

**Technology Training for Primary Teachers in Sub-Saharan Africa**

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**Abstract**

As technology has spread throughout the world, there are places where the tide of advancement has missed for various reasons. Many school children in sub-Saharan Africa do not receive the training to be successful competitors in the economic and educational worlds. The information they are missing is how to use technology for learning effectively. The infrastructure is slowly improving. A literature review shows some of the challenges of bringing educational technology into sub-Saharan Africa schools, especially those in more rural areas. As solutions are discovered to overcome these challenges, the teachers at these schools still have very little training in using technology in the classroom. As training opportunities are developed for these teachers, the most effective practices are discussed.

### **Technology Training for Primary Teachers in Sub-Saharan Africa**

As technology has spread throughout the world, there are places where the tide of advancement has missed for various reasons. Many school children in sub-Saharan Africa do not receive the training to be successful competitors in the economic and educational worlds. The information they are missing is how to use technology effectively. The teachers of these children are not adequately prepared with the technological training to teach their students how to utilize the technology.

According to Momanyi et al. (2006), technology in developing countries is not entirely nonexistent. These countries are just slower to receive and use this technology than the rest of the world. Because of the inequalities in resources, technological education is also somewhat behind. Teachers in developing countries, especially in rural areas, are also unsure what to do with the computers once they receive them. The teachers of sub-Saharan Africa are untrained in the use of technology in the classroom. They are often overworked and do not have time to go to the university to receive this instruction. Many of these teachers are also isolated in rural areas and would genuinely benefit from training and support. Teachers in sub-Saharan Africa need technology training and support in order to give their students the best opportunities in their futures.

### **Current State of Schools in Sub-Saharan Africa**

It is difficult for teachers in sub-Saharan Africa to leave their classes for any type of training. A report by UNESCO Institute for Statistics (2016) explained classroom situations across much of sub-Saharan Africa. Class sizes are enormous and often contain more than one grade in a single class. There are over 50 students in a single class in the primary schools, on average (Leach et al., 20015). There are not enough textbooks for each student to have one. Students must share with an average of three other students for each text. There is a lack of available restrooms and water in many schools. In fact, only about two-thirds of the primary schools have toilets, and almost half of those are mixed gender toilets. Nearly half of the schools do not have drinkable water. Haßler et al. (2020) continued explaining the common situations of teachers. Teacher training courses in low- to middle-income countries are of low quality. The programs do not provide the pedagogy for teachers to be effective in the classroom. The teachers in the low- to middle-class countries are not motivated to stay at schools for various reasons, including the infrastructure limitations and delayed payments for services.

### ***Infrastructure in Sub-Saharan Africa***

Electricity access is still a concern in sub-Saharan Africa. According to the World Bank, Sustainable Energy for All (SE4ALL) database, 44.7% of the population had access to electricity in 2016, which rose to 47.7% in 2018 (The World Bank, 2018). The electricity access in countries ranges from 11% of Burundi's population to 100% in Seychelles. As may be expected, the interior countries are the ones with the least amount of electricity access (The World Bank, 2018). However, access to mobile phones percentages in these countries do not always reflect these numbers of electricity access. Mobile access is slightly higher (The Economist, 2017). Even with the lack of electricity, mobile technology is filtering into sub-Saharan African countries.

### ***Mobile Devices in Education***

Technology is not exactly new to most teachers in developing countries. Mobile phones are quickly becoming a part of daily life in sub-Saharan Africa. According to The Economist (2017), two-fifths of the population in 2016 had mobile phones. In the Congo Democratic Republic in 2016, 17.4% of the population had electricity, while 22% had mobile phones (The Economist, 2017). This means that those with mobile phones often must walk many miles to recharge their devices. In Namibia, while the teachers were isolated, and many did not have electricity in their schools, they had the means to connect through technology (Boer & Asino, 2018). Seventy-one percent of the primary school teachers in this study indicated that they had online access regularly during the day. Of these teachers, 43.7% had access through smartphones or tablets.

By 2012, undersea internet cable lines were installed around the African coastline (Forden, 2015; Hennessy et al., 2010). These undersea internet cable lines lead to lines extending inland, but it is a slow process (Forden, 2015). Many classrooms do not have internet access. If the school does have access, it is typically in only one room in the building.

Some countries in sub-Saharan Africa have more access to technology than others. While teachers in Namibia had access to technology, they did not know what to do with this in the classroom (Boer & Asino, 2018). The most common usage of technology in education was for email (Boer & Asino, 2018). Teachers who are uncomfortable with technology themselves will not try to implement it in the classroom (Hennessy et al., 2010; Kafyulilo, 2014; Momanyi et al., 2006). Teachers are not aware of what resources are available, how to find lessons, or how to implement these resources in an actual classroom. A study found that although teachers have access to mobile technology, they did not know how to use it in a classroom and preferred to use mobile phones for social activities (Gloria & Oluwadara, 2016). However, through pre- and post-tests, the researchers found that these same teachers' self-efficacy improved significantly after mobile technology training, indicating that with training, teachers' attitudes and self-confidence in using mobile technology can increase, thereby boosting the possibility information and communication (ICT) adoption in their classrooms.

### ***Challenges with Mobile Technology in the Classroom***

There are challenges to using mobile technology. One concern is that not many mobile phone apps are compatible with academic programs (Kafyulilo, 2012), although things are improving. Bandwidth and slow transfer connections also cause problems with the educational usage of mobile devices. A study in Tanzania demonstrated how mobile technology training could develop those positive attitudes of teachers that increase technology use in classrooms (Kafyulilo, 2012). The researchers selected 29 pre-service teachers, four college instructors, and 12 in-service teachers for this study. These educators all had access to their own mobile phones. Mobile phones were the most accessible technology in schools. Every student had access to a mobile phone, whether it was their own, a friend's or parent's phone. The pre-service teachers' attitudes were positive toward using mobile devices in the classroom because of their familiarity with the devices. However, the in-service teachers were less willing to use phones in the classrooms. Many of the reasons pointed to the misuse of the phones by students, i.e., texting,

watching inappropriate videos, "activities which are considered unethical" (Kafyulilo, 2014, p. 123). The four professors from the Dar es Salaam University of Education that participated in the study were excited about the prospects of using mobile devices in the classroom but wanted specific training on ways to use devices in the classroom before committing to the idea (Kafyulilo, 214).

### **Technology Training with Teachers in Sub-Saharan Africa**

Even with all the challenges, teachers in sub-Saharan Africa want to use technology in their classrooms. But just providing teachers with technology will not work. An initiative in Uganda provided computers to many schools, but teachers did not receive proper training (Varkey Foundation, 2018). These computers just sat in the rooms' corner, not being used by students or teachers (Gloria & Oluwadara, 2016; Varkey Foundation, 2018). "The use of digital technology in education has to be considered very carefully, as such investments have often not led to improvements in student learning outcomes" (Haßler et al., 2020). Teachers across the sub-Saharan region simply do not have the skills or training to use technology. They need training and continual support for the technology to be utilized in these classrooms.

### ***Teachers' Feelings of Inadequacy***

According to Norton and Gonzales (1998), teachers are responsible for discovering what technology would be best to improve educational practices. However, the teacher should not have to shoulder the success of integration himself or herself. In a situation where the teacher has as many obstacles as those in sub-Saharan Africa, the teacher should not be expected to discover which technologies to use without support and guidance. Teachers have reported that even with computers in their classrooms, the teachers received little training, and many felt they were not properly prepared to use these resources (Momanyi et al., 2006). Haji et al. (2017) stated:

The use of . . . technologies in teaching and learning . . . has been clearly low due to: low confidence and low competencies of the teachers, formal opposition by teacher to use pedagogical tools that they were not initially trained to utilise in a professional way. (p. 152)

Feelings of inadequacy are not the only barriers to ICT across sub-Saharan Africa. As was mentioned earlier, reliable electricity and technology infrastructure is a difficult barrier to remove (Haßler et al., 2020; Hennessy et al., 2010). Many of the available programs are not produced in students' native languages (Hennessy et al., 2010). Some studies show that teachers' own attitudes and lack of knowledge are also factors in their use of ICT (Hennessy et al., 2010).

Professional development and training can help teachers feel adequately prepared to integrate technology into their classes (Davis et al., 2009; Gloria & Oluwadara, 2016; Haßler et al., 2020; Kafyulilo, 2014; Momanyi et al., 2006). The technology integration in the classroom can be more successful with continued support to teachers (Davis et al., 2009; Hennessy et al., 2010). Trainings can take many different forms; however, five elements should be present (Momanyi et al., 2006)

- teachers can reflect and make informed decisions about how to use technology in the classroom;
- teachers can create lessons that use technology;
- teachers can identify what resources are available to them;
- teachers will commit to using technology in the classroom; and
- teachers need to be able to collaborate about effective technological uses.

### ***Technology Training Needs***

Different studies have looked at the best ways to provide training and support to educators in sub-Saharan Africa (Davis et al., 2009; Haßler et al., 2020; Hennessy et al., 2010; Momanyi et al., 2006). An essential element of these trainings is that the trainings should come to the educators. The Digital Education Enhancement Programme (DEEP) is an initiative that provided teachers with a kit that included high-quality multimedia materials and planning tools (Hennessy et al., 2010). The teachers' self-confidence in their abilities to teach using technology increased when they had access to a personal computer, had a partner with which to develop lesson plans, and pedagogical training in implementing these technologies (Hennessy, 2010).

Teachers who are early adopters in implementing technology are working against the grain of tradition. For example, in Namibia, an elder must give the permission for anything to be tried (Boer & Asino, 2018). Going against culture is somewhat daunting. It takes time to realize that using technology reduces the workload of the teacher rather than increasing it. In overcoming the barriers, Leach et al. (2005) made some observations. Teachers that are using computers in the classroom should not be working in isolation from each other. For those instructors using new resources, it is much easier when collaborating with others who are working toward the same goal. A group of instructors can develop shared resources and a knowledge base that can support peers. Hennessy recommends that a professional development program should include peer support groups among local teachers who are working with similar subjects and age groups (2010).

Another critical aspect of implementing ICT (information communication and technology) in schools is the teacher buy-in. Feenberg (2010) discussed that decisions made by those who are not in the immediate situation might lead to unused resources. Providing training materials is a good start, but teachers need to have explicit training to have a successful implementation of technology in the classroom. This training is also most effective when conducted in the teachers' own classrooms or school, the immediate vicinity of where they will be using what is learned (Hennessy, 2010).

### ***Sub-Saharan African Teachers Wants in Training***

When teaching a child to ride a bike, an adult does not expect the child to grasp the concept and to master riding a bike immediately on his or her own. The adult will give a lot of support, physically and verbally. As the child gets better and better, the adult will withdraw the physical support. However, the adult will continue running along beside to give the child the confidence to continue on his or her own. Soon the child will leave the adult behind to join friends, riding bikes around the neighborhood.

Providing ICT training for teachers in sub-Saharan Africa is not so different from teaching a child to ride a bike. The ICT trainers provide the scaffolding that will give the instructors confidence as they learn to pilot the technology independently. Teacher professional development and learning should model appropriate pedagogy and collaborative learning (Haßler et al., 2020). This modeling will encourage teachers to use these effective techniques in their classrooms. In a study conducted by Agyei (2020), there are two recommendations given by teachers that support this idea. The first recommendation is to provide scaffolding and authentic technical experiences in teacher professional development programs. The second recommendation is to provide adequate time for the teachers to become assured in their abilities to use the technology in the classroom.

Davis et al. (2009) interviewed different teachers about what they preferred in a training. Teachers preferred what is termed by Davis et al. as an "organic approach" instead of a computer-based training approach (Davis et al., 2009). An organic approach began with a professor of educational pedagogy and technology coming to their region to conduct the trainings. Trainings were conducted face-to-face in the teachers' own schools using the equipment the teachers would be using. There were three different modules that the teachers completed. In addition to the professor's presentations, there were assignments that the teachers worked on together in groups of their peers. Teachers set personal goals for themselves as they worked through the modules. These assignments and objectives were reviewed together with the trainer at the end of modules. Teachers were also to keep a portfolio of examples of the effective use of technology in their classrooms. There was an optional fourth module in which a teacher could become an on-site mentor. Professional development and training in ICT were also provided to the teachers at no cost. The teachers appreciated this training because it offered a direct connection with the expert. There was active learning involved in this process, which helped to solidify what was being taught. The teachers had a local support group.

### **Recommendations for Solutions**

Sub-Saharan Africa has been increasing the use of ICT in classrooms, although not as quickly as much of the rest of the world. The countries of Africa have some unique challenges. Teachers in Africa want to include technology in their classes (Ngimwa & Wilson, 2012). Many of these teachers know of the benefits but are hesitant to use technology because of their own anxieties, shortcomings, lack of training, and cultural limitations.

Literature recommends that teachers in sub-Saharan Africa be given time during school holidays or breaks in which they are given one-on-one training (Leach et al., 2005). Because of the heavy loads many teachers carry during the school year, it is recommended that these trainings do not occur during regular teaching time or after the school day is completed (Hennessy et al., 2010). This training should be more comprehensive than a one- or two-day workshop (Haßler et al., 2020). The focus of these trainings should encourage developing lessons using technology and implementing these lessons in the classroom. Once teachers have completed these trainings, it is recommended that there should be a monthly meeting with other teachers to share ideas, problems are discussed, and solutions suggested (Haßler et al., 2020; Leach et al., 2005). These trainings should also be organized to take place in a relatively close to the receiving of the technology in the classroom. Teachers need to be able to immediately

implement what is being learned, but the equipment should not sit idle for extended periods (Momanyi et al., 2006; Norton & Gonzales, 1998).

It is recommended that, ideally, those who are conducting the trainings be someone from a higher educational institution because teachers would like to be trained by an expert, not only in using the technology but in the pedagogy that goes with using technology in a classroom (Hennessy, 2010; Kafyulilo 2014). This trainer should also be someone who would be available to sit down with groups of instructors, face to face. It is also recommended that the trainer begin training others in the school or region to become the resident expert, a "train the trainer" situation (Norton & Gonzales, 1998). That way, when the expert has completed the initial training, there is a regional expert who is available to come into schools to help others.

The recommendations given will not speed up the process of updating infrastructure or providing first-world conveniences. However, if these recommendations are followed, the teachers will be ready to accommodate technology levels in the classrooms as they come.

### **Conclusion**

Children in sub-Saharan Africa have a more difficult time learning to be successful competitors in the world. The teachers of these children are not adequately prepared with the technological training to teach their students how to utilize the technology. Governments in sub-Saharan Africa are aware of this gap and are trying to update their separate countries' infrastructures. A literature review has shown that providing face-to-face teacher training, especially in rural areas, is a boon to educators. With these trainings, the literature again shows that ongoing support is needed to allow these teachers to successfully adopt technology in their classrooms. This support can be in the form of a regional expert to contact for assistance. Cohorts of other teachers in their schools or grade levels are beneficial to the teachers to learn from each other, share ideas, and problem-solve together. With these trainings, teachers in sub-Saharan Africa will be able to better equip their students for a better future.

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