

MATHSWHIZZ KIDS: KENYA NATIONAL LIBRARY SERVICE MATHEMATICS DIGITAL LEARNING PROGRAM FOR PRIMARY SCHOOL CHILDREN

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Abstract

The Kenya government initiated a Digital Learning Programme (DLP) in 2013. The programme targeted learners in all public primary schools and aimed at integrating the use of digital technologies in learning based on the believe that technology now defines our world and there is need to prepare our young people for today's realities. The first phase of the project estimated to incur a total coast of 17 billion Kenya shillings and expected to deliver 1.2 million devices in the next two years to cover all public primary schools. The pilot phase took off in 2015 targeting 150 primary schools (ICT Authority, 2016). However, the project implementation has been quite slow and frustrating due to lack of political goodwill, poor transport and communication infrastructure, lack of electricity in most of the rural primary schools and security. In addition, resistance by some school board of management (BOG) who are afraid of maintenance and other costs related with ICT, and teachers who lack basic computer skills.

This paper considers the experience and impact of Mathswizz, a mathematics digital learning program at Kenya National Library Service (knls), Nakuru. The project targeted the underserved children in six public primary schools and was supported by Electronic Information for Libraries (EIFL) Public Library Innovation Programme. The project uses ICT to entice children from the undeserved community to interact with technology as they learn mathematics with an aim of changing their attitude towards the subject. By using colored animations and worksheets in teaching mathematics, the project also aims at boosting self-confidence, stimulating lifelong learning technology based culture and help children improve their academic performance. The paper discusses implementation of the project, how librarians handled children and teachers lacking basic computer skills and provision of transport for children from the informal sector for successful implementation. The paper also considers the impact of the project, which has inspired a love for mathematics among children,

improved reading culture, increased the numbers of young library users and contributed to improved academic performance. It argues that the knls Nakuru library's experience offers an effective model of supporting access to quality education and replicable model for bringing ICT to underserved children.

Key word: *Quality Education, Mathematics, Digital Learning, ICT*

Introduction

Globally learning institutions in both developed and developing nations at the primary, secondary and tertiary levels as well as adult education regardless of whether public or private are embracing the use of technology in teaching (Eaton, 2010). Some of the most notable global technology trends in education includes: technology use and integrations; expansion of mobile technology; asset based approaches to evaluation (at classroom level use of portfolios, at regional or national level use of benchmarks and at international level use of large scale frameworks); increased creativity; global approaches to leaning; global mobility and borderless education.

The Kenya government, since independence recognizes the importance of education as both a right as well as a tool for achieving social economic development. Unfortunately, the primary school curricula did not factor in technology and computer studies contrary to the secondary school curricula that incorporated computer studies. Introduction of compulsory free primary school education by the government in 2002 led to rapid growth of primary schools population across the entire nation. Currently, primary school population estimate is 10.4 million children in both public and private primary schools.

The Kenya government in an attempt to promote literacy carried out an Early Grade Reading Assessment (EGMA) pilot assessment in Malindi County in 2007. The assessment established that class 1 to 3 had low literacy and numeracy skills (MOEST, 2015). The study further argued that lower primary school pupils received less interest and attention from the head teachers, parents. On the other hand, the teachers were using wanting instructional methods. The results formed the foundation for the Primary Math and Reading (PRIMR) initiative a program implemented by the Ministry Of Education Science & Technology (MOEST) with financial support from USAID. The results indicated that significant gains in pupil literacy and numeric performance could be achieved through improved teaching instructions. PRIMR findings formed the basis of starting the TUSOME program a National Literacy Programme.

The Kenya government adopted the TUSOME program with an aim of working towards achieving Vison 2030, quality education through improved

learning/teaching approaches. The program involves integration of ICT in teaching thereby distributing digital gadgets to all primary schools in Kenya targeting pupils in grade 1 to 3. However, technology roll-out in public primary schools has been quite slow due to a number of reasons: poor transport and communication infrastructure especially in rural areas; lack of internet connectivity; lack of electricity; fear of high maintenance and other costs by the head teachers & Board of Management; Technophobia among teachers and lack of political good will as well.

Kenya National Library Service (knls) through a variety of ICT programs is supporting the efforts made by the government to build a knowledge economy by providing access to digital technology, e-learning and ICT skills. One of these programs is a Mathematics Digital Learning project for primary schools children in Nakuru County and its environs.

Nakuru County is a cosmopolitan and agriculturally rich town with most of the town dwellers hawking foodstuffs. This means most of the parent's enroll their children in the public primary schools since they cannot afford the cost of enrolling them in private schools. Unfortunately, most of the public primary schools are under resourced. They lack computers, electricity and the teachers lack basic computer skills. This scenario disadvantages these children in terms of their mental development and creativity as compared to their counterparts in private schools. The trend has a long-term negative effect in their future. The performance of pupils in Nakuru County is quite poor especially in mathematics probably because of poor mathematics teaching approach used by most of the teachers. During the Nakuru county library outreach programs in public primary schools, we discovered that majority of the pupil's hated mathematics with passion. This prompted the staff to strategize on how to secure the future of our children.

Nakuru Library Mathswizz project is the first of its kind to be offered by the Kenya National Library Service, which has 61 branches. The project was launched in 2016 with funding from the Electronic Information for Libraries Public Library Innovation Program (EIFL-PLIP) and was implemented in partnership with knls and Bookwave international.

Mathswizz kids project is a mathematics online database preloaded with primary school mathematics curricula from class 1 to 8 and Grade 1 to 3. The program aims at encouraging children to enjoy learning mathematics in an interactive and friendly approach using animations and excel worksheets. The program also aims at bridging the digital divide, boosting self-confidence, changing the attitude of pupils towards mathematics and help children appreciate the value of technology in their future careers.

Why the library chose Mathswizz program

A number of reasons motivated us to adopt the Mathswizz database. The Mathswizz program provides a participatory approach to learning; the interface is user friendly; the use of colored animations (robots) to explain different mathematics formulas; the database has audio and video options thus children can watch and listen as they take notes and the program is perfect platform for the smooth running of the government TUSOME program. The library has enough computers that are connected to a reliable internet and power supply courtesy of management and the American Embassy. The program also helps monitor the performance of the pupils and the teacher can send feedback to the pupils inform of a text message and add a stickers or emoji. This we found to be quite fascinating to the young learners.

Majority of the children access the database from the library since they cannot afford computer nor internet in their schools as well as from their homes.

Goals of the project

Initially the pilot project targeted 600 pupils from 6 public primary schools, however its popularity attracted 3 more schools and 100 other children who come on their own at the library every evening from nearby schools thus forming the homework club.

The projects overall goals were to:

- Provide access to relevant, adaptive and highly engaging mathematics digital content through the Mathswizz database;
- Create awareness on availability of digital content and a passion for reading, personal growth and learning for primary school children;
- Conduct outreach session in 6 primary school;
- Improve the students performance in mathematics through the interactive Mathswizz program;
- Change the attitude of pupils towards mathematics;
- Bridge the digital divide.

Initial preparations

The project implementation team selected six schools out of the 10 book clubs to participate in the program. A stakeholders meeting was held at the library targeting the head teachers from the selected schools, mathematics teachers, parents, Area chief and a representative from the county government. They were taken through the program and allowed to critics the database however they were all amazed by the functionality of the program and were in agreement that it

would make learning and teaching mathematics not only easy for the learners and teachers but also an enjoyable experience.

The following schools were selected for the pilot project: Mwariki primary school; Racetrack Primary School; Lake View Primary School; St. Xavier Primary School; Kenyatta Primary School and Free Hold Primary School. Other schools that joined the program halfway were Darul Primary and Crater academy.

We held an official launch for the Mathswizz programme. The chief guest was the County Director of Education and was accompanied by other government officers. Other key stakeholders who attended the launch included the Director KNLS, Bookwave international officers, chief, Local youth groups and Nakuru playmakers among many others. The message was well received Nakuru Library is the community digital hub for all.

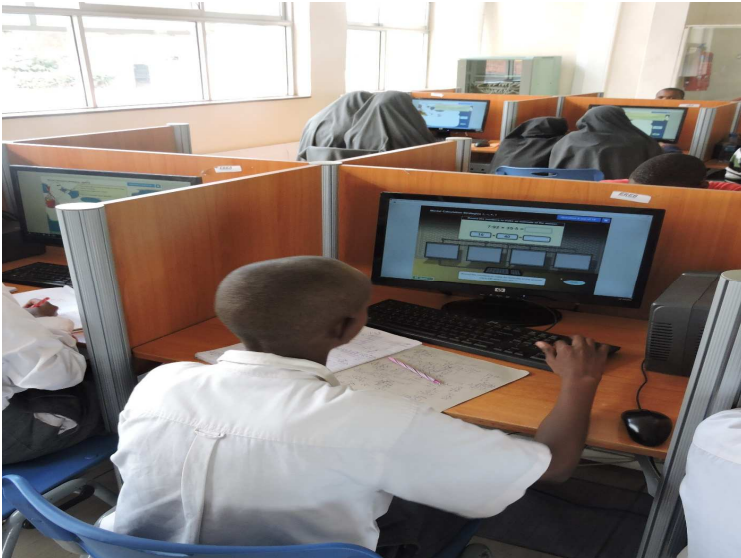
It was meant to sensitize the community on the role the library was playing towards supporting the government initiatives towards providing access to quality education to all underpinned by technology. The launch was covered by the local media and not only made the library more visible but won the confidence of the community.

Learning program

Every school choose one stream to participate in the Program. The library lesson was slotted in the school time table and allocated one hour. The librarians too came up with a time table indicating the specific day and time a school was expected to attend the library lesson. The lessons took place from Monday to Friday, class teachers, mathematics teachers and parents representatives accompanied the children to the library.

The first school to turn up for the training was St. Xavier Primary School with 60 pupils all from class six. The rest of the above mentioned schools were equally trained on different days on how to log in; access the syllabus that their level class; select the lesson; observe the examples and then perform the exercise as demonstrated. Children were also taught how to switch on the computer as well as switch off the computer; how to use a mouse, key pad and how to type. At the end of the lesson the pupils could easily move the mouse, click, select and type. The math lesson became quite enjoyable and teacher's role became minimal. The pupils worked in groups of two thus making learning highly participatory. Pupils never missed the library lesson and even those who initially had chronic conditions appeared to have forgotten their health conditions.

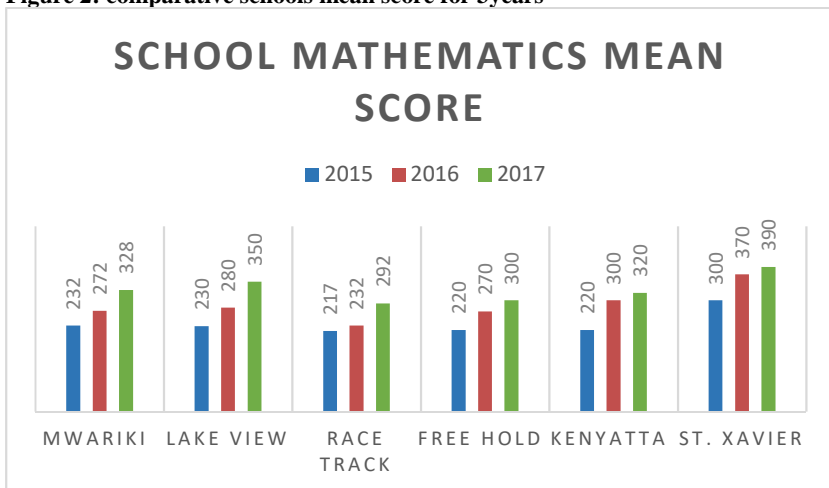
Figure 1: Mathematics lesson at the library



The above figure shows the high level of concentration by pupils during the mathematics lesson at the library. This clearly show technology plays major role in learning This gave teachers an opportunity to relax and concentrate on other subjects and pupils enjoyed discussing with their peers. The pupils bonded so well as each got support from other members whenever they got stuck. The children were enticed to first read a story book before they use the computers and this worked as motivation to complete a story and summarize in order to access a computer.

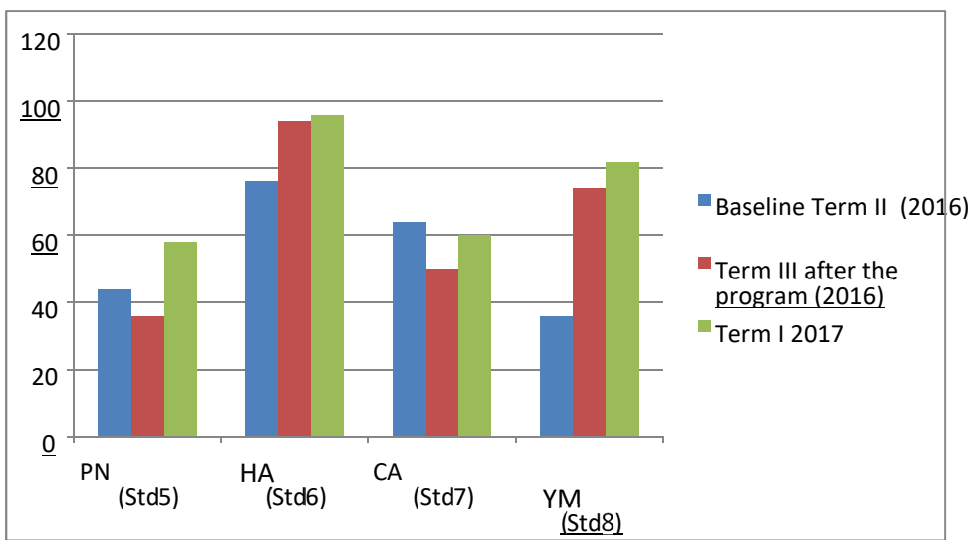
Success evidence

Figure 2: comparative schools mean score for 3years



From the above figure, the schools mean score has been on the increase since they started using technology in learning. This clearly shows technology plays a major role in influencing the general performance of pupils. Technology boosts the understanding of a child since they get involved in solving problems on their own. Thus making them to remain focused.

Figure 3: Mwariki primary school random sample



The above figure summarizes performance of pupils from Mwariki primary school, which indicates a notable general improvement in mathematics. Though the pupils graduated to the next class, their knowledge of mathematics remained superior to the change. The Mwariki Primary mathematics teacher, Mr. Bushnell said:

“The virtue online math tutor is interesting interactive software that has made mathematics learning fun and easy to follow. Those pupils, who have used this platform, have significantly had their score improve. It is projected that if the program continues uninterrupted then its full impact will be realized and mathematics subject will never be the same again. We strongly commend the great work done by the KNLS-Nakuru branch and also recognize the unwavering support of our donors who have made this great work happen.”

Benefits of the Program

- Change of attitude towards mathematics: The children no longer feared mathematics they embraced the subject with ease and with a lot of

enthusiasm. The subject they once dreaded changed to be their favorite referring to it as the game of numbers.

- Improved academic performance: The pupils who participated in the pilot project recorded a great improvement in all the subjects and their mean score since then has been on the increase
- Children acquired basic computer skills thus triggering a love for technology in learning: Majority of the children had never seen a computer before but they had the opportunity to not only see one but also learn how to use it. During their free time they typed letters to their parents teachers and the librarians.
- The children gained confidence and improved their self-esteem: When we started the program some of the children were quite withdrawn and never wanted to participate in class probably fearing to be ridiculed by their peer. However, the class became so lively and even the very quiet children became very active.
- Reduced pupils and teacher absenteeism: They all never wanted to miss the library lesson
- The library membership for both junior and adult went high as well as institutional membership: Many parents opted to be bringing their parents to the library and in the process registered their families as library members.
- The library received International and local recognition: The library received a lot of media coverage thus making the Nakuru library visible in the world map. We won international recognition and presented our success story at the Next Library conference held in Denmark through EIFL sponsorship. Locally we won an award as the best public library of the year 2017.
- Knls board supported the introduction of the program in three other branches namely Kibera, Narok and Buruburu library
- Early this year (2018) the Nakuru Youth Bunge and the Ministry of Education approached the library has the digital learning programs expert to help implement the TUSOME project which had stalled in 26 public primary schools within the county(2018)
- Inadequate computers : the number of children keeps on increasing day by day but the number of computers remains the same.

Challenges

Most interesting we never faced any form of resistance from the teachers, parents or pupils. They all embraced use of technology with an open mind. Every program comes with its own unique challenges and it all depends with how we manage them. Some of the obstacles that we faced during the implementation of the program were:

- Lack of basic computer skills: Most of the children and teachers lacked basic computer skills and we were forced to start by training them on basic computer skills. Moving a mouse was the most difficult for a start but later became a game.
- Lack of computers in public primary schools & Homes: the government is yet to put proper ICT infrastructure in public primary schools and this meant children could only use the program the library. Hence children couldn't practice more during their free time in schools or at home.
- 'Matiang memo' The Cabinet Secretary for Education issue a memo barring students from leaving the school compound during normal school time. This made us adjust the program and so all the pupils came for their library lesson on Saturdays at the library.

Conclusions and Recommendations

Technologically enabled public libraries in Africa are in a position to help government achieve quality education through introduction of technologically enabled creative and innovative services to citizens. The public libraries are places for lifelong learning and governments should invest more in establishing digital hubs or computer lab where children and the community at large can learn basic computer skills from an early age. It might be difficult for the government to equip all schools with computers but for a public library it is affordable. Our experience demonstrates, that public library can add significant value to the formal education.

We recommend technology integration in education in order to inspire positive changes in teaching and learning. Technology makes learning interesting, enjoyable and helps develop a lifelong reading culture. It makes teaching easier for teachers and helps track the performance of the pupils. At the same time students demonstrate improved academic results and increased motivation to study.

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