Hypermobile learning in an immobilized society: Four Tanzanian universities and one globe

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Abstract

The contradictions of depoliticized (economic) globalization in Africa south of the Sahara are reinforced by current communication technologies. Inadequate ICT skills among students and teachers, traditional philosophy of teaching and learning, lack of technical expertise on digital contents production, lack of relevant e-learning curriculum, and selective investments in ICT infrastructure have led to 'hypermobile learning'. We witness the imbrication of neo-colonial object-subject relations with the fractal of domesticated fertility (the lure of foreign novelty) characterizing 'forest fringe cultures' in Africa. The internet and smartphones hailed for facilitating elegant assemblages of work and leisure, of private and public spheres, contribute to blurring the divides that traditionally maintained the integrity of individuals. Dealing with ailing ICT infrastructure in African universities, both lecturers and students are expected to produce coping strategies from their personal mobile devices. Our qualitative research shows both groups to complain about the hypocrisy of the educational system, which bans the wayward smartphone in the formative primary and secondary levels, yet counts on that very tool for students to accomplish their university studies. Available mobile networks are overloaded such that students choose to wait until midnight to access them. The new forms of bricolage between technologies and life/work cycles, ambivalently propagated as m-learning, in fact impede structural interventions, sustained power brokerage and life-time mobility. The implied 'human sacrifice', we argue, is what occupy-sites and recent student protests in (South) Africa decry.

Introduction

Over the past decades we have witnessed the growth of information and communication technology (ICT) supplying the world with hardware and software ever more efficient and powerful at controlling our lives. The Internet, social media applications as well as mobile technologies powered by wireless networks and broadband technologies have reshaped socio-economic structures, affecting how we live, how we communicate, how we learn and conduct business. Smartphones have become ubiquitous in our lives due to their flexibility, portability, affordability, easy-to-use and multi-functionality such that by the end of 2015 there were more than 557 million unique mobile subscribers in Africa alone. The current forecast is that the number will increase to 725 million in 2020 generating revenue of $210 billion (GSMA Intelligence, 2016). Mobile penetration in Africa have topped access to electricity and safe-and-clean-water (Fritschi et al., 2012a). People read more on Smartphone than they do on printed texts, especially young generations (Fritschi et al., 2012a). As Castells (2004) predicted, we are living in a network society, full stop. Mobile internet and social media create new elites, some of whom are the once voice-less now able to voice their marginalization and oppression. The democratization of mobile devices such as smartphone ensures that ideas spread fast and may achieve massive support on the mere click (Miller, 2016). The rise of digital activisms such as the occupy movements and the so-called Arab spring have led governments and co-operations to deploy sniffing technologies to monitor and track the shifting online agendas in order to save and revamp their outmoded selves.

This study concurs with the constructivist approach to technology, opposing the dystopia of substantivists and stating that technologies are shaped by human actors, who design according to cultural norms (Feenberg 2005, Miller 2016). One major part of life touched by it is education. Mobile technologies and the Internet contribute to world literacy, albeit literacy of a certain kind, bedeviled by problems of access to learning resources, equity and quality of education. The limits of formal education in the South, ranging from lacking expertise to overcrowded classrooms, are painfully magnified through the looking-glass of digital connectivity (Chambo, Laizer, Nkansah-Gyekye, & Ndume, 2013; Fritschi, Wolf, & others, 2012a; Mtebe, 2016; O'Hagan, n.d.; Traxler & Leach, 2006). Every ICT potential has social conditions. If "mobility is empowering and liberating" (Adams 2005), by expanding the quality learning resources and the global learning communities, joined for collaborating with peer experts and interested communities, the condition is that learners have the necessary skills, reliable and enabling infrastructure and tools (Fritschi et al., 2012a; Siemens, 2014). While mobile learning satisfies the needs of the currently most advocated theory of learning – connectivism (Holzinger, Nischelwitzer, & Meisenberger, 2005; Moore, 1993; Siemens, 2014), it is an empty box without enabling environments cultivated by quality policies, curriculum, and instruction design as well as adequate devices (Chambo et al., 2013; Jaffer, Ng'ambi, & Czerniewicz, 2007). Next to the digital

literacy of students and teachers, the material connectivity and ability to pay for the Internet subscription as well as availability of local content are contingencies of mobile learning (Abu-Al-Aish, 2014; Fritschi et al., 2012a; Holzinger et al., 2005; Mtebe, 2016). It is in this context that the present study will explore mobile-learning deployment in public universities in Sub-Saharan Africa; highlight the challenges and the readiness of the stakeholders to cope with them. Despite the proliferation of smartphone in Africa like in other parts of the world, little is known about its application in education. Our empirical study provides cases from universities in Tanzania to reveal the ambiguities of mobile learning deployment.

Theoretical and conceptual framework

Mobile learning as described by O'Malley & Fraser (2004) is, "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies". It slightly differs from e-learning in learning content, availability and accessibility, and media capacity (Ally, 2009). Mobile learning arguably offers the true learning "anywhere" and "anytime" envisaged but unattainable by e-learning on laptop and desktop computers (Uden, 2006). It is more personalized, situated, interactive and collaborative, thus fitting both formal and informal learning setups (Kukulska-Hulme, 2007; Traxler & Kukulska-Hulme, 2016). Given its easy applicability and wide acceptance (Fritschi et al., 2012a; Wagner, 2005), the smartphone can provide an alternative to the crowded classrooms faced by higher learning institutions today (Lehmann & Söllner, 2014). On the side of the students, a recovery of motivation and sense of responsibility may be expected (Uden, 2006). The fact is that globally students and teachers have already become used to accessing learning resources through their mobile devices (Abu-Al-Aish, 2014; Fritschi et al., 2012a) and that they are ready to embrace the technology regardless of the aforementioned challenges (Corbeil & Corbeil, 2011; Fritschi, Wolf, & others, 2012b; Mtebe, 2016; Onguko, 2010). The interest of our qualitative study is to determine whether African university environments are prepared for and embrace the changes ahead.

Mobile learning in Africa

Like anywhere else, in Africa it is uncommon to find a university student or teacher without a mobile phone (Chambo et al., 2013; Mtebe, 2016; Onguko, 2010). The shift from web to mobile services is manifest in various life-changing applications in all sectors of society (Fritschi et al., 2012b). They include applications such as Ushahidi, which translates to "testimony" in Swahili which was deployed to map reports of violence in Kenya after the elections in 2008. The Tanzania based "mPaper" mobile app used for distribution of Tanzania's digital media (newspapers, magazines and books) from a wide range of publishers won the best educational innovation award in Africa in 2015. Also, the "Eneza"

educational app which offers SMS based virtual tutor and teacher's assistant services is prominent across Africa with headquarters in Nairobi Kenya. The "Ugandan constitution" app offers access to the national constitution in case of confrontation with police. The Uganda-based "Jumia/Kaymu/OLX "app offers online shopping possibilities to all registered retailers in Uganda and the rest of east Africa. In Nigeria, the "Orin" app which translates to "song" in Yoruba enables lovers of Nigerian and other African music to share their favorite genre with members. The "2GO" app, estimated to have more than ten million users in Nigeria alone, connects people from across the globe so they can chat and share experiences. "Nigerian dictionary" lists popular apps in West-Africa that offer translation services to languages and dialects. These apps not only draw on connectivity; they have in common the purpose of raising connectivity.

In mobile learning the MoMath project in South Africa, offering mathematics content and support to Grade 10 students, is typically cited as a success story(Fritschi et al., 2012a; Porter et al., 2016). In response to a request from the south african president, Nokia funded and led the project with public and private education stakeholders. Mobile learning initiatives benefit education if targeting specific needs in domains with limited resources (Abu-Al-Aish, 2014; Fritschi et al., 2012a). They are unique in providing displaced learners across the globe with access to quality education (Chambo et al., 2013; Fritschi et al., 2012a; Mtebe, 2016; Muyinda, Lubega, Lynch, & van der Weide, 2010; Traxler & Leach, 2006). Specifically, the MoMath projects in South Africa, MoMath project at the University of Dodoma in Tanzania, the Moodle mobile research at the University of Dar Es Salaam, and the MoLODUM at the University of Makerere demonstrate that success and sustainability of mobile learning deployment depend on the availability of adequate and efficient policies that facilitate integration of mobiles into the education system and curriculum (Muyinda et al., 2010; Traxler & Leach, 2006).

One major challenge though concerns design (Abu-Al-Aish, 2014). A common problem jeopardizing deployment is letting technologies and their technical evolution decide choices of design rather than having the educational needs determine these (Jaffer et al., 2007). Tellngly, companies have done little effort in technological innovation to improve digital inclusion for those with less-capable devices (Holzinger et al., 2005; Muyinda et al., 2010). The second problem is policy, and its technophobia. The lack of educational strategies on integrating modern technology cause some schools to ban mobile phones on their premises. Their option is indicatively not to equip students and teachers with relevant knowledge and skills for productive and responsible use, but to avoid disruptions and to 'protect' students from the globe's shocking imagery, in a growing concern on students and teachers alarming misconducts when exposed to mobile phones in schools, as in the case of class disruptions due to phone-calls, time-wasting on social media, and access to socially undesirable content such as pornography and gambling (O'Hagan, n.d.). On top of these two poles, of design and the user's policy

environment, we investigate the user's encountered obstructions to mobile learning deployment in the four universities in Tanzania and the readiness of the universities to embrace mobile learning.

Theoretical framework

We approached the study looking through three lenses: the critical theory of technology, the design science, and the learning theory of the digital age – Connectivism. We were influenced by the fact that mobile learning services significantly relies on the ability of the education systems to setting necessary enabling environment that ensures that teachers and learners are able to accomplish learning related activities without being constrained (Chambo et al., 2013; Fritschi et al., 2012b). Such obligation does not fall sorely on the hands of technocrats; it is a democratic process that necessitates multi-sector and multi-level participation of all actors. The technocrats are responsible for translating the social requirements from the stakeholders into actionable and programmable artifacts that can be used to accomplish the social task. Unfortunately, Africans rely so much on the imported technologies from other parts of the world such that it challenges the significance of her independency in the name of agenda, content, and structure.

Specifically, the critical theory of technology critically emphasizes on the democratization of technologies (Andrew Feenberg, 2005). It stresses that technologies are neither neutral nor autonomous because their designs are shaped by the desire to changing or improving social situation. Also, in the cause of its use, if societies discover misfortunes, irregularities or setbacks as a result of applying such technology, they have the power to institute change in the design and techno-codes(Andrew Feenberg, 2005). Critical theory of technology fits well with the study especially by the influence it brings particularly the alignment of the technical design with the social problem to be solved. It is useful because it emphasizes in the collaborative work between technocrats and other stakeholders to ensure the relevant, safe and reliable technologies are available to address specific social-economic order of the intended group. Such collaborations help to avoids boycotts and other related conflicts raising at all social levels. The discussions on how the technocrats convert the social needs into technical-designs and techno-codes fall beyond critical theory.

In order to expand our understanding of the problem and to address the technological aspect as well as learning in the digital connected world, we added the design science (DS) philosophy and the learning theory in the digital age - connectivism. The DS help to explore social problem or phenomena in the form of Information systems (IS) problems (Hevner, 2007). In DS, researcher starts by investigating the relevant social problem, then design the artifact needed to solve the problem in a form of model, constructs, instantiation or method (Gregor & Hevner, 2013). In order to achieve the desirable outputs the study had to be carried out in accordance to the Hevner (2007) three cycles that

are relevancy, design and rigor. The relevancy cycle is used to explore relevant social need to be investigated of which are translated from the research problem and objectives. Also, the design cycle is where researcher combines the available knowledge of the problem and his/her expertise to design the solution for the problem, the solution is evaluated by the stakeholders before they can be documented and applied. In the end the solution has to be communicated and implemented in accordance to the rigor cycle. The purpose of the rigor cycle is to evaluate the solution against what is already known about the topic. Our results are presented and discussed in the following sections.

As previously described, mobile learning supports all of the learning theories, however due to multi-tasking and multi-functioning nature of the mobile devices; connectivism was opted for this study. The founding ideology within connectivism camp is that knowledge is distributed across the networks powered by the Internet such that there exist multi-level and multi-purpose learning resources, learning communities and expertise that can be exploited by the capable learners(Siemens, 2014). Also, learning has becomes a network forming process such that learners are not limited to what they learn and access in their locality, the Internet is open to everyone. The abilities to access, traverse nodes, evaluate the sources as well as the content, establish and maintain connection as well as to synthesize materials from various sources are pivotal(Siemens, 2014). For the learning to occur in the connectivism world, radical changes need to happen in the way we theorize teaching and learning, set learning environment, as well as how we impart necessary skills to the learners (Siemens, 2014). In particular, teachers' roles need to shift to reflect student-centered. Therefore, we formulated our interview questions based on the requirements and demands coming from the connectivism especially those related to readiness.

Methodology

In order to understand social perception of the phenomena surrounding mobile learning deployment in the universities, it is required to apply methods that involve and engage those affected by the deployment. Despite the presence of similar studies around the world, mobile learning deployment is contextual in nature. Therefore it is vital to explore the actual situation as they occur in the specific social settings than predicting or inheriting the outcome. Thus, the combination of design science and qualitative methods including the grounded theory were deployed in this study. It is proven that qualitative approach facilitates knowledge induction from individuals' perspective of the phenomenon or social problem (Creswell, 2009). Particularly, its strength is embedded in its ability to provide complex textual descriptions of how individuals or group experience a given research issue (Creswell, 2009). Similarly, grounded theory enables a researcher to formulate theory based on the results of the collected and analyzed data (Trochim & Donnelly, 2008). On the other hand, design science allows a

researcher to approach the research problem in a form of information systems (IS) problem(Hevner, 2007). By applying design science approach, the problem is solved through three design cycles that are relevancy, design and rigor cycles as described in the previous section (Dresch, Lacerda, & Antunes Jr, 2015; Gregor & Hevner, 2013; Hevner, 2007).

In this study, we applied qualitative methods such as in-depth interviews, observations, and document reviews during the relevancy cycle to collect respondents' perception of the mobile learning deployment potentials and challenges. The same were used to evaluate the findings before they can be communicated. Specifically, semi-structured qualitative interviews using open- ended questions were carried out to twenty five (25) lecturers, forty eight (48) students and seven (7) ICT experts from four universities in Tanzania: Mzumbe University (MU), Open University of Tanzania (OUT) and the University of Dar Es Salaam (UDSM). These universities were chosen based on their diverse characteristics including their population, experience and nature of their programs as well as history. On top of that, we explored policy documents from all the universities to understand to what extent they support mobile and other learning technologies. On the other hand, the respondents were selected based on the theoretical sampling approach that prescribes that samples should be decided based on how the study is developing such that the next data to be collected and who to be involved depends on the coded and analyzed data from original sample (Coyne, 1997). One of the strength of the theoretical sampling is on the adaptability it provides to the data collection and being not bound by the variable rather than original predictions (Coyne, 1997).It is argued that the success of the grounded theory relies so much of the use of theoretical sampling as it provides flexibility needed for the study (Bricki & Green, 2007)

Data analysis

One principal requirement of the Grounded theory is to interrelate the data collection and analysis processes(Corbin & Strauss, 1990). Analysis is carried out, as soon as data are collected so as to identify patterns and disparities. As previously described, through theoretical sampling, decisions on the next data to be collected and the person to be involved is dictated by the emerging theory (Creswell, 2007). That flexibility enables researchers to extensively explore the problem from different angles so as to capture an in-depth understanding of the phenomena through constant comparing the emerging theory with the raw data until when the saturation point is reached (Alhussain & Drew, 2012; Coyne, 1997; Creswell, 2009). The common approach used to analyze qualitative data involves breaking the raw data into concepts and then categories that can be further related to each other. The concepts are the abstract labels that defines the incident, action or events of the studied phenomena presented within data(Corbin & Strauss, 1990). In this work, we applied the three coding procedures that are open, axial and selective coding as described by Corbin and Strauss (1990).

During open coding, by the aid of Nvivo 10, we labeled data based on the emerging concepts as presented by the respondents about how they perceive the phenomena. The concepts and labels were revised and compared with the rest of data so as to remain with the most relevant and acceptable concepts that defines the actual situation. In the end, a total one hundred and forty eight (148) concepts were coded during this stage. Next, we compared and organized the concepts into categories and sub-categories as described in the table-1 below. From the identified concepts, we managed to induct two main categories that are deployment readiness and deployment challenges of which the former combines three sub-categories: personnel, organization and policy readiness whereas the later is composed of five sub-categories that are pedagogical, infrastructural, policy, financial, and human-related challenges as described below.

Category	Sub-category	Description	Representative quote
Readiness	Personnel	It includes students' and educators' perception, attitudes, knowledge and device ownership	.....I can say it is so helpful to us because regardless where you are you can open and study. So I can say, it is so helpful to us students regardless your on daladala (commuting) someone sends you a question, you can refer to your notice and answer the question (Simon –OUT student)
	Organizational	It includes status of the university infrastructure, manpower, and culture	There is no Internet at the hostels, when you want to use the Internet you have to go to some few classes, if you are let you find classes are full then you will have to wait or come back at night …… (Yusra MU-student)
	Policies	It includes the national and institutional policies and strategies	Policies are there, what is missing is enforcement. Making whoever is responsible to obey them… (Zabron – MU IT expert) .... for example the government is talking about ICT education in all schools, but the reality is different ... (Kashu –UDOM student)
challenges	Pedagogical	Includes stakeholders capacity, course design, skills ,digital literacy and support	The biggest challenge for us is dealing with lecturers, their ICT skills and knowledge for majority is low so they find our systems not friendly to them. So we are forced to repeat trainings just to build their capacity ...(Kizito OUT IT expert)
	Infrastructural	Includes connectivity, university Wi-Fi, technologies and servers	To be honest, wi-fi services have some few concentration areas where you can access them. For example when I want to access, I usually go at lecture room A110 ……. (Yusra MU student) Wireless internet is only accessible in some few places. For example in this college of education you must go to the

			administration block or to the library (Malakai UDOM student)
	Financial	Ability to own relevant technologies and devices, paying for bandwidth, paying for mobile subscription	-----based on social-economic status of our Tanzanian societies, I can say that majority buy smartphone through student loan because when majority when they enroll they come with feature phones, but as soon they get the money from loans board majority buy phones. Also, when the next loan installment delays some students sell the same phones. (Dhulfa – UDOM-S)
	Human-related	Students' and lecturers' attitudes and motivation	… Why should I use my own devices and bundle for the university work? … (Hirah – OUT Lecturer)
	policy-related	Includes education-policy alignment, availability of ICT policies and strategies, policy enforcement and influence, staffing and human resource management	…for the case of staffing, we are very few, for example each college has just one IT expert doing all the jobs….. We have tried to convince them (management) but we failed … (Joackim – UDOM staff)

The main objectives of exploring the mobile learning deployment readiness was to understand how prepared are the universities including the stakeholders towards deployment. Also, we wanted to explore the available infrastructure and policies to understand their potential contribution to the deployment. We observed that generally, stakeholders are to some extent aware of the capability and potentials brought by mobile technologies in our societies and education in particular. Also, we uncovered that, mobile devices especially Smartphone ownership in the universities is high (estimated at 80% to students and 95% lecturers). Moreover, mobiles play significant roles of covering for the unfit infrastructure and university libraries such that the mobile Internet has become the savior for students and lecturers in accessing learning resources. On top of that, respondents are optimistic towards mobile learning that it improves accessibility, flexibility and personalization of learning thus it is a positive intervention to the education systems.

However, there is also a sense of skepticism to the mobile learning deployment resonating from the fear of misuse of the devices that might lead to accessing unethical content, time wasting due to addiction to irrelevant activities as well as ability to learn through devices. On top of that, skepticism resonates from the lack of digital literacy to both students and educators due to the limited exposure to the ICT education throughout pre-university formal education particularly in public schools. It is

believed that majority joins university while they are ICT illiterate or have attained informal trainings from families or friends. The general prescription from the respondents is that the lack of digital literacy and exposure contributes to the misuse and resistance to the technological deployment.

Similarly, we explored how prepared are the universities in terms of infrastructure, manpower and policies towards mobile learning. Our belief is that mobile learning will flourish if there is in-place an enabling environment equipped with right infrastructure, manpower and policies. The result revealed that majority of the students and lecturers connect their mobiles to the Internet through mobile-internet-service-providers due to the universities infrastructural challenges such as lack of Wi-Fi services or slowness. Also, despite the universities having ICT policies related to learning technologies, the policies do not reflect on the integration of mobiles into education. Also, there is a problem of staffing and motivation given to the educators.

Regarding the challenges to the mobile learning deployment, we uncovered five categories that reflect areas of concerns to the mobile deployment in the universities. They include pedagogical, financial, policy related, human related, and infrastructural challenges that are further discussed in the coming sections. These results were verified through member checking approach whereby the respondents were involved in checking for accuracy and validity.

Discussions of the results

These results precisely describe how the university stakeholders understand and perceive mobile learning deployment potentials and challenges. Together with our discussions in this section, the results provides an insight to the policy makers, educators and researchers intending to implement or theorize mobile learning in sub-Saharan Africa and beyond. Our resolve is that before we can reap the mobile learning fruits, the education systems need to focus on eradicating the discussed challenges here under:-

Pedagogical challenges

In order for mobile learning to justify its relevancy, it should either provide solution to the known education problems or offer new possibilities that would enhance learning experience. Such commitment requires availability of qualified and motivated experts, and also, the mobile learning initiatives and activities need to be configured within the education systems (Jaffer et al., 2007). The results reveal the mismatch between the initiatives and the actual situation in the universities such that despite having policies on electronic learning, universities lack expertise in key areas such as mobile application design, development and management as well as instructional design. Of the four

universities, we encountered just three instruction designers and two mobile application developers. Likewise, the universities lack experts in the area of multimedia and content development.

Similarly, universities lack commitment to integrate mobile into their curriculum as well as class activities despite having policies on learning with technologies. On top of that, there is "antimobile" culture within universities such that some lecturers proudly ban or complain about students who take videos or appear to concentrate on their mobile during the sessions. Also, students complain that there is not room for the online student-teacher consultation and that some lecturers do not accept ideas obtained from other sources that contradicts the true mobile learning culture that embraces learning to take place "anywhere" and "anytime" and that emphasize on teacher-student and student-student collaborations that leads to reduced transactional distance (Moore, 1993; Siemens, 2014).

Infrastructural challenges

The mobility is core to mobile learning, learner can participate in the learning process without being constrained by the time and space(O'Malley & Fraser, 2004). Such can be achieved if the learner owns devices that connect to the Internet as well as having enabling infrastructure. In African context, there are two possibilities for students to connect to the internet: through university infrastructure, through mobile-internet service provider. The former goes with the utopian belief that universities are obliged to provide appropriate learning environment to students and teachers while in the university premises whereas the later falls under the mobile business model. The situation in the four universities can be referred as "antimobile" such that the university infrastructure prohibits learning with mobile. For example, in one of the universities the wireless hotspots are disconnected whereas in the other three universities, while the hotspots are online, the quality of service is close to "no-mobile". In order to survive, one need to posses navigating skills in order to detect right position and time to be able to successfully connect. On top of that, limited fluidity and scope of what you can access online forces users to migrate to own-internet connection.

Due to the infrastructure challenges, no wonder majority of students and teachers connect to the Internet through their mobile-internet service provider. Tanzania is blessed with seven major mobile-internet service providers in the name of Airtel, Hallotel, Smart, Tigo, TTCL, S, Vodacom, and Zantel with over forty million subscribers (TCRA, 2016). They are supposed to connect all needy citizens the rich and the poor in all regions without bigotry. However, experience suggests that the connectivity model favors those in town centers where traffic is guaranteed (Ministry of works, Transport and Communication, 2016). The rural communities are less connected, thus contributing to the both digital divide and "hypermobile learning". Likewise, connection silos exist even in the town-centers such that some locations are not covered by certain mobile-Internet providers. As witnessed by

students and lecturers, in some location users are supposed to locate network signals at the top of mountains or by climbing the trees. To some locations, the networks are either overloaded or have poor signals. These connectivity problems constitutes to the slow adoption of technologies especially mobile learning.

Financial challenges

Ability to pay for the infrastructure, connectivity and bandwidth is crucial for the mobile learning. As previous discussed, we claim that African public universities face budgetary constraints that affects their ability to pay for the bandwidth. Subsequently, the bandwidth size is not decided based on the university needs, but how much can be paid. For example, none of the studied universities have bandwidth close to 1Gbps, majority are operating on 40Mbps. These revelations limit the capability of the university to offer Wi-Fi services.

On the other hands, learners' ability to own devices is diverse. While it is believed that majority of Africans, students and teachers own mobile phones (Fritschi et al., 2012a; Mtebe, 2016; Porter et al., 2016), our result suggest that very few can afford such technologies, general consensus among respondents is that the main source of student mobile Smartphone ownership is the government loan known as "boom". This can easily be observed when new students enroll into universities, as little as thirty percent (30%) own Smartphone while majority owns feature phones depending on families' financial status. For a semester, student receives a total of 700,000Tshs (280 USD) that covers meals (@8,500ths (3.4 USD) a day), accommodation and stationeries. Upon receipt of the boom, challenged by the limited access to university-wide ICT services such as computers and the Internet, majority of students opt to sacrifice some services such as meals and stationeries in-favor of cheaper mobile devices. Unfortunately, not all students are fortunate to receive the boom. It is estimated that on average, twenty percent (20%) of the university students are incapable of owning Smartphone thus not being able to participate on mobile learning. Moreover, financial challenges limit ability to pay for mobile-internet subscription especially for the unsupported students. Also, despite the availability of special student bundle (1GB per week @1500 (0.6 USD)), some students cannot afford it. In order to cope with such loss, the new form of sociality has emerged: sharing the friend's hotspot, a friend with enough data shares with the have-not.

Policy related challenges

Majority of African countries own national ICT Policies(Fritschi et al., 2012a; Jaffer et al., 2007). Amongst other things ICT policies strongly put emphasis on the integration of ICT in the education systems and its institutions(Fritschi et al., 2012a). In Tanzania for example, the current ICT policy

embraces the application of mobile technologies in bridging the digital divide(Ministry of works, Transport and Communication, 2016), however there is no specific mention of mobile for teaching and learning activities. On the other hands, majority of the national ICT policies were developed long before mobiles have become ubiquitous such that little emphasis can be found in those documents(Fritschi et al., 2012a; Porter et al., 2016). Such policy vacuum and the lack of guidelines on the mobile application in education has led to universities and schools to institutionalize their own policies of which some are detrimental to the development of the societies. For example in most of African education systems including Tanzania mobile phones are illegal in all public schools.

Similarly, all the studied universities own ICT policies as well as implementation strategies. However, in practice, little can be witnessed in terms of enforcing and priotising those plans. Participants believe that despite the limited budget, the university managements are not doing enough to stimulate and drive changes. The emphasis in all the universities except for the open university of Tanzania, is on traditional face-to-face. Our claims can be justified by looking into the current course designs, activities and assessment mechanisms; they all reflect traditional systems whereby students are supposed to be located in the pre-defined physical geographical location. Also the current rules require students to attend physical classes for certain amount of hours for them to be allowed to attend examinations.

Likewise, like in other African countries, the old national ICT policy in Tanzania emphasized on the deployment of ICTs and ICT knowledge in all levels of education so as to stimulate and improve learning and living standards (Fritschi et al., 2012a; Ministry of works, Transport and Communication, 2016). Despite such commitment, very few public schools are equipped with necessary skills and technologies. As a result, instead of bridging the digital divide gap, it has formalized the classes between the “haves” and “have-not”. The families of the haves go to privately owned schools where they can afford the luxury of learning and practicing ICTs whereas the “have-nots” keep wondering in the public schools where the ICT skills are rarely offered. Subsequently, majority of the students join university while still digital illiterate, hence affecting their performance and their ability to learn through digital media. In addition, results suggest that, in the pre-university levels there are few qualified teachers who can impart ICT skills to students. The lack of relevant ICT knowledge, we join other researchers to hypothesize that it causes misuse and ban of mobile-phones in schools(Porter et al., 2016).

Human related challenges

Based on the elearning experience in four universities, majority of lecturers and students never use the systems. Such reluctance in part can be attributed to how the deployments were carried out but we can confirm that human elements played great role. Although majority of the respondents believe

that reluctant is due to lack of trainings, records indicate that both students and lecturers were trained more than once. Likewise, some respondents believe that lack of policy enforcement from the management is the cause whereas some respondents argue against enforcement. We argue that resistance to change is common during and after systems deployment and we associate that to human behavior and that users will always look for scapegoat to justify their resistance for change. For example, in one encounter, one lecturer questioned the value of using personnel's own devices as well as the Internet in order to accomplish the university based task. Although, such claim was not echoed by other lecturers, such reservation could be detrimental to the mobile learning initiative.

Recommendation and conclusion

The previous section detailed the challenges hindering mobile-learning deployment in the Tanzania's public universities. We have established the similarities with other studies in the Sub-Saharan Africa (Fritschi et al., 2012a; Mtebe, 2016; Muyinda et al., 2010; Porter et al., 2016). The challenges are critical and they impact institutions' ability to mobile learning. We can associate these challenges to the "antimobile societies". When such situations combine, they contribute to the "hypermobility" and thus "hypermobile learning". Although, participants unanimously subscribed to the mobile learning deployment despite the identified challenges, we subscribe to the idea that sustainable deployment of the mobile learning services require careful planning and multi-player involvement(Brown, 2003; Fritschi et al., 2012a; Jaffer et al., 2007; Mtebe, 2016; Porter et al., 2016). In order to achieve the optimal deployment objectives, we recommend the following:

From the respondents' perspective, there is urgent need for multi-sector and multi-level policy intervention so as to facilitate the accessibility, affordability as well as responsible use of devices. Also, holistic policies are required to ensure coordinated and integrated approach such that all sectors and stakeholders complement each other towards mobile success. Also, for the academics national and institutional policies should facilitate integration of mobile in the education systems. Such policy should address issues related to curriculum, assessment, teacher development as well as ICT education in schools. On top of that, there should be complimenting policies in other sectors that fosters for electrification, infrastructure development as well as social well-being. Similarly, the responsible organs should prioritize and enforce policies and strategies that promote creativity, innovation and social transformation through the use of mobile because they affects more people across all social groups. Also, in order to facilitate mobile ownership and access to mobile broadband, governments need to subsidize the mobile technologies and infrastructure in order to support the marginalized communities as well as reaching remote locations. Likewise, respondents calls for universities to provide technologies to the needy students through tuition fees schemes. Also, adopting initiatives

such as one-laptop-per-kid in Rwanda will facilitate equity and digital inclusion as well as creating a sense of belonging to a nation.

Also, mobile learning success depends on the learners' ability to learn through mobile devices, ability to devote time on the learning aspect of the mobiles than socializing for entertainment, ability to connect and establish networks with relevant learning networks and communities than being caught into illegal and immoral activities such as pornography and gambling(O'Hagan, n.d.). Such skills can be built through a dedicated learning spectrum that aims at building safe digital culture for all. Respondents believe that, the banning of mobile phones in schools due to misuse can be attributed to digital illiteracy; communities must be trained on the positive and the negative sides of the mobiles. Similarly, teachers are unaware of how they can benefit from having students with mobile phones in class which contributes to their fear of losing of control, identity and their relevancy. Overall, we confer with the respondents that practical ICT knowledge should be offered in all schools and universities so as to equip students with necessary skills and awareness so as to build a responsible, creative and innovative digital citizens who understand the what, why, and how aspect of applying digital technologies in their lives.

Moreover, mobile connectivity should happen anywhere and anytime, Universities should prioritize budget for broadband and wireless services. Also, the government together with the mobile-internet service providers should ensure that all citizens get connected regardless of their locations. Talking of Tanzania, the respondents questioned the implementation status of the national fiber backbone that at present all regional head-quarters are connected. On top of that, electrification and security should be strengthened so that to avoid service disruptions and theft.

Additionally, the mlearning success requires attitudinal change from all stakeholders specifically student, teachers and education systems. Leaning shifts from teacher being the source of knowledge to student centered whereby learning becomes personalized to students' need and preferences (Siemens, 2014). The studied universities are in the state of creolization, the hybrid between the tradition and digital learning methods. For example, students and teachers use mobiles as a coping strategy to respond to the lack of enabling infrastructure. Mobile phones have become the source of connecting to the Internet so that they can access learning resources. Without them, and the limited book titles in the libraries, learning would be impossible. In order to achieve the needed transformation, apart from capacity building, teachers need to be motivated. It was observed that, most of the interventions focus on equipping needy students with technologies while ignoring teachers' concerns. Our discussions with teachers realized that teachers need equipments and motivational support. For example, one teacher questioned the logic of using own mobile phone or

laptop for the university works while the never recognize such efforts for example paying for the maintenance.

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