TANZANIA 2017 FIELD TESTING REPORT:

Can Out-of-School Children Make Learning Gains with Kitkit School?

Globally, the number of out-of-school children rose by 2.4 million between 2010 and 2014, reaching a total of more than 59 million (UNESCO, 2017). Of those, 30 million live in sub-Saharan Africa. While Tanzania is on track to achieve the Millennium Development Goal on education by enrolling more than 90 percent of children in primary schools, abolishing fees and building schools in every village, enrollment of primary school-aged children has been dropping. Furthermore, equity and quality pose major challenges. Girls, the poorest children, children with disabilities and children living in underserved communities are most vulnerable to dropping out of school or never going to school. Access to pre-primary education is very low and the quality of education dampens children's prospects of a productive future. An estimated 2 million children between the ages of 7 and 13 years are out-of-school (UNICEF, 2018 from https://www.unicef.org/tanzania/education.html).

In the response to this urgent issue, the use of technology to aid literacy and numeracy acquisition in remote areas has been attracting serious attention from government and NGOs. Researchers found out that mobile technology approach can offer a way to provide an important platform to tackle the challenging task of reaching those children who have little or no access to quality education (Gottwald, Morris, Wolf & Galyean, 2017). The use of technology for Sub-Saharan countries has the potential to transform the lives of millions of children excluded from education, by giving them free access to quality educational materials, facilitating their 'self-directed' learning, and effectively intervening in hard-to-reach areas. Our purpose of testing in Tanzania was to investigate whether children without access to school could learn early literacy and math skills through the usage of Kitkit School. Our team closely monitored whether OOSC Children in a rural village could learn to read and count on their own, aided only by digital devices.

Methods

The 2017 OOSC testing in Tanzania was done in an isolated rural village in Mtwara located in the southeast part of Tanzania between September and December 2017. The village of our testing site is called Kisima Cha Wokovu daycare center (see Figure 1) and is rural environment where 90 percent of parents do not have any children's books at home. Most of them have no job and some of them are farmers. About 50 school-age children in the village were out-of-school due to poverty, death of parent(s), or responsibility for family chores. Many children in the village who had never gone to school had limited access to printed material, with few books available to them.

For 3 months of trial, a total 38 out-of-school children aged 5 to 10 came daily to play with Kitkit School. Initially, the testing started with 25 out-of-school children recruited with assistance from local community leaders and 5 out-of-school children voluntarily visiting the site from the same village (is called Likonde) and willing to participate in Kitkit School testing. As the testing went by, 8 more children joined Kitkit School.

Participating children were given access to Kitkit School from 8 a.m. to 2 p.m., every weekday, in a local community center. With the freedom to come and go as they chose, children each averaged four hours of daily playtime. With one tablet available per child, facilitators were responsible for distributing the tablets to children at the center, but did not intervene with their play. The participating children did not attend other education programming or initiatives during the time.

Tablets were preloaded with Kitkit School in Swahili, which includes Swahili literacy and math games and contents, and e-book library and videos. The tablets were given to the children without direct instruction, as the rationale of testing was to investigate whether the devices could be useful in the absence of instruction by adults or teachers. Kitkit School team members were in charge of the daily administration of the site, including site management, tablet usage (e.g., charging, setup, memory swap), and preparation of bread and tea. For 3 months of the testing period, the total Kitkit school playtime was 6,248 hours (average 239 minutes per day).

In the beginning and end of the 3 month period, children at the center were asked to take a digital pre- and post-test on the tablet. The digital test is modeled after the 2014 EGRA and EGMA administered nationally in Tanzania, with sub-tests including questions on letter sound recognition, familiar word recognition, invented word recognition, and number recognition, simple addition, and subtraction.

Figure 1. Mtwara Site Location

Figure 2. Morning Session at the Kitkit School Site

Figure 3. Kitkit School Images of Initial start page and games

Results

Our staff noticed remarkable changes in children as they played with Kitkit School. During the three months, children at the site were heavily engaged in using Kitkit School and had been observed reciting the “Alphabet song” and even spelling words they had practiced. Within five days, they were able to figure out how to use tablet device (i.e., turn on/off, usage of ‘hold’ function, game switch) seamlessly on their own. Within two weeks, they were singing Alphabet song and chicken song (about numbers from 1 to 100) in the village. One boy, exposed to literacy games with animal pictures, opened up a notepad and wrote the word “babu.” Although anecdotal, this observation reveals that Out-of-School children playing Kitkit School demonstrated a high level of engagement and positive learning outcomes.

Pre and Post-testing results supported what our staff had observed at the site. After three months of play, eight children ages 6 to 10 had participated in both pre and post-test. Literacy and math learning outcomes of those eight children were assessed using digital tests modeling Early Grade Reading Assessments (EGRA) and Early Grade Math Assessments (EGMA). Results showed substantial learning gains in both literacy and math. On average, they showed a 15% improvement in their literacy scores and a 20% improvement in math. Specifically, children made the biggest gains in 'Familiar Word Identification' of literacy and 'Number Identification' of math area.

In order to validate the progress made in learning of out-of-school children in Mtwara is meaningful, we chose to compare their post-test scores with scores of their peers who were enrolled in a local primary school. In September, 2017, a group of 160 1-3 Grade children in a rural primary school in Bagamoyo, Tanzania took the same digital test that was also administered to the out-of-school children in Mtwara. The test scores of 160 Bagamoyo Grade 1-3 children were established as a baseline benchmark.

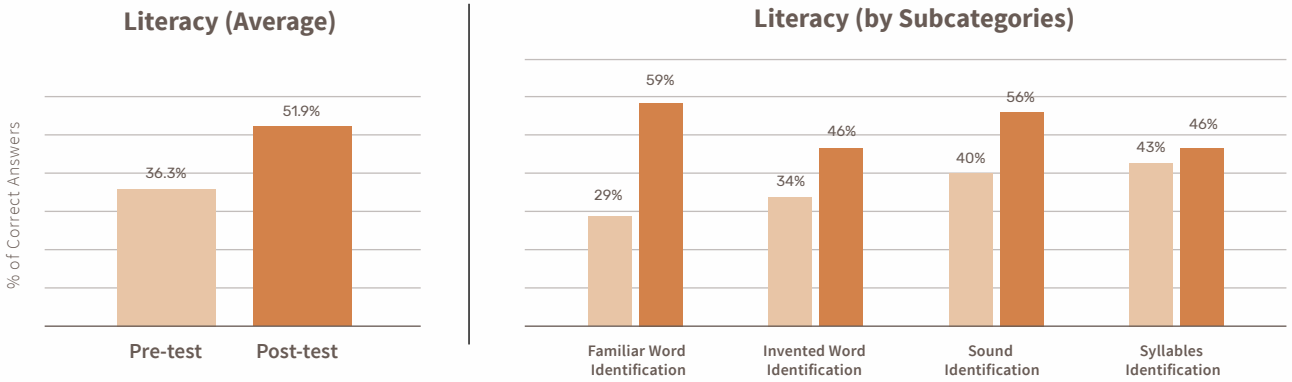

Figure 2. Literacy Learning Gains of Out-of-School Children with Kitkit School

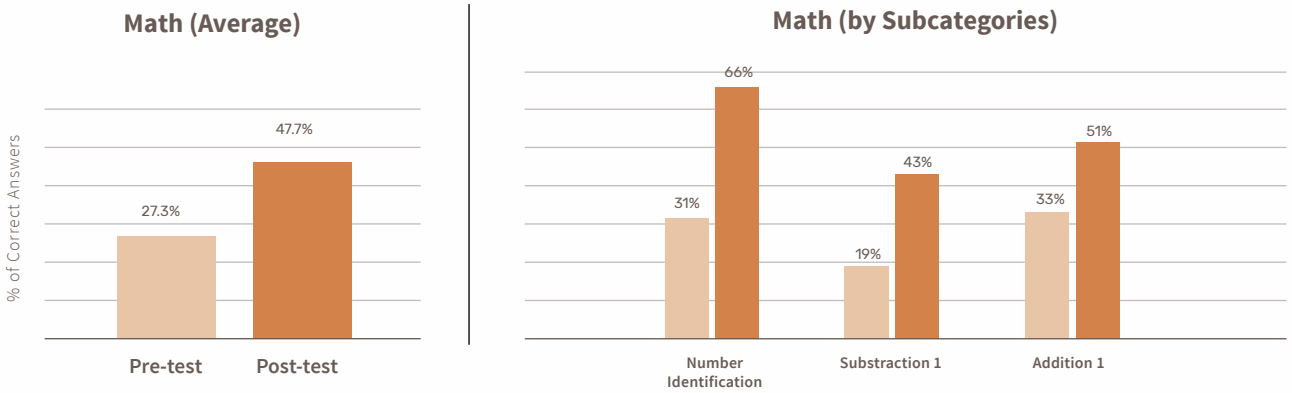

Figure 3. Math Learning Gains of Out-of-School Children with Kitkit School

Figure 4 illustrates the literacy and math learning outcome comparison between post-test scores of the out-of-school children and baseline scores of the in-school children. After playing independently with Kitkit School for 3 months, the out-of- school children's post-test scores became comparable to the baseline scores of the in-school group. Children in-school averaged 53% on the literacy baseline test and 48% on the math baseline test, while out-of-school children achieved a 52% average on the literacy post-test, and a 48% average on the math post-test.

This result provides support to the use of Kitkit School as an autonomous learning application in remote areas. The opportunity to trial Kitkit School with out-of-school children in Mtwara has shown the possibilities of utilizing the application to support children who lack access to formal education, and to catch them up with their in-school peers successfully.

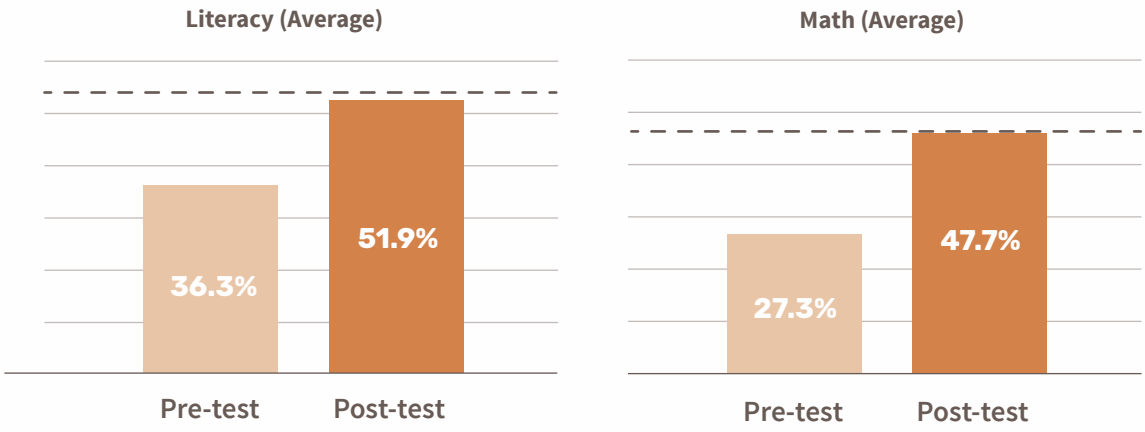

Figure 4. Score Comparison of Out-of-School Children vs. In-School Children

Conclusions and Implications

The Kitkit School team embarked on its' adventure with a critical question—What can we do for millions of children around the world who have no or limited access to quality education? Our 2017 testing in rural Tanzania revealed that after 3 months of Kitkit School play, Out-of-School children aged 6-10 showed significant learning gains in literacy and math. It is worthwhile to mention that, besides simply making positive progress in learning, the post-test scores of participating Out-of-School children became comparable to baseline scores of their in-school peers. These results are deeply encouraging, particularly in the context of Tanzania where 23.2% of 7- to 13-year-old children were not enrolled in primary schools due to various barriers to school enrollment. Our results demonstrate that mobile technology approach as an educational tool has a great potential to facilitate "self-directed" learning for children in remote or fragile areas and to deliver high-quality learning opportunities throughout the world, to children who do not have conventional educational opportunities.

Tablet-based intervention enables an individualized learning plan. This is particularly beneficial to Out- of-School children in a village center where a diverse group of children aged 5 to 10 played Kitkit School daily. Within this mixed-age group setting, it must be challenging to meet individual child's unique learning needs. In the context of a traditional school-based intervention with a teacher leading a singular lesson, the lesson may be paced too slowly for some children

and too fast for other children. The struggle to meet all children's diverse learning needs can be mitigated by individualized learning where learning can be tailored to meet the specific needs of individual children, as children have a degree of choice and can set their own pace in Kitkit School.

Although the use of tablet technology in literacy and math interventions is not a silver bullet, we believe that such use of education technology reveals a potential path to effectively addressing aspects of the global crisis of educating Out-of-School children in hard-to-reach areas. A number of projects are proving that scalable, regionally - tailored and uniquely - integrated hardware and software solutions can help fill the gaps in learning. Kitkit School continues to support our goal of helping some children who otherwise don't have access to educational opportunities.

References

Gottwald, S., Morris, R., Wolf, M., & Galyean, T. (2017). Bringing the Bottom Billion into Basic Literacy: How We Can and Why We Must. New directions for child and adolescent development, 2017(158), 93-104.

Gove, A., Brunette, T., Bulat, J., Carrol, B., Henny, C., Macon, W., Nderu, E., & Sitabkhan, Y. (2017). Assessing the Impact of Early Learning Programs in Africa. New directions for child and adolescent development, 2017(158), 25-41.

UNESCO Institute for Statistics. (2017). UIS. Stat [Interactive Database]. Retrieved from http://data.uis.unesco.org.

UNICEF (2018) Global Initiative on Out-of-School Children: Tanzania Qualitative Study Report. Retrieved from https://www.unicef.org/tanzania/Tanzania_Qualitative_Study_V4.pdf

UNICEF (2018) Global Initiative on Out-of-School Children: Tanzania Country Report. Retrieved from https://www.unicef.org/tanzania/reports/tanzania-country-report