Mobile Learning as a chance to enhance education in developing countries – on the example of Ghana

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ABSTRACT

Education has become one of the biggest public enterprises in Ghana, taking about 11 percent of the GDP, enrolling about a quarter of the population in schools and other educational services (EDU 2011). The need for content, the demands of young people, requesting material for self-conducted learning, the lack of teachers, the small proportion of trained teachers and the lack of equipment in schools in rural areas are a huge challenge. The advancement of technology and high mobile penetration rates in developing countries has broadened the horizon of education. One possibility to overcome the problems is the application of the concept of mobile learning (called m-Learning). At first, it is required to describe the current situation in Ghana; this includes the identification of stakeholders as well as corresponding and influencing factors, which have to be taken in consideration when planning a holistic m-Learning-model for Ghana. M-Learning implies inherently a chance in the didactical approach. In the next step, together with a group of teachers in Ghana, research will be done, aiming at the implementation of a sustainable m-Learning concept for secondary education. Integrating teachers in the first phase is a necessity, since it supports the development of a pedagogical concept, which is necessary for a change in pedagogical practice to integrate m-Learning in daily practice.

Keywords

m-Learning, developing countries, educational needs, didactical change, mobile phones, educational content, content design, access to learning objects, secondary schools, teacher education, informal learning.

INTRODUCTION

To tackle educational challenges, systemic integration of ICT has been outlined as an opportunity for improving the quality of teaching and learning as well as expanding access to learning opportunities (UNESCO 2011). Bearing in mind that secondary school attendance and completion are strongly influenced by poverty, location and gender (EFA, 2011), mobile based solutions help to compensate the lack of infrastructure. M-Learning has been described as having the potential to "reach people who live in remote locations where there are no schools, teachers, or libraries" (Ally, 2009). Osiakwan from Accra, Ghana, stated in his presentation during the eLearning Africa Conference in May 2012: "The implications for literacy increase through the transition away from only voice and SMS phones towards more sophisticated smart-phones, where educational content can be accessed and learning achieved." He pointed out the mass of online content and the potential for a young person in the remotest part of Africa, enabled by mobile broadband and a smart-phone, to appropriate the same knowledge as elsewhere in the world (Osiakwan, 2012).

Based on careful literature research of m-Learning projects in developing countries and former personal experience (Grimus, 2010) this research work is directed on exploring opportunities of m-Learning with mobile phones especially in the area of Ghana. Due to the fact that previous projects were successful, but not sustainable, our project is aimed to develop a sustainable model for integration of m-Learning in Ghana. The investigation of the proposed stakeholders will be first done with school teachers in Ghana.

RESEARCH QUESTIONS
Primary Question

Which necessary factors have to be considered for a sustainable implementation of a comprehensive area-wide m-Learning concept for countries in Sub Sahara Africa (on the example of Ghana)?

Subquestions
Prerequisites:
Technological Aspects: What are technological requirements to enable access to educational content with mobile phones?
Individual Aspects: What kind of devices are currently in use? What are the requirements for content?
What are the key drivers and barriers in the uptake of m-Learning services for students/teachers/school-authority?

Quality in Secondary Schools and Sustainability
What are the preconditions and requirements for getting access to educational content (e.g. learning objects)?
What lessons could be drawn from experiences to date in Sub Sahara African countries (SSA)?

What has to be implemented in the curriculum of secondary schools?
How can content provided for secondary schools be alternatively offered for informal learning?
How can institutions and educators create conditions for appropriate technology enhanced learning?
How can teachers be prepared to enhance education by integration of m-Learning in Ghana?
What are the consequences for education?

IDENTIFICATION OF THE SIGNIFICANT PROBLEMS IN THE FIELD OF RESEARCH

Former policies of ICT-in-education-initiatives focused on establishing PC labs in schools (and universities) to enable improved teaching and learning in classroom settings. Access to PC's or laptops in Ghana at home is not common: 9.1% in 2010 (ITU 2011), otherwise the ratio of mobile cellular subscriptions to fixed telephone lines in Ghana is 74.3:1. Nowadays declining costs for mobile devices and data plans, the near-ubiquitous access to mobile phones, especially among the region's youth, holds potential for expanding learning opportunities to underserved communities that are at risk of exclusion from affordable, high quality learning experiences.

Due to these facts focus of our research activities is laid on m-Learning with mobile phones in Ghana, and the needs to be taken in consideration when planning a sustainable solution. After a careful literature research (Ho et al., 2009) large-scale integration is far from reality, based mainly on the lack of infrastructure (schools, teachers and learning material) in developing countries. In rural areas of Ghana's North, quality of education is reported as to be rather low (EDU 2011).

In general it can be figured out that there are two main-levels for establishing m-Learning in a wider range. First the infrastructure and availability of devices (and related costs) and secondly the education related factors. Nevertheless if m-Learning is seen as a holistic approach which can change the educational system, stakeholders and their depending parameters must be identified. Figure 1 presents a first overview of the stakeholders as well as their related factors.
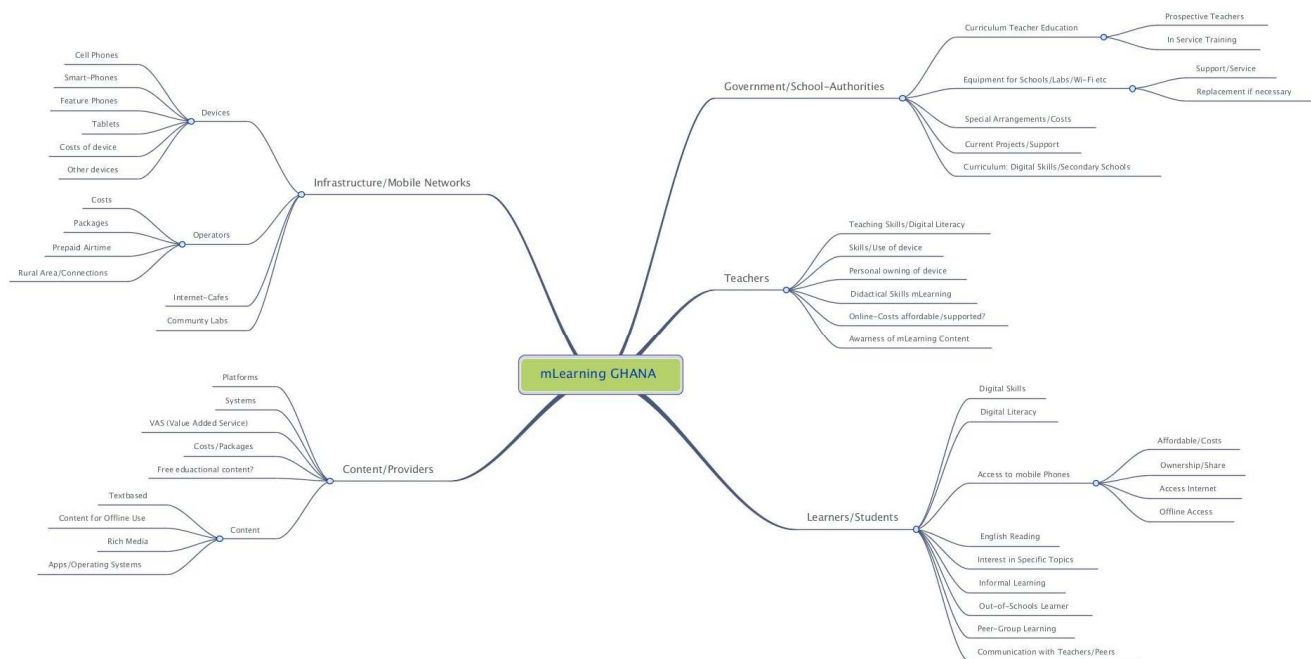

Figure 1: mLearning in developing countries, stakeholders and related factors, Ghana

Stakeholders and corresponding factors are interacting, each with unique interests and needs, in the complex system of m-Learning:

- Government / school authorities: equipment of schools (Pc labs, Wi-Fi; service, replacement, device management capability); finances; curriculum development/ teacher education (prospective teachers / in-service training), quality of education, curriculum for (secondary) schools/digital skills, approbation of projects)
- Infrastructure / technology: mobile devices (specification / attributes of device, costs: cell phones, smart-phones, feature-phones, other device; memory); mobile network operators: connectivity (costs: packages, prepaid airtime), rural areas: bandwidth, Internet-cafes, community buildings with free Wi-Fi
- Teachers: teaching skills / didactics (digital literacy, use of device); didactic of m-Learning (online communication, knowledge and evaluation of online-content, access to device outside of school)
- Learners / students: digital skills (digital literacy, digital reading); access to device (ownership / share; cost of data plans, access to Internet / offline use of content); language (English); interest in specific topics (out-of school-kids; peer-group-learning; communication with teacher(s) / cooperation with peers); formal learning (schools), informal learning (self motivated); policies for appropriate use

- Content provider: access to appropriate content, instructional design, operating systems (standardisation); platforms / systems, local relevance of the content, providing content for offline learning (text-based, rich media, messaging, apps); free educational content; costs / special packages (Value Added Service, VAS, operators offering developing countries packages with low subscription costs including learning content)

Careful research will help to understand interactions and challenges, relevance for the whole system and existing solutions. The outcome is a framework, providing the foundations for transitions into m-Learning in Ghana.

BRIEF OUTLINE OF THE CURRENT KNOWLEDGE OF THE PROBLEM DOMAIN– STATE OF EXISTING SOLUTIONS

Within a dispersed population as in Ghana, mobile phones are prerequisites to implement sustainable m-Learning solutions. For example Lauren Dawes reports, the highest level of access to a mobile phone or SIM Card amongst young people was found in Ghana, where it reached 90% (Dawes, 2011). Mobile penetration rate of Ghana in general is reported with 88% in 2012 (population of Ghana: 24.722.485), (Ghanareporters, 2012). In contrast most of the teachers do not have internet-enabled computers to access cost-effective online open educational resources (OER). Mobile learning should address the learner and their personal relationships (peer groups, teachers, etc.), what the learner is learning (topics, relationship to prior experience, etc.), and where and when learners are learning (Laudrillard, 2007). According to Laurillard various aims for implementation of m-Learning can be figured out as a chance for developing countries, to compensate specific needs, as there are lack of books, distance to schools, girls education, drop out-rates, e.g.. Lauren Dawes investigated how mobile technology affects the daily life of young people in remote areas and to achieve further aspirations. For Ghana her key-findings figured out: 35% of the youth named education as their key priority, 63% believed that they could learn through even a basic mobile device, 39% were most interested in m-Learning services, which would develop their professional skills, and 27% were most interested in language lessons. As a barrier for accessing information 46% named financial constraints/poor background, while 72% named the mobile phone as the most important asset (out of 5 choices: mobile phone, TV, clothes, radio, bank account). As barriers for m-Learning were identified: limited features (50%), limited content (44%), screen size (22%), and phone usability (28%); 73% recognised the potential of learning through their mobile, compared to 4% who did not (Dawes, 2011). For young people, not having the chance to continue formal learning and for the "out of school's" it is their chance to continue learning by using their mobile phone.

In developing countries about 50% of m-Learning programs are designed to be compliant with feature phone technologies, while smart-phone penetration is still low. This is very important, because access to learning material via mobile phones does not only support formal settings but is often the only chance for informal learning (out of school children, girls looking for anonymous help with questions of HIV prevention etc).

PRESENTATION OF PRELIMINARY IDEAS: THE PROPOSED APPROACH AND THE RESULTS ACHIEVED SO FAR

Delivering education in Sub Sahara Africa (SSA) by using mobile phones is widely seen as an optimal solution, because mobile networks are widely spread. Ford and Leinonen name factors as usability, accessibility, and affordability, to be of most importance (Ford & Leinonen 2009). Those factors need to be taken into account together with appropriate pedagogical models, when developing a model of mobile learning. Many m-Learning projects are currently taking place in SSA, most are on a small scale and often not documented, comparative studies rarely exist (Ho et al., 2009). Most of the projects are not sustainable after the pilot phase, because resources are usually not available to sustain the project on long-term. This has been figured out as one of the challenges of previous projects; an example is the OLPC Project in Ghana (OLPC, 2009). Kukulska-Hulme addressed the importance of socio-technical support for learner mobility (Kukulska-Hulme et al., 2011). Furthermore m-Learning in developing countries is different from the "first world" because of different objectives: due to the fact that formal learning occurs not often, a main focus is on informal learning.

The proposed approach can be structured as following:
- State of the art "m-Learning in developing countries"
- Identifying stakeholders as well as all influenced partners
- Field research in Ghana
- Interpretation of outcomes of interviews, evaluations and observations
- Design of a model for integration of m-Learning in Ghana
- Implementation of m-Learning activities on site, as a follow up of the evaluation,

Mobile technology can enhance the shift from instructional classroom teaching to learner centered educational settings (Holzinger, 2005). It is necessary to point out the difference to institutionalised learning, when designing a model for mobile learning. In traditional formal classroom instruction learners are viewed as objects that hold knowledge that has been pre-determined and pre-planned by the single teacher. In developing countries, due to lack of learning material and textbooks, lessons are mainly teacher-centered, students listen, there is rarely room for creativity, reflection, transformation, critical thinking, interaction and self-directed learning.

Traxler asks: "Do we define m-Learning in terms of technologies, or user experience?" and continues "...knowing where to find the answer becomes more important than knowing it or having it" (Traxler, 2009). Muyinda defines m-Learning as a "process of giving and receiving feedback" (Munyinda, 2007). Munyinda further points out, that a successful m-Learning solution requires a better understanding of the pedagogical, technical and organizational settings in order to develop appropriate solutions. M-Learning allows learners to "choose what, when, where, why, and how they learn in a

way that is individualized, personalized, and highly interactive (Cobcroft et al, 2006). M-Learning can contribute to the quality of education. It offers also opportunities of interaction between teachers and learners.

For the implementation two aspects are important and have to be taken in consideration in the research, based on topics from table 1 (see page 2): Technology and infrastructure, including costs, compatibility and limitations of the device, and management aspects, which include the pedagogical, training and support issues.

Since mobile devices reduce barriers to accessibility, changes in didactics and teacher education are important. Didactical skills for m-Learning are the most important topics and are addressed in the course in Ghana. Testing the platform for science and math education, www.skool.com.gh (which is a joint-project from the Ghanaian government and Intel), and the Ghanaian e-learning portal for kids: http://www.e-learningforkids.org/ allows gathering some experience for later practice in classroom. Www.Skool.com.gh offers various learning sequences aligned to Ghana's new education curriculum. Based on practical work in the course and during the last week in classroom practice, the experience will be evaluated and the outcome integrated in the proposal of the framework for m-Learning in Ghana.

SKETCH OF THE APPLIED RESEARCH METHODOLOGY

Criteria for investigations are: specific educational situation, practical usability, theoretical applicability and viable sustainability in Ghana:

- Scrutinizing literature prior to quantitative and qualitative research:
- Identifying best-practice projects by investigating relevant literature on successful ICT projects in SSA (e.g.: MoMaths [mobile learning for Mathematics Project, developed with Nokia], Mxit, or Mobile4Good [M4G], mobile phone games dealing with health education (HIV);
- Figuring out details: how they contribute to solve specific problems; identifying "gaps" (facts not noted so far);
- Scrutinizing and analyzing evaluation-methods of m-Learning projects, identifying best-practice approaches;
- Transferring the findings to (prospective) work on mobile phones,
- Quantitative research: structured questionnaires, surveys to investigate teachers digital skills and expectations of m-Learning (field research in Ghana)
- Qualitative research: individual interviews (field research, secondary school -teachers, school-authority, telecommunication- networks), group interviews.

Research in the first stage is focussed on teacher education, regarding teachers's kills and curriculum matters. Structured interviews with stakeholders contribute to the findings. Surveys are designed according the topics outlined in Figure 1 (see page 2). An important question stresses content design, which has to be reflected on the findings related to the topics of access and availability. As example to address specific topics the research of Ebner points out trends and behaviour of young people using mobile devices (Ebner, 2102). The overall result is presented in the framework, to indicate the status of readiness for implementation with the teachers of the course.

DESCRIPTION OF THE PH.D. PROJECT'S CONTRIBUTION TO THE PROBLEM SOLUTION

This project should help to provide deeper insights in the different problems and contribute to a better understanding what has to be taken in consideration when planning a sustainable solution for m-Learning. A closer look at the curriculum (information literacy, critical reading and problem solving) will help to figure out challenges in the field of pedagogical awareness and content. In rural areas still exists the problem of delivering qualified education, on the other hand the demand of education is increasing, and has to address the learning needs of young people from poor rural communities. For the youth in rural areas, taking advantage of mobile phone ubiquity, m-Learning is a way to incorporate education into their lives when they may have previously been denied the opportunity. As mobile phones are accessible to communities in remote areas, they also extend the reach of mobile-enabled educational resources (Valk et al., 2010) and open new possibilities for learning.

Learning with mobile phones will increase access to learning material in Ghana in many ways:

- Affordable access to study material (up-to date-information, no printing costs, replacing textbooks, easy to repeat content and instructions, cooperation with peers and in groups, even when not able to attend school)
- Teachers support (access to up-to-date-resources, cooperation with other teachers)
- Motivation for families, learning material is available in the household
- Girls, often not allowed to continue school-attendance, are able to access learning material
- HIV information can be achieved anonymously (important for teenager, girls)

DISCUSSION OF HOW THE SUGGESTED SOLUTION IS DIFFERENT, NEW, OR BETTER AS COMPARED TO EXISTING APPROACHES TO THE PROBLEM

Osiakwan pointed out the importance for young people to use their chance to access online content in the remotest parts of Ghana by using mobile phones, therefore the development of a model for sustainable integration of m-Learning in Ghana is necessary (Osiakwan, 2012). Ghana's experience shows that improvements in access/attending schools put pressure on effectively achieving learning outcomes across various social groups and communities. Completion rate in Ghana is relatively high but not high enough for achieving the Education for All goals (EFA). Geographical inequalities tend to be the most important barriers, closely associated with socioeconomic disparities (EDU 2011). Young people out of socially or locally disadvantaged groups, faced mostly by developing countries, show often no confidence in ICT. Thus, with the implementation of m-Learning at young age could overcome this problem (Saipunidzam, 2010).

Adopting a mobile learning approach can improve the educational quest of Ghana. This project proposes a model for implementation of m-Learning in Ghana. It takes into account the specific technological environment and infrastructure, the needs, choices and expectation of in the region. Integrating teachers already in the first stage, inviting them to contribute with their experience to new didactical and pedagogic strategies, is very important, to motivate them to integrate m-Learning in their daily business in secondary schools. With their activities, m-Learning can help to improving education and the life prospects of young people in Ghana. With a good framework being designed and the support of the stakeholders m-Learning environment could be realized successfully in Ghana.

SUMMARY AND OUTLOOK

In this paper an overview of the current situation in Ghana was given and the opportunity of m-Learning integration in the current educational system outlined. The rapid growth of mobile phone access potentially opens up new ways for addressing the systemic educational challenges in Ghana. Bearing in mind that a holistic sustainable m-Learning model for Ghana has to be developed, the next approach is to integrate the results of field studies. The outcomes of these research studies will be taken into account for further implementations. We assume that learning with mobile phones seems to be an ideal solution to tackle the needs in education in developing countries – on the example of Ghana.

A possible follow up research project: Mobile phones (and today more and more smart-phones) are widely available amongst children in European countries. Due to the fact that these mobile phones are mainly banned from the classroom, it could be a chance, to learn from the experience in Ghana, how the use of these devices might transform the educational practice in secondary schools in the future.

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EXPLANATION OF ABBREVIATIONS:

EFA   Education for All, Goals 2015

EFA Goal 6   "Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills"

Feature Phones   Low end phones

GPD   gross domestic product"

JHS   Junior High School

SSA   Sub Sahara Africa

OER   open educational resources