MOBILE LEARNING

ASSESSMENT REPORT

A.E.F Ruben Primary School

Ruben Centre

”Enhancing ProFuturo Mobile Learning System”

wiLearn 4 Life | Virtual Essence

08.09.2023

Prepared by Victor Malombe, wiLearn 4 Life Kenya Representative

INTRODUCTION

Ruben Centre is a faith-based Charitable Trust striving for an empowered and just Mukuru community by providing quality education, health, financial and social services to children and families in the area. Run by the Christian Brothers African Province, it is one of eight Christian Brothers project sites across Africa, and offers a vital source of community development programmes to the residents of one of the largest slums in Nairobi. The school currently has over 3,000 learners from PP1 to class 8.

In July 2017 AEF Ruben School opened an Information Technology Centre. A significant catalyst in the development of the Centre was the generous donation from Profuturo, a program of the Telefonica Foundation and La Caixa Foundation. The Profuturo donation included 4 boxes of tablets which can be transported to each of the school's classrooms for use. Each box contains 48 tablets (appendix 1) . In addition, Profuturo supplied 4 laptops and small projectors. The Kenyan Ministry of Education kindly donated a projector for the center along with 2 laptops and some tablets.

Virtual Essence has been supporting the school with digital content through the MsingiPack packaged as an Android application that provides offline access to content. However, updates are no longer possible since the Android tablets have unsupported old firmware (Android 4 - see Appendix 2). The tablets however are in good shape and have a functional browser (Google Chrome) that can access web/HTML content, that Msingipack is compliant to.

We set out to test if we could enhance the school's digital learning infrastructure with up to date high quality syllabus material, revision mock ups, and supplementary open educational resources. Without relevant content, gadgets will not add value to learning. wiLearn 4 Life has been championing offline mobile learning to the forgotten and most vulnerable people living in crisis areas and hard to reach places in Kenya, Tanzania, Zimbabwe, and South Sudan. The core of wiLearn's solution is the **mo**bile **L**earning **L**ab **i**nteractive (moLLi) kit (see appendix 3) that is built to support smart learning in remote and underserved locations.

The content modules (including MsingiPack) are packaged in a small portable web server that provides access to WiFi connected devices via web browsers. Access is boosted using high power long range PoE repeaters that operate on both 2.4GHz and 5.8GHz bands with up to 1200Mbps wireless speed (300Mbps on 2.4G; 867Mbps on 5.8G). This not only increases the simultaneous connections but also the distance from where users can connect (up to around 80 meters).

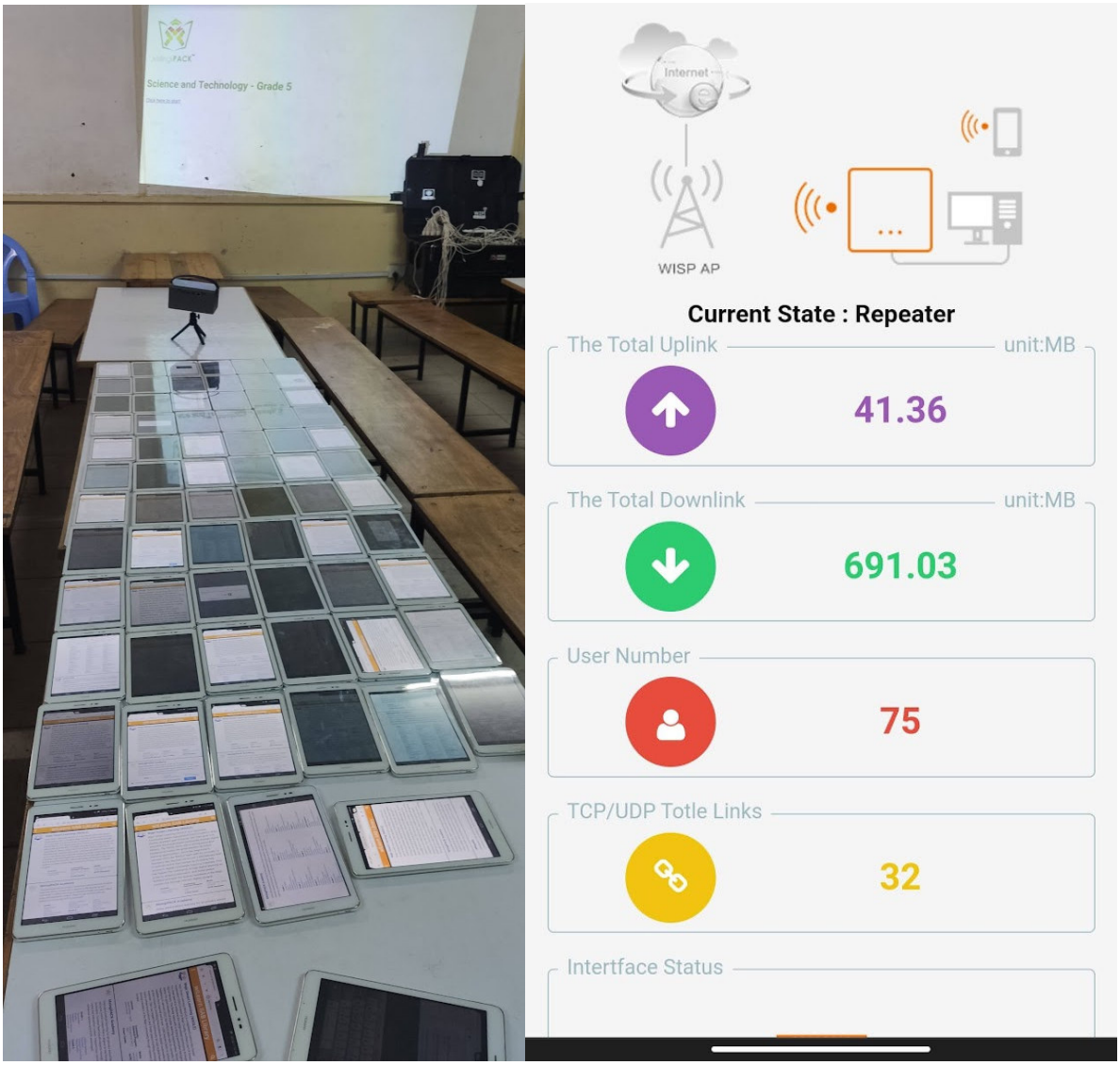
EXPERIMENT

On 8th September 2023, wiLearn 4 Life & Virtual Essence visited the school to check if the web based offline mobile learning solution would work effectively for the A.E.F Ruben Primary School in expanding the learning content library while using the existing tablets. The goal is to support 100 simultaneous access since classes have 100 learners on average. The experiment was structured in 3 parts:

1. **Simultaneous access limit**: How many tablets can connect to the wiLeran's digital library at the same time? How many IP addresses can be assigned? Tablets were connected to the open WiFi one after the other while observing the speed of connection and homepage loading using Google Chrome browser.
2. **User experience**: How fast and efficient can learners access, load and interact with digital content? Grade 6 learners were given the tablets and the teacher guided them in accessing certain topics of the Kiswahili lesson in the Msingipack content module.
3. **Resource utilization and performance**: How efficiently and effectively the digital library is using its available resources, such as CPU, memory, disk, network, and power? Using interactive system-monitor, process-viewer and backend administrative interfaces, system resources were checked in real time.

RESULTS

Simultaneous Access Limit



We connected 75 devices simultaneously. The homepage loading was fast up to around 60 simultaneous connections. Thereafter the speed of homepage loading was declining.

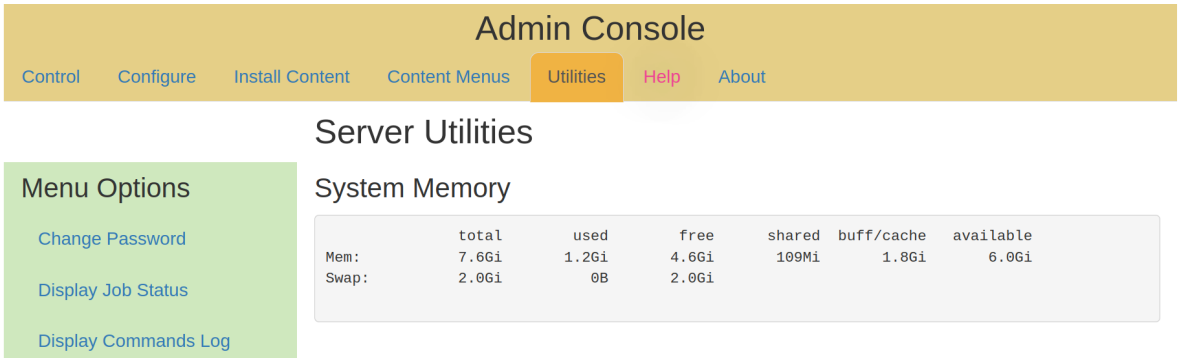
User Experience

Grade 5 learners were led to access a Kiswahili lesson in the MsingiPack module using the tablets. It was observed that all the 50 learners were able to access and navigate the subtopics of the lesson, which included interactive multimedia content with text, images, audio and video. A few learners (less than 10) needed help to navigate to a particular sub topic, as they could not find the menu, or they navigated too much backwards until the homepage disappeared. This is normal as it was a new concept that they were experiencing for the first time.

Resource Utilization and Performance

With around 50 simultaneous connections, the PoE extender had around 20% CPU utilization and 80% memory utilization. This is a good balance to ensure efficiency.

The Digital Library coped well with 50 users simultaneously accessing its content. During 15 mins timespan, the processor load average is around 0.18 which is way better than the maximum recommended 0.7 for single core processors. However, the Digital Library is multicore, with 4 processor cores. The "100% utilization" mark is 1.00 on a single-core system, 2.00, on a dual-core, 4.00 on a quad-core, etc.



The Digital Library has a total of 8GB RAM. The memory utilization is also low with 50 simultaneous connections, with around 1.2 GB usage.

CONCLUSION

The experiment ascertained that the wiLearn's Digital Library is able to reliably extend the usage of the Profuturo's digital learning infrastructure by providing offline access to MsingiPack syllabus material and thousands of high quality open educational resources to serve as supplementary references.

RECOMMENDATION

1. Install two Digital Libraries (two servers & two PoE extenders) to accommodate 100 simultaneous learners, and optionally a smart wireless projector to connect to the Digital Library for teacher led sessions where audio is necessary.
2. Two learners share one tablet. This leads to collaborative problem-solving, builds interpersonal relationships and positive learning experiences among learners. All these lead to better learning outcomes.
3. Headphones and audio splitters to enable a conducive environment for multimedia access using the tablets.

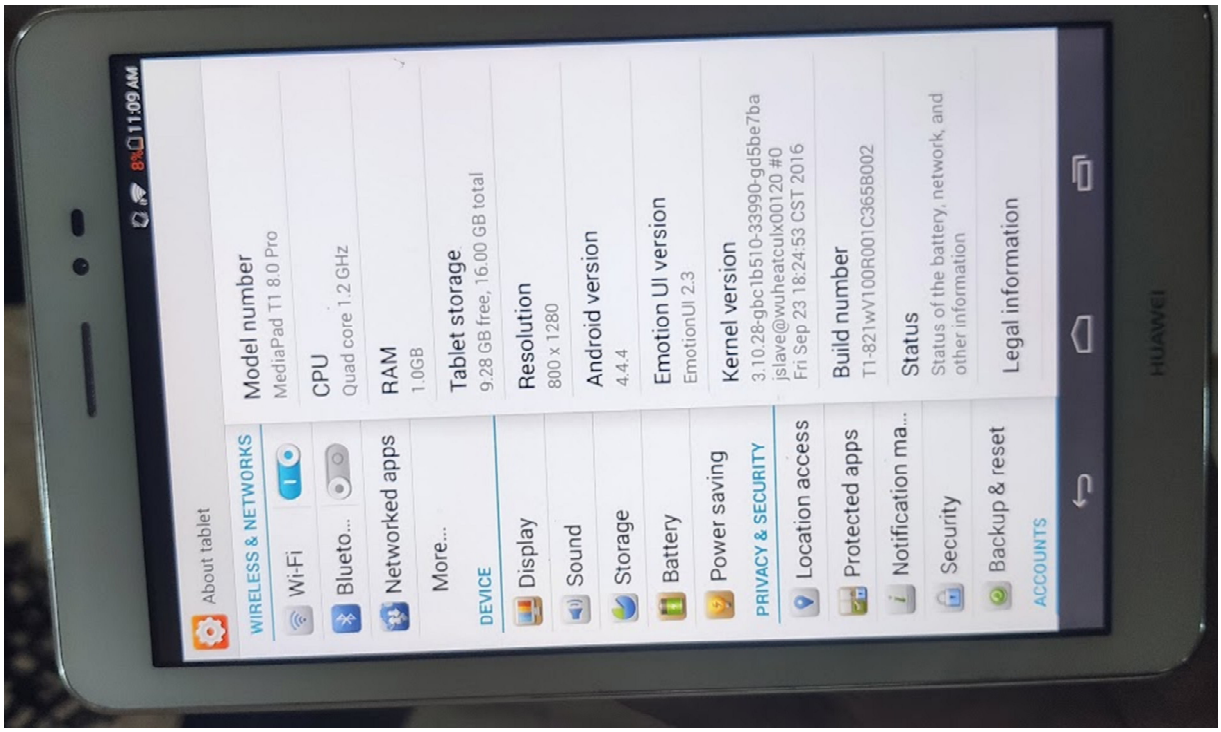
REFERENCE

1. https://www.rubencentre.org/latest-news/2019/7/30/information-technology-centre-opens-at-aef-ruben-school

APPENDICES

Appendix 1: ProFuturo Kit

Appendix 2: Huawei Tablets Info



Appendix 3: wiLearn's mobile Learning Lab interactive (moLLi) kit