervention programs in K–12 schools need major pedagogical reforms—for example, changes in teaching and learning approaches and school ethos—to be successful. Unlike Jaillet's study, Kessel's study was based on the constructivist theory of learning, so it is better suited, comparatively, to the OLPC program.

Other well-known laptops in schools initiatives, such as those implemented in North America (for example, in states such as Maine, Indiana, Michigan, and Virginia), showed similar mixed results—that is, they provided new opportunities for teaching and learning, but they also raised issues of concern, such as digital literacy, curriculum development and integration, and student distraction issues (Holcomb, 2009; Lei & Zhao, 2008; Muir et al., 2006; Muir, Knezek, & Christensen, 2004; Warschauer, 2005). Although these initiatives were largely targeted at middle to high school students, they offer useful lessons about the challenges of introducing laptops into the classroom environment.

Other scholars are more cautious about laptop initiatives for education reform. They advocate, instead, for a systemic approach. For example, in Africa, Unwin feels that money spent "on training teachers to inspire a new generation of African leaders" (2009, p. 111) is better than that spent on technology alone. Nunatcho (2008) and Apiola, Pakarinen, & Tedre's (2011) OLPC studies (in Cameroon and Tanzania) also suggest that teachers should be included in the initiative.

IS THE ONE LAPTOP PER CHILD ENOUGH?

Table 1. Laptop-to-Student Ratios and Number of Teachers Recruited Per School.

School	Laptop-to-Student Ratio	Number of Participant Teachers
GS Kagugu	1:1	11
EPAK Don Bosco	1:2	7
Nonko PS	1:1	3
GS Kicukiro	1:4	7

Methodology

This study takes a direct look at how teachers involved with the program in Rwanda feel about the project and report first-hand from their experiences. It seeks to highlight some of the roles teachers play in the initiative, and it does so with a view to helping researchers better understand some of the issues involved with how teachers in developing countries incorporate low-cost laptops into their classrooms, as well as the teachers' impressions of the laptops' impacts on their students.

We framed our study as a group discussion using a semistructured format. We chose this approach over a one-on-one interview because we felt that group discussions in this particular context would allow us to dynamically adjust our interviews while enjoying a better grasp of the nuanced perspectives of the teachers (as the discussions would evolve). According to Flick (2009), conversations in this format can evolve to become a meaningful and useful central corpus of knowledge. The group interactions can also inspire more frank and candid responses that can be checked and balanced by the group participants, thus possibly increasing the fidelity of the data collected (Patton, 2002, p. 386).

School Selection

To identify possible schools for selection, we contacted one of the persons at OLPC Rwanda (the in-country organization managing the project) for suggestions on schools. This organization oversees the laptop deployments across the schools and coordinates the end-user trainings (for both students and teachers). We received a list of 17 schools from the contact as the set of schools that had implemented the program to date. On our contact's recommendations, we shortlisted seven schools and then made contact with the principals to inform them of our plans. Six of the principals (four public and two private schools) agreed to our request to recruit study participants in their school, while one declined.

Eventually, we selected the four public schools for the study and left out the two private schools because of logistics and time constraints.

We selected the following public schools: GS Kagugu, École Polytechnique d'Application Kimihurura (EPAK) Don Bosco, GS Kicukiro, and Nonko Primary Schools. Nonko and GS Kagugu, respectively, were the first and second public schools to implement the program. They had a one-to-one (1:1) laptop configuration—that is, one laptop for each child in the school. The other two schools did not have this laptop-to-student ratio; EPAK had 1:2, and GS Kicukiro had 1:4. This information is summarized in Table 1.

Teacher Selection and Discussion Process

We used convenience sampling to select our teacher sample. Since we had to conduct our study during regular school hours, teacher selection could only be made based on availability. As the principals had a good understanding of the time schedules of their teachers, as well as their suitability for our study, we asked them to help with the recruitment. They selected the teachers for us and also provided us with the location—one of the unoccupied classrooms in each school. The number of teachers recruited per school and the number of discussion sessions we held per school varied. In all, we held nine discussion sessions (one per day). The number of teachers recruited per school is shown in Table 1.

The discussion sessions took place around noon, with participants sitting around a table in the classroom. After informed consent procedures, discussions began, and a friendly atmosphere was quickly established. Gradually, the participants took over some of the "interviewing" role; they began to engage each other in the discussion, leaving us, at times, more in the position of "listening in" (Ritchie & Lewis, 2003, p. 171). The conversations were

lively, in-depth, and sometimes passionate. Talks of shared experiences frequently arose, thus facilitating deep discussions related to education reform and the OLPC program. The discussions were audio-recorded for future analysis.

Data Collection and Analyses

Following the interviews, we transcribed the recorded audio files into a text document. Then we used open coding techniques to code the corpus for analysis (Corbin & Strauss, 1990). To do this, we analyzed the data paragraph by paragraph to build concepts and categories that we felt were dominant in the document.² In some instances, we analyzed sentence by sentence. Essentially, the document was read first to discover general themes that we deemed important for structuring the analysis. We then re-read it iteratively (subject to the salient themes) in search of the answers to the repeated questions: "What is this paragraph about?" "What is being referenced here?" "Is it relevant to the study?" Supporting quotations that backed up the themes were then clustered for reporting. We replaced the names of the teachers with pseudonyms to preserve anonymity.

Methodological Limitations

Our method admits several limitations that may impact our results and its implications. First, we selected schools based on the recommendation of a local OLPC trainer whose knowledge and judgments may have been biased in favor of the program's implementations in those schools. Second, the teacher selection process may also have been biased, since the principals may have sought to present their best teachers or those with a positive view of the program. On the other hand, given the strict hierarchical organization of the schools we visited, we submit that dealing with principals is unavoidable. Furthermore, we note that, despite these potential pro-OLPC biases, our results (as will be seen) exhibit considerable criticism of the program. Thus, we feel that our results remain valid despite these limitations.

Findings

Our analysis revealed the following salient themes: 1) Teachers primarily think of the OLPC initiative as a computer literacy and rote learning project, and they report learning outcomes among their students

largely along these lines. Beyond learning computer skills, 2) the teachers note that the program has empowered some of their students both positively (making them more enabled learners) and negatively (emboldening some to become rude and disruptive in class). Although most teachers like the program, they are 3) encumbered by a lot of implementation burdens. However, and most significantly, 4) the teachers often view themselves, and not their students, as the primary users of the laptops, and they find ways to employ them for both personal and school-related work.

1. Computer Literacy and Learning Outcomes

Generally, all the teachers think of the OLPC program in terms of a computer literacy and learning project—that is, one designed to help improve information technology (IT) skills. Specifically, they believe that it will help their students get started early in life with the much-touted computer literacy skills. They frame this theme around two main discussion threads: 1) acquiring computer literacy skills early, and 2) computer skills for economic development goals. The threads are reflected in the following sections.

1.1 Acquiring Computer Literacy Skills Early

One of the teachers from GS Kicukiro captured this well:

[OLPC] is a good vision. In further school for example, it will help the student study computer science. It will be good if a student study computer something in primary school—when he will be in further school, it will not be a problem.

Another teacher from the same discussion group expressed a similar notion:

I think when it starts in primary school; every child of Rwanda will be able to use computers. I think it will be better.

1.2 Computer Skills for Economic Development Goals

The teachers view computers as powerful agents of economic development. For them, computer literacy leads to the acquisition of computer skills, which can directly impact the country's development. In particular, they refer to their country's vision of an IT future (Rwanda, 2000). One of the teachers pointed out this linkage in his remark:

2. This list was kept separate from the data.

IS THE ONE LAPTOP PER CHILD ENOUGH?

This is the technology which we have to start using. That is why I can advise only the Ministry of Education to encourage everybody to study how to use computers . . . in order to develop our country by using technology.

Another teacher from EPAK Don Bosco highlighted the implication succinctly:

[W]hen we use those computers in our schools, all 238 schools in our country, we will not be at the same level of development.

1.3 Learning related outcomes

In the context of this enthusiasm for the laptops, we asked the teachers for examples of learning outcomes they felt were produced. Mostly, they related two kinds of learning outcomes: 1) a rote learning form (which they viewed as “student-centered learning”), and 2) a self-directed learning form (which resonates more closely with the broader OLPC constructivist vision).

1.3.1 Rote Learning

Generally, the teachers were more attuned to rote learning, and they gave copious instances of it, though they questionably qualified these as “student-centered learning.” Some of the instances they cited included English-language learning, or using the laptop as a tool to improve vocabulary and diction, and curriculum learning, or using the laptop as a tool to support the traditional classroom form of learning.

1.3.1.1 English-Language Learning

This form of learning was, by far, the one most commonly cited by all the teachers as an example of a good learning outcome. For example, Caleb from GS Kicukiro said:

When teaching English for example, I open to the program. After opening the program which shows how to learn vocabulary . . . I show them how to look for dictionary. And they check for the words they know in English. I sometimes bring loudspeaker which I connect to the laptop so that it may sound loudly . . . any word I know that any child needs to know its pronunciation I write it, and after writing it, I press enter and then the word is spoken loudly. The child will see how the word is written and how to pronounce it and they enjoy it.

Frank from Nonko gave a similar response:

In reading, the children get the true pronunciation through the sentence and words written. They write the sentence or words in the laptop and they listen how to pronounce or to read the sentence. And they repeat it and for that they get the right way for speaking and spelling.

1.3.1.2 Curriculum Learning

The teachers also view the laptops as tools to support their traditional mode of teaching and learning in the classroom. Olivia from GS Kicukiro expressed this common view thusly:

Now I consider the laptop like a tool I need in my teaching profession. I can use it in pronunciation. In science I use it. Above all in social studies, you can research, you can see the maps and you can search them.

Andrew, from the same discussion group as Olivia, added the following:

In science, I use it to teach how the earth rotates around the Sun.

Jake from Nonko gave an even clearer response:

I used it in the teaching of mathematics and social studies. Here there is a game which is related to mathematics. For example, memorize activity which is activity to create games. The learner tries to find the question and answers in the program.

Then, in social studies, it helps you for teaching geography. It has a map and we make the pupil to find those maps in the laptop and we ask them to do an analysis of the map.

1.3.2 Self-Directed Learning

Teachers reported very few instances of students using the laptops in ways that appeared more consistent with the broader OLPC vision—students learning how to learn by themselves. These interesting examples were reported only by teachers from the schools that had a laptop for every student—Nonko and GS Kagugu. But even in this case, only three teachers—two from GS Kagugu and one from Nonko—accounted for these sorts of examples. One of them from GS Kagugu shared this passionately:

There was a time I was teaching social studies. The cause of the genocide in Rwanda, I have taught them. But they come and ask me: “Teacher! What is the cause of genocide?” I ex-

plained but the child said: "Look, I understand something else at home." . . . Then the children took the laptop . . . entered website and they understand more than I have told them. . . . [T]hey came to show me! They ask a lot of questions! They know more than we teach in class!

The teacher from Nonko gave a unique example of students collaborating and sharing knowledge about food recipes and cooking experiences:

With the information from the parent, for example how to prepare a meal, the students took the image [using the laptop webcam] of the preparation of some food to cook. Cooking in water, beans, they took the images on their own and they came to school with many information and they showed how to prepare that kind of meal. It was helpful to the students as well as the teachers.

2. Student Empowerment— Positive and Negative

The teachers reflected that the laptops were beginning to change the dynamics of their traditional teacher-student relationship in ways that were indicative of student empowerment. Very few of them recounted instances where they felt that students were enabled as better learners and behaved as such (positive empowerment). In fact, most felt otherwise, recounting several instances where students had actually become emboldened to be rude and disruptive in the classroom (negative empowerment).

2.1 Positive Empowerment

One of the teachers who led us in the direction of positive empowerment gave a distinctive response when we asked him how he felt about the laptops and if they helped students to become better learners. He responded thusly:

It has helped me and the method of [my] teaching has improved. You know when I'm teaching, the students can create their own and participate during the teaching and give their own ideas. It has made teaching easier. And students work more than me.

2.2 Negative Empowerment

Most of the teachers felt that the laptops were a source of what they viewed as negative empowerment. They narrated several experiences they encountered to justify this feeling. The accounts ranged from the suspicion that the laptops distracted the students and motivated them to be

disruptive in class, to the notion that the laptops emboldened them to challenge the teachers' authority. Adam from GS Kagugu gave an insightful example:

The classes which the teachers are not interested in using the laptops, if he goes on the blackboard and start teaching each activity, the child who has been trained can say: "Teacher, write the problem for us and we will solve it." So the student will try to embarrass the teacher. And the teacher will say: "Go out [of the class]!"

Another teacher from a different school pointed out the same issue:

A big problem for the laptop: When I want to teach with laptops, I give it to the children and they do not respect my instructions! You say: "Go there!" They refuse! They know that they shall go outside. But they refuse. They do what they want! It helps them to disturb because they can always check it [on the computers] by themselves!

3. A Lot of Implementation Burdens

Overall, the teachers spent considerable time talking about how the laptops constitute a burden for them. Although they viewed the program as a good development, both for school and country, they saw the computers' impact as more of a burden than a blessing to their pedagogy. They highlighted a range of challenges: technology-use burdens (inadequate technical support and laptop end-user training), infrastructure burdens (lots of laptop hardware/software problems, lack of electricity and Internet access), laptop ownership burdens, and educational burdens (meager digital content and poor curriculum integration). We report on these burdens below.

3.1 Technology-Use Burdens

All the teachers felt that they lacked adequate laptop user and technical support training. They wanted more training (on a continual basis), so that they could be adept and thus be able to better assist their students as they used the laptops. This lack of adequate training affected their confidence and comfort levels with the laptops. One of the teachers reflected:

[T]he training must be repeated regularly so that the teachers don't forget.

Another teacher stated more forcefully:

First of all, I should advise you to prepare enough trainings for teachers before they give laptops to

IS THE ONE LAPTOP PER CHILD ENOUGH?

children. They have to think about training the teachers. After that, they should give laptops to teachers only so that teachers have enough time to prepare themselves in order to be perfect in front of their learners.

Adam from GS Kagugu insinuated that this feeling of inadequacy—children finding problems on the laptop that the teacher cannot help to resolve—was probably why some of them preferred not to use the laptops in the classroom. He shared this personal feeling reluctantly:

It is the one reason why! Those problems which the children found by using the laptops, that is why some teachers don't like to use them. Even, there are some teachers from the beginning of this year who did not give the children the laptop to use in the class!

3.2 Infrastructure Burdens

The teachers also reported common computer hardware/software problems widely reported about the program. They all made comments like:

"The mouse does not work very well."

"The mouse and the keyboard fail quickly."

"The battery power is very low."

"They have faulty software."

Expectedly, they pointed out that contextual issues such as the poor supply of electricity nationwide (unstable, unreliable, and even sometimes unavailable) and the lack of wireless Internet access infrastructure in most of the schools affected the way the laptops were used. In a reflective moment, one of the teachers said:

Another problem is also of electricity. When electricity goes, because the laptop was kept, there is no charging. When you bring it in the school and the electricity goes, it's not working!

In essence, when the power supply fails, the laptop battery power often fails, too, because some of them cannot hold a charge as expected. One teacher expressed this frankly:

Some times when being used, the laptop will not conserve power for a very long time! Battery power is very low!

At the time of the study, only GS Kagugu had wireless Internet access infrastructure installed and functional. But even then, its wireless coverage only

served a portion of the school. Most of the students had to physically leave their classrooms to connect to the network. Others preferred to seek free wireless connections at places like the Kigali International Airport or one of the business centers at the city center.

3.3 Laptop Ownership Burdens

Many teachers revealed that the issue of laptop ownership was a burden for them. They claimed that, in their schools, the laptops are owned by the schools and not the students. This was an "unofficial" policy adopted for "administrative reasons," they said. In general, the schools had indirectly transferred the responsibilities of laptop ownership to the teachers, holding teachers accountable, to varying degrees, for the safekeeping of the devices. We even heard stories of teachers being held financially liable for the loss or theft of laptops. As a result, a lot of the teachers preferred not to let students take the laptops home with them, even in the schools with a 1:1 ratio. Ade from GS Kagugu expressed this fear thusly:

When the learner lost it, it becomes a big issue in that circumstance. That's why you don't prefer to give them every day. Because there is a risk!

Valerie, a fellow teacher, expounded the implication:

Let's begin for the student: The student comes and tell us that he lost this laptop because I've been doing this or maybe somebody came and took it forcefully like that. Then as teachers we try to do some investigation. If we catch that one who took it, we can put our problem to the police then he can be in charge of that. If you don't get that one who took it, so as a teacher you have to pay it back! Yes, the teacher will have to pay from his own money! Yes! It's up to me as a teacher to pay it because it's me who gave it to the learner.

Furthermore, teachers at the schools that did not have a 1:1 student to laptop ratio (GS Kicukiro and EPAK Don Bosco) rarely allowed their students to take the laptops out of the classroom, keeping them locked in large cupboards most of the time.

In general, these practices around ownership are seriously at odds with the OLPC vision, in which the student is the owner of the laptop and is expected to keep it with him or her when not at school.

3.4 Educational Burdens

Finally, the teachers raised the issue of laptop usage within the framework of a traditional classroom setting as perhaps their greatest burden. Simply put, they considered the laptops a major distraction to pedagogy. Valerie echoed this feeling:

When we are teaching our learners those laptops, we get tired! . . . [O]ne teacher to supervise those learners, we get tired! Because they are like 50 learners. You come to this one, maybe go to another one, and another one, so it becomes very hard to help them properly as you can do if you're teaching 10. Then they do better. But 50 students is a big issue. We get tired. And the time it takes for us is a big time!

She truly felt that they do not really get to "teach" with the laptops because of the time constraints. She expressed this feeling strongly:

We pretend to teach! But normally we don't because it is not easy to help 50 students! In maybe one hour!

Adam added that some teachers (in his school) do not even bring out the laptops for the students to use during the current school term because of similar of issues:

Fearing the problems! Even getting tired because . . . like in [period one], we have around 55 learners like that. And you know learners of lower primary are very talkative! So to help them becomes a big issue, so they prefer to keep them in the cupboard than teach with it!

The teachers also shared their lack of a methodology for learning with the laptops—curriculum integration issues. One of teachers who underscored this said the following:

I think first of all, the NCDC—The National Curriculum Development Council—the ones that do the curriculum for the Ministry, the people who brought the program, they have to think about the design of the OLPC program. . . . They don't tell me where I can use it and when I can use it in class. . . . I just decide for myself. I say "Today, I will teach by using the laptops!"

Another teacher stated it concisely:

I can teach what I want or what I like and someone else can teach what he likes . . . like that. We don't have a curriculum!

D. Teachers as Primary Learners and Users of the Technology

What we found most interesting from the study was the phenomenon that teachers viewed themselves and not their students as the primary learners and users of the technology, and have found ways to use it both for personal and school-related work. This thrust was conspicuously present in all the discussions. Teachers from 1:1 schools highlighted this the most. For example, Olivia from GS Kicukiro linked the learning to a change in her teaching experience:

By using laptop, my teaching experience has changed. Now I'm confident in English language. When I have a difficulty in writing, I use laptops. I can go to airport myself and use my laptop to get information in Science, Geography, and History about Rwanda. I can consult Wikipedia. I can read the history of Rwanda and other countries of Africa, of Europe and so on.

Other teachers were more focused on how they use the technology. At EPAK Don Bosco, a teacher professed:

[W]e use those laptops in teaching; they help us to teach and to plan some lessons. I like it.

And another remarked:

It helps me to prepare the lesson and to make some research of lesson.

Gene from Nonko was more specific:

The laptop is good. . . . [T]he teachers use it as the aid material when they're teaching because we bring it home, we can make photos about . . . for example if you teach Science, you can make photos about the plants, about the animals and you bring the photos and you show the treatment [to students].

And Olivia shared a similar example:

The record program helps me to prepare my lesson, I can take a photo of an object and I show it to my student. I ask a student to name it and dialogue in Scratch [a program on the laptop].

Elaine from EPAK Don Bosco sounded even more personal:

The activities help me to improve my own speaking and pronunciation. Before I have no knowledge, after I learnt it, now I can do some things on the laptop.

IS THE ONE LAPTOP PER CHILD ENOUGH?

Here, we see another striking departure from the OLPC vision—while students are prevented from owning (and in cases, even using) the laptops, the teachers have adopted them as personal devices and teaching aids, leading to a perceived improvement in their teaching abilities.

Demographic Information

A total of 28 teachers—14 males and 14 females, aged between 23 and 57 years—participated in the study during July 2010. Of this group, 50% (14) were under 30 years of age, 14.3% (4) were between 30 and 40 years of age, 25% (7) were between 40 and 50 years of age, and 10.7% (3) of them were over 50 years of age. According to their account, they reported earning an average monthly wage³ equivalent to about \$50. Almost all (26) relied exclusively on public transportation for their daily commute. The remaining two teachers used other means—one lived close to school and thus walked to school daily, while the other had a bicycle for the daily commute. All had mobile phones, and about a third (9) of them browsed the Internet on their mobile phones (usually for about 30 minutes a day). Additionally, nearly half (12) regularly visited cybercafés to browse the Internet. Four of the teachers actually have their own personal computers (two desktops and two laptops). The longest had possessed his for about two years (since 2008). Eight other teachers reported that they regularly visited cybercafés to use computers and access the Internet.

In terms of their educational level, only one of them reported having a first degree (a four-year university degree); the rest all had the basic diploma/teacher training qualification (essentially a high school diploma received from a teacher training college). Two-thirds (19) of the group had taught for a period shorter than 10 years, and one-fifth (6) had taught for more than 20 years. One unique participant had 37 years of teaching experience. All were multilingual—they all spoke the local language Kinyarwanda, French, and English (but their fluency was varied, ranging from good conversational proficiency to poor fluency). They generally taught a combination of these subjects—English Language, Mathematics, Social Studies, Elementary Science and Technology, and Kinyarwanda.

Discussion

The teachers' viewpoints offer lessons for researchers, policy makers, and practitioners, especially those interested in using low-cost laptops to transform pedagogy in sub-Saharan Africa. We suggest several such lessons:

Laptops change teacher-student relationships in classrooms.

The introduction of laptops into classrooms seems to always come with mixed blessings, especially in developing country contexts typically still enmeshed in educational tradition. A number of studies have already pointed this out (Brekelmans, Wubbels, & den Brok, 2002; Hannafin & Savenye, 1993; Leach, Ahmed, Makalima, & Power, 2006). While the presence of a laptop probably empowers students (and even teachers) positively to improve learning, it also empowers students negatively (sometimes leading to classroom disruptions). Mangiatordi and Pischetola (2010) noted its role in changing the teacher-student relationship in their OLPC case studies in Ethiopia and Uruguay, while Hollow (2010) highlighted the distractions it brought to the Ethiopian classrooms. A number of other findings regarding technology interventions in similar contexts resonate well with this finding. For example, Jaillot (2004) noted this same problem in his French study. The automated reading tutor study done in Ghana and Zambia by Mills-Tetty et al. (2009) also noted students were bored and distracted with the reading tutor. Thus, this problem is not specific to the OLPC program, but it suggests that OLPC needs to anticipate some of these common problems to mitigate their impact on their project. One-to-one laptop interventions such as the XO bring "unique management challenges to the teacher" (Dunleavy, Dexter, & Heinecke, 2007).

Teachers want to use technology, too.

We deduced this conclusion from the high level of enthusiasm the teachers showed toward ICTs in general. Almost all of them embraced the laptops at least for their computer skills benefits. Furthermore, they all had their own personal mobile phones, and about one third of them had Internet-enabled phones, which they used to browse the Web regularly. Also, about half of them visited cybercafés to

3. The teachers reported a monthly wage somewhere between 25,000–29,000 Rwandan Francs (RWF), depending on their years of service. An exchange rate of US\$1 = RWF600 was used for the conversion.

browse. Thus, it was not surprising that they were motivated to use the OLPC laptops, even though they felt that the XO's impact on sustainable pedagogy was minimal. Obviously, pedagogy and technology use are two different things. Anderson et al.'s (2012) Digital Study Hall and Panjwani, Samdaria, Gupta, Cutrell, & Toyama's (2010) studies in India offer good examples of a different mode of technology intervention that reflects this dichotomy well—teachers embraced a technology intervention tool that may be unsustainable for pedagogy in the long term. In this case, the teachers appeared eager to embrace technology, probably to “catch up” with the West. They seemed fascinated with mobile and computing technologies and wanted to embrace the new possibilities they brought.

It takes time to train teachers to adopt and integrate new computing technologies into their classroom.

Although contrary to OLPC's constructionist-driven philosophy, part of our findings suggest that training teachers to adopt and integrate new computing technologies is critically important for deployment in their classrooms. Teachers have an important role to play in the program if it is to succeed (Hennessy, Harrison, & Wamakote, 2010). As Nugroho and Lonsdal noted in their review, “teachers' participation is still essential to the success of any deployment project, mainly because deployments to students are carried out through schools. This seems to be especially noticeable in developing countries, where the method of learning is very often teacher-centred” (2009, p. 11). This finding also resonates with several previous learning technology research outcomes (e.g., Cuban, 1993; Hannafin & Savenye, 1993; Unwin, 2009; Warschauer, 2003). However, training takes time, needs repetition, and often depends on other factors, such as the level of teacher education, socioeconomic context, training resources, and even teacher pedagogical beliefs (Butler, 2007; Butler & Sellbom, 2002; Ertmer, 2005). A recent study by Ebner et al. (2011) hints at this.

Teachers feel they need to integrate the laptops into their curriculum, but they do not know how.

The teachers feel that the laptops should be integrated into their current curriculum to impact pedagogy, but they do not know how to direct this. We

also see this trend in the Ethiopian and Tanzanian studies. For example, Apiola et al. remarked in their Tanzania study, “[T]he most fundamental obstacle for using the laptops in teaching was that the staff does not know how laptops could be integrated in the classroom” (2011, p. 6). As the teacher from GS Kicukiro in our study responded: “[T]he people who brought the program, they have to think about the design of the OLPC program . . . They don't tell me where I can use it and when I can use it in class.” The argument is that OLPC needs to re-think its program so that it can be framed within the standard curriculum in these regions.

Conclusions

Transforming the pedagogical model has always been a complex process that is sensitive to the roles of students, teachers, administrators, and even the local context. Employing technology as a transformation tool also adds to the complexity, bringing with it implications for the method and practice of teaching. In this study, we examined the OLPC implementation in Rwanda from the viewpoints of teachers, so as to better understand some of these implications. Although conceived of as a constructionist initiative for students to self-direct their learning experience, the results of this study revealed a complicated experience that included teachers who were actively involved in the implementation. The teachers in this study embraced the initiative, but they struggled to adapt it to their realities. They viewed the initiative primarily as a computer literacy and rote learning project, and they reported outcomes along these lines. They reported some positive and negative impacts on some of their students; some became more empowered as learners, and some became more rude and disruptive in class. Most significantly, the teachers often viewed themselves, and not their students, as the primary users of the laptops, and they have found ways to employ the laptops for both personal and school-related work.

As they indicated in this study, the teachers are vital to the pedagogical process and should be deeply involved in initiatives that seek to transform it. Without incorporating them into these frameworks, they could work to hinder its lofty goals, even though they may desire to appropriate such technologies for their own personal and teaching needs. ■

IS THE ONE LAPTOP PER CHILD ENOUGH?

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IS THE ONE LAPTOP PER CHILD ENOUGH?

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