TECHNOLOGY FOR EARLY CHILDHOOD EDUCATION

A MONITORING AND EVALUATION STUDY OF KARIBU CENTRE COMPUTER PROGRAM
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A MONITORING AND EVALUATION STUDY OF KARIBU CENTRE COMPUTER PROGRAM

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*iHub_ RESEARCH*
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</table>
EXECUTIVE SUMMARY
The Karibu Centre is a vibrant, multi-dimensional community centre in Thika, Kenya with a unique emphasis on Early Childhood Education (ECE) programs targeting disadvantaged young learners. The centre recognizes the importance of early childhood education and has embraced technology as an engaging educational tool to help young learners meet important developmental milestones. Since 2010 Karibu Centre has been positively partnering with its community through the following programs:

1. Community Daycare for age’s 6 months - 2 years.
2. Community Pre-School for ages 3-6 years.
3. Outreach Tech; implementing tech programs in other community schools.
5. Adult Outreach Programs for Parents; Vocational Training, Support Groups, Employment Programs.
6. Sustainable Agriculture to create jobs and generate income

This study focused specifically on Karibu Centre’s computer technology program for young learners, which has been implemented within 4 schools in the Thika area and is benefiting approximately 800 children. This program exists to improve the quality of education through innovative technology with the use of laptop computers and engaging software. From March 2014 to November 2014, iHub Research evaluated the effects of this computer program on students’ performance.

Equipment used within this computer program is primarily The Intel Classmate PC, Waterford Early Learning Software, Sebran Software and Tux Typing. These programs feature tailored lessons, which teach age appropriate skills including literacy, math, science, drawing and coloring. The software keeps children engaged to learn and promotes basic literacy skills through the use of videos, animations and interactive music. Waterford software keeps track of students’ progress by generating automated weekly reports on their performance. In addition to these teaching tools, Karibu Centre has collaborated extensively with Intel, Team4Tech, VMware & Mustek to make this program as dynamic as possible for young learners in Kenya.

This study was conducted in four schools within Thika district. Three schools in the study were actively using the computer program; Kenyatta Primary, Barracks Primary and Karibu Center (private). Additionally, for the purpose of a control group for our research, Kamenu Primary, a neighboring public school not using computers for learning was included. Research participants were as follows:

1. 326 students
2. 22 teachers
3. 20 parents
This study sought to compare the benefits and challenges of using the Waterford software for student assessment as compared to traditional learning methods, such as DIBELS test. DIBELS (Dynamic Indicators of Basic Early Literacy Skills) is a short fluency measure, developed by University of Oregon, to regularly monitor the development of early literacy and early reading skills. The second objective of this study was to measure the progress of students, using early learning Waterford software curriculum in the Karibu Centre and neighboring schools. Lastly, the study sought to identify any gaps between the curriculums used for early childhood learning in Kenya and the Waterford Software program in order to advise on practices to be adopted by Karibu Centre with regards to improving the computer program.

Key findings from the study were as follows:

1. Traditional teaching methods in Kenyan public schools face several challenges. In classrooms where there are many students, it becomes challenging to track individual student performance as well as accord students the attention they need; negatively impacting the quality of learning.
2. Testing results have shown that students using the Karibu Centre computer program performed significantly better across all testing categories than students not involved in the program.
3. DIBELS results revealed that students at the age of 5 (pre-unit) who use the computers on a daily basis out performed 7 year olds (class 1) from the control group which did not have access to computers. Furthermore, the same students outperformed 8 year olds (class 2) in the area of phoneme segmentation (an important measure of future reading success.)
4. Waterford Early Learning Software was found to be an extremely effective tool for education and based on its ability to track individual students performance is more efficient than other software programs. Additionally, this software greatly benefited teachers by helping them to understand where students struggle in the curriculum.
5. Findings show that regular use of a computer program for learning helps students gain valuable skills at an early age. Further, student performance is directly linked to the amount of time spent using the computers.
6. Use of computers in ECE makes learning fun, interactive and enjoyable, a sentiment expressed by the students interviewed in the research.
7. Training of teachers is an important and integral aspect to a successful computer education program. Teachers who were interviewed expressed that consistent training boosted their confidence with the technology and enabled them to effectively troubleshoot issues encountered in the computer lab.
8. Parents were found to be highly supportive of the computer program and the majority of those interviewed also expressed interest in personally being trained to better support their child’s learning.

The study concluded that when implementing a computer program for use in early childhood education (ECD) it is important to ensure that the purpose of the program is to supplement existing efforts (traditional teaching methods). Curriculum used in the software should be tailored to local needs for greater effectiveness. Software used should also have ability to track individual student performance to enable teachers provide the relevant assistance to each student. Training of teachers should be conducted regularly to ensure they are well vast with the programs used thus increasing their effectiveness. Finally, if the devices available are not enough for large groups of students, the study recommends providing dedicated ICT lab teachers to manage student groups in the computer lab. Overall, the study found that usage on the computer program in early childhood education is effective in supporting student performance.
INTRODUCTION
Early Childhood Education (ECE) is broadly defined as the education given to children before entering primary school. Industrialized countries define it from birth to the age of 8 while developing countries stop at the age of 6. ECE is key as the foundation and thus success to higher levels of education. The government of Kenya in the Early Childhood Development (ECD) guidelines of 2006 defines this age to be between conception and eight years.

Growth and development of children at this age is vital and special consideration should be given when designing programs to ensure that children develop holistically. For this reason, the children in the ECE age are further grouped as follows:

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>½ - 2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Play Group</td>
<td>Baby Class</td>
<td>Pre-Primary 1</td>
<td>Pre-Primary 2</td>
<td>Standard 1</td>
<td>Standard 2</td>
<td>Standard 3</td>
</tr>
</tbody>
</table>

Table 1 Groups in which children fall

According to guidelines provided by the Ministry of Education (MOE) in Kenya, in order for the child to grow holistically, the children need to be exposed to the following factors: protection from physical danger; adequate nutrition and health care; appropriate immunizations; opportunities to develop fine motor skills; encouragement of language through talking, being read to, singing; support in acquiring additional motor, language and thinking skills; as well as additional opportunities to develop independence. A table showing a detailed description of the services for children can be viewed in Appendix 1.
At the ECE level, the methods of learning barely differ between curriculums. The goals focused on are maintained as the development of social, personal, emotional, physical, intellectual communicative, language, literacy, mathematics, art, science and social skills.

ECD has been deployed across the world using a variety of tactics from traditional classroom setup to usage of computers. In Kenya, the government of Kenya through the Kenya Institute for Curriculum Development (KICD) has invested in digitizing educational content for learning. Research into ICT use in early childhood development (ECD) in Kenya (Ndiritu, Mburu, Kimani, 2013) indicated that this investment is not likely to bear fruits unless training of teachers is put at the forefront. The study further explored the Information Communication Technologies ICT skills that ECD teachers should possess to effectively integrate ICT usage in early childhood learning. Studies conducted in other countries (Heft & Swaminathan, 2002; Wang & Ching, 2003) have shown that the use of ICTs in early learning can improve vital skills of children in areas such as creativity, language, literacy, writing, mathematics, social interaction as well as cognitive aspects. These technologies include computer games, programmable toys and control technologies, which encourage children to learn through interactive play, therefore stimulating their senses.
Some authors (NAEYC and Fred Rogers Centre, 2012) however believe that computer devices impose threats to other areas in the children’s development including exercise, concentration, eyestrain and fatigue, language development and social isolation. The joint position statement on technology and interactive media use with young children (NAEYC and Fred Rogers Centre, 2012) shows that there can be a negative impact on early learning if the teachers do not have the sufficient skills and training to guide the children based on the assumption that the program has sufficient education value.

The use of ICT in early education is therefore highly related to teachers’ ICT competencies, professional development, grade which they teach, years of teaching and attitudes. This indicates therefore it is not necessarily about what technology is used but how it is used. (NAEYC and Fred Rogers Centre, 2012)

Children from the ages 3-5 have been found to gain most in literacy particularly in terms of vocabulary and phonetics. Previous studies have recommended that a good relationship should be established between parents and teachers/the teaching center because once the parents trust and appreciate ICTs, they influence their children to adapt to it faster (Chiong and Shuler, 2010). Few studies have been conducted locally showing the impact ICT integration has on the students’ progress. Majority of the studies have focused on teacher training and the impact it would have to learning at ECD level.

This research study conducted on the computer program implementation in Karibu Centre and neighboring schools looked into the impact of computer usage to student performance; perceptions of the users (teachers, students and parents) on the technology; as well as the possible gaps identified when comparing traditional teaching practices in ECD in Kenya with computer aided instruction for ECD.
BACKGROUND
iHub Research conducted a monitoring and evaluation of the deployment of computer programs in 4 schools in Thika district, Kenya, commissioned by Karibu Centre. Karibu Centre implements early learning programs via laptops across three schools in Thika district namely Karibu Centre, Kenyatta Primary School, and Barracks Primary School. Kenyatta and Barracks are public primary schools that showed keen interest in getting the computer program set up in their premises. The schools went further to setup computer labs in preparation for the computer deployment and thus were the first to be selected when Karibu Centre got additional computer devices. Karibu Centre also introduced the program to two neighboring schools within the area, but faced difficulty in full implementation due to lack of resources from the receiving schools side, particularly electricity. Twenty laptop computers were given to each school and located in an ICT child-friendly lab in which classes were to be conducted on a 1:1 student to laptop ratio for purposes of accurate tracking. A control group was also considered in the evaluation from Kamenu Primary School, (Thika). Each of the participating schools has an early education program covering pre-unit (5-6 years), class 1 (7 years), and class 2 (8 years).

The traditional practice of executing the ECE Curriculum is that teachers are provided with guidelines on what each child should achieve in the various age groups (see Appendix 1). The teachers are also provided a syllabus to teach students the concepts expected of their group level. The schools that have computer labs set up in Thika (Karibu Centre, Kenyatta Primary School and Barracks Primary School) supplement traditional teaching methods by providing students with an opportunity to gain further skills through the use of computer programs. Students in the school use the computer programs for periods ranging from fifteen to thirty minutes, two to four times a week depending on the school. In particular, in Karibu Centre (private school) students access the computers for thirty minutes everyday while in Barracks and Kenyatta primary school students access the computers for a fifteen-minute period twice a week.

The different programs used by the students are introduced gradually at different learning stages. The programs include:

**WATERFORD EARLY READING PROGRAM** - an early learning program developed in the U.S. that aims to reduce the burden of teachers in assessing students while ensuring students access high-quality content, via multimedia such as songs, videos and games. The program measures children performance in terms of: vocabulary, accuracy and fluency with connected text, alphabetic principle, phonemic awareness and reading comprehension. The purported benefit of the program the fact that it is self-paced and individualized, allowing the child to move to the next stage only after completing the earlier stage, with no influence from teachers.
Students across the schools were monitored using Dynamic Indicators of Basic Early Literacy Skills (DIBELS), an American curriculum-based test used to identify struggling children. DIBELS is a set of procedures and measures for assessing the acquisition of early literacy skills from kindergarten through sixth grade. The DIBELS is designed to be a short (one minute) fluency measure used to regularly monitor the development of early literacy and early reading skills. DIBELS are comprised of seven measures to function as indicators of phonemic awareness, alphabetic principle, accuracy and fluency with connected text, reading comprehension, and vocabulary.

Depending on the number of assessment periods per year, progress can be measured using certain benchmarks in this case up to the second grade. DIBELS were picked as the measurement tool for this research because DIBELS are one of the most common tools used globally to track progress. Despite its global use, scholars such as Goodman (2006) disagree that DIBELS are an effective assessment tool, citing them as inaccurate and even harmful as a process, which has not been proven to facilitate development in reading and writing skills (Goodman, 2006). During the course of the research, particularly in the public schools the research team faced some difficulties in assessing some students and can thus agree that the DIBELS test has some inaccuracies where determining a student’s reading ability is concerned. This is because in some cases the test was terminated when a student took too long to respond as per the guidelines given for conducting the test.

MINI SEBRAN and SEBRAN programs offer students the opportunity to interact with colorful pictures and numbers, pleasant music, and gentle games that teach letters, numbers, simple math, and rudiments of reading.

Coloring Book & TUX TYPING provide the students with the opportunity to improve their creative skills in the arts and typing skills.
The iHub Research team began the monitoring and evaluation study in March 2014 until November 2014. The main objectives of the study were:

1. To measure the progress of students, using early learning Waterford software curriculum in the Karibu Centre and neighboring schools.
2. To compare the benefits of using the Waterford software for assessment over traditional learning methods such as the DIBELS test.
3. To identify gaps between the traditional Kenyan curriculum used for early childhood learning in Kenya and the Waterford Software program in order to advise on practices to be adopted by Karibu Centre.

Key indicators used to measure the progress of students’ achievement included:

1. Test scores and standardized assessment in the Waterford Early Reading Program;
2. Dynamic Indicators of Basic Early Literacy Skills (DIBELS) performance for students in the four schools surveyed;
3. Students’ perception of technology;
4. Basic computer literacy - basic navigation and knowledge of usage of the computer programs.

In addition to the indicators, general demographic data (gender, age) were also captured.
Karibu centre provides 4 teachers and 2 technical staff for 101 children, has electricity and Internet throughout the school and 80 computers on the premises for educational use. Basic curriculum, which is used in the school, is the nationally recognized Kenyan curriculum although additional teaching styles are incorporated as well. The school runs 8am to 3pm and follows the Kenyan school year.

Since 1973, Kenyatta Primary School has had a special unit for teaching children with disability that has 4 teachers. Kenyatta Primary has a total 1,248 students with a 1:3 student to textbook ratio. Each class level has multiple classes to accommodate the number of students enrolled. This is commonly referred to as streams. Thus in Kenyatta primary school, the lower classes have 3 streams (East, West and Central) till Standard 3 and upper primary classes have 4 streams from Standard 4-8. Kenyatta primary has 4 early childhood development (ECD) teachers and 31 primary school teachers. It has an electricity connection only in the computer room with 20 computers on the premises. Kenyatta primary school runs from 8.20 am -12.30 pm for ECD pupils and 8.20 am - 3.10 pm for primary school pupils. Kenyatta primary is a public school. Karibu Centre implemented the computer program in April 2013.

Since 1987, BARRACKS PRIMARY SCHOOL has run a special unit for teaching children with disability with 4 teachers. Barracks primary has a total 940 students with a 1:4 student to textbook ratio, 1 stream at ECD and 2 streams per class (East and West) at primary level. Barracks Primary has 5 ECD teachers and 34 primary school teachers. The school has an electricity connection in a few classes and 20 computers on the premises. Barracks primary school runs from 8.00 am - 3.10 pm. Barracks primary is a public school. Karibu Centre implemented the computer program in April 2013.

KAMENU PRIMARY SCHOOL has a total of 1,393 students with 1 stream at ECD and 2 streams at primary level. The school has 5 ECD teachers and 32 primary school teachers. It has an electricity connection in a few classes and no computers on the premises. Kamenu Primary School runs from 8.00 am -3.10 pm. Kamenu primary is a public school and for the purpose of the research was used as the control school.

It is important to note that in Kenya, public schools rely largely on the resources allocated by the government for their operations and are not required to charge any tuition fees to the students since it is covered by the governments free primary education program. The funding allocated to the public schools is limited and mostly spent on allocating the students resource materials for learning like textbooks. Private schools on the other hand have a larger pool of resources as they can either be donor funded as in the case of Karibu Centre or charge a fee to the students for tuition.
METHODOLOGY
This research study used Experimental Design to evaluate the effectiveness of the Waterford computer program in Kenya. This method focuses on internal validity where the key question is whether observed changes can be attributed to the program or intervention (i.e., the cause) and not to other possible causes (sometimes described as “alternative explanations” for the outcome). Through Experimental Design, the research team aimed to identify the main effects of the Waterford computer program towards improved academic performance by students throughout the monitoring period (March - November 2014). The student groups selected were exposed to the same content on the computer program while the control group learned the same content through traditional methods. All the students were tested using the DIBELS test at the baseline (March 2014) and end-line (November 2014) research period.

326 students were tracked for the 9-month duration (243 using the computer program and 83 not using the program from ECD, standard 1 and 2).

A total of 22 teachers were interviewed across the four schools. These were primarily teachers in the ECD classes (nursery, pre-unit), class 1, 2, and computer lab support staff and administrators. In total, out of the 22 teachers interviewed, number of teachers per school was as follows: Karibu Centre (5), Barracks (6), Kenyatta (7) and Kamenu (4).
The breakdown of the students and teachers interviewed in their schools is as follows:

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>ECD</th>
<th>CLASS 1</th>
<th>CLASS 2</th>
<th>TEACHERS</th>
<th>TRANSFERRED STUDENTS</th>
</tr>
</thead>
<tbody>
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<td>Karibu Centre</td>
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<td>-</td>
<td>-</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Kenyatta Primary School</td>
<td>29</td>
<td>30</td>
<td>35</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Barracks Primary School</td>
<td>32</td>
<td>32</td>
<td>30</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Kamenu Primary School</td>
<td>23</td>
<td>30</td>
<td>30</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>142</td>
<td>92</td>
<td>90</td>
<td>22</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 1 Number of respondents interviewed in the study March 2014
All study participants took the DIBELS assessment test. The performance reports for the DIBELS were collected from all four schools. Reports from the Waterford Early Learning Program were also collected from the three schools that used it (Karibu, Kenyatta, Barracks). In order to better understand the performance of the students, the research team used observation and in-depth interviews to collect additional information from the teachers and students. The majority of respondents interviewed were very young, aged less than 8 years old, thus while communicating with the students to collect the data, the research team incorporated a variety of methods:

1. In-depth Interviews were conducted using Swahili language and responses were recorded through questionnaires.
2. Students were observed interacting with the computer program and could point at various aspects of it to answer some questions in the survey.
3. The classroom and computer lab teachers provided additional information where the students were unable to respond.
4. Pictures and videos were taken at various levels of the research to capture what the student indicated.

The data collected from the study included performance results from the DIBELS testing and Waterford programs from the three public schools and Karibu Centre; pictures and videos of the students taking the DIBELS test and interacting with the computer programs; and pictures of the computer labs and activities. A sample DIBELS test is included in Appendix 2b.

Data from the study was analyzed using Microsoft Excel through assessing the proficiency levels of the students in the DIBELS and comparing performance in Waterford software, reviewing responses given in the interviews and aggregating the findings using charts and graphs.
LIMITATIONS OF THE STUDY

The study aimed to interview 340 students, aiming at a sample size of 30 students per class per school in the public schools (90 students each) and all the students in Karibu Centre in pre-unit and nursery (60). However, there were several absent students particularly in the public schools during the end-line data collection in November 2014, which made it difficult to reach the targeted quota. This was resolved by going back to the schools in January 2015 when the schools resumed. The end-line DIBELS testing was therefore conducted over a ~90day period. By the time that end-line surveys were conducted in January 2015, 32 students had transferred to other schools leading to inconclusive results for some of the original participants. The main reason for this was delayed testing; where the testing slotted for November took place in January because of scheduling conflicts. The majority of the transferred students (22) were from the control group - Kamenu Primary School. Additionally, as the testing in Kamenu was conducted at the beginning of the next school year (2015), there might be slight variations from what would have been expected of the group.

When conducting the DIBELS tests, sounds presented a major challenge. The children currently enrolled in the public schools who had received a private education at the Karibu Centre carried on some of the benefits even into the first and second years of primary school. A significant amount of time was spent coaching the children by the DIBEL testers on how to answer the questions before giving them a chance to do it, and some children were too anxious to answer any of the questions. This made for data that was not truly reflective of children’s capacity. Ken Goodman, in an article titled ‘Suffer Little Children to Come to Be DIBELSed’ 1, tackles some of the issues encountered by the team in carrying out the test including the need to terminate tests if children do not answer (resulting in a zero on the section) and the cultural issues inherent to the test. Young children are difficult subjects to assess accurately because of their activity level and distractibility, shorter attention span, wariness of strangers, and inconsistent performance in unfamiliar environments (Benner, 1992).

The researchers encountered issues as they conducted the DIBELS assessment test. Researchers (Wortham, 1990; Benner, 1992) note that assessments of infants, toddlers, and young children requires sensitivity to the child’s background and knowledge of testing limitations and procedures with young children. The research team found that cultural issues that could have affected the testing included factors like language barriers particularly in the case where the DIBELS was conducted in English language whereas in ECE in Kenya even mother tongue language is used as a medium of instruction.

The research team observed some students try to cram the instruction provided to pass the DIBEL test. This interestingly is the same behavior also empirically noted in older students in Kenya (who cram for the KCPE). To note that such behavior is identified from such an early age may also speak to the nature of the rote curriculum and learning environment, which makes students focus cramming to pass exams instead of learning for knowledge sake.

Language barrier was also a major challenge in conducting the interviews with the students to gain their perceptions on the technology. The interviews were conducted in Swahili language although in some extreme cases where the students were unable to communicate, native language (mother tongue) was used. In this case, some information may have been lost in the translation process.
RESULTS
The results section represents findings from data collected during the research period (March –November 2014). It highlights findings in the categories: student performance, perception of the technology by the students and teachers, gaps identified in research and challenges faced by the users.

A total of 326 students were interviewed with an almost equal ratio of boys to girls (146 and 159, respectively). The breakdown of the students according to gender in the four schools is as follows:

### MARCH 2014

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BARRACKS PRIMARY SCHOOL</td>
<td>43</td>
<td>49</td>
<td>92</td>
</tr>
<tr>
<td>KAMENU PRIMARY SCHOOL</td>
<td>45</td>
<td>38</td>
<td>83</td>
</tr>
<tr>
<td>KARIBU CENTRE</td>
<td>33</td>
<td>25</td>
<td>58</td>
</tr>
<tr>
<td>KENYATTA PRIMARY SCHOOL</td>
<td>46</td>
<td>47</td>
<td>93</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>167</td>
<td>159</td>
<td>326</td>
</tr>
</tbody>
</table>

*Table 2* Number of respondents interviewed in the study March 2014
Table 3 Number of respondents interviewed in the study March 2014

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BARRACKS PRIMARY SCHOOL</td>
<td>43</td>
<td>50</td>
<td>93</td>
</tr>
<tr>
<td>KARIBU CENTRE</td>
<td>31</td>
<td>20</td>
<td>51</td>
</tr>
<tr>
<td>KENYATTA PRIMARY SCHOOL</td>
<td>41</td>
<td>49</td>
<td>90</td>
</tr>
<tr>
<td>KAMENU PRIMARY SCHOOL</td>
<td>32</td>
<td>29</td>
<td>61</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>147</td>
<td>148</td>
<td>295</td>
</tr>
</tbody>
</table>

**FINDING 1:**

TRADITIONAL TEACHING METHODS FACE SEVERAL CHALLENGES AND REQUIRE RE-EVALUATION TO IMPROVE STUDENTS’ QUALITY OF LEARNING

Traditional methods used to teach students in the classroom include: the use of reading flashcards; say/repeat; reading books and short stories; skills writing and use of patterns; sentences or letters; use of, poems; charts; and music.
All the teachers interviewed (n=22) were asked how they traditionally assessed students in English literacy. They indicated that they use reading and writing tests, oral reading tests and periodic exams to assess students’ performance. The DIBELS method of assessment that was used for this study to assess students during the baseline and end-line, is not traditionally used in Kenya as a literacy assessment test and instead assessment in ECD is conducted using standardized tests designed by teachers in the school.

When the teachers were asked if they faced any challenges using traditional teaching and assessment methods, 82% of the teachers interviewed noted that they faced challenges. Key challenges identified include:

- Limited teaching materials and books for the large number of students in the classrooms
- Language barrier in communicating where some students are used to mother tongue so it's hard for them to learn,
- Some don't know how to use flashcards;
- The high student to teacher ratio makes it difficult to attend to each child individually; students without basic reading skills, listening are not attentive;
- Teachers face difficulty in explaining things the students have never seen e.g. oceans; and the different paces at which the children learn required tactical approaches from teachers.

The teachers tried to overcome these challenges by drawing charts, using stories, music, riddles and poems to explain concepts, requesting parents to purchase some books for their children, grouping the children according to different levels (slow, advanced), for the schools with computers using the software programs to supplement what was taught in class as well as allocating additional time and guidance to the students to ensure everyone understands the concepts.
FINDING 2:

STUDENTS USING THE COMPUTER PROGRAM PERFORMED BETTER THAN STUDENTS NOT USING THE PROGRAM

STUDENTS DIBELS PERFORMANCE ACROSS SCHOOLS

As mentioned above, the DIBELS test is a short fluency test. It aims to test four things in literacy: sounds, letter naming, phonemes, and nonsense words. They are described below:

1. S – Sounds: a standardized, individually administered measure of phonological awareness that assesses a child’s ability to recognize and produce the initial sound in an orally presented word
2. LN - Letter Naming: Students are presented with a page of upper- and lower-case letters arranged in a random order and are asked to name as many letters as they can
3. PH – Phoneme: assesses a student’s ability to segment three- and four-phoneme words into their individual phonemes fluently
4. NW - Nonsense Words: tests letter-sound correspondence in which letters represent their most common sounds and of the ability to blend letters into words in which letters represent their most common sounds

The figure below shows an aggregated comparison of the four schools average total scores in the DIBELS tests.
Figure 3 Comparison of Student Performance in DIBELS 1 and 2

COMPARISON OF STUDENT PERFORMANCE
In general, based on reviewing performance in DIBELS test 1 and 2, **students using the computer program performed better than those not using the computer program.**

**The summary below highlights the performance**

01 There was an increase in scores of students between DIBELS test 1 and 2 by a majority of the students tested. Of the students sampled in primary school, students in Barracks Primary School performed better than all their counterparts in both DIBELS tests 1 & 2.

02 Students from Karibu Centre pre-unit, who are much younger (age 5), performed better than their counterparts in the public schools (7 and 8 year olds), particularly in test 2.

03 The Karibu students (5 year olds) outperformed the students in class 1 (7 year olds) in the control school - Kamenu Primary. Of concern was the fact that children in Kamenu Primary School only attained the level of Pre-Unit students at Karibu Centre in Class 2, which suggests that those students, though older, were at par with children two years behind them in school. The high performance of the Karibu Centre students as compared to Kamenu school could be explained by the fact that the teacher to student ratio is relatively low in Karibu than Kamenu and the daily access to the computer program by Karibu students which supplements lessons learned in class provides the students at Karibu with an added advantage. While there are demonstrable gains that could be ascribed to the software, it is curious that the difference shown by the children in the control school was so glaring.

It is important to note that students in Barracks Primary School in pre-unit were not tested in DIBELS during the study period. Additionally, in Karibu Centre only has ECD classes (baby class, nursery and pre-unit) and for purposes of comparison with the other schools, only pre-unit students were tested.
DIBELS TESTING EXPERIENCE IN KARIBU CENTRE

There was a significant improvement in performance of Karibu Centre students in the DIBELS tests 1 and 2. The overall performance of the students in Karibu Centre between the two tests is represented in the figure below.

With the exception of three children, the Karibu cohort showed improvements in the DIBELS test between the first and second tests. The vast majority showed a marked difference between the first and second tests, showing significant improvement in their overall performance.

Figure 4  Karibu DIBELS 1 and 2 overall performances.
LETTER NAMING (LN)

In letter naming (LN), the majority of the students at Karibu Centre scored above the 20% threshold with the exception of one student. According to a DIBELS assessment report by the University of Oregon, students are considered at risk of achieving later reading goals if they perform below the 20% mark in successive DIBELS tests. Although two students had scored below 20% in test DIBELS 1, by DIBELS test 2, only one student remained below the 20% benchmark. There was significant improvement across the board amongst Karibu students in the fluency of letter naming. It should be noted that although letter names comprise a set of teachable skills, teaching letter names does not lead directly to improvements in student reading outcomes in the ways characterized by the foundational skills of early literacy (Adams, 1990). The letter naming measure is highly predictive of later reading success thus it is included as an indicator for students who may require additional instructional support on the basic early literacy skills.

Figure 5 Karibu Pre-Unit Performances in Letter Naming
SOUNDS

In the sound fluency measure, students are generally assessed in their ability to recognize and produce the initial sound of an orally presented word. When testing sound fluency, the level of reliability differs dependent of the number of times that the test is carried out. The students’ performance in sounds usually affects their phonemic awareness. The figure below displays how Karibu Centre students performed in DIBELS test 1 and 2 sounds.

![Karibu DIBELS 1 and 2 performances in Sounds](image)

**KARIBU DIBELS PERFORMANCE IN S**

It is important to note that 5 students declined in their sound fluency proficiency test from DIBELS test 1 to DIBELS test 2.

**PHONEME SEGMENTATION**

Majority of the students in Karibu Centre scored much higher than 35 marks in this particular test indicating that they were in the established category. This is a good indication that the learning software enabled them to be well versed in the work that the DIBELS test demanded of them.
The DIBELS testing methodology demands that testing be abandoned if the child does not answer a section of questions particularly in phoneme testing. This explains the absence of scores for nine students in DIBELS test 1 because they scored zero. Six of the students went on to have high phoneme scores in the second DIBELS test.

Only half of the children at Karibu Centre performed better in the second round of DIBELS testing for phonemes than in the first.

**Figure 7** Karibu Pre-Unit DIBELS 1 and 2 Performance in Phonemes
The pre-unit children at Karibu were exposed to 30 minutes every day of the software that featured work on phonemes. The research team earlier mentioned the challenge of having to coach students prior to testing them. That challenge was mainly faced in the phoneme phase of testing particularly in the public schools. The students from Karibu Centre were fluent in this section and did not have to be coached to take the phoneme test, which can be attributed to the daily exposure to the software in the computer program.

DIBELS TESTING EXPERIENCE IN OTHER SCHOOLS

The DIBELS performance of the students in pre-unit from Karibu Centre was also compared with performance of students in the neighboring schools. The control group (students not using the computer program) was from Kamenu Primary School. The table below shows the average performance of the students in the 4 schools in DIBEL test 1 and test 2.

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>CLASS</th>
<th>S</th>
<th>LN</th>
<th>PH</th>
<th>NW</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAMENU</td>
<td>PRE-UNIT</td>
<td>5.58</td>
<td>8.08</td>
<td>2.77</td>
<td>3.92</td>
<td>20.35</td>
</tr>
<tr>
<td>KARIBU</td>
<td>PRE-UNIT</td>
<td>18.72</td>
<td>24.74</td>
<td>16.84</td>
<td>29.00</td>
<td>89.29</td>
</tr>
<tr>
<td>KENYATTA</td>
<td>PRE-UNIT</td>
<td>8.09</td>
<td>12.71</td>
<td>2.94</td>
<td>5.47</td>
<td>29.21</td>
</tr>
<tr>
<td>BARRACKS</td>
<td>CLASS 1</td>
<td>23.03</td>
<td>41.28</td>
<td>26.33</td>
<td>84.33</td>
<td>174.98</td>
</tr>
<tr>
<td>KAMENU</td>
<td>CLASS 1</td>
<td>12.73</td>
<td>19.11</td>
<td>11.00</td>
<td>27.00</td>
<td>69.84</td>
</tr>
<tr>
<td>KENYATTA</td>
<td>CLASS 1</td>
<td>11.73</td>
<td>24.82</td>
<td>7.09</td>
<td>19.68</td>
<td>63.32</td>
</tr>
<tr>
<td>BARRACKS</td>
<td>CLASS 2</td>
<td>22.42</td>
<td>27.32</td>
<td>26.68</td>
<td>93.53</td>
<td>169.95</td>
</tr>
<tr>
<td>KAMENU</td>
<td>CLASS 2</td>
<td>12.72</td>
<td>40.89</td>
<td>22.16</td>
<td>55.53</td>
<td>131.29</td>
</tr>
<tr>
<td>KENYATTA</td>
<td>CLASS 2</td>
<td>17.30</td>
<td>45.75</td>
<td>27.25</td>
<td>74.91</td>
<td>165.21</td>
</tr>
</tbody>
</table>
DIBELS 2

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>CLASS</th>
<th>S</th>
<th>LN</th>
<th>PH</th>
<th>NW</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAMENU</td>
<td>PRE-UNIT</td>
<td>16.21</td>
<td>20.38</td>
<td>45.23</td>
<td>22.46</td>
<td>104.28</td>
</tr>
<tr>
<td>KARIBU</td>
<td>PRE-UNIT</td>
<td>27.28</td>
<td>40.89</td>
<td>58.16</td>
<td>47.05</td>
<td>173.39</td>
</tr>
<tr>
<td>KENYATTA</td>
<td>PRE-UNIT</td>
<td>17.76</td>
<td>31.41</td>
<td>36.00</td>
<td>40.24</td>
<td>125.41</td>
</tr>
<tr>
<td>BARRACKS</td>
<td>CLASS 1</td>
<td>34.32</td>
<td>56.22</td>
<td>54.17</td>
<td>102.17</td>
<td>246.88</td>
</tr>
<tr>
<td>KAMENU</td>
<td>CLASS 1</td>
<td>20.73</td>
<td>35.89</td>
<td>39.95</td>
<td>54.47</td>
<td>151.05</td>
</tr>
<tr>
<td>KENYATTA</td>
<td>CLASS 1</td>
<td>28.17</td>
<td>48.45</td>
<td>54.41</td>
<td>71.45</td>
<td>202.49</td>
</tr>
<tr>
<td>BARRACKS</td>
<td>CLASS 2</td>
<td>40.05</td>
<td>65.21</td>
<td>52.21</td>
<td>108.63</td>
<td>263.99</td>
</tr>
<tr>
<td>KAMENU</td>
<td>CLASS 2</td>
<td>29.22</td>
<td>45.58</td>
<td>53.47</td>
<td>63.47</td>
<td>191.74</td>
</tr>
<tr>
<td>KENYATTA</td>
<td>CLASS 2</td>
<td>34.32</td>
<td>54.94</td>
<td>54.84</td>
<td>100.50</td>
<td>244.60</td>
</tr>
</tbody>
</table>

Table 5 Comparative performances of students in DIBELS test 1 and 2. Students using the Karibu Centre computer program performed significantly better across all testing categories than students not involved in the program.

All the students significantly improved in their performance in the 9-month testing period between DIBELS test 1 and 2. Students in the control group (Kamenu) had a relatively low margin of increase to students in the group that use the computer programs to supplement learning (Karibu Centre, Kenyatta School and Barracks School). The percentage increase in performance across the four schools in the DIBELS tests is represented in the table below.
Table 6  Percentage increase of students across DIBELS test 1 and 2

Students in Kenyatta and Barracks school interact with the computer program at least twice a week for a period averaging fifteen minutes per class where as students in Kamenu school learn solely using traditional methods of learning. When the performance of students was assessed, the research team found that standard 1 students performance increased from DIBELS test 1 to 2. While the initial scores of the Kamenu and Kenyatta students in sounds were about the same, the Kenyatta students’ percentage increase was over 80% more than that of the Kamenu group (63%) at the end of the testing period. This is an indicator that the computer program is likely contributing to increased performance of the students’ more than traditional methods of teaching. The standard 2 performances showed a significant increase with the trend in performance being repeated. Overall, students from Barracks in class 1 and 2 had the highest average scores across the different tests in both DIBELS tests 1 and 2.
In letter naming DIBELS test, students are presented with a page of upper- and lower-case letters arranged in a random order and are asked to name as many letters as they can. In this test, students are considered at risk of achieving later reading goals if they perform below the 20% mark in successive DIBELS tests. A look into the performance of students across the four schools revealed that a lot more emphasis should be placed on improving this skill group. In DIBELS test 1, students from Kamenu and Kenyatta in pre-unit and class scored below 20%. Despite the significant improvement in performance in DIBELS test 2, at the end of the testing period, students in pre-unit in the control group (Kamenu) merely averaged 20%. The average performance in letter naming for the three classes represented in the charts below:

**Comparative Performance in LN pre-unit**

*Figure 8 Comparative Performances in Letter Naming for Pre-Unit Students*
During the baseline survey, students in class 1 in Kenyatta and Kamenu were, on average, in the at-risk category with Barracks students posting scores that put them at low-risk. At the end of the study period, Kamenu students still posted scores that put them at some risk category while Kenyatta students moved to low risk. Some of the gains may be ascribed to the reading work done by the children over the year since learning was also taking place using traditional methods of teaching across the four schools. The learning software used at Kenyatta and Barracks schools may also have contributed to the gains made in those schools as the children use it twice weekly.

**Figure 9** Comparative Standard 1 Student Performances in Letter Naming
During the baseline study, Barracks Class 2 students’ performance (under 30) was at a deficit risk category at the beginning of the test period and showed significant improvement by the time of the end-line study. By the end of the study period, the students at Barracks had the highest scores, putting them at least risk in the group.

While Kamenu had started off in the middle of the group, their Class 2 students were at the bottom at the end of the study period, lagging behind their peers at Kenyatta and Barracks Primary Schools. This indicates the use of the learning software likely enabled significant improvement in the scores, especially in the case of Barracks Primary School.

Figure 10 Comparative Standard 2 Student Performances in Letter Naming.
FINDING 3:

WHEN SELECTING COMPUTER SOFTWARE FOR TEACHING EARLY CHILDHOOD CONCEPTS, SOFTWARE’S WITH THE ABILITY TO TRACK INDIVIDUAL STUDENTS PERFORMANCE ARE MORE EFFICIENT.

Waterford Software Performance
Waterford early reading provides weekly feedback in order for the teachers to know what areas the students are struggling in, after-which teachers can inform the other subject teachers to assist specific students in specific areas. The Waterford software program is designed to take the student from pre-school through to class two. In these schools, the target for the test scores should average at 70% and above for a well-performing student.

In ECE, a summary of factors to be considered when assessing the performance of a software include:

- The software is interactive;
- The program can be customized to the child’s level;
- The program allows for creation of new activities;
- The program follows the correct and effective teaching path.

Waterford Early learning program provides for all the above-mentioned issues. Programs such as Waterford thus aims to help children achieve learning objectives while having fun.

During the interviews, the research team found that students in the private school were able to graduate to the Waterford program by pre-unit, whereas those in the public schools took up to class 1. This resulted in an age disparity in the comparison of results. This finding could be as a result of the private school having access to greater resources, which allows for a more student-oriented curriculum, rather than the basics that most government schools offer.

The Waterford System was generally easy for the students to use. When asked to demonstrate how to navigate through the system, majority of students were able to quickly identify the picture of their class teacher and then their own images before beginning the coursework.

Based on the Waterford scores, a majority of students in the three schools using the computer program performed above the 70% requirement in reading. Each student’s performance was analyzed individually because they are at different levels on the Waterford platform.
PERCEPTION OF PARTICIPANTS ON THE COMPUTER PROGRAM

ICT tools may have a role to play in improving the students’ grasp of the English language since the majority of the above mentioned challenges could theoretically be solved with the use of computer programs as a teaching aid. From the four schools, of those using the computer program, 233 students were interviewed.

The research team was interested in understanding perception of the students towards the computer program. When asked whether they found studying with the computer program similar to traditional lessons in class or different, 60% of the students indicated they found it different to the traditional practice of learning in class. 36% of the students found the learning using the computers and class the same while 4% did not have a response.

Figure 11 Students response to the question: Is the experience learning with the computer program different or similar with traditional learning

majority of the above mentioned challenges could theoretically be solved with the use of computer programs as a teaching aid.
All the students who interacted with the computer program indicated that they liked using it for learning. When students were asked what they liked about the computer program, majority of them preferred reading topics like letters (28%) followed closely by Math-related topics. The figure below indicates what the students liked about the computer program.

**Figure 12** Students response to the question: What the students liked about the computer program.
The students kept on referring to the computer programs as games during the interviews and indicated that the music, the cartoons, pictures, counting and reading were some of the things they liked most about learning with computers. This highlights the “game” feel that ICTs have over textbooks; making learning more fun.

95% of students in the control group (Kamenu Primary School) also indicated that they would like to use computers for learning. The reasons they gave for these include: the computers would be good; they would help them know how to read, type, play games and understand how to learn many things as well as improve their grades. There was a group of students (15) who wanted computers but didn’t know why. Four students did not like the thought of learning with computers. Of the four, two indicated that this was because they don’t like them while the other two mentioned that the teachers would take them.

As indicated earlier, students in Karibu Centre interacted with the computer program daily for periods of half and hour each while those in the public schools (Kenyatta and Barracks) used the computer program twice a week for fifteen- minute periods. The major challenge faced by the teachers in the public schools was the limited number of laptops, which meant that in a class, students were divided into two groups (a & b) with about twenty students each to go to the computer lab. This in turn reduced the total amount of time spent using the computers by each group from half an hour to only fifteen minutes each. A key challenges faced by the teachers of students using the computer program in the public schools was how to ensure that students who remained in class were kept engaged. This was later addressed by ensuring that an ICT teacher was hired to manage students who went to the computer lab while the class teacher remained with the other students in class. The Karibu students, who are much fewer than their counterparts in public schools, were not affected and managed to use the computer program daily for half an hour periods.

**FINDING 4:**

**REGULAR USAGE OF THE COMPUTER PROGRAM FOR LEARNING HELPS STUDENTS DEVELOP ICT SKILLS AT AN EARLY STAGE**
PROBLEM SOLVING WHEN USING THE COMPUTER PROGRAM

Activities that engage children in problem solving are aimed at helping them to identify a set of goals as well as develop attention and persistence in achieving the goals. Problem solving also assists children to develop flexibility in thinking to understand and reflect on relationships of cause and effect. During the interviews, the students and teachers mentioned that they face some challenges when they interact with the computer program.

Some of these challenges included: “computers are too few, computers hang, students face difficulty in unlocking the program, it was challenging learning what features to use in the program, some topics are not very clear, login in challenges where some students struggle to find their pictures or open the programs,” among other technical issues.

The students using the computer program displayed competency in using the programs. During the interviews the students interviewed demonstrated the processes they went through to open the learning software’s (Waterford, Sebran, Tux Typing). Students indicated that in a few cases, they had some trouble getting the programs to work (computers stalled) and had to use creative methods to troubleshoot the computers.

Figure 13 Students response to the question: Do you get stuck when using the program? N=241 (March,) N=220 (November)
The majority of the students exposed to the computer programs mentioned that they get stuck at some point or other. Several students who gave this response were from the public schools. Of these, 75% asked for the teacher’s help. This could be attributed to the procedures taught in the computer lab by the teachers, or the icon on the Waterford program that informs the students to get help from the teachers.

The teachers indicated that while they were able to assist the students to troubleshoot the problems, key issues that kept being tackled on the computers included: computers ‘hanging’ a lot, understanding the features on the programs was a challenge, log-in issues where students struggled to find their pictures (in Waterford).

Other solutions attempted by the students when the computers stalled included restarting the programs or changing the computer. Development of problem solving skills starts with students understanding the consequences of actions. It was interesting to note the responses when the researchers asked the children how they handled the computer program when it refused to work because it displayed interesting tactics and some level of ICT skill. The table below highlights a summary of the responses.
### Table 7: Students reactions when the computer gets stuck

<table>
<thead>
<tr>
<th>COUNT OF WHAT DO YOU DO WHEN STUCK</th>
<th>TOTAL</th>
<th>IN PERCENTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASK A FRIEND</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>ASK FRIEND FOR HELP THEN TEACHER</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>ASK TEACHER FOR HELP</td>
<td>101</td>
<td>75%</td>
</tr>
<tr>
<td>CHANGE COMPUTERS</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>CHANGE TO ANOTHER PROGRAM</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>COMPUTER GIVES SAD FACE</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>GET TIRED</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>GO TO CLASS/ LEAVE</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>IS PUNISHED</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>LISTEN AGAIN THEN ASK TEACHER</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>NOTHING</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>PRESS ALL KEYS</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>RESTART COMPUTER</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>RESTART COMPUTER AND CHOOSE ANOTHER PROGRAM</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>RESTART COMPUTER THEN ASK TEACHER FOR HELP</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>TRY AGAIN</td>
<td>5</td>
<td>4%</td>
</tr>
<tr>
<td>TRY AGAIN, ASK TEACHER</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td>135</td>
<td></td>
</tr>
</tbody>
</table>

Important to note: students who indicated restarting the computer had knowledge of the computer power button and knew to press it until the screen went off and them press it again for it to come back on. Few students used trial and error (pressed all the buttons) until they found the right one.
FINDING 5:

REGULAR TRAINING BUILDS TEACHERS CONFIDENCE AND MOTIVATION TO USE COMPUTER PROGRAMS FOR TEACHING

TEACHERS’ PROFILES

A total of 22 teachers were interviewed to supplement the data collected from the students. Of these teachers, 20 were female and the majority possessed a diploma in Education.

The Highest level of education achieved by the teachers is indicated below:

<table>
<thead>
<tr>
<th>LEVEL OF EDUCATION</th>
<th>NUMBER OF TEACHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s Degree</td>
<td>1</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>2</td>
</tr>
<tr>
<td>Diploma/ Certificate</td>
<td>16</td>
</tr>
<tr>
<td>Secondary</td>
<td>2</td>
</tr>
<tr>
<td>Primary</td>
<td>1</td>
</tr>
</tbody>
</table>

*Table 8* Table showing number of teachers interviewed and level of education attained
In total, 6 teachers were interviewed from Barracks Primary School, 4 from Kamenu Primary School, 5 from Karibu Centre and 7 from Kenyatta Primary School.

Training was conducted at the Karibu Centre for all the teachers before the devices were deployed to the schools. The training covered an introduction to Microsoft Office Suite, Internet use, computer basics (packages), introduction to the programs on the computers – Waterford and Sebran. In this case, the teachers spent 15-20 minutes on the program everyday of the training to understand how it worked. The training took two weeks from 3 pm -5 pm, consisting of training on a computer package and interaction with the programs for children.

During the interviews, the teachers were asked how they felt about the training that was conducted. Of the eighteen teachers interviewed who were exposed to the computer programs, 10 felt that they needed more training on how to use and teach the program. Those from Karibu Centre were most confident to use the tools, with only one teacher requesting additional training.

Teachers also rated their confidence in teaching with the computer programs. On a scale of excellent, very good, good, capable and poor, fourteen teachers stated that they felt they were good at using the computer programs for teaching (they rated their confidence above average). Three teachers rated themselves as average by rating (capable), four teachers did not give a response to this question and one indicated that they were very poor at using the program.

![Figure 15](attachment:image.png) Teachers confidence levels using computer program N=18
During the interviews, the teachers were asked to highlight some of the problems they encountered during teaching. We were keen to know which problems they faced while using the traditional methods of teaching and which ones they faced while using the computer programs. The problems they listed are stated in the table below:

Challenges faced during teaching as indicated by teachers interviewed: A comparison of traditional teaching challenges to computer usage challenges

<table>
<thead>
<tr>
<th>TRADITIONAL TEACHING</th>
<th>TEACHING USING COMPUTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate teaching materials for the large number of students in the classrooms</td>
<td>Power shortages sometimes disrupt learning with the computers</td>
</tr>
<tr>
<td>There are many students and it’s difficult to give them individualized attention.</td>
<td>The computer programs don’t open sometimes. The programs have errors sometimes and stop working.</td>
</tr>
<tr>
<td>Language barrier. Some students speak mother tongue.</td>
<td>Limited computer knowledge. It’s challenging to use the programs.</td>
</tr>
<tr>
<td>Shortage of books for students.</td>
<td>Shortage of computers. Computers are few particularly in the public schools</td>
</tr>
<tr>
<td>Some students don’t know how to hold pencils. It takes time to teach them to write.</td>
<td>Program doesn’t have sounds, which we concentrate on in ECD.</td>
</tr>
<tr>
<td>Some students don’t know how to read. They don’t understand easily.</td>
<td>The content is foreign on the programs, e.g. On Waterford; the currency is in US Dollars instead of Kenyan Shillings.</td>
</tr>
<tr>
<td>It’s cumbersome using chalk. some students don’t use board well, and movement around class is hard.</td>
<td>Difficult to maintain all the students attention in class because they move at different paces and have computer classes at different times.</td>
</tr>
<tr>
<td>It takes long time to teach slow students.</td>
<td>The programs don’t follow the syllabus.</td>
</tr>
</tbody>
</table>

*Table 10*  Comparison of problems faced using traditional teaching methods and teaching through computer programs
The teachers suggested a few solutions to help them with the problems faced from traditional style of teaching. Examples include:

- Taking more time with the weak students,
- Trying to translate the content for children who did not understand English and
- Giving them more exercises for practice.

Similarly, the teachers had some suggestions on how to solve the problems they faced using computer for teaching. They suggested that:

- Software should be localized to allow the students to understand easily.
- Teachers needed more training so that they could be more comfortable with the software.
- Teachers want to have a technician on call to help them debug any errors they encounter.
- Teachers requested for additional computers to use so that all the students in a class can learn at the same time.

Evaluating the impact of ICT on social skills is very important in the overall development of a child. When teachers were asked if usage of the computer program would have any effects on the students’ social skills, they gave varied responses. 50% on the teachers (n=22) indicated that computer usage would have positive effects on the students. These would include, improved communication skills, increased confidence and engagement of the students to learning, kids would be brighter and happier and more engaged to learning. The remaining teachers indicated that without moderation of use of the computer program, excessive and unregulated usage would affect the students negatively. The negative effects indicated include: students get distracted in the learning process as well as carried away by the computer games, students could access harmful sites, students using the computer program would boast to those not interacting with it (particularly in the public schools) and finally that students would lose interest in traditional learning in the classrooms and instead prefer to use the computers.
FINDING 6:

PARENTS OF ECD STUDENTS ARE HIGHLY SUPPORTIVE OF THE COMPUTER PROGRAM USAGE BY THEIR CHILDREN AND WOULD ALSO LIKE TO BE INVOLVED

A focus group discussion was held with Karibu Centre where 20 of the children’s parents shared their views on the software that the children were using. They were excited about the knowledge that the children had acquired from using the software, stating that they had learned a lot from their children. The majority of the parents requested training on the use of computers, so that they can better support their children’s learning. This reflected the importance of home support for children’s learning as well as the enthusiasm of parents to acquire computing skills.

The perception of the parents was that introduction of computers to schools is a good idea and will further improve the children’s brain development. All the parents interviewed believed it would ease the children’s learning process. The research team assessed the parents’ ICT access levels during the focus group. Only three parents access Internet on their phones. The rest did not access it at all.
Some highlights from the discussions with the parents are summarized in the responses below:

1. The children’s interest in education and attending school has increased following the introduction of the computer program. It has taught them counting, they can identify animals, can construct sentences and can differentiate colors better than older children not using the computer program. Their performance is improving by the day and they have better understanding of what they are studying in class. In terms of reading the baby class and the pre-unit kids are almost at the same level. The children are able to operate mobile phones and the television sets at home.
2. The children using the computer program are more vibrant and well educated compared to those not using the computer program.
3. The children using the computer program are learning more things in spite of their young ages compared to older children not in the program.
4. They can identify schoolwork with the real world: What they learn with the computer, they can identify it outside school.
5. The children under the program are more interested with learning and well disciplined.
6. The children are very eager to go to school for the computer classes.
7. They are also good and eager to operate home electronics like phones, televisions and video players.

RECOMMENDATIONS AS STATED BY PARENTS:

The Karibu Centre should go beyond class through continuing to give the lessons to the students who started there even after they leave Karibu Centre for primary schools and run follow-up classes. Alternatively, remedial computer classes should be introduced for students who have left the Karibu Centre. Each child should be given a computer to go home with if possible. Parents too would like to learn how to use computers. The Karibu Centre should offer computer classes to the parents over the school holidays. If parents are taught how to use they can help the children when at home with the computer.

LIMITATIONS OF COMPUTER USE ACCORDING TO PARENTS:

1. Internet - Bad information may be bad for the children; Parents fear that unrestricted access to the Internet could cause harm to their children.
2. Fear for continued performance. Performance may decline after students leave the Centre because there are no computers in public schools.
CONCLUSION
The research study into the computer program in Karibu Centre revealed many points that should be considered when executing a computer program for students in early childhood. Traditional teaching methods, which include using of various tactics like charts, flip cards, say and repeat methods, music and drama to transfer knowledge concepts to children in early childhood although effective need re-evaluation so as to improve student’s quality of learning. This is because in large classrooms where only one teacher is handling many students e.g. more than thirty, the teacher faces several challenges in identifying struggling students. This makes it challenging for the teacher to provide the students with individual attention while at the same time ensuring that the more advanced students remain properly challenged and engaged. During the study the research team found that the usage of computer programs especially those with features like that of Waterford Early Learning software to supplement learning in classroom provided the added advantage of enabling students to learn at their pace. The teachers also had the ability to view weekly progress reports on the individual students progress. Students who used the computer program performed better in the DIBEL test than those who did not use the computer program to supplement learning. In the DIBELS test 1 and 2, there was significant improvement by all the students, at each stage with those using the computer program performing better than the control group. This shows that the computer program is effective in aiding student performance.

The research team found that the computer program was well liked by both users (students and teachers). Across the three schools using the computer program (Karibu Centre, Barracks and Kenyatta Primary School), users indicated that they liked using the computers for learning. In particular, students found usage of colorful pictures, music, games and cartoons in creative ways to teach letters, counting and coloring an engaging factor that kept them interested in using the computers.

The major challenge faced by the teachers in the public schools was the limited number of computers which meant that in a class, students were divided into two groups (a & b) with about twenty students each to go to the computer lab. This in turn reduced the total amount of time spent using the computers by each group from half an hour to only fifteen minutes each. A key challenges faced by the teachers of students using the computer program was how to ensure that students who remained in class without using computers were kept engaged. This was later addressed by ensuring that an ICT teacher was hired to manage students who went to the computer lab while the class teacher remained with the other students in class.
Regular usage of the computers for learning (daily or a few times a week) is recommended to ensure consistency of usage and maintaining of interest by the users. Regular usage ensures that after the initial excitement of using computers for learning wears off, students will effectively use the time spent in the computer labs to engage learning software as opposed to playing non-teaching games. The teachers also need to be encouraged to also use the computers so that they gain confidence using the programs as well as become more competent in troubleshooting when the computers stall during lessons.

The research study found teachers needed to be provided with regular training to boost their confidence and increase their ICT skills. This will motivate them to not only increase excitement for teaching in class but also help them identify creative ways to teach the students concept through further researching tactics on the computers in their spare time. Parents, who are an important factor to consider in early childhood education since they also participate in teaching their children while at home, requested that they would also like to benefit from computer education training. This will enable them relate well with their children and be in a position to help their children practice while at home but also develop their individual ICT usage skills.

Implementing ICT programs for learning for students in early childhood stage require important consideration of software. Waterford early learning had several advantages but teachers indicated that it would be better if local examples could be used to teach concepts. An issue such as accent was also a factor that could affect learning since it impacts pronunciation of words affecting how sounds are taught. This could have been a factor that affected the student’s sound scores since their teachers have different accents to that used in the software that was developed in United States of America.
RECOMMENDATIONS
The ECE computer program has generally been well received by the students and teachers in the three schools, Barracks, Kenyatta and Karibu Center. Based on the research, a majority of the students indicated having interest in different programs on the computers because they felt it contributed to them learning new things. The teachers from all four schools were also in agreement that the computer program is relevant and should continue being used. The teachers indicated that despite some challenges faced while using the ECE programs, they were happy that these programs were providing innovative ways to tackle issues faced in traditional classrooms. Based on the test scores received from the DIBELS students in the schools with ECE computer programs are performing much better than their counterparts in schools without the computer program. Comparing the DIBELS results with the control group from Kamenu Primary School evidences this.

After conducting the baseline study, the research team recommended to Karibu Centre to address the issue of providing ICT teachers as well as fixing the logging in section in the Waterford Programs to ensure all the students particularly in the public schools could easily access their profiles. This would reduce the number of cases where teachers have to assist the individual students log into the software which is time wasting. During the end-line survey, the above flagged issues had been resolved.

Some of the issues raised by the teachers, such as regular training and encouraging teachers to practice using the computers when they have some free time may take time to address, but are worth noting. This will increase their understanding of the ECE computer programs currently in use as well as boost their confidence teaching with the programs. Training on computer troubleshooting should be conducted again or manuals provided which the teachers and computer lab assistant can refer to when they face computer trouble. This will help reduce the number of incidences where the computers remain unused to ensure maximum efficiency.

Due to the limited number of devices, the teachers particularly in the public schools have to split the students into two groups. This forces them to keep moving between the computer lab and the class to ensure that both groups are kept busy while they wait to use the computers. This problem is a huge hindrance and can be tackled by either appointing a teacher who focuses solely working with the students in the computer lab, or by increasing the number of devices in the schools. Increasing the devices ensures that a teacher can take all the students to the computer lab at once instead of splitting them into two groups. This will increase productivity and efficiency of using the computer programs particularly in the public schools where they do not have a separate computer lab teacher.

The Karibu Centre should consider introducing computer software that has been developed locally to the computer program to complement the efforts of the Waterford Early Learning Software. This is because locally developed software take into consideration the curriculum set by the Ministry of Education in Kenya as well as account for accents which the students would be familiar with. This it is hoped will go a long way I helping the students improve their pronunciations and performance particularly in Sounds testing at ECD stage.

Finally, more research should be conducted on the impact of the computer program to student performance at ECD stage. For future testing, it is also recommended that Karibu Centre consider using some localized tests for student performance e.g. Uwezo assessment tests which are quite popular in the East African Region. These tests have been designed to take into consideration contextual and cultural issues factoring in examples of products or things the students would be familiar with. This research study, which conducted in a period of only nine months showed significant results that indicated the impact the computer program had in that short period, it would be important to follow up and see if the performance continues to increase several years down the road.


APPENDIX
## APPENDIX 1

MINISTRY OF EDUCATION IN KENYA: GUIDELINE ON SERVICES FOR CHILDREN

<table>
<thead>
<tr>
<th>VERY YOUNG CHILDREN (0-3 YEARS)</th>
<th>PRE-SCHOOL AGED CHILDREN (4 – 5 YEARS)</th>
<th>CHILDREN IN THE LOWER PRIMARY SCHOOL (6 – 8 YEARS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Protection from physical danger.</td>
<td>All of the above, plus;</td>
<td>All of the above, plus;</td>
</tr>
<tr>
<td>b) Adequate nutrition and health care.</td>
<td>a) Opportunities to develop fine motor skills.</td>
<td>a) Support in acquiring additional motor, language and thinking skills.</td>
</tr>
<tr>
<td>c) Appropriate immunizations.</td>
<td>b) Encouragement of language through talking, being read to, singing.</td>
<td>b) Additional opportunities to develop independence.</td>
</tr>
<tr>
<td>d) An adult with whom to form an attachment.</td>
<td>c) Activities that will develop a sense of mastery.</td>
<td>c) Opportunities to become self-reliant in personal care.</td>
</tr>
<tr>
<td>e) An adult who can understand and respond to their signals.</td>
<td>d) Opportunities to learn co-operation, helping, sharing.</td>
<td>d) Opportunities to develop a wide variety of skills.</td>
</tr>
<tr>
<td>f) Things to look at, touch, hear, smell, taste.</td>
<td>e) Experimentation with pre-writing and pre-reading skills.</td>
<td>e) Support for further development of language through talking, reading, and singing.</td>
</tr>
<tr>
<td>g) Opportunities to explore their world.</td>
<td>f) Hands-on exploration for learning through action.</td>
<td>f) Activities that will further develop a sense of mastery of a variety of skills and concepts.</td>
</tr>
<tr>
<td>h) Appropriate language stimulation.</td>
<td>g) Opportunities for taking responsibility and making choices.</td>
<td>g) Opportunities to learn cooperation and to help others.</td>
</tr>
<tr>
<td>i) Support in acquiring new motor, language and thinking skills</td>
<td>h) Encouragement to develop self-control, cooperation and persistence in completing projects.</td>
<td>h) Hands on manipulation of objects that support learning.</td>
</tr>
<tr>
<td>j) A chance to develop some independence.</td>
<td>i) Support for their sense of self worth.</td>
<td>i) Support in the development of self-control and persistence in completing projects.</td>
</tr>
<tr>
<td>k) Help in learning how to control their own behavior.</td>
<td>j) Opportunities for self-expression.</td>
<td>j) Support for their pride in their accomplishments.</td>
</tr>
<tr>
<td>l) Opportunities to begin to learn to care for themselves.</td>
<td>k) Encouragement of creativity</td>
<td>k) Motivation for the reinforcement of academic achievement</td>
</tr>
</tbody>
</table>
APPENDIX 2A

DIBELS ASSESSMENT DESCRIPTION

DESCRIPTION OF THE ISF MEASURE

The DIBELS Initial Sound Fluency (ISF) Measure is a standardized, individually administered measure of phonological awareness that assesses a child’s ability to recognize and produce the initial sound in an orally presented word (Kaminski & Good, 1996, 1998; Laimon, 1994). The ISF measure is a revision of the measure formerly called Onset Recognition Fluency (OnRF). The examiner presents four pictures to the child, names each picture, and then asks the child to identify (i.e., point to or say) the picture that begins with the sound produced orally by the examiner. For example, the examiner says, “This is sink, cat, gloves, and hat. Which picture begins with /s/?” The student then points to, or says the name of, the correct picture. The student is also asked to produce the beginning sound for an orally presented word that matches one of the given pictures. The examiner calculates the amount of time taken to identify/produce the correct sounds and converts the score into the number of initial sounds correct in a minute. The ISF measure takes about 3 minutes to administer and score, and has over 20 alternate forms to monitor progress.

Alternate-form reliability of the OnRF measure is .72 in January of kindergarten (Good, Kaminski, Shinn, Bratten, Shinn, Laimon, Smith, & Flint, 2004). While that level of reliability is low with respect to standards for educational decision-making (e.g., Salvia & Ysseldyke, 2001), it is remarkable in a one-minute measure, especially one that can be repeated. By repeating the assessment four times, the resulting average has a reliability of .91 (Nunnally, 1978). The concurrent criterion-related validity of OnRF with DIBELS PSF is .48 in January of kindergarten and .36 with the Woodcock-Johnson Psycho-Educational Battery Readiness Cluster score (Good et al., 2004). The predictive validity of OnRF with respect to spring-of-first-grade reading on CBM ORF is .45, and .36 with the Woodcock-Johnson Psycho-Educational Battery Total Reading Cluster score (Good et al., 2004).

How does ISF link to the Big Ideas in Beginning Reading?

ISF is a measure that assesses phonemic awareness skills.

DESCRIPTION OF THE LNF MEASURE

DIBELS Letter Naming Fluency (LNF) is a standardized, individually administered test that provides a measure of risk. LNF is based on research by Marston and Magnusson (1988). Students are presented with a page of upper- and lower-case letters arranged in a random order and are asked to name as many letters as they can. If they do not know a letter, the examiner provides the name of the letter. The student is allowed 1 minute to produce as many letter names as he/she can, and the score is the number of letters named correctly in 1 minute.

Students are considered at risk for difficulty achieving early literacy benchmark goals if they perform in the lowest 20% of students in their district. Students are considered at some risk if they perform between the 20th and 40th percentile using local norms. Students are considered at low risk if they perform above the 40th percentile using local norms.

How does LNF link to the Big Ideas in Beginning Reading?

Letter Naming Fluency (LNF) is included for students in grades K and 1 as an indicator of risk. Unlike the other DIBELS measures, LNF does not measure a Basic Early Literacy Skill. Although letter names comprise a set of teachable skills, teaching letter names does not lead directly to improvements in student reading outcomes in the ways characterized by the foundational skills of early literacy (Adams, 1990). However, because the measure is highly predictive of later reading success, it is included as an indicator for students who may require additional instructional support on the Basic Early Literacy Skills.

https://DIBELS.uoregon.edu/market/assessment/measures/Lnf.php
DESCRIPTION OF THE PHONEME SEGMENTATION FLUENCY MEASURE

The DIBELS Phoneme Segmentation Fluency (PSF) measure is a standardized, individually administered test of phonological awareness (Kaminski & Good, 1996). The PSF measure assesses a student’s ability to segment three- and four-phoneme words into their individual phonemes fluently. The PSF measure has been found to be a good predictor of later reading achievement (Kaminski & Good, 1996). The PSF task is administered by the examiner orally presenting words of three to four phonemes. The student then to verbally produces the individual phonemes in each word. For example, if the examiner says “sat,” and the student says “/s/ /a/ /t/” he or she receives three possible points for the word. After the student responds, the examiner presents the next word, and the number of correct phonemes produced in one minute determines the final score. The PSF measure takes about 2 minutes to administer and has over 20 alternate forms for monitoring progress.

How does PSF link to the Big Ideas in Beginning Reading?
PSF is a measure that assesses phonemic awareness skills. Phonemic Awareness (PA) is: the ability to hear and manipulate the sounds in spoken words and the understanding that spoken words and syllables are made up of sequences of speech sounds (Yopp, 1992) essential to learning to read in an alphabetic writing system, because letters represent sounds or phonemes. Without phonemic awareness, phonics makes little sense. fundamental to mapping speech to print. If a child cannot hear that “man” and “moon” begin with the same sound or cannot blend the sounds /rrrrrruuuuuunnnnn/ into the word “run”, he or she may have great difficulty connecting sounds with their written symbols or blending sounds to make a word.
a strong predictor of children who experience early reading success.
https://DIBELS.uoregon.edu/market/assessment/measures/psf.php

DESCRIPTION OF THE NWF MEASURE

The DIBELS Nonsense Word Fluency (NWF) measure is a standardized, individually administered test of the alphabetic principle including letter-sound correspondence in which letters represent their most common sounds and of the ability to blend letters into words in which letters represent their most common sounds (Kaminski & Good, 1996). The student is presented an 8.5” x 11” sheet of paper with randomly ordered VC and CVC nonsense words (e.g., sig, rav, ov) and asked to verbally produce the individual letter sounds in each word, or read the whole word. For example, if the stimulus word is “pov” the student could say /p/ /o/ /v/ or say the word /pov/ to obtain a total of three letter-sounds correct. The student is allowed 1 minute to produce as many letter-sounds as he/she can, and the final score is the number of letter-sounds produced correctly in one minute. Because the measure is fluency based, students should receive a higher score if they are phonologically recoding the word, as they will be more efficiently producing the letter sounds, and receive a lower score if they are providing letter sounds in isolation. The intent of this measure is that students are able to read unfamiliar words as whole words, not just name letter sounds as fast as they can.
The NWF measure takes about 2 minutes to administer and has over 20 alternate forms for monitoring progress.

NWF is a measure that assesses alphabetic principle skills. Alphabetic Principle (AP) is: the ability to associate sounds with letters and use these sounds to form words. It is composed of two parts:
Alphabetic Understanding: Letters represent sounds in words.
Phonological Recoding (blending): Letter sounds can be blended together and knowledge of the systematic relationships between letters and phonemes (letter-sound correspondence) can be used to read/decode words.
a prerequisite to word identification
https://DIBELS.uoregon.edu/market/assessment/measures/nwf.php
APPENDIX 2B

SAMPLE DIBELS TEST
APPENDIX 3

CHARTS SHOWING STUDENTS PERFORMANCE

COMPARATIVE PERFORMANCE IN DIBELS - PRE-UNIT

STUDENT PERFORMANCE IN DIBELS - STD.1
STUDENT PERFORMANCE IN DIBELS - STD.2
APPENDIX 4

SURVEYS (STUDENTS, TEACHERS, CONTROL GROUP)

STUDENT SURVEY

a. STUDENTS HAVING NOT INTERACTED WITH COMPUTER PROGRAM

Hi, I'm called X; I work at a company called iHub. We are conducting a study on behalf of Karibu Centre to evaluate the computer program. We spoke to teacher Y about coming to ask you a couple of questions and she said it was ok. At any point if you feel like it is too hard for you to understand, you can ask me to explain more. Also, if there is something that you don't want me to answer, you can always tell me so that we skip it.

Would you be interested in participating in this study?

a. Yes……………………………………………………01 Continue
b. No…………………………………………………….02 Terminate

Start Stop

1. How old are you? _______ (Una miaka ngapi?)
2. Gender:       Male Female
3. What class are you in? _______ (Uko darasa gani?)

PERCEPTION ON COMPUTERS

1. Have you used computers to learn in school? (Umetumia kompyuta
2. Do you use computers out of school? (Unatumia kompyuta ukitoka shule?)
   Yes daily/yes once a week/Not much/Never
3. If yes, what do you do on the computers? (Unafanya nini wakati unatumia
4. Would you like to use computers to learn? (Ungependa kutumia Kompyuta
5. If yes, why? (kwa nini ungependa hivi?) ___
6. Is there anything you don’t like about computers? (Kuna vitu haupendi

END

Thank you very much for taking your time in this survey.
a. STUDENTS INTERACTING WITH COMPUTER PROGRAM INTRODUCTION:

Hi, I’m called ____________; I work at a company called iHub. We are conducting a study on behalf of Karibu Centre to evaluate the computer program. We spoke to teacher ______________________ about coming to ask you a couple of questions and she said it was ok. At any point if you feel like it is too hard for you to understand, you can ask me to explain more. Also, if there is something that you don’t want me to answer, you can always tell me so that we skip it.

Would you be interested in participating in this study?
  a. Yes…………………………………………………… 01 Continue
  b. No…………………………………………………….02 Terminate

DEMOGRAPHICS:

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<thead>
<tr>
<th>QUESTIONNAIRE NUMBER</th>
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<tbody>
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<td>DATE OF INTERVIEW:</td>
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<td>TIME OF INTERVIEW:</td>
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<tr>
<td>NAME OF INTERVIEWER:</td>
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<td>NAME OF STUDENT:</td>
<td></td>
</tr>
<tr>
<td>SCHOOL:</td>
<td></td>
</tr>
</tbody>
</table>

1. How old are you? ___(Una miaka ngapi?)
2. Gender: Male Female
3. What Class are you in? : ___(Uko darasa gani?)

PERCEPTION ON COMPUTER PROGRAM

1. When do you use the computers? (Unatumia Kompyuta wakati gani?)
2. Is there something special that you like most at the computer lab? (Kuna kitu unapenda sana wakati unatumia kompyuta?)
3. When did you start using the program? (Ulianza kutumia kompyuta lini?)
4. How many times do you use the program (system)? (clarify, in a day/week) (Unatumia kompyuta mara ngapi kwa wiki?)
5. What do you use the program for? (Ni jambo gani unafanya wakati unatumia kompyuta?)
6. Do you share the computer with someone else? Yes/No (Je, unatumia kompyuta peke yako ama unatumia pamoja na mwanafunzi mwingine?)
7. How often does this happen? Every lesson| once in a while (Ni mara ngapi unatumia pamoja na mwanafunzi mwingine?)

8. Are their lessons that you like in the program? Which ones? Why? (Kuna somo ambalo unapenda wakati unatumia kompyuta? Ni somo gani hesabu, sayansi, kingereza)

9. Are there lessons that you don’t you like in the program? Which ones? Why? (Ni somo gani ambalo hupendi wakati unatumia kompyuta? Kwa nini?)

10. Do you get stuck while using the program during the computer lessons? (Kuna wakati ambapo ukitumia kompyuta unakwama katika somo? Ndio, la?)

11. What do you do when you get stuck while using the program? (Wakati unakwama, wewe hufanya nini)

12. Is learning with this program different from being taught in class by a teacher or the same? How? (Kwa maoni yako, unaona tofauti yoyote kati ya kusoma darasani na kusoma ukitumia kompyuta? Fafanua)

13. Is the teacher always in class when you use the program?

14. Any additional comments?

END
Thank you very much for taking your time in this survey
b. STUDENTS NOT USING COMPUTER PROGRAM INTRODUCTION

Hi, I’m called X; I work at a company called iHub. We are conducting a study on behalf of Karibu Centre to evaluate the computer program. We spoke to teacher Y about coming to ask you a couple of questions and she said it was ok. At any point if you feel like it is too hard for you to understand, you can ask me to explain more. Also, if there is something that you don’t want me to answer, you can always tell me so that we skip it.

Would you be interested in participating in this study?

a. Yes……………………………………………………01 Continue
b. No…………………………………………………….02 Terminate

DEMOGRAPHICS

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<td>NAME OF STUDENT:</td>
<td></td>
</tr>
<tr>
<td>SCHOOL:</td>
<td></td>
</tr>
</tbody>
</table>

1. How old are you? _______ (Una miaka ngapi?)
2. Gender: ☐ Male ☐ Female
3. What class are you in? _______ (Uko darasa gani?)

PERCEPTION ON COMPUTERS

1. What subjects do you learn in class? (Unasoma nini darasani?)
2. Do you get textbooks to study the subjects you learn in school? Y/N (Unapata vitabu vya kusomea?)
3. Do you use the textbook alone or share with someone? (Je, unatumia pekee yako ama unagawanya na mwenzako?)
4. Are there any problems you face in trying to get access to reading material? Which ones? (Kuna shida yoyote unapata ukijaribu kupata vitabu vya kusomea?)
CURRICULUM

5. What do you learn in English? (Unasoma nini katika somo la kingereza?) (Reading, writing, pronunciation, spelling, other) Tick all that apply?
6. What do you learn in maths? (Unasoma nini katika somo la hesabu?)
7. What do you learn in science? (Unasoma nini katika somo la siyansi?)
8. Out of the three subjects, which one do you like? Why? (Kati ya hizi masomo, ni gani unapenda zaidi?)
9. Which one is not your favourite? Why? (Ni somo gani hupendi?)
10. Do you ever get stuck when learning something in class? Yes/No (Je, umewahi kwama wakati unafunzwa darasani?)
11. What do you do when you don’t understand something the teacher is saying? (Unafanya nini wakati huelewi jambo ambalo mwalimu anafunza darasani?)
12. How do you feel about learning in class? (Una hisia gani kuhusu kusoma darasani?)

PERCEPTION ON COMPUTERS

13. Which electronics do you have access to at home? (TV, Radio, Computer, Mobile, other, specify)
14. Which one do you know how to use? (Unajua kuyumia gani?)
15. Have you ever used a computer? Y/N (Je, Umewahi kuumia kompyuta?)
16. Would you like to use computers to learn? (Ungependa kutumia Kompyuta kusoma?) Y/N
17. If yes, why? (kwa nini ungependa hivi?) ___
18. Is there anything you don’t like about computers? (Kuna vitu haupendi kwa kompyuta) Y/N
19. If yes, what? (nini?) ___

END
Thank you very much for taking your time in this survey
TEACHER SURVEY

a. TEACHERS INTERACTING WITH THE COMPUTER PROGRAM

Hi, I’m called ____________; I work at a company called iHub. We are conducting a study on behalf of Karibu Centre to evaluate the computer program. All the information provided will be kept strictly confidential and will only be used for the purpose of this study. Your participation will be highly appreciated. If you are not comfortable answering a question, kindly feel free to skip it.

Would you be interested in participating in this study?
- a. Yes…………………………………………………… 01 Continue
- b. No…………………………………………………… 02 Terminate

DEMOGRAPHIC QUESTIONS

<table>
<thead>
<tr>
<th>QUESTIONNAIRE NUMBER</th>
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<tr>
<td>TIME OF INTERVIEW:</td>
<td>START</td>
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<tr>
<td>(24 HR CLOCK)</td>
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1. Gender: Male Female
3. Highest level of education attained:
   - No formal education
   - Bachelor’s Degree
   - Master’s Degree
   - PhD
   - Primary School
   - Secondary School
   - Diploma/Certificate
   - Other

4. What course did you study?
5. What is the age of children you teach?
TEACHING METHODS

6. For how long have you been a teacher with this school?
7. How many students are in your class?
8. How do you currently test students in English literacy?
9. How do you normally identify students who are struggling to learn concepts in English literacy?

COMPETENCY:

1. Do you consider yourself computer literate? Yes | No Which of the following can you do on a computer
   - Word processing
   - Programming
   - Internet browsing
   - Others (Specify)
2. Have you had ICT training in the last two years? Yes | No (If yes go to 3, if no Go to 4)
3. If yes, briefly describe the training?
4. What devices had you used before this project?
   - None | PC | Computer classes | Tablet | Smartphone | Other (Specify)
5. Do you have computer access at home? Yes | No
6. If not, how often do you have access to computers out of school? Daily | Some days of the week | once a week | once a month | Never
7. Do you have access to the Internet out of school? Y/N
8. If Yes, how do you access it?

ECE CURRICULUM

1. Which teaching method do you use to teach the students: (charts, music, arts, other)
   - a. Flash cards reading
   - b. Say | Repeat
   - c. Read Books | Short stories
   - d. Skills writing
   - e. Patterns | Sentences | Letters
2. Do you face any challenges using this traditional method of teaching? Yes | No
3. If Yes, what challenges do you face?
4. How do you overcome the challenges faced?

COMPUTER PROGRAM and INTERNET USE

1. Have you used the computer program in the school? Yes | No
2. Which program have you used? Sebran | Waterford | Mini-Sebran | None
3. How do you feel about the programs with regards to relevance to the topics covered?
4. How would you describe your experience with the computer program?
5. Has your confidence in teaching with ICT increased since you started using this program? Yes | No
6. Do you have access to the Internet through the laptops? Yes | No
7. What would you like the Internet for? Teaching research/communication
8. Do you use the computers in the lab during your own time? Yes | No
9. If yes, how many hours (per day /per week) do you use them for?
10. What do you use them for?
   Open (Sending Emails| Social Networks| Teaching research| Music| Games | Other)

11. Do you feel well enough trained when using the computer program or would you like some more?
    Well trained| Need more training
12. Have you faced any challenges while using the computer program?
13. What challenges have you faced?
14. Do you have any recommendations to address the above-mentioned challenges? (Specify)

PERCEPTION

1. Do you think that this early introduction of ICT is beneficial to the children? Yes/No/Maybe/ Sometimes
2. Where do you think ICT is most relevant in a child’s education? Early/Primary/Secondary/ University
3. Do you think the ICT program is adequate for the early learning? Yes/No
4. If not, why? (Too fast-paced/ too advanced/ too strong an accent| other- specify)
5. Is the ICT use balanced with the children’s other activities and lessons? Yes/No
6. If No, what are the negative effects on activities you have noticed?
7. In your opinion, what effect does the ICT have on the children in terms of social skills while learning with the computers? Positive/negative/none
8. How confident are you in teaching with the program? Poor/Capable/Good/Very good/ excellent
9. How good are your technical skills with the laptop such as when problems arise? Poor/ Capable/Good/Very good/excellent
10. Do you feel that your workload is increased or decreased with the introduction of ICT?
    Increased/Reduced| Other (Specify)
11. Any additional comments?

END
Thank you very much for taking your time in this survey
a. TEACHERS NOT USING THE COMPUTER PROGRAM

Hi, I’m called ____________; I work at a company called iHub. We are conducting a study on behalf of Karibu Centre to evaluate the computer program. All the information provided will be kept strictly confidential and will only be used for the purpose of this study. Your participation will be highly appreciated. If you are not comfortable answering a question, kindly feel free to skip it.

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1. Gender: Male Female

2. Age:
   - Less than 18 yrs. old
   - 18-29 yrs. old
   - 30-39 yrs. Old
   - 40-49 yrs. Old
   - 50-59 yrs. Old
   - 60-69 yrs. Old
   - 70 yrs. Old and above

3. Highest level of education attained:
   - No formal education
   - Primary School
   - Secondary School
   - Diploma/Certificate
   - Bachelor’s Degree
   - Master’s Degree
   - PhD
   - Other ________________________________

4. What course did you study?

5. What is the age of children you teach?
TEACHING METHODS

6. For how long have you been a teacher with this school?
7. How many students are in your class?
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COMPETENCY:

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ECE CURRICULUM

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PERCEPTION

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10. Do you feel that your workload is increased or decreased with the introduction of ICT? Increased/Reduced/ Other (Specify)
11. Any additional comments?

END
Thank you very much for taking your time in this survey
karibucentre.org