

KITKIT SCHOOL APPLICATION IN KALOBEYEI PRIMARY SCHOOL

Background

Since 2008, Xavier Project, an NGO, has led projects in Kenya and Uganda to support equal opportunities and protection for refugee communities. Since 2017, Xavier Project has partnered with Enuma[®], Inc., a leader in digital early learning solutions, to deliver KitkitTM School, a tablet-based early learning solution. Xavier Project implemented Kitkit School with refugee children in Kalobeyei Primary School, an extension of Kakuma Refugee Camp in Northern Kenya. Like many other schools in Kakuma refugee Camp, Kalobeyei Primary School faces various challenges such as a high pupil population with very few teachers (teacher: student ratio 1:180), scarce teaching resources, and high percentage of students who need extra support. An additional challenge is that the children in Kalobeyei learned academic contents in English, the primary academic language in Kenya, even though English is not their native language or the language spoken in their homes.

Kitkit School is a tablet-based independent learning tool with a comprehensive curriculum spanning early childhood to early elementary education. Kitkit School incorporates game-

based learning principles into the curriculum so that it is a highly engaging learning tool. Children can fully concentrate for the entire 30 minutes with minimal intervention from the facilitators. The children are also learning at their own pace and only make progress once they have mastered the concepts. Since most schools have acute shortage of teachers, with sufficient number of tablets, an entire class can be engaged without a teacher being physically present. Kitkit School is a finalist in the ongoing Global Learning XPRIZE competition. Its various pilot studies show evidence young children who use the app in diverse settings, including a rural Tanzanian village or a remote area in Africa, achieved positive learning outcomes.

The goal of Kitkit School implementation in Kalobeyei Primary School was to increase access to quality education for refugee children and help them to acquire key literacy and numeracy. This field study was designed to evaluate if Kitkit School can enhance children's early literacy and math skills in a crisis setting and serve as an effective independent learning tool to facilitate their self-learning process.



Methodology

From January – March 2018, Kitkit School team and Xavier organized Kitkit School sessions each day to coincide with the school’s daily schedule. 270 students spanning Class I through Class III played with Kitkit School for 30 minutes daily. Those participating students had about 40 sessions with Kitkit School during the 8 weeks. Each of 270 students was provided with his/her own tablet for the session, allowing for an individualized learning experience. The facilitators and teachers passed out tablets and observed the sessions, but did not interfere with children’s play.

To explore the effectiveness of this intervention, we conducted an evaluation study. 35 children were selected randomly from the 180 children in Class II and Class III (aged 8 to 14) and took oral literacy and math tests before (in January, 2018) and after (in March, 2018) the Kitkit School intervention.

Three trained facilitators administered the oral tests, which were redesigned based on the EGRA and EGMA. There are five subtasks in the literacy oral test and seven subtasks in the math oral test. The five subtasks for literacy measured (1) letter sound knowledge, (2) familiar word reading, (3) invented word reading, (4) oral passage reading, and (5) reading comprehension. The seven math subtasks measured (1) number identification, (2) quantity discrimination, (3) simple addition, (4) simple subtraction, (5) missing number, (6) double-digit addition, and (7) double-digit subtraction.

To sustain its use in limited resource environments, Kitkit School was designed to be used offline, and has multi-user functionality so that many children are able to use one tablet. Designed for independent learning, the program requires little staff training to launch.

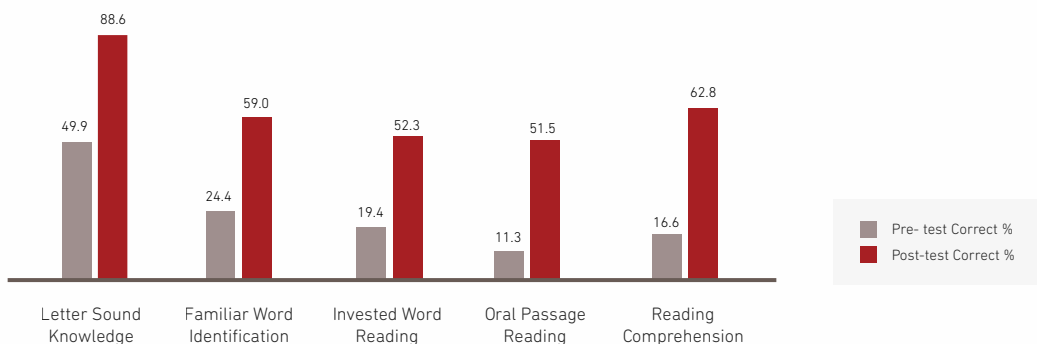
Results

For randomly selected 35 students out of 180 Kitkit School intervention participants, their pre- and post-test literacy and math scores were compared to examine the effectiveness of Kitkit School intervention in the Kakuma Refugee Camp. Students who had participated in the Kitkit School intervention for 8 weeks showed significant learning gains, with 30 minutes of independent daily learning with Kitkit School. As seen in the figures below, students’ scores on both literacy and math tests significantly improved after 8 weeks of Kitkit School intervention.

For the literacy test, the improvements are 32% to 46% in the Kitkit group (see Figure 1). Children who played with Kitkit School were able to improve their identification of letters from approximately 50 out of 100 letters to close to 89 out of 100 letters. The ‘Reading Comprehension’ area displayed huge gains after the 8 week-long Kitkit intervention.

Figure 1. Changes in Literacy Test Scores of the Kitkit Intervention Group

Pre-/Post-Test Correct % Comparison in Literacy Scores

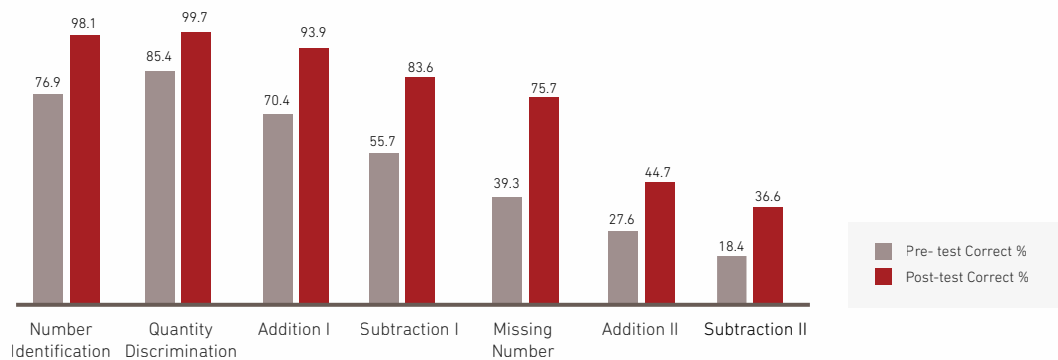


Similarly in Math, children showed score increases between the pre-test and post-test (see Figure 2). The participating students increased their percentage of correct answers by 14% to 36% across math subtasks. Specifically, about half of

children who played Kitkit School were able to improve their ability to answer double-digit addition questions. A subtask that presented the greatest score gains was the 'Missing Number' area.

Figure 2. Changes in Math Test Scores of the Kitkit Intervention Group

Pre-/Post-Test Correct % Comparison in Math Scores

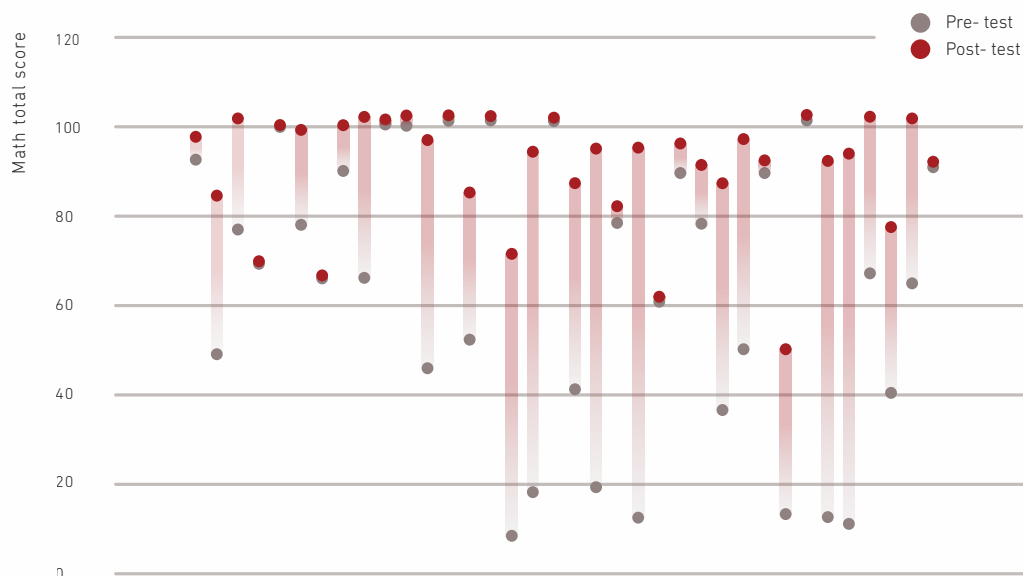


One notable findings of the Kitkit School intervention in the Kakuma Refugee Camp is that bottom 10% performers in the math pre-test showed significant learning growth in the math post-test. Comparing the math pre and post-test score

distributions of randomly selected 35 students clearly illustrates this finding (see figure 3). Overall math scores were computed by aggregating scores of the 7 subcategories and then we created scatterplots to examine score distribution of

Figure 3. Comparison of Math Pre and Post-test Results of Kitkit Group Children (n=35)

Pre/Post-Test : Math Total Scores of Kitkit Group Children (n=35)



*Note: each dot represents a unique student ID

the pre-and the post-tests. In the pre-test plot, scores of the 35 children are widely spread across the full score range (0-122), and substantial number of children scored under 40. In contrast, the score distribution of the post-test became flat and all participating children, except one child (ID=29), scored higher than 60. Particularly, score changes of students who received less than 20 in the pre-test are noteworthy. Table 1. Shows significant math score gains between the pre and post-test of the bottom 10% performer (n=7), ranging from 36 to 83. This finding indicates that the Kitkit School curriculum has great potential to support young learners with scarce resources and limited opportunities and to close achievement gap.

Table 1. Learning Gains among Children with Low Pre-test Scores (n=7)

| ID | Age | Gender | Pre-test | Post-test |
|----|-----|--------|----------|-----------|
| 16 | 10 | F | 8 | 71 |
| 17 | 11 | F | 18 | 94 |
| 20 | 9 | M | 19 | 95 |
| 22 | 10 | M | 12 | 95 |
| 29 | 10 | F | 13 | 49 |
| 31 | 11 | F | 12 | 92 |
| 32 | 11 | M | 11 | 94 |

Conclusions

With 30 minutes of independent learning daily with Kitkit School for 8 weeks, students in Kalobeyei Settlement increased their post-test scores by double-digit averages in both literacy and math. Achieving provable learning outcomes in literacy and numeracy in a crisis setting is all the more challenging and vital, when teachers are often unqualified, and there are minimal learning resources and class sizes can exceed 200. The results of this study present evidence that Kitkit School in an emergency setting can achieve positive learning outcomes for all children, but also narrow the existing achievement gaps to support students reporting with lower pre-test scores.

Furthermore, the implementation of Kitkit School shows the great potential that it can be useful to support teachers and under-resourced school community as an independent learning tool. Facilitators and teachers in Kalobeyei elementary school found it easy to implement, and saw impacts to their engagement in academics. The testimonials from teachers resonate successful implementation of Kitkit School in Kalobeyei Settlement.

“This project inspired me and the learners in my class. I have seen a lot of changes in my learners like they can now read and write and they also do mathematics correctly.”

-William Atari, Class I teacher

“This kitkit project has brought a lot of improvement in our school. One of the girls in from the kitkit class has improved up to position 3 this term.”

- Simon Peter, Class I teacher

“The program has really helped the children to improved. As their teacher I also found it easier to teach in class as the pupils were motivated and actively participating.”

- Chachita Abel, Class III