

Mobile phones in Africa: opportunities and challenges for academic librarians

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Mobile phones in Africa: opportunities and challenges for academic librarians**Abstract:**

Lack of Internet access and availability of computers in Africa has hindered learning and teaching there. However, the growing prevalence of mobile phones in Africa and elsewhere has created a way for information to be quickly and easily disseminated in areas where access to the Internet and computers are limited. Mobile phones in Africa are currently being used to share information relating to agriculture, as well as other critical topics such as health and finance. This paper will examine these current uses, investigate the current and future use of mobile phones by academic libraries and in education in Africa, and discuss how mobile phones might be leveraged to further education and information dissemination through academic libraries.

Background:

According to a 2010 study by Gillwald et al., 'Internet usage is not common in Africa. Only about 26% ...know what the Internet is and less than 10% use it.' This is due mostly to the high cost of computer ownership, lack of computer skills, slow connections, and the high cost of Internet access. Additionally, lack of electricity is a factor in some areas (Gillwald, Milek, & Stork, 2010, p.18). Conversely, mobile phone ownership in Africa is booming, with about 650 million users across Africa, or more than half the population (Sambira, 2013). The lack of Internet access there has facilitated the swift uptake in adoption of mobile phones, and has actually driven innovative uses for them such as mobile banking, which preceded current mobile banking use in the United

States (Fox, 2011). 'By the year 2015, the mobile network will break the electricity barrier in more than four major regions. Sub-Saharan Africa will have more people with mobile network access than with access to electricity at home.' (Cisco, 2011, p.3) Africa is now second only to Asia in the use of mobile phones; and a December 2012 report by the World Bank states that there are now 650 million African mobile phone subscribers, more than the United States and the European Union combined. (World Bank, 2012).

Smartphones are making inroads into Africa as well. Chinese manufacturers are providing smartphones in Nigeria for as little as \$100.00 US, and growth of smartphone use there exceeded 1200% between 2010 and 2011 (Connors & Maylie, 2011). Of the 500 million cell phones in Africa, it is estimated that about 3% are smartphones (Publishers for Development, 2011). However, smartphone usage in Africa is predicted to increase to 265 million users by 2015 (Jidenma, 2011). With the widespread use of mobile phones already in place in Africa, and lack of infrastructure to support local access to the Internet, it appears that it will be a short leap from current mobile phone usage to an increased presence of smartphones there.¹

Current applications of mobile phones in Africa:

Mobile phones are currently being used successfully in Africa and in other developing countries to share information in the areas of health, agriculture, and as a tool for commerce. One use of mobile phones in Africa to share important health-related information via text messages is aimed at new and expectant mothers in developing countries. **MAMA**, the Mobile Alliance for Maternal Action, is focusing its efforts in

¹ Portions of this introduction were published by the author in <http://conference.ifla.org/past/2012/191-kesselman-en.pdf>

South Africa, Bangladesh, and India, and was founded in 2011 by a partnership between USAID and Johnson and Johnson. ‘MAMA messages in South Africa will encourage earlier antenatal care, help HIV-positive mothers understand how to prevent transmission to their babies and encourage exclusive breastfeeding for all mothers. In South Africa MAMA aims to reach 500,000 women and household decision makers through their mobile phones.’ (<http://healthunbound.org/mama/>).

While sharing of health information is a relatively new use of mobile phone technology in Africa, mobile banking there preceded widespread adoption in the United States. According to World Bank economist Gabriel Demombynes, ‘...73pc [percent] of Kenyan adults use mobile money, and nearly a quarter use it every day.’ (2012) One of the most widely noted ventures in this area is the Kenya based **M-PESA** service. M-PESA was started by Safaricom, the largest mobile provider in that country, in March 2007. M-PESA is a ‘...SMS based money transfer system that allows individuals to deposit, send, and withdraw funds using their cell phone. M-PESA has grown rapidly...and is widely viewed as a success story to be emulated across the developing world.’ (Jack & Suri, 2009, p. 2).

However, there are some detractors of M-PESA. A recent article in Slate.com claims that use of M-PESA by Kenya’s poorest is a financial hardship, and not a help (Zimmerman & Meinrath, 2012). The article calls for more regulation of Safaricom and companies like it, so that its service is accessible to all. The article references a follow-up to the original study by MIT professors William Jack and Tanveet Suri. This second study, while acknowledging that M-PESA is used less by the very poor in Kenya, is not quite so negative in outlook. In it, Jack and Suri claim that their latest statistics regarding

the use of M-PESA in Kenya demonstrate that it has in fact been adopted by more of the poor there, possibly due to an increased availability of more affordable cell phones.

‘The descriptive statistics across rounds suggest that the product has been adopted by an ever-broadening cross-section of the population. While it has always been used by a non-negligible share of those with lower economic means, it has quickly expanded its reach into these groups, and is now used by households with a wide range of economic, demographic, and educational characteristics.’ (2010, p.17).

An additional African success story of mobile phone integration in both commerce and agriculture is **KACE**, or Kenya Agricultural Commodity Exchange. KACE was founded in 1997, and is Kenya’s oldest private commodities exchange firm, which provides small-scale farmers in Kenya with access to national commodities markets. ‘The main activities of KACE include linking farmers and mainstream buyers by collecting information on the prices in different markets of various commodities on a daily basis from market vendors, then availing them to the farmers in real time.’ (Karugu, 2011, p. 2). The farmers access this information via mobile phones, and where available, through the Internet in cybercafés. Mobile phone access is in the form of text messages, where ‘An interested person sends an SMS with the name of the commodity in question to 411 and instantly receives a reply citing that day’s wholesale prices in the main markets collected and compiled by the KACE staff for that commodity.’ (Karugu, p. 9). Additional access to this information is available in the form of pre-recorded voice messages, but text messaging is the preferred format by those who access it by mobile phone.

The Grameen Foundation is an organization which uses mobile phones in all of the areas of commerce, agriculture, and health, particularly for the betterment of women in Africa and other developing countries. Founded in 1997, they began by providing

micro-loans to small business entrepreneurs in developing countries, adopting the microfinance model of Grameen Bank. In 2009, Grameen developed **AppLabs**, in partnership with Google and mobile phone company MTN in Uganda. Their Community Knowledge Worker program helps get important agricultural information to small farmers in rural areas through ‘... CKWs who act as “trusted intermediaries” in their communities, using basic smartphones loaded with an application that helps them provide information services to their fellow farmers.’ (Grameen Foundation, 2012). In the area of commerce, AppLabs has launched four mobile banking services in Uganda, similar to M-PESA. They plan to develop the service so that even the very poor can benefit. ‘By observing consumer behaviors, conducting field research, leveraging industry experts and crowdsourcing ideas from the public, the AppLab Money team will identify products that have the highest potential for sustainability, scalability and impact for the poor.’ (Grameen Foundation, 2012). And in the area of health, Grameen has established MOTECH, a service similar to MAMA which tracks expectant mothers through their pregnancies via text messages. Health care providers are also able to register with MOTECH, so that they are aware of pregnant mothers in their area and what care they should be receiving for different stages of their pregnancies.

Grameen and others have focused their efforts on making technology and information available to women in rural Africa. However, adoption of mobile phone technology for the purposes of gaining information relevant to agricultural or business pursuits has been slow to take place. A study by Jiyane in 2010 of women hawkers and vendors in South Africa demonstrates that these women use mobile phones for communication purposes, but not informational uses (p. 58). The mobile phone has

benefitted them by enabling them to spend less time away from customers, allowing them to communicate with others while still selling their products. The women have not taken advantage of the more sophisticated applications described above (mobile banking, commodities pricing, and agricultural advice), and Jiyane concludes that this is mostly due to the costs associated with mobile services (p. 59).

Another factor cited in her report is that many of the services are provided in English, and language is a barrier for some. Additionally, many of the women do not have the necessary skills to use the phones optimally (Jiyane & Mostert, 2010, p. 60). Recently, in their 2012 Development Report the World Bank for the first time admitted that gender inequality was a significant factor in economic growth for developing countries, and proposed actions to begin to redress the problem (Herrfahrdt-Pahle & Rodenberg, 2012). Recommendations made by Jiyane are in line with this latest World Bank Report, and include skills training for women utilizing multimedia methods such as radio programs and instructional DVDs in local languages, Adult Basic Education for women at convenient times and locations to improve literacy, and government provided Internet access (p. 60). In order for mobile phones to be truly beneficial to women, and everyone in rural Africa, training needs to be provided in ways that are accessible, and should ideally be integrated into the educational system as early as possible.

Mobile technology in education in Africa:

In addition to the innovative uses of mobile phones in agriculture, commerce and health care, efforts that are being made to introduce school children in Africa to the latest mobile technologies. 'In Africa, it's a situation where even at the best of schools and

universities, computers are still fairly rare,' said Tim Kelly, the lead information and communication technologies specialist for InfoDev, a unit of the Washington-based World Bank. 'Mobile phones are much more common and are increasingly starting to resemble computers.' (Davis, 2012). Some of the mobile phone developments include a book published by students using MXit, a mobile phone instant messaging platform, a solar powered interactive whiteboard used in conjunction with cell phones, and tutoring via text messaging (Davis).

An example of the use of mobile phones in education is the acclaimed Dr. Math tutoring service, which won a Technology in Government Award in 2011. 'The TIGA Awards are an initiative of the United Nations Economic Commission for Africa (UNECA) and the Government of Finland. They recognise African governments and institutions which are using ICTs effectively in public service delivery in fulfilling UNECA's African Information Society Initiative (AIS).'(eLearning Africa, 2012). The program also utilizes the MXit (short for Message eXchange it) platform, a free mobile application, which costs less than one cent per message (Davis, 2012). The students use the service to get on-demand tutoring from University level engineering students, and other qualified teachers. The service was developed in South Africa at the Meraka Institute in Pretoria.

Another innovative mobile math program using the MXit platform was developed by Nokia in 2009 in South Africa, called Momaths. This application provides math theory, practice problems, and tests. Teachers can access content to support their lessons, and keep track of individual learning. The pilot project was implemented in grade 10 mathematics classes in six schools in South Africa, reaching 260 students. A second pilot

was conducted in 2010, with initial results from that project showing a 14% increase in improvement in math skills (Nokia, 2010).

Nokia has also developed the successful EPROM (Entrepreneurial Programming and Research on Mobiles) program in Africa, in conjunction with MIT. EPROM was developed by MIT researcher Dr. Nathan Eagle, who began the program at the University of Nairobi in Kenya, and then expanded to two more universities in Uganda and Rwanda. The university students, many of whom had minimal basic technology skills when entering the program, are taught programming in Python and Java, and develop mobile applications, some of which are turned into viable commercial enterprises.

EPROM's aim has been to disseminate a globally applicable mobile phone programming curriculum while fostering mobile phone-related research and entrepreneurship. To date, the EPROM curriculum is currently being taught within Computer Science departments in ten Sub-Saharan African countries. Thousands of African computer science students have completed these courses and many have formed a variety of mobile phone start-ups based in Nairobi, Kigali, Addis-Ababa, and beyond.

<http://alumni.media.mit.edu/~nathan/>)

Mobile phones in academic libraries in the United States:

In the United States, mobile service to academic libraries was estimated at 44% in a survey conducted by *Library Journal* in 2010. An additional 21% of academic libraries planned to offer 'some type' of mobile services in the near future (Thomas, 2010, p. 30). Mobile services to libraries which are now considered mainstream include access to the online catalog, readers' advisory apps, downloadable audio books, access to databases, text notifications and text reference (Kroski, 2008). The collaborative, librarian-maintained website, Library Success: a Best Practices Wiki, lists over 200 libraries in the US alone which have been offering text reference services since 2010.

Since that [2010] survey, we've seen more libraries in the mobile mix, and forward-thinking librarians continue to push the boundaries of mobile innovation. They've developed custom mobile websites and applications, augmented reality tours and place-based collections, point-of-need information and self-service features via QR codes, e-books and device circulation, and an expanded social media presence. They've also increased interactivity through Facebook, Twitter, YouTube, Foursquare, Tumblr, and other mobile-ready social platforms.' (Thomas, 2012).

Mobile services provided by libraries do not stop at access to information, however. 'As librarians work with students as part of information literacy classes, at service desks, and in cyberspace, it is important to realize that for students, the mobile device will increasingly become an instrument for creation of digital content, and not just a device for access to content.' (Lippincott, 2010, p. 210).

As Lippincott suggests, mobile devices and apps which allow interaction between students and instructors can and are being applied to information literacy in academia. One innovative application of mobile technology for information literacy instruction incorporated the web based software from Poll Everywhere (<http://www.polleverywhere.com/>). A pilot study using their app to survey students in information literacy classes at Champlain College was met with success. Librarians asked questions about searching and information sharing habits, where the '...activity set the stage for the rest of the class- a discussion about student awareness of personalized searching on the internet and the importance of a balanced information diet in the context of the habits that students already identified.' (Burkhardt & Cohen, 2012, p. 196)

A similar example comes from Purdue University, where the web-based application Hotseat was created and is used by faculty to interact electronically with students, especially in large lecture halls where students might be reluctant to pose a question in front of a large group (McRea, 2009). Students can login to Hotseat via their

social networking accounts, such as Facebook or Twitter, and comment on the lecture as it takes place in the classroom. According to the developers, the app was created to be accessed through Facebook and Twitter because most students are already familiar with these networking sites (McRea, 2009). And because not all students bring a laptop to class, Hotseat will also work on mobile devices, with students using cell phones commenting on the lecture via text. Some filtering of messages among students takes place, resulting in 'near real-time' delivery (Purdue Research Foundation, 2011).

Another library program at Champlain College utilizes Skype to provide information literacy instruction and reference services via mobile devices to students studying abroad. Students from Champlain studied courses in Irish culture, literature, and history at their campus in Dublin, Ireland, but 'struggled to use online resources' (Cohen & Burkhardt, 2010, p.265). Skype's incorporation of screen sharing capability into their software allowed librarians to use this feature to guide students through the search process, rather than attempting to describe it in text. Librarians could point out library resources and subject guides, and working with course faculty, prepare students to complete a research project. Video conferencing also helped clarify questions during the reference interview by allowing librarians and students to pick up on non-verbal cues (Cohen & Burkhardt, 2010, p. 267).

A recent follow-up to the *Library Journal* survey anticipates mobile device integration into libraries will continue to grow, although another survey has not yet been conducted. Thomas predicts,

Mobile websites will be refined, content will be added, more mobile-friendly platforms will become available, and usability of mobile resources will be examined in greater detail. Integration with emerging features and services, such as mobile payment systems (Square, Google Wallet), checkins and gamification (Foursquare, GetGlue, QR codes,

SnapTags), social sharing and content curation (Path, Tumblr, Instagram, PicPlz), place-based collections, and augmented reality tours (Scan Jose) built from library digital collections, will present exciting opportunities. (Thomas, 2012).

However enticing these sophisticated developments may seem, academic librarians are also asked not to overlook traditional cell phones as a means to providing services and outreach.

Librarians who notice more traditional cell phones on campus should consider text reference for their mobile outreach programs. With Google Voice, AIM Hack services (five- or six-digit numbers popular for mobile phone donations), and library-based options such as MyInfoQuest and Mosio's Text a Librarian, you can set up a text reference service that can help you handle ready reference questions (or even more complicated questions) quickly and easily. (Kosturski & Skornia, 2011, p. 12)

These types of applications and services could be transferred to future academic library services in Africa, as will be discussed further.

Technology and academic libraries in Africa:

In stark contrast to the rapid integration of mobile apps in academic libraries in the US, technology usage in education has been slow to take hold in Africa. In most cases, technology in the form of computers and Internet access, and even electricity, is scarce or absent. In a commentary in *PNLA Quarterly, Library and Information Science* faculty member Niran Adetoro of Tai Solarin University states that:

Budget allocations to African libraries and information systems have remained inadequate for decades... the basic information resources of libraries, databanks, and the like that are available to the poorest countries are hopelessly inadequate, frequently taking the exclusive form of published sources arriving sporadically by sea-mail to understaffed libraries. Infrastructure is another problem. Effective information management requires information and communication technology. Many countries in Africa lack the required information infrastructure to aid development, including Internet and telephone (Adetoro, 2010, p. 40).

A study of technology use in college libraries in Africa ‘...shows that 85 per cent of the libraries provide less than one computer for every 100 students and 36 per cent provide less than one computer for every 500 students...whilst 15 per cent of the libraries are not connected at all.’ (Kamba, 2011, pp. 67-68). Where technology does exist, most do not use it to its full potential. A review of Ghanaian university library Internet usage revealed that most students, both undergraduate and graduate, as well as faculty, used the Internet primarily for sending and receiving personal e-mails, and not for research or collaborative information sharing (Armah, 2009, p. 86).

A survey of twenty nine Nigerian academic libraries to assess the status of computer availability and technology literacy in these libraries was conducted by Ani et. al. Of the responding libraries with computers, few were found to have online services such as public access catalogs, or the ability to catalog resources electronically. Only four of the responding libraries provide internet access to their patrons. ‘The major obstacles that influence effective adoption of ICT in university libraries are inadequate funds and the poor state of electricity in Nigeria.’ (Ani, et. al., 2005. p. 701) Where electricity, computers, and internet access exist, connectivity is often another hindrance to academic libraries. Echezona and Ugwuanyi (2010) find that most African academic libraries utilize satellite or leased line connections, which in addition to being slow are very expensive. Much hope is placed in the recently laid fiber optic cable for increasing bandwidth in the future (Public Radio International, 2011).

Recommendations for academic library practice and services in Africa:

Technology availability, use and acceptance in some places in Africa, particularly rural areas, are extremely limited, and markedly different from the current rapid developments taking place in the United States. While libraries here are working to offer more mobile access to a multitude of digital collections, libraries in Africa are lacking in the most basic resources, not only computers, but even electricity in some cases.

However, the availability of the mobile phone in Africa has allowed many there to take advantage of innovative applications to obtain beneficial information, primarily utilizing text messaging. This is paving the way for the anticipated widespread adoption of the smartphone, which will allow public access to the Internet for the first time.

However, before this can occur, much needs to be done so that schools, libraries, and faculty are able to effectively reach all students. Following are recommendations which will allow future improvements to the current library practice and services to take place:

- Basic adult education, especially in rural areas and for women, so that these adults are able to acquire any missing skills preventing them from utilizing mobile phones or computers, such as literacy and English as a second language. These need to take place at times and locations which are convenient, and utilize whatever methods are available (Jiyane & Mostert, 2010, p. 60).
- Basic technology literacy should be taught as early as possible, by utilizing whatever devices are currently available, so that children are comfortable with devices as part of their everyday activities (Unwin, 2005, p. 115).

- Basic skills emphasis in schools especially by utilizing mobile phone applications, such as Dr. Math or Momaths.
- Training of teachers, university faculty and librarians needs to take place so that all are comfortable with technology. Training can take place utilizing appropriate levels of technology if computers and Internet access are not available. This could take the form of courses taught via radio, television, DVD, or mobile phone messaging (Unwin, 2005, pp.124-125).

After remedial literacy skills and basic technology instruction, specific measures which could be adopted by libraries include the following:

- Adoption by libraries of offline databases stored on CD-ROMs, hard drives, or other appropriate mass storage devices where the Internet is not yet available.
- Because electricity is scarce in some areas, creation of solar powered charging stations for mobile devices should be a priority (Traxler & Leach, 2006, p.102). These could be installed in libraries and local extension centers.
- Until smartphone adoption becomes ubiquitous, texting will be the most accessible use of mobile phone communication in Africa. University librarians should therefore be trained to utilize text reference. Outreach programs to students to make them aware of this service should be developed.

- Once librarians have been trained in the use of cell phones, they can be used to promote information literacy among students through the use of group text messages, using platforms such as the Mxit program. Information literacy courses can be implemented using text messaging, similar to the method used by the MoMaths program. Group polls via text can be conducted to help assess outcomes.
- Development of outreach programs by librarians, based on the Grameen Community Knowledge Worker program, where librarians act as travelling teachers sharing information and technology literacy utilizing mobile phones.

By educating those who are lacking basic literacy through whatever means are appropriate, and then in the use of mobile phone technology, these learners will be prepared for the use of smartphones when they become available. Teachers, university faculty, and librarians in schools, public libraries, and academia, need to learn how to use digital resources in whatever form are currently available. Library Science programs in African universities need to incorporate technology instruction into their basic curricula, where this is not already being done (Aina, 2005, p.174).

After any basic literacy and technology instruction needs have been addressed, the use of mobile phones in the classroom should be demonstrated by teachers beginning in primary education and continuing through higher education. Mobile phone teaching should be utilized whenever possible, such as by incorporating programs such as MoMaths and Dr. Math, paving the way for student familiarity with the mobile phone as a means to information and instruction. At all levels of education, information literacy

will be an essential skills needed by students if they are to become critical thinkers and successful researchers when access to the Internet is widespread.

Librarians in Africa, as they are in other parts of the world, are in a unique position to capitalize on the changes afforded by the Internet and mobile technology. Outreach is sorely needed by this group in order to assist in the uptake of information access which is about to become available to many in Africa when smartphones become more accessible. Information literacy will become an important aspect of their services to those who have never been exposed to the Internet, but before this happens librarians in Africa will need to embrace the existing mobile phone technology as a way to share information. Text reference is the most appropriate way to do this, as texting is the most available teaching and information sharing tool at present. Librarians might adopt the model currently being used in agriculture by the Community Knowledge Workers program, by reaching out to teachers in primary and secondary schools as well as university faculty in a variety of academic areas, demonstrating text reference as a way to obtain information. Information literacy skills could be promoted by librarians, utilizing group text messaging platforms, and in the future through videoconferencing and smartphone apps.

Research Agenda:

There is much that needs to be researched in the area of library practice and services in Africa, especially as it pertains to the use of mobile phones in this field. Following are proposed areas of continuing and new research which would enable development of library services; and in particular those utilizing mobile phones.

- Further investigation of the state of the library science curricula in African universities should be a priority, with a view toward incorporating technology use and familiarity with electronic resources.
- An investigation into the disparity in technology use across the gender gap should be made, with potential methods of lessening this gap identified.
- Examining information seeking behaviors of African university students and faculty would allow effective methods of information literacy instruction to be developed, and applied to dissemination through mobile devices.
- Recommendations for text reference services as they apply to African libraries would be of benefit, as this area of library service has not yet been implemented and would be an easily adopted method of information sharing (Sekyere, 2011, p. 8).
- Further investigation of how existing mobile phone applications might be adopted to teaching, information literacy, and library use in Africa is needed, as well as development of novel uses of appropriate technologies for these purposes.

Conclusion and future directions:

Technology in general has been widely embraced in Africa, and many view it as a means of economic salvation, but it is apparent that there is still a lack of basic resources which inhibits technological growth. Limited access to electricity, computers, and the Internet have prevented technological growth in the past, but innovative uses of mobile

phones have done much to work around this. Additionally, basic skills which have been found to be lacking are adult literacy and training in English as a second language, which prohibit some from utilizing mobile phone technology to the fullest. Much still needs to be done so that technology is accessible by rural populations, the very poor, and by women. Training of teachers, librarians, and faculty in the use of computers, the Internet, and mobile phones would be a first step toward ensuring access to technology.

All of this points to the need for African librarians to adopt mobile phone technologies as an integral part of their instruction, and to employ them particularly in the areas of information literacy, text reference, and outreach. Librarians around the world are at a critical time, when the rapid developments brought about by the Internet and mobile phones must be sought as a way to enhance library services. African librarians are in a unique position to utilize mobile phones to create new avenues of information sharing and instruction, which will then pave the way for future smartphone use in Africa.²

² Portions of this conclusion were published by the author in <http://conference.ifla.org/past/2012/191-kesselman-en.pdf>

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