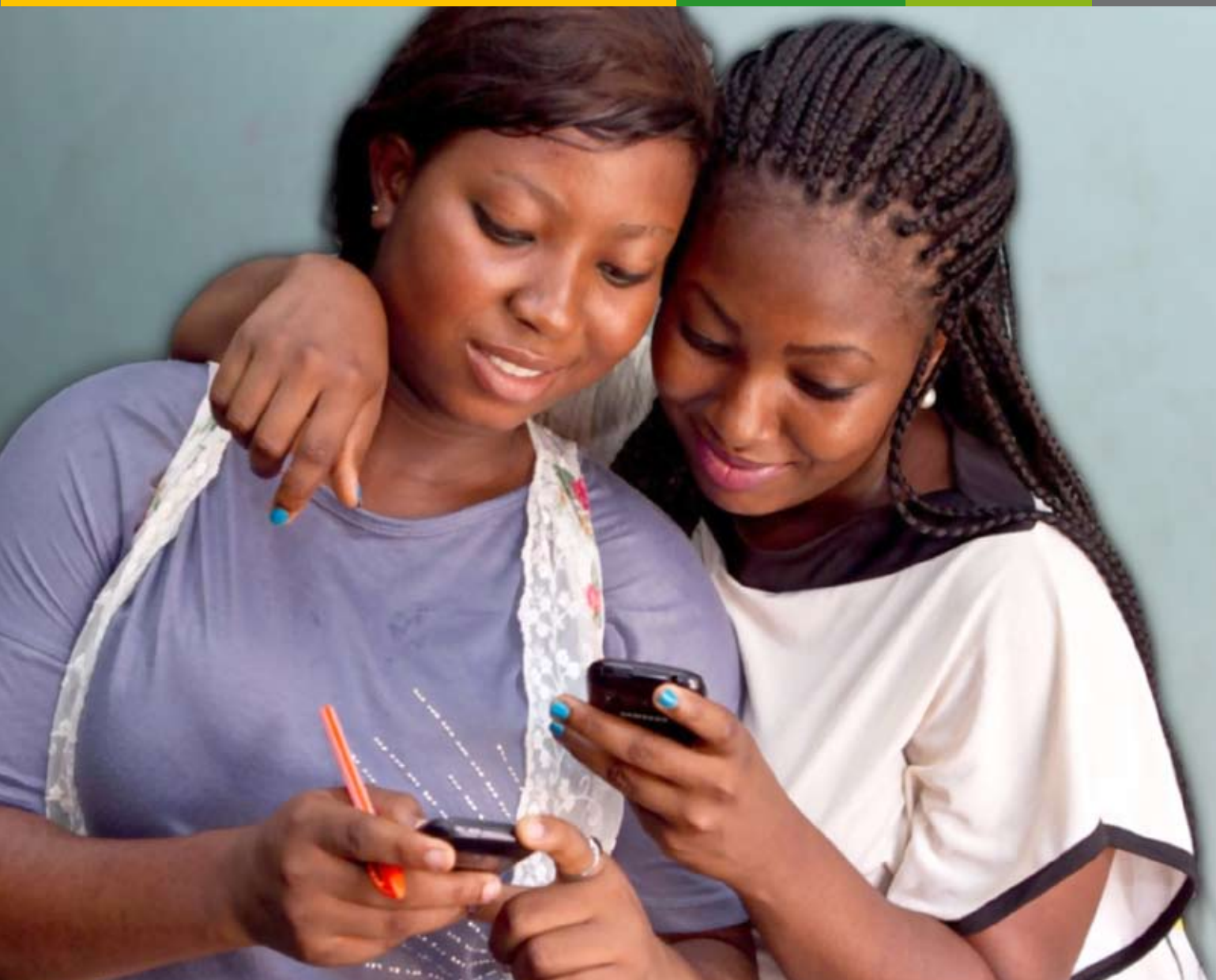# m-Learning

Mobile Learning
Pilot Project Report | **April**
2013

A group of 33 young beneficiaries were selected from in and around Abuja to test the feasibility and effectiveness of learning and skills acquisition through mobile devices. The pilot project lasted four months and was supported by the Department of Foreign Affairs and International Trade (DFAIT) through the Canada Fund for Local Initiatives (CFLI).

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Contents

BACKGROUND

Very few technologies have achieved the ubiquity of mobile devices. The wide availability of networks and variety of devices and applications make mobile phones the most rapidly adopted technology in recent history. The International Telecommunications Union (ITU) declared that the number of connected mobile devices, the vast majority of which are mobile phones, surpasses the world's population.

The nature of this prolific technology provides both personalized experiences and multifunctional capabilities; mobile phones have become cameras, music players, wallets, and more. Particularly for young people, advances in the sophistication of mobile technologies have essentially changed the way people interact with each other, create, consume and learn.

Mobile Learning employs the use of mobile technology, often in combination with other information communication technologies, to enable learning anytime and anywhere. People can use mobile devices to access educational resources, connect with others, and create content, inside and outside the classroom. Mobile learning also encompasses efforts to support broad educational goals such as effective administration of school systems.

One of the many benefits of mobile learning is the ease of "fitting it in" to already established lifestyles. The convenience of mobile devices enables the learner to carry the device anywhere, allowing for learning to become location and time independent.

Around the world, mobile learning is being adopted in educational contexts to create new opportunities that empower the learner. It is categorically the 'future' of learning.

Contextually, mobile learning offers a SMART solution to two major problems faced by Nigerian youth: diminishing access to post basic education and unemployability. An uneducated society breeds restiveness. Therefore, engaging this demographic through a familiar device that virtually everyone owns, can create a platform for overcoming learning barriers and impart employable skills.

Challenges to achieving these goals using mobile technologies are:
- The usability of mobile devices and apps for learning
- Willingness of the target demographic to engage this new learning platform
- Development and delivery of mobile learning content to mobile learners
- Effectiveness of the mobile learning experience
- Testing and certification of learners
- Sustainability

The M-Learning Nigeria pilot project was conceived to test the feasibility of overcoming these challenges in Nigeria.

CONTEXT FOR MOBILE LEARNING IN NIGERIA

With the liberalization of the telecommunications industry in the 1990s, Nigeria experienced a rapid expansion of mobile networks, coverage and subscriber base. The penetration and growth of mobile phones within the country has positioned it as one of the world's fastest growing mobile markets.

Nigeria's demographic makeup features a population that is relatively young (born within the digital revolution period). To these 'digital citizens' technology and indeed mobile devices seem innate to their everyday lives. It is against this backdrop that learning through an already familiar and accessible technology is seen as an emerging opportunity to develop Nigerian youth.

More importantly, it is the existing socio-economic challenges – poor access to education and high youth unemployment – that make exploring this emerging opportunity imperative.

Access to Education

An estimated 26 million Nigerian youth are without access to post-basic education and therefore deemed unemployable. The approximately 459 higher institutions in Nigeria have an average enrollment of only 2 million students per year. Vocational institutions are also inadequate for a rapidly growing population. Poor access to formal education therefore results in a high incidence of drop out from education.

On the plus side, basic requirements to obtain an education are good. The literacy rate in Nigeria is above average for Sub-Saharan Africa. According to UNESCO, Nigeria has a literacy rate of 72% for citizens above the age of 15. A majority of the population can communicate in English (the national language) or Pidgin English.
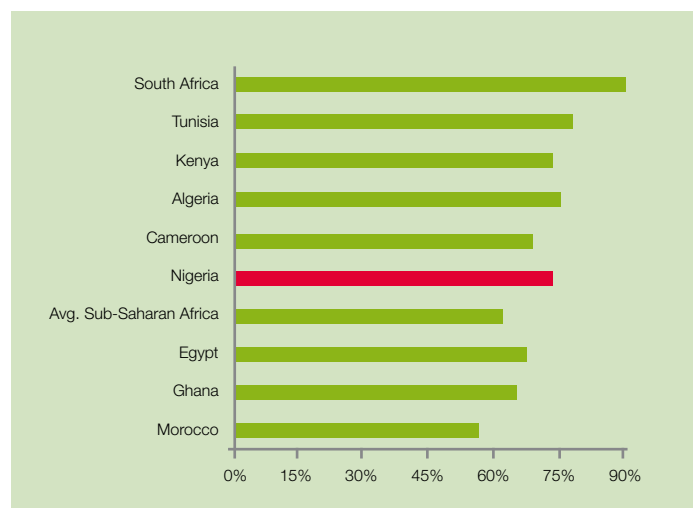
Source: UNESCO Institute for Statistics, EFA Global Monitoring Report 2010, statistical annex

Youth Unemployment

In Nigeria, the unemployment rate increased from 21.1% (2010) to 23.9% in 2011. This suggests that over 40 million youth are currently unemployed. Within the continent, South Africa has also fared badly at 25%.

The incidence of unemployment is higher in rural areas than in urban areas. It is also more pronounced for those between the ages of 15-44 (the economically active population), amongst BA/BSc/HND graduates, and females.

Unemployment Rate by Age Group, Sex, and Sector		
Educational Level	Urban	Rural
SSS 'O LEVEL	13.9	22.5
BA/BSC/HND	16.8	23.8
Age Group	Urban	Rural
15-24	33.5	38.2
25-44	16.3	24.1
Sex	Urban	Rural
MALE	16.9	25.1
FEMALE	17.2	26.1

Source: National Bureau of Statistics, 2011

Growth of Mobile Use in Nigeria

Nigeria's telecommunications regulator reports that mobile subscriptions will reach the 120 million mark this year. Already, half of the youth population own mobile devices. Access to mobile phones in Abuja, FCT is reported to be 71.8%.

Research has also established a growing desire to use mobile devices for education related activities. In a study carried out by Pyramid Research in 2011, it was established that:

- 45% Nigerians between the ages of 15 - 35 use their mobile phone for education related activities.
- 25% Rural mobile phone users hope to access agriculture related information through their phones
- 30% Rural mobile phone users hope to access education related apps through their phones

It is expected that increased 3G data coverage will drive even greater adoption of mobile educational services in Nigeria.

One of the many benefits of mobile learning is the ease of "fitting it in" to already established lifestyles
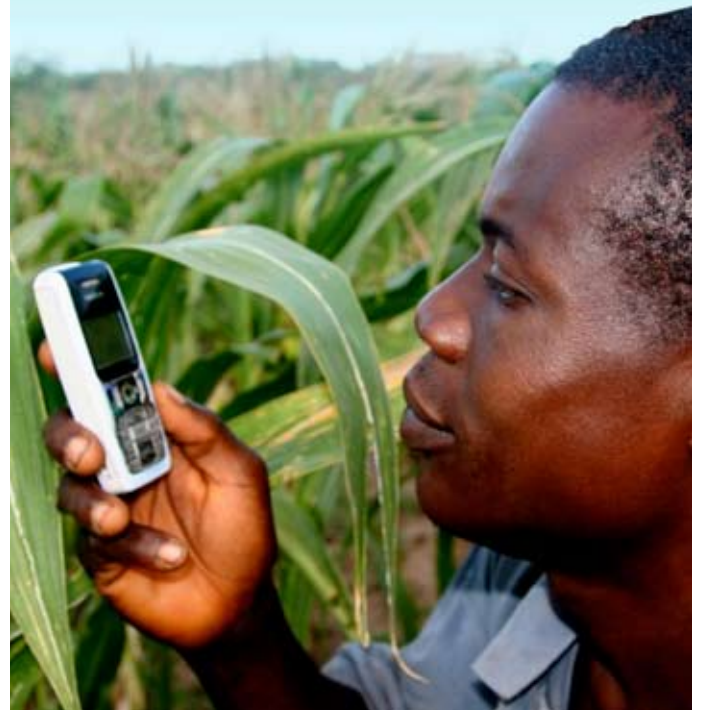
ABOUT M-LEARNING NIGERIA

The m-Learning Nigeria pilot project was administered by the Shehu Musa Yar'Adua Foundation. It was established to explore the possibility of exploiting opportunities presented by the advance and growth of mobile technologies in Nigeria as a way to address social problems of limited access to education and youth unemployment. The project sought to evaluate the efficacy of mobile learning devices as tools for delivering learning content to Nigeria's unemployed and unemployable youth.

The scope of the pilot phase was to test the mobile learning platform with 33 pilot users, and monitor their progress and level of skill and knowledge acquisition within a four-month period (December 2012 – March 2013).

The pilot phase involved establishing a Project Management Office (PMO), selection and testing of technology (mobile devices and networks) and platform (learning management system and application), sourcing and screening of participants, focus group sessions, deployment of content and mobile devices and follow-up assessments. This report centers on the final stage.

Project Stakeholders

The following organizations and institutions were stakeholders or partners in the project:

FULL NAME
Shehu Musa Yar'Adua Foundation

URL
www.yaraduacentre.org

ROLE IN m-LEARNING NIGERIA
Administrator

PROFILE
The Shehu Musa Yar'Adua Foundation was established by the friends, family and associates of Shehu Yar'Adua to continue the enduring legacy of one of the nation's foremost leaders and inspire Nigeria's future generations.

Through its facilities and programmes the Foundation endeavours to further the ideals of Shehu Yar'Adua; his commitment to national unity, good governance and to building a just and democratic society for all Nigerians.

The Foundation's Public Policy Initiative addresses the formulation and implementation of sustainable public policy through conferences, advocacy and publications.

FULL NAME
Department of Foreign Affairs and International Trade (DFAIT) through the Canada Fund for Local Initiatives (CFLI) locally administered by the Canadian High Commission in Nigeria

URL
www.international.gc.ca

ROLE IN m-LEARNING NIGERIA
Donor

PROFILE
The CFLI is a program under the stewardship of the Department of Foreign Affairs and International Trade (DFAIT) that supports small projects proposed and implemented by local NGOs and other grassroots organizations such as village councils, cooperatives and women's groups. This enables Canada to respond to local needs by working at the community level. The CFLI serves to strengthen Canada's relationships with civil society and local communities and to build networks of contacts in countries around the world

The CFLI funding for M-Learning was locally administered by the Canadian High Commission in Nigeria.

FULL NAME
Datawind Ltd.

URL
www.datawind.com

ROLE IN m-LEARNING NIGERIA
Hardware Provider

PROFILE
Datawind is a leading developer of wireless web access products and services. Datawind offers a series of wireless web access devices and related web delivery platforms. Datawind invented the Aakash tablet (dubbed the cheapest tablet in the world) which was used for this project.

Datawind is a UK based company with major operations in Europe, Canada and India. It is committed to bringing the next billion people into the internet age by offering internet access devices with affordable, anywhere, anytime internet connectivity.

The Project Team

A team of experienced volunteers and youth development enthusiasts was assembled to implement the m-Learning project.

Amara Nwankpa
Project Coordinator

Amara is an IT professional and advocate for good governance and national development. As an enthusiast for social innovation using new media, he founded LightUpNigeria - a youth movement focused on improving electricity supply - mobilized using social media. He is also a founding member of EnoughisEnough Nigeria – a coalition of youth and youth led groups focused on encouraging youth participation in good governance initiatives.

As a professional in the information and communication field, Amara is one of the architects of the 1-Gov.net platform, a single, common electronic government infrastructure for the Federal Government. 1-Gov.net currently connects over 3,600 locations for 350 Ministries, Departments and Agencies.

As a pathfinder for youth involvement in good governance, he played key roles in the mobilization and advocacy that led to the acknowledged increase in the positive involvement of young Nigerians in the 2011 elections.

Hannah Kabir
Relationships and Communications Manager

Hannah is a self-motivated implementer by nature and thrives on being able to draw inspiration and expertise from various fields to actualize her ultimate goal of contributing to the development and welfare of humanity. Her background in business economics and vast experience in the ICT public sector as a business analyst adds to her multi-dimensional understanding and strategic approach.

With a BSc in Business Economics, Ms Kabir started her career in a telecoms company where her hands on approach allowed her to learn how to program phones and handle commercial customer care easily. Her attraction to technology as an enabler led her to a career path as a Business Analyst in the public sector IT company- Galaxy Backbone Plc, where she was instrumental in Corporate Strategy & Development for six years.

Hannah's interest in the energy sector developed after completing an MSc. in Renewable Energy, Enterprise & Management. She currently is CEO of Creeds Energy and an energy consultant. She lends her expertise to both private and public sector clientele. Her areas of focus and interest are Solar Photovoltaic Systems, Community Development, Energy Efficiency, Carbon Development Mechanisms and Joint Implementation.

Emmanuel Otokpa
Usability Manager

Emmanuel is an IT professional and a photographer, with expertise in project management. He was Project Manager for the Social Media Tracking Centre (SMTC), during the April 2011 general elections. One of the tools used was "REVODA" a mobile application developed for citizens to monitor and report back on the elections and progress within their polling units.

He is a founding member of "Photowagon" a group of professional photographers promoting photography in Abuja and Nigeria in a fresh, creative and innovative way, and was part of the "My Nigeria" photo exhibition held in 2011. His commitment to community development has seen him involved in projects such as"Photopower", a volunteer and charity initiative to empower youth through the use of photography. The pilot project worked with the Hope for Survival Orphanage Gishiri, Abuja. Fifteen teenagers (15 to 19) were taught to express themselves through photography. He is also a part of the "My Africa Is"project.

Emmanuel is presently the CEO of Paradigm Systems Limited and Blazing Images. He is also the Head, Projects at Meermaad Networks, where he provides skills needed to execute and finalize projects on both still and motion photography. He is a dynamic individual with good organizational experience.

Boyowa Egure
Content Manager

Boyowa received her bachelor's degree from the University of Maiduguri where she studied library and information science. She worked with WaterAid Nigeria as a volunteer/consultant then moved to ActionAid Nigeria where she continued her career in development communications. After three years in the communications department, she combined her communications skills with monitoring and evaluation and worked with the Impact Assessment and Shared Learning Department in ActionAid Nigeria.

Boyowa left ActionAid Nigeria to work with the Ekiti State Government for a year as Special Assistant to the Governor on transformation and strategy. While there, she worked as a liaison between the Office of the Governor and various Ministries and Departmental Agencies, developed a template to monitor progress in the state, and was part of the team that pioneered the state's social security scheme.

With a career spanning development and the public sector, she has eight years experience in communications and advocacy work in Nigeria.

Boyowa currently focuses on strategy development and communications consulting. She is a managing partner at Loretta Daniels Consulting.

RUNNING THE PILOT

Methodology

The project set out to determine the feasibility and effectiveness of mobile learning for the average young Nigerian. Assessing the concept against these parameters required that the project team do the following:

1. Identify, select and test a mobile learning solution

2. Select mobile devices that represent the kinds of smart mobile devices available in Nigeria

3. Select a group of young Nigerians representative of the demographic diversity in the country

4. Assess their interests and identify areas in which they wish to acquire skills

5. Assess level of competence of the participants in their areas of interest

6. Identify subject matter experts in the participants' areas of interest

7. Develop educational content that addresses interests of the participants

8. Provide participants with test devices

9. Deploy educational content to the Mobile Learning Management System and deliver curriculum remotely to participants mobile devices

10. Allow participants to interact with learning content and the platform on their own terms and in their own space

11. Conduct field visits and interviews with participants during the learning period

12. Organize focus group meetings to allow participants to interact with and provide feedback to the project team and subject matter experts

13. Use focus group meetings as class room sessions to provide a physical dimension to learning

14. Assess participants both in-field and at the end of the learning period

15. Analyze results and make conclusions

Selecting a Mobile Learning Management System

Criteria for selecting a Mobile Learning Management System were established as follows:

Architecture	**Performance** Must be light on bandwidth Scalability: Can the server deal with our load? Must handle 10,000 concurrent connections or more than 5,000 logged in users at acceptable performance Redundancy/failover/stability: Can the product cluster and work with a load balancer? **Standards** Should support open standards Should be accessible **Technology** Browser dependency should be low Java dependency should also be low Mobile app preferred Off-line use – Can learners access offline content when not within data coverage areas?
Vendor/ Support Company/ Market Acceptance	**Technical support** Country and regional support/presence available **User community** Size of user community Availability of a support contract (even for Open Source) Open Source: how active is the community Number of years in market
Financial	 **Software** Total licence cost (initial, annual) **Implementation/development** Implementation cost Training cost
Functionality	 **Degree of "fit" to our project** Supports blended interactive and collaborative learning Supports workflow **Integration** Has remote content delivery (learning modules) Has communication tools (mail, forums, chat) Allows setting of assessment (quiz question types, assignments) Allows user management on system (tracking, reports) Supports learning hierarchy Supports tracking, groups, selective release Social media integration Has notifications **Usability** Look and feel, ease of use Multi-language support Diacrit char support, eg UTF8 Branding, possible?
Support Effort/ Change Management	 Resources required to maintain Knowledge base for user support Materials available for support Materials available for training

The following three Mobile Learning Management Systems were assessed for the pilot:

1. Blackboard 9.1
2. Upside LMS
3. Openclass

All selected Mobile Learning Management Systems scored well in testing. However, Upside LMS was chosen for the pilot because it was the only LMS that allowed for offline use – a feature the project team was keen to incorporate in the pilot due to the sporadic nature of mobile data services in Nigeria.
A summary of the features of the Selected Mobile LMS is presented below:

UPSIDE2GO
LEARNING ON THE GO

Upside2Go is a mobile learning platform that not only delivers training content to learners easily; it also enables a mobile-based approach to real-time sharing and collaborating.

Key Features include:

Learning Media
Upside2Go supports a variety of learning content – HTML courses, videos, podcasts, flashcards, documents, quizzes and surveys. Learners can download and store content on their mobile devices for offline access or they can choose to view it online.

Asynchronous Mode
Upside2Go's limited dependency on Internet/GPRS ensures that learners can access content in offline mode too. This means they can download the content once and view it multiple times. Its automatic and manual synchronization options enable them to stay in sync with updates in real-time.

MIS and Reports
An exhaustive set of standard built-in reports for courses, curriculums, assessments and surveys, along with extensive filters for multi-level reporting, helped effectively measure and monitor learners' progress. Key reports include graphical charts for detailed analysis.

Selecting Test Mobile Devices

Choosing the Mobile Platform
Three smart phone platforms were considered for the pilot:

1. Apple IOS
2. Blackberry OS and
3. Android OS

During in-house testing it was observed that the Upside2Go Mobile App provided consistent performance on all three platforms.The Android OS platform was chosen because of the many affordable devices in the market currently running this platform compared to the other two.

Choosing the Devices
In selecting the devices for testing, the project team considered only one constraint – price. Two devices were chosen for the test. These devices were considered to be affordable ($75 - $150 range) and still capable of delivering a satisfactory user experience. The devices selected were:

1. Samsung Galaxy Pocket
2. DatawindUbiSlate 7C+

Below is a summary of the features of the devices:
The Samsung Galaxy Pocket Smart Phone

SAMSUNG GALAXY POCKET

Samsung Galaxy Pocket is a smartphone for budget-conscious consumers offering an 832MHz single-core processor and a 2.8-inch display with QVGA resolution. The back features a basic fixed focus camera of 2 megapixels, and a 1,200mAh battery resides under the back cover. You also get a 3.6Mbps 3G radio, Wi-Fi, A-GPS, and 3 gigabytes of on-board storage. All of that is confined inside of a body with a thickness of 12 millimeters. The Samsung Galaxy Pocket is Samsung's new entry level smartphone that targets first time smartphone users.

It runs on Android: The Galaxy Pocket comes loaded with Google's Android 2.3.6 (Gingerbread), the most popular version of android out now, complete with Google apps and services.

Size: The pocket is compact, at just 97g and a height of 103.9mm it fits right into your palm…and pocket.

Applications: The Pocket has access to Google Play and Samsung apps - literally hundreds of thousands of apps to play with.

Price: Between N15,000 – N22,000 ($100 - $140)

AAKASH UBISLATE

UbiSlate 7C+ is a tablet launched by the low cost tablet manufacturer Datawind. This Ubislate 7C+ is a smart phone tablet, supports GPRS and wifi. Tablet is powered by 1Ghz A8 cortex Processor, with embedded HD video co-processor and runs on android ICS 4.0 operating system.

Features:

Processor: 1 Ghz A8 Cortex Processor

Simslot: Available

GPU: Available as embedded HD video co-processor

Operating System: ICS, Android v4.0

Screen Type: 7 inch, 5-point touch capacitive screen with a resolution of 800X480

Memory: Internal memory of 4GB, extendable to 32GB and 512MB RAM

Connectivity: WiFi - 802.11 B/g/n, GPRS using simslot, Bluetooth

Camera: VGA front camera and No rear camera

NFC: Not available

Built in GPS: No built in GPS , supports GPS using GPRS

Video: Supports up to 720P

Audio: stereo speaker

Browser: Ubisurferbrowser, HTML

Ports: Micro USB 2.0, Mic, Micro SD slot

Battery: 3200mAH, 4 hours of continuous usage on wifi

Flash support: Supports Flash 11.1 and above

Pros of this tab: Support for simslot/phone/GPRS. Low price. Supports Bluetooth. Battery backup is good. Comes with Ubisurfer browser best known for compression and acceleration internet content.

Price: $75

M-Learning Participants and Interests

Sixty young Nigerians expressed interest in participating in the pilot. 33 participants were selected from this pool to become beneficiaries of the pilot project. We note that the original intent of the project was to work with 30 participants. However, given the level of interest shown, the project team determined that it could stretch the resources for the pilot to accommodate three additional beneficiaries. Of the 33 participants, 16 were female and 17 were male.

Data collected regarding participants is analyzed below:

Age Range
Participants were between 18-29 years with the median age range being 24 years. Female participants include more 24 year olds and are generally older than the male participants.
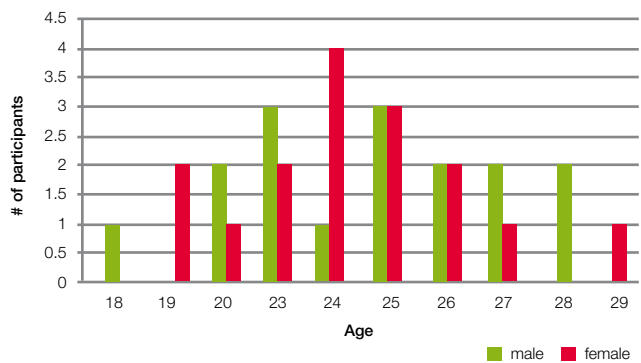
Education Level
There were no primary school leavers in the sample age range. A majority of participants were within the tertiary school graduate category with more females than males. Male participants, however, dominate the secondary school leaver category.
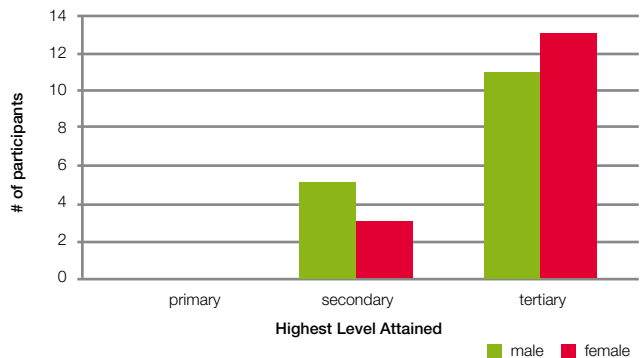
Understanding of English

Participants' understanding of written and spoken English is closely correlated to the level of education above. The data shows that understanding is higher for female participants compared to male participants, with more male participants ranking medium.

Subject Preferences

Participants were asked to rank their preference for five subjects on a scale of 1 to 5 (1 being most preferred and 5 for least preferred). Agriculture was the subject that most participants ranked as their most preferred subject. It was rated as first choice by a majority of the male participants, followed by graphics design. Most participants preferred Solar Technology followed by E-commerce and Photography as their second choice.
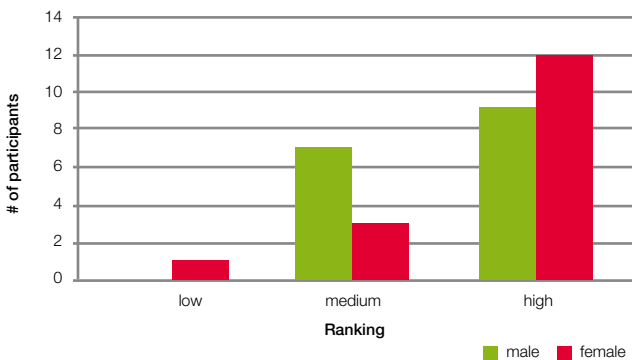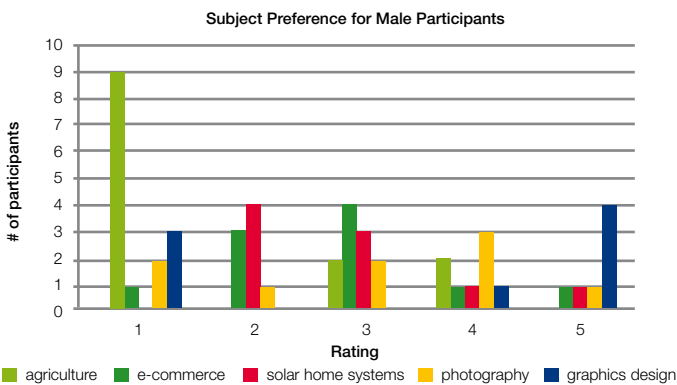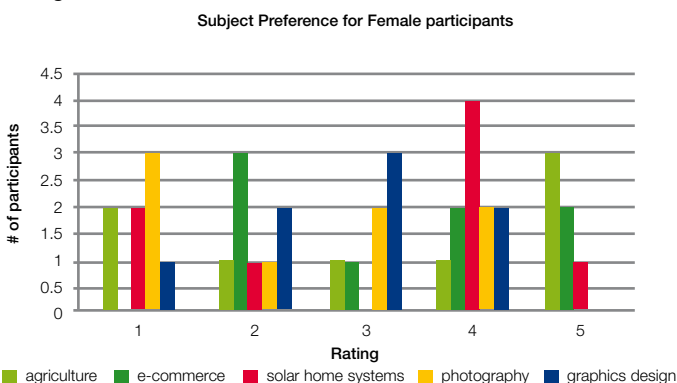

Subject Preference for Male Participants

For the female participants, Photography was most preferred as first choice followed by Solar Technology and Agriculture. As second choice, E-commerce was tops followed by Graphics Design.

Subject Preference for Female participants

Level of Competence in Preferred Subjects

All participants were assessed to have little or no knowledge in the subjects they expressed interest in.

Subject Matter Experts

Given the short period available for the pilot, it was only possible to source subject matter experts for 3 of the 5 subjects that participants expressed interest in.

Subject Matter Experts were not academicians, but professionals and employers with some reasonable practical experience in the subjects identified.

Subject Matter Experts:

Brian Christopher Udoh
Agriculture

Brian is an Aquaculture officer at Songhai Rivers Farm, a joint development initiative. He has an MSc. Aquaculture (Breeding and Genetics) from Micheal Opara University of Agriculture, and a Bachelors Agriculture Technology in fisheries and wildlife from Federal University of Technology, Akure. He holds membership in the following societies: Wildlife Conservative Society, European Aquaculture Society and Institute of Agricultural Professionals of Nigeria.

He has worked in Okomu National Park, research institutes and various farms. Brian has brought both his expertise and willingness to share practical knowledge with agriculture enthusiasts in the project.

Adekola Mustapha Moshood
Solar Technology

Kola is an Electrical and Electronic Engineering graduate of the Federal University of Technology, Yola and a member of the Solar Energy Society of Nigeria. He is a seasoned solar technician with over 5 years practical experience across different projects all over Nigeria.

From design and installation of solar power systems for different companies to installing solar powered boreholes, street lighting, home and office systems, Kola has brought his wealth of experience to support the development of the course content for the m-Learning Project.

Subject Matter Expert resources employed contd.

Aisha Augie-Kuta
Photography

Aisha is an award winning photographer and emerging filmmaker, with an M.Sc. in Media and Communication from the Pan African University, Lagos. She also holds a B.Sc. in Mass Communication, ABU Zaria and a Certificate in Digital Filmmaking from the New York Film Academy. She has leveraged her years of corporate work and photography experience to provide useful education content for the project.

Course Content

Given the short duration of the pilot and limited resources, only beginner-level content was developed. A total of 8 course modules were authored (six for Agriculture, one each for Solar Technology and Photography). Some of the Agriculture modules were developed so that, combined with their interaction with the Subject Matter Expert during Focus Group Sessions, the learner could begin a practical project using the skills acquired.

Courses Authored

The following courses were authored and delivered as part of the project:

Course	Module	Synopsis
Agriculture	General Introduction to Agriculture Broiler Production Layer Production Quail Management Guidelines to Producing Moringa Aquaculture	Agriculture courses provide the learner with general knowledge of the agriculture value chain. Specific areas that can foster small to medium enterprise development are detailed.
Solar Technology	Introduction to Solar Technology	A Solar Technology course was developed to improve understanding of renewable energy sources, particularly application of solar photovoltaic and best practices in design and installation. Content focuses on raising awareness of available viable options for use and impacting basic knowledge about solar as an alternative energy technology.
Photography	Introduction to Photography	The course provided learners with basic instructions and guidelines concerning the art of photography, enabling them to develop commercially viable skills, either taking pictures using their phones or a digital single lens camera.

Field Visits and Interviews

The project team conducted field visits to each of the participants, observing and interviewing them as they used the mobile learning app in their natural environment. Interviews were documented on video (CD available).

Participants provided feedback on their experience with the application, usability, convenience, access to data and challenges they faced.

Project team member Hannah with participants during a field visit

Learner-Driven Learning

Participants were allowed 6 weeks to learn from the mobile app at their own pace. All participants were, however, encouraged to complete all modules regardless of their specific interests. At the end of the period, it was observed that 23 participants had completed at least one module.

The pilot project largely encouraged experiential learning. Participants were encouraged to pursue their interests and share their experiences with each other using the interactive features of the LMS such as "forums" and "share" to start discussions, upload pictures, podcasts and videos.

These learning diaries were used to measure the levels of interest and engagement with the various subject areas and with the learning platform. Some learners also took the initiative to acquire more knowledge outside of the mobile learning environment by visiting establishments or starting small pilot projects related to the various subject interest areas.

Self paced learning at the learners convenience

Focus Group Sessions

Focus group sessions were organized involving participants, the project team and subject matter experts. Focus group sessions were used to provide guidance and instruction to learners, solicit feedback and provide classroom type sessions to complement the mobile learning experience.

A cross section of participants at the first focus group session

Learner Assessment

At the end of the learning period, participants were assessed as follows:
1. Self Assessment – Participants were required to assess themselves and report whether they had improved upon or acquired new skills
2. Assessment by Subject Matter Experts – A professional appraisal of participants in the three subject areas.

Limitations of the Pilot

Content
Although experienced resource persons in the relevant subject matter developed the learning content, these were not subjected to strict academic or approved curriculum appraisal. As a result, the content does not lend itself to conventional expectations regarding its impact on learners.

Hands-on Experience
Participants were encouraged to find opportunities to try their hand at what they were learning. However, the pilot did not explicitly create an environment for participants to gain hands-on experience in the various subject areas. This limited the learners' ability to truly assess their skills.

Assessment
The pilot did not feature structured assessments or a proctored exam. Assessments were carried out with multiple choice questions administered through the mobile app as well as interviews with the subject matter expert. While this represents how most assessments for hiring are done in Nigeria, results are still subjective.

Challenges Experienced during the Pilot

Mobile Application Performance
Participants reported that the application often crashed, particularly during sharing of pictures or video. This significantly affected the ability of the project team to use social interactions on the mobile app as an indication of interest in the experience.

Mobile Application Support
Upside Mobile Learning Management System support comes from India. Support personnel are not available 24/7 but keep to Indian daylight hours. Due to time zone differences with India, the window for support was shorter than was considered acceptable.

Network Reliability
Reliability of the data services on mobile networks in Nigeria is a known handicap. It presented a challenge to participants as it occasionally increased the difficulty in synchronization. However, the adverse effect of this challenge was significantly reduced by the Upside2Go feature that allowed users to learn in offline mode.

PILOT RESULTS

User Experience – Galaxy Pocket

Twenty-eight out of 33 participants responded to requests for feedback regarding user experience on the Samsung Galaxy Pocket. Participants provided feedback in the following areas:

1. Convenience
2. Readability
3. Battery life/Power
4. Ability to study offline

User experience results are presented below:

User Experience – Galaxy Pocket
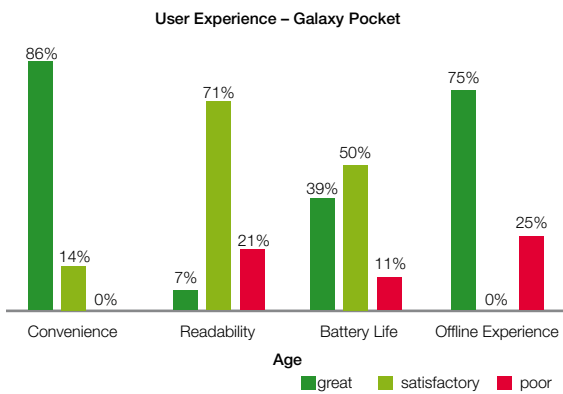
Convenience – Galaxy Pocket

All participants that responded were either elated or satisfied with the convenience of the Galaxy Pocket. 86% of participants described the experience as "very convenient". Participants considered the experience convenient because there was no pressure and they were able to learn at their own pace. The totally new and different experience of learning also contributed to the pleasantness of the experience.

Convenience

"Very convenient way of learning. I could study while tending to my child."
Chenemi Ugbede, 29, Female

"Was very convenient. I travel a lot between Akwanga and Abuja and I can read while in the car travelling."
James Igedelgomu, 28, Male

Readability – Galaxy Pocket

71% of participants described the reading experience on the Samsung Galaxy Pocket as satisfactory, although they would prefer a larger screen. 21% of participants found it too difficult to read from the Galaxy Pocket screen and considered the experience poor. Although most participants were able to complete their courses, they recommended that a larger screen will make learning easier.

Readability

"Screen size was ok, but I will prefer a bigger screen."
Ayo Adegbola, 27, Male

"Screen size was small, had to be squinting, maybe because I use glasses."
Zainab Shuaibu, 23, Female

Battery Life – Galaxy Pocket

For an environment like Nigeria where access to electricity is sporadic and not universal, battery life is an important experience factor. 89% of participants thought the battery life of the Galaxy Pocket was either satisfactory or great. Only 11% thought the battery drained rather too fast while learning.

Battery Life

"Battery life was very okay, I might not charge a whole day."
Maimuna Ibrahim, 25, Female

"Battery life was fair, like 5 hours (of usage)."
Medina Salihu Lamosi, 22, Female

Offline Learning Experience – Galaxy Pocket

All participants were able to use the offline learning feature. However, 25% of participants complained that the offline learning feature did not work satisfactorily for them. The ability to learn offline was considered part of the reason why participants thought the experience was "convenient".

User Experience – UbiSlate 7C+

Five Participants were selected to test the Ubislate 7C+ and all provided feedback in the following areas:

1. Convenience
2. Readability
3. Battery Life
4. Offline Learning
5. Data Speed
6. Application Performance
7. Camera Function

Responses from participants who tested the UbiSlate were similar, presented in table form below:

Area	Experience
Convenience	It was very convenient learning from the tablet compared to the Galaxy Pocket. However, it wasn't as easy to carry about.
Readability	Reading using the tablet was far easier compared to the Galaxy Pocket as the screen was several times larger.
Battery Life	Battery life for the tablet was considered fair.
Offline Learning	Most participants had challenges with synchronization for offline learning which affected their ability to access content or send completion data back to the LMS. The experience was considered poor.
Data Speed	Data Speed was considerably slower on the UbiSlate. This also negatively impacted the user experience.
Application	The application performance was more stable on the UbiSlate compared to the Samsung Galaxy Pocket.
Camera	Picture quality was poor and the camera being in the front of the device was considered a usability problem.

Participant Assessment

Course Completion

Out of 33 participants in the pilot project, 23 presented themselves for assessment.

The chart below indicates courses completed by participants who were assessed:

Course Completion

■ participants

10	5	8
Agriculture	Solar Technology	Photography
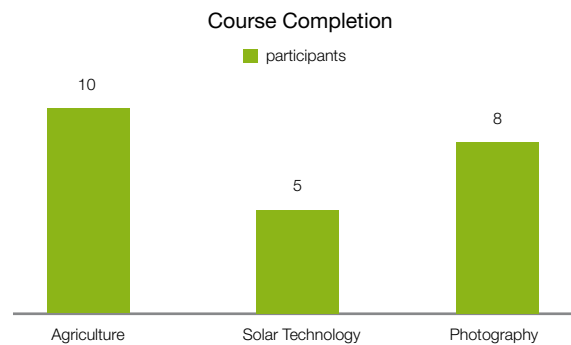
Ten participants completed the agriculture course, five completed solar technology and eight completed photography.

Participants' Self-Assessment

Four levels of competence were defined as the basis for assessing pilot participants:

1. Newbie – Little or no knowledge or skill on the subject.

2. Beginner – Has acquired some basic skills in the subject area and can execute simple projects but requires supervision.

3. Intermediate – Has developed skills to execute simple tasks on their own without need for supervision. However, guidance and additional skills are required to execute more complex tasks.

4. Expert – Can execute most tasks in the subject area without supervision. Has acquired some experience in the field and is in a position to teach others.

Below are self-assessment results by participants compared to expert assessment of participants:

Subject	Baseline Self Assessment	Participants' Self Rating After M-Learning

Agriculture

Baseline Self Assessment

Expert	0
Intermediate	0
Beginner	0
Newbie	33

(x-axis: 0, 10, 20, 30, 40)

Participants' Self Rating After M-Learning

Expert	3
Intermediate	4
Beginner	3
Newbie	0

(x-axis: 0, 2, 4, 6)

Solar Technology

Baseline Self Assessment

Expert	0
Intermediate	0
Beginner	0
Newbie	33

(x-axis: 0, 10, 20, 30, 40)

Participants' Self Rating After M-Learning

Expert	0
Intermediate	0
Beginner	5
Newbie	0

(x-axis: 0, 2, 4, 6)

Agriculture

Baseline Self Assessment

Expert	0
Intermediate	0
Beginner	0
Newbie	33

(x-axis: 0, 10, 20, 30, 40)

Participants' Self Rating After M-Learning

Expert	0
Intermediate	7
Beginner	0
Newbie	0

(x-axis: 0, 2, 4, 6, 8)

Subject Matter Expert Assessment of Participants

Subject	Baseline Self Assessment	Participants' Self Rating After M-Learning

Agriculture

Baseline Self Assessment:
- Expert: 0
- Intermediate: 0
- Beginner: 0
- Newbie: 33

Participants' Self Rating After M-Learning:
- Expert: 0
- Intermediate: 0
- Beginner: 6
- Newbie: 4

Solar Technology

Baseline Self Assessment:
- Expert: 0
- Intermediate: 0
- Beginner: 0
- Newbie: 33

Participants' Self Rating After M-Learning:
- Expert: 0
- Intermediate: 0
- Beginner: 4
- Newbie: 1

Agriculture

Baseline Self Assessment:
- Expert: 0
- Intermediate: 0
- Beginner: 0
- Newbie: 33

Participants' Self Rating After M-Learning:
- Expert: 0
- Intermediate: 0
- Beginner: 7
- Newbie: 1

Subject Matter Expert Comments

Brian Udoh on Agriculture:

"This mobile learning strategy has demonstrated its ability to impact knowledge on various categories of interested participants with low or high educational levels and low or high knowledge on the subject of interest. The programme has been able to transform assessed participants from zero knowledge to 60% knowledge on their subject of interest. More interest was drawn towards broiler, quail and moringa production during the course of the learning period.

I am pleased with the potential for this learning strategy. If this programme is properly managed it could be used as a vital tool in reaching out to thousands of practicing farmers all over the nation requesting expert support in their area of production. This will immediately impact on food production and put the nation on the right path to achieving food security.

My recommendation is that more subjects in agriculture should be included in the curriculum and lecture materials should be more pictorial. If possible, video demonstration of farm practices and techniques should be uploaded to aid or impact on a wider category of interested participants. Regular assessment of participants via verbal or written assessment can help generate focus in learning any subject area of choice by the participant in agriculture, which will generally enhance their ability to learn and eventually increase their knowledge on the subject."

Adekola Mustapha Moshood on Solar Technology:

"Generally, the learners have progressed from having no knowledge to acquiring basic understanding of the subject matter through their participation in the m-Learning Pilot.
It is difficult to grade these participants according to what they learned without having taken the course assignments. This was due to challenges associated with the mobile app during the learning period. It is intended that these would be solved and they can take the assignments even after the course has ended.

Based on perceived interest though, my recommendation would be for there to be practical sessions or how-to videos to allow learners to visualize the installations".

Aisha Augie on Photography:

"The m-Learning Project has made an impact on most of the students that took the photography course. They have gone out of their way to do practicals, acquire more knowledge and a few of them are actually considering turning it into a hobby and even part time employment. Others were interested but had challenges and have started reading photography articles on the internet. What most of the students have clamored for though are practical sessions from the m-Learning Team. Overall, the photography course content being included in the m-Learning platform has been a success".

Putting m-Learning to Use

New Poultry Farmers in Rije

Two pilot participants who took interest in the Agriculture content during the m-Learning Pilot have already started putting their acquired knowledge to use. Participants believe that what they have learnt and the knowledge they can continue to acquire through their mobile phones have given them the confidence to try their hands in poultry farming.

Dogo and Santu tending to their chicks

A Moringa Farmer in Kubwa

A female participant in Kubwa is also leveraging the m-Learning experience to convert her interest in the cultivation of the herbal plant, Moringa Oleifera, to a sustainable enterprise. She found a clearing at the back of her compound in Kubwa and has planted Moringa herbs with the intent to go into small-scale production.

Chinasa Okweze with her Moringa Oleifera plants

CONCLUSIONS

Feasibility

Application

Pilot Project results demonstrate that it is feasible to deliver a meaningful learning experience to learners nationwide using mobile devices. The experience with the Upside2Go mobile learning app shows that features associated with traditional e-learning can now be delivered successfully on mobile devices. The mobile app used in the pilot incorporated learning features such as:

- Video
- Podcasts
- Quizzes
- Structured Curricula
- Flash cards
- Integration with a backend Learning Management System to monitor and follow the progress of learners.

A similar mobile learning management system with the desired features could be developed and hosted locally in Nigeria.

Mobile Data Services

Despite statistics that suggest that a majority of the 48 million Nigerians that have access to the Internet do so through mobile devices, one of the major concerns for this pilot was that the unreliable and patchy coverage of mobile data services in Nigeria will render the mobile learning experience tedious and ineffective. In truth, the project did experience problems with data connectivity and participants complained often about not being able to connect to the LMS. However, having taken advantage of any window of wireless connectivity to synchronize the mobile app content, participants could use the offline learning mode to continue learning when out of range of a decent data service.

The offline learning feature significantly improved the feasibility of mobile learning in Nigeria.

Availability of Capable Mobile Devices

The pilot tested mobile learning on some of the least expensive, entry level smart phones available in the market. These devices are already prevalent among the target demographic. However, where they are not, the affordability means that it is easy for potential users to acquire capable devices or benefit from subsidized interventions.

Desirability

From the pilot results, it can be concluded that Nigerians in the target demographic find mobile learning desirable, particularly if the content available features subjects they are interested in learning more about.

Interest, convenience and offline access are the main drivers for this desirability. Learning on tablet devices will be most desirable to the target demographic.

Effectiveness

The pilot demonstrates that learning on mobile devices has the potential to be very effective. However, it is important that it be combined with other physical channels for learning. Mobile learning can reduce barriers to the acquisition of knowledge and reduce the demand for classrooms. A blended learning model which combines class room learning, practical tutoring, mobile learning and proctored exams will have the most desirable effect.

Sustainability

Sustainability is perhaps the biggest challenge that will face any future, larger scale mobile learning initiative. The sustainability challenge requires that multiple stakeholders be interested and participate. Key stakeholders to ensure sustainability are:

1. Mobile Learning Champion
2. Institutions of Higher Learning and Vocational Education
3. Mobile Network Operators
4. Government
5. New Donors

Benefits

Cost Effective

In terms of improving access to education and employability skills, mobile learning can be most cost effective. Potential users already own mobile devices that can support mobile learning applications and will not require them to purchase new devices. Content development costs can be spread over a large population of beneficiaries. The requirement for traditional learning facilities is minimal, suggesting that existing facilities can be used during off peak periods.

A Customized Experience for Each Learner

Mobile learning can facilitate interest-driven skills acquisition. Learners can choose what, when and how to learn – ensuring a personalized experience. Learner interest improves the probability of knowledge assimilation. Different learners learn effectively at different paces. Allowing learners to pace themselves improves their capacity for effective learning.

Learning Anywhere

Mobile learning overcomes the limitations of distance between the learner and centers of knowledge. This is a significant factor for learners located in rural areas or living in parts of the country where centers of knowledge are few and far between.

RECOMMENDATIONS

Larger Scale Implementation

The m-Learning pilot has demonstrated the significant potential of mobile learning as an effective self development and empowerment platform for young Nigerians. Committing resources to a larger scale pilot – to affect a larger group of beneficiaries and to deliver certifiable skills – is therefore justified.

Local Platform Development and Hosting

Despite the successes with the Upside2Go Learning Management System, it is recommended that a community of mobile application developers be engaged to develop a mobile learning platform and mobile learning apps customized for Nigeria. A community of developers can be recruited through the Co-Creation Hub – a social innovation center based in Lagos, dedicated to accelerating the application of social capital and technology for economic prosperity.

The proposed mobile learning platform should be hosted in Nigeria, preferably in close proximity to any of the major mobile network operators. This will facilitate improved user experience and speed of access.

Focusing on Developing Vocational Skills

Demonstrable skills that can be immediately applied to self or organized employment (as opposed to academic qualifications) represent "quick wins" for any youth development initiative in Nigeria. It is therefore recommended that content for the larger scale pilot should focus on development of vocational and industry-specific skills.

Industry Focus

It is recommended that the larger scale pilot focus on developing skills for a specific industry. This approach will reduce the number of required enabling stakeholders to successfully implement the project. Industries to be considered should feature unsaturated demand for vocational skills and command considerable interest among Nigerian youth.

Additional industries can be included after the larger scale pilot has been successfully implemented.

The following industries are recommended for consideration:

1.   Arts and Entertainment
2.   Agriculture
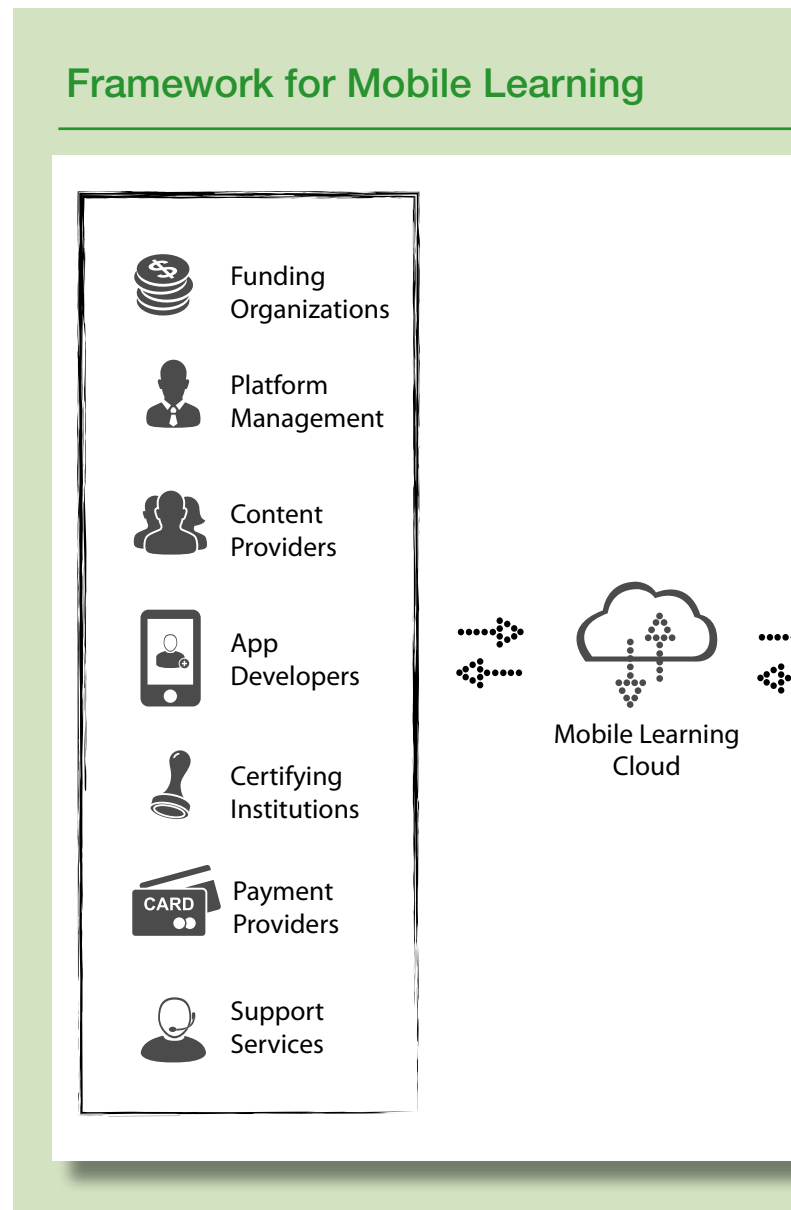3.   Information Technology

Blended Learning

Electronic learning has been found to be more effective if combined with elements of traditional learning and assessment. This is referred to as "Blended Learning". In order to make the

participants as "industry ready" as possible, it is recommended that the proposed larger scale pilot feature the following components.
1.   Self-Paced Mobile Learning
2.   Classroom Tutorial Sessions
3.   Proctored Examinations

Framework for Mobile Learning

The successful implementation of mobile learning requires a multi-stakeholder approach. Stakeholders are required to play different roles as identified in the illustration below:

Framework for Mobile Learning

- Funding Organizations
- Platform Management
- Content Providers
- App Developers
- Certifying Institutions
- Payment Providers
- Support Services

Mobile Learning Cloud

Funding Organizations

Funding organizations with resources to support youth and vocational development in Nigeria are essential. These organizations might consider direct support for enabling partners or through other stakeholders such as the platform managers. Mobile device manufacturers can also be donors, providing subsidized hardware to learners.

Platform Managers

An organization will be responsible for the operations and processes for the entire mobile learning platform. The organization provides a single point of contact for all other stakeholders involved in the implementation of the mobile learning platform. The organization will work with other stakeholders to ensure that the platform is deployed and functions as expected.

App Developers

A community of platform developers will create and continuously improve the mobile learning platform and associated apps.

Certifying Institutions

Certifying institutions are established and accredited institutions capable of certifying learners in specific industries. A certifying institution could be a traditional education institution or a professional body. A private organization could also be a certifying institution, issuing proprietary certifications, e.g. Cisco Certification.

Content Providers

Content providers will create and deploy mobile-specific content for the platform. The content provider will be guided by curriculum specifications from certifying institutions. A certifying institution can also be a content provider.

Payment Providers

These are organizations that can offer payment processing services for commercial transactions on the mobile learning platform.

Support Services

This stakeholder will provide support services to users and learners on the platform. Support services include response to enquiries, issue resolution and trouble ticketing.

Mobile Learning Cloud

The virtual part of the platform will reside in the hosting environment – preferably a datacenter at close proximity to any of the mobile network operators. It will contain all content, services and management applications for the mobile learning system.

Mobile Network Operators

Mobile network operators are very critical to the success of mobile learning. They can determine the quality of access for users and their coverage determines who can be reached. Incorporating at least one of the mobile network operators as a stakeholder to mobile learning can significantly reduce the cost of access while presenting opportunities for satisfying user experiences.

Blended Learning Centers

Establishments with traditional learning facilities can afford learners use of the facilities for classroom tutorial sessions. The blended learning centers should have a competent faculty to facilitate learner tutorials, report on learner progress and conduct proctored exams.

User Devices

Learner Community
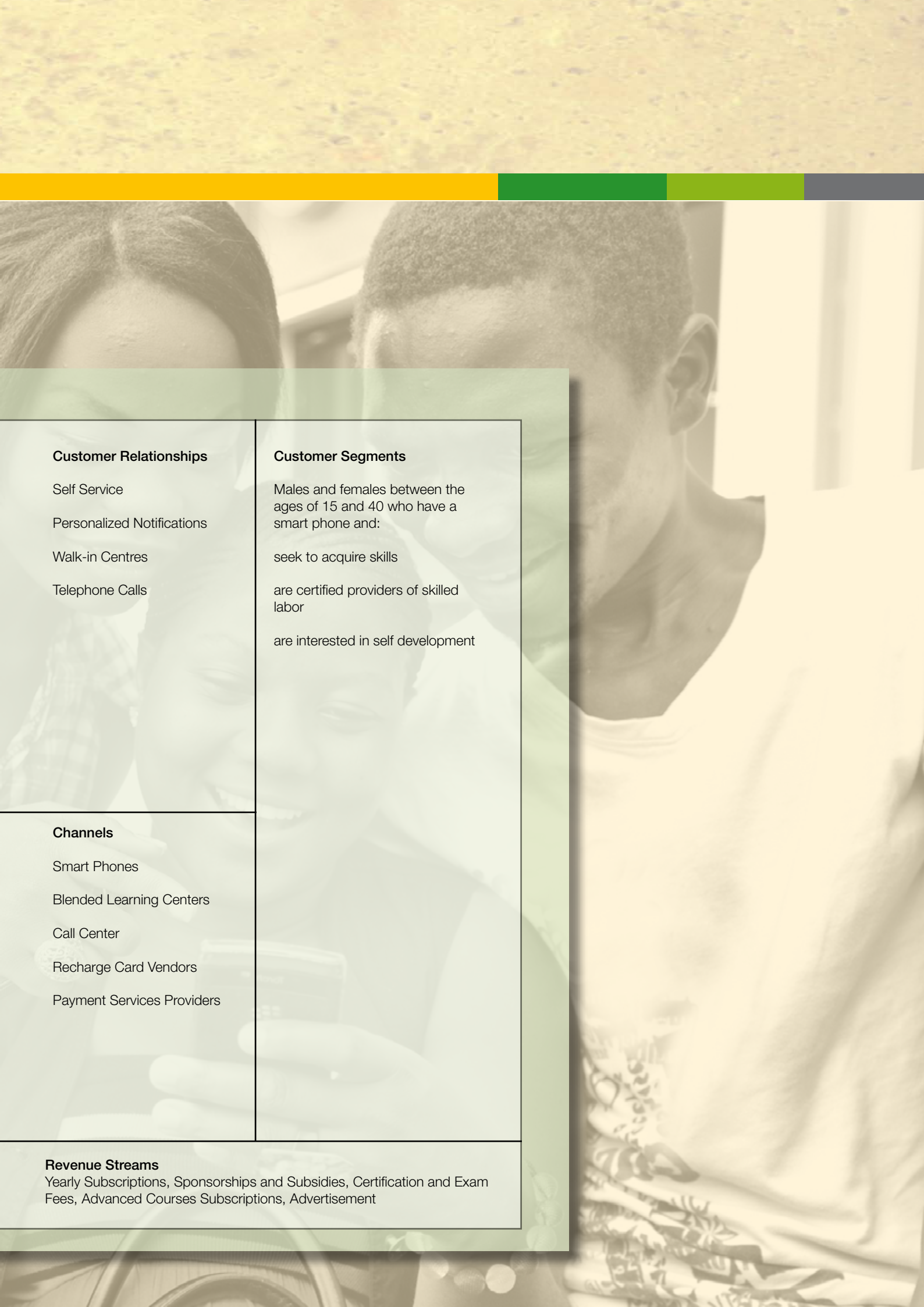
Mobile Network Operators

Blended Learning Centers
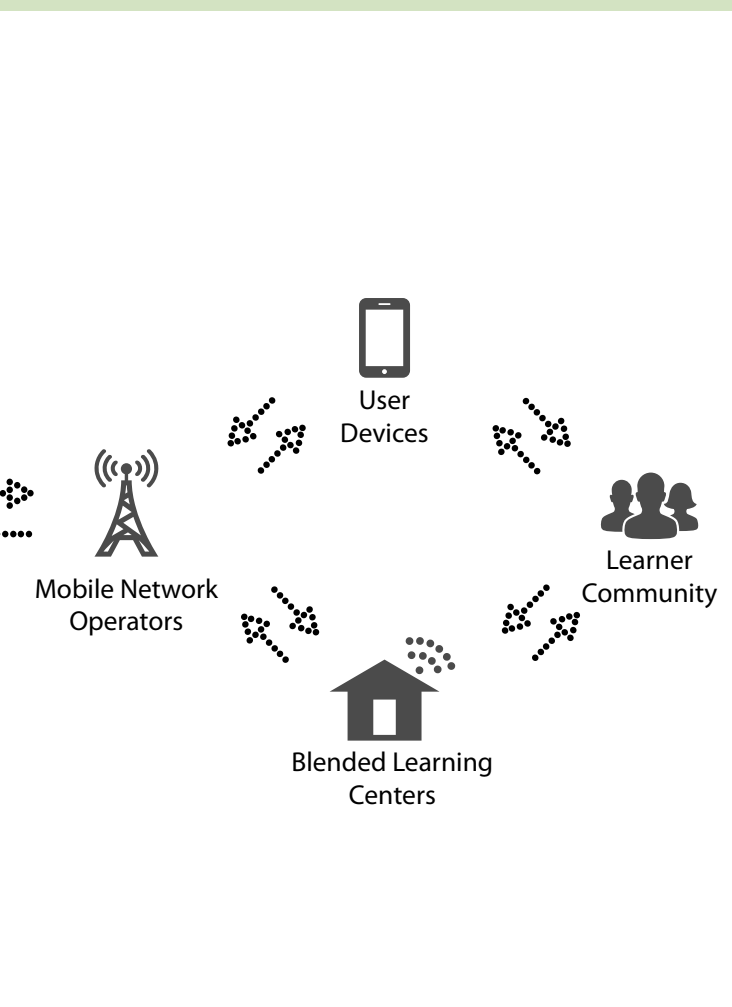
Business Model

Social Enterprise
It is recommended that the platform manager organization be a special purpose vehicle incorporated as a social enterprise. This will enable the platform management organization to apply commercial strategies to create value for platform partners and sustain the platform.

Business Model Canvas

Key Partners

App Developers – e.g. CCHub

Funding Partners – e.g. CIDA, Ford Foundation, Rockefeller Foundation

Payment Providers – e.g. Firstmonie, Paga, Interswitch

Certifying Institutions – e.g. Canadian Academy of Art, Nigerian Actors Guild

Content Providers – e.g. Local Universities and Polytechnics

Support Services Providers – e.g. Contact Solutions

Mobile Network Operators – e.g. MTN, Visaphone, Glo

Blended Learning Centers – e.g. Pan African University

Key Activities

Software Application Management

Advertisement

Web Maintenance

Learner Support

Partner Relationship Development

Relationship Management

Provision of Learning Services

Provision of Certification Services

Key Resources

Project Managers

LMS Managers

IT Manager

Business Developer

Researcher and Developer

Content Manager

Relationship Managers

Marketing and Communications Manager

Value Propositions

Access to learning and skills development, anytime, anywhere

Convenient and affordable access to industry certification

Corporate social responsibility fulfillment for partners

Revenue share for partners

Cost Structure
Research and Development, Application Development, Business Development, Hosting and Connectivity Costs, Partner Revenue Share, Employee Wages, Overhead

Customer Relationships

Self Service

Personalized Notifications

Walk-in Centres

Telephone Calls

Customer Segments

Males and females between the ages of 15 and 40 who have a smart phone and:

seek to acquire skills

are certified providers of skilled labor

are interested in self development

Channels

Smart Phones

Blended Learning Centers

Call Center

Recharge Card Vendors

Payment Services Providers

Revenue Streams
Yearly Subscriptions, Sponsorships and Subsidies, Certification and Exam Fees, Advanced Courses Subscriptions, Advertisement

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