Towards a Mobile Learning Curriculum Framework

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Abstract: The rapid spread and penetration of mobile devices to every layer of society has confronted the educational community with many new opportunities and responsibilities. As mobile computing and its disruptive aftermath enter the education arena, the challenge becomes how to harness the potential in ways that are beneficial to the educational community at large and the learners in particular. This paper outlines the initial conception, design research methodology followed and the development of the definitive Mobile Learning Curriculum Framework as a first attempt to systematically and comprehensively explore, where and how mobiles could appear within educational provision. The curriculum framework is underpinned by three broad learning objectives; to acquire domain knowledge, to develop sufficient and appropriate skills to enable mobile learning practice and to understand the role and impact of domain knowledge in the relation to the application context. To this end the curriculum framework is presented as a modular solution for adaption to accommodate differing contexts.

Keywords: Mobile Learning, Curriculum, Education.

1. Introduction

The rapid diffusion of mobile phones in society continues to transform the ICT landscape with major potential implications for education and the potential achievement of the millennium development goals. Along with new opportunities it has additionally created many new responsibilities for all involved in education. The ubiquitous access to technology have forced schools, education departments and a myriad of other stakeholder in the education domain to enter into conversations about utilising mobile technology in particular towards learning gains. Over the last year or two, there has been an increased global awareness, specifically and increasingly amongst the corporate private sector and amongst the global agencies, donors and foundations, of the capacity of mobile technologies to deliver learning to people and communities beyond the reach of more conventional methods and established institutions. In October 2010, for example, the *UNESCO chair in e-learning* in Barcelona sponsored an international seminar that focussed on *mobiles, learning*

and development. At about the same time the GSMA Development Fund published its *mLearning: A Platform for Educational Opportunities at the Base of the Pyramid* [1] intended to give the mobile network operators a sense of the business case and it published "The Mobile Proposition for Education [2]". In February 2011, the World Mobile Congress in Barcelona sponsored its first awards for learning and attracted an impressive field from organisations working in development. The GMSA held an mLearning workshop was held in June 2011 in Cape Town and in August 2011, USAID convened the first *m4Ed4Devsymposium* in Washington DC as a prelude to launching the mEducation Alliance in February of 2012. In November 2011, the WISE debate in Qatar focus on mobiles, education and the hard-to-reach, in December 2011, UNESCO in Paris convened its First Mobile Learning Week, consisting of both closed and open sessions. In the winter of 2011, both the World Bank and the World Economic Forum both published reports on mobile learning. In March of 2012 there was a further International Symposium in Washington organised by UNESCO and drawing together major practitioners and stakeholders. These sessions focussed, regionally and globally on policy issues and teacher development, the latter seen as a crucial place to break into the educational cycle and promote education for all. Teacher development is one of the most manageable and cost-effective ways of using mobile technologies to break into the cycle and the system of education. The current Framework should be seen in this wider context, a tool for institutions and organisations making policy changes. Many of the emerging debates amongst these newfound converts to mobile learning centre on scale and sustainability and come from government and corporate stakeholders. The proposed Framework represents a balanced and educational account of mobile learning rather than just a commercial or organisational one.

As the international conversations change from *if* mobile learning can contribute to educational gains to *how* it can be achieved, the emphasis moved from technocentric approach to a more pedagogical orientation. South African Department of Basic Education has, in their White Paper on e-Education [3], acknowledged that there is currently a global revolution taking place which poses specific challenges for education and training systems internationally and locally. These challenges are centralised around the participation in the information society and more specifically the impact of ICT's and their integration into the learning and teaching process. As a developing continent, the lack of infrastructure for information and communication technologies is responsible for widening the gap between Africa and the developing world. This so termed "digital divide" refers not only to connectivity and infrastructure but includes the development of local content, collective knowledge integration, cultural inhibitions and insecurities about "developing competences for surviving the breakneck speed of the Internet age [3]". The South African Department of Basic Education articulates these challenges pertaining to education stating: "The challenge is to roll out ICT infrastructure that is specifically suited to Africa. Through appropriate technologies, it is hoped that South Africa will ... implement a solution that works now, and has the capacity to handle future demands [3]".

While the challenges of connectivity, infrastructure and hardware availability and support constitute the realities of Africa and are well documented in literature, it also records an enormous growth in cellular use. Mobile technology has permeated to all spheres of the South African community and is recorded as a 100% penetration [4]. In addition, the accompanying rapid development of mobile technologies, has led to more powerful, more flexible and more accessible devices. Within a few years the mobile market has diversified to include devices ranging from feature phones through to smartphones and smart tablets.

Utilisation of the available opportunities is, however, often hampered by the knowledgeable implementation of the technology in ways that are relevant and meaningful to the educational community. To assist in preparing in-service and pre-service educators,

NGO's, practitioners, researchers and instructors to utilise mobile technology a *Mobile Learning Curriculum* is deemed be a significant advantage.

2. Objectives

A group of practitioners in South Africa and international colleagues came together with the aim to develop a *Mobile Learning Curriculum Framework* and from there have purposefully incorporated additional domain collaborators within the constraints of the initiative. The collaboration has endeavoured to develop the curriculum through a systematic and comprehensive Design Research approach. The process, initiated by seed funding from the South African Department of Science and Technology, was started in 2011 and is envisaged to be completed in 2012.

It is envisaged that the *Mobile Learning Curriculum Framework* document would present a snapshot of a vast and dynamic field. Maintaining the currency of such a curriculum will be an ongoing intent and will ultimately be the responsibility of the community of practitioners and domain experts. The creation of a living document is thus an opportunity as well as a challenge to the domain itself. As a consequence of the momentary nature of the *Mobile Learning Curriculum Framework,* themes for inclusion were considered to be of immediate relevance to cover the breath of the field. In an endeavour to extend beyond the local and incorporate international concerns, it is acknowledged that the terms used are perhaps more relevant to the South African educational domain and a brief outline of the semantics are incorporated for that purpose. To highlight the descriptive nature rather than a prescriptive outline, the Mobile Learning Curriculum was reconceptualised as a *Mobile Learning Curriculum Framework*.

That being said, producing a curriculum framework that has an inherent international or even national design with an immediate local relevance was dismissed very early on in the deliberations. A modular approach was proposed and as such the curriculum framework consists of a number of themes and related modules as a generic offering. These themes were harvested from the domain and a first draft compiled by internationally recognised domain experts.

The *Mobile Learning Curriculum Framework* is thus based on the body of theory and practice about Mobile Learning and cannot claim localisation relative to all possible or even instances of implementation scenarios. The intention is therefore for institutions to select appropriate themes and modules to reflect their specific needs. These would then need to be adapted towards adopting the curriculum within their local context to suit the needs of their specific target audience. As such this curriculum framework will not include detailed lesson plans or courseware, but will take account of three sample adaptations as exemplars of localisation and practical implementation.

Although the curriculum was initiated with South African needs within an African context in mind, it has evolved with sufficient generality to be used as a framework elsewhere. The curriculum framework is additionally non specific in terms of the target audience and level to accommodate the dynamic nature of the domain as well as the possible implementation intentions of such a curriculum. Consequently the bouquet of themes and modules could support, for example:

- Training. To facilitate the need for teachers, lecturers, NGO practitioners etc. to meaningfully engage with instances of professional development in order to become knowledgeable about and/or be qualified in the field of mobile learning. As part of this professional development, considerations on how to plan and integrate mobile learning would be a prominent concern.
- Assist teachers, lecturers and trainers who are, or will soon be, tasked with teaching a module or set of modules focused on *mobile learning* to a specific audience;

Particular modules would be selected, adapted and used by the teachers to direct and structure their teaching and learning. Modules could suggest available resources, mobile-enabled pedagogy and possible ways for assessment.

- Guide teachers, lecturers, trainers and other practitioners in mobile enabled pedagogical practices for their subject teaching. Concerns on how best to design and organize learning instances; addressing concerns such as governance, planning, practicalities, mobile safety and options for developing basic literacy through the use of mobile devices would be significant.

The purposeful nature of the curriculum framework implies, through its broad application area, that it accommodates the needs of academia and practice. Implementing organisations need assurance that the framework can be viewed as representative of the domain as relevant and consistent; that the expected practicality and effectiveness has been validated to justify the investment. To this end a structured educational design research approach was used as outlined in the following section.

3. Methodology

The term design research incorporates terms such as *design experiments* [5, 6], *applied research* [7] or *development research* [8, 9] and *design-based research* [10]. Hannifin and Wang define design research as "a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories" [10]. Van den Akker et al [11] describes educational design research as the systematic study of designing, developing and evaluating educational interventions (programs, processes and products) as solutions to address complex problems in educational practice. Reeves [12] holds forth that "it investigates the development of solutions to practical problems in learning environments with the identification of reusable design principles." He argues that design research aims at developing optimal solutions for problems in context rather than comparing methods in artificial contexts. Cobb, Confrey, di Sessa and Shauble see the aim as "to investigate the possibilities for educational improvement by bringing about new forms of learning in order to study them" [13].

As such it is argued that research of this nature can result in context-specific knowledge, serve a problem solving function and speaks to reality rather than just report on it. Based on the outline of Reeves [14] the development of the *Mobile Learning Curriculum Framework* will comprise five main phases illustrated in Figure 1 below.

Seed funding was procured from the South African Department of Science and Technology. During Phase 1 a task team was formed and through open and targeted invitations domain experts volunteered their time and expertise. Subsequently, through a process of arbitration, a methodology, target audience and scope was identified. Various themes were proposed through an open call on various mailing lists within the domain of mobile learning. Core themes were acknowledged and the themes were further deconstructed to modules.

Phase 2 outlines an expert review through communities of practice and identified experts in the field. Feedback will be evaluated and incorporated. This will allow for inclusion of additional elements that are considered significant within the domain.

Phase 3 will target specific practitioner communities with a track record of applying mobile learning in formal as well as informal settings.

Phase 4 will consist of a number of regional workshops to expose the curriculum framework to regional critique and additionally create some awareness of the collaboration.

Phase 5 aims to develop sample courseware for accreditation and work towards integration instances.
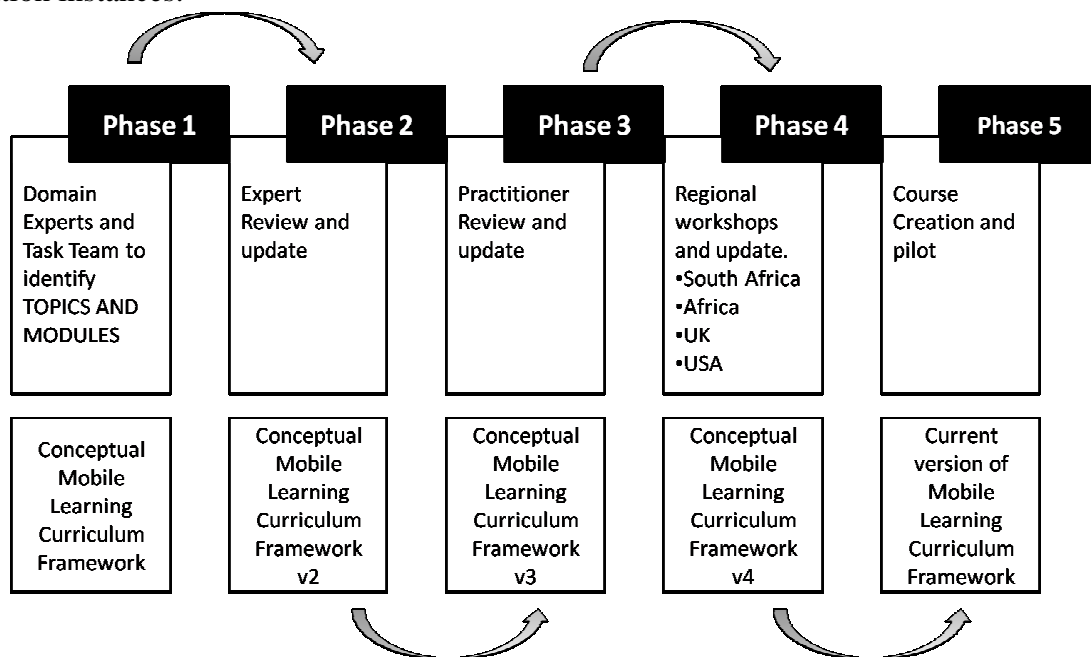

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Domain Experts and Task Team to identify TOPICS AND MODULES	Expert Review and update	Practitioner Review and update	Regional workshops and update. •South Africa ▪Africa ▪UK ▪USA	Course Creation and pilot
Conceptual Mobile Learning Curriculum Framework	Conceptual Mobile Learning Curriculum Framework v2	Conceptual Mobile Learning Curriculum Framework v3	Conceptual Mobile Learning Curriculum Framework v4	Current version of Mobile Learning Curriculum Framework

Figure 1: Iterations as phases in creation of the Mobile Learning Curriculum Framework

Building on the arguments of Plomp [15, 16] and the work of Nieveen [17] each phase with the process of refinement to confirmation, of the *Mobile Learning Curriculum Framework* will be subject to evaluation criteria that reflects the maturation process. Criteria progress from

- Relevance - Design is based on the domain knowledge.
- Consistency - Construct validity, the design is logical.
- Practicality - The curriculum framework is realistically usable in the education domain.
- Effectiveness - Using the curriculum framework results in desired outcomes.

To date there have been commitments to develop a day course for in-service practitioners, a week course for the in-service professional development of teachers and the development of an undergraduate course aimed at pre-service teachers in South Africa. The *Mobile Learning Curriculum Framework* does not aim to reflect specific societal or target audiences' needs. The adaption, subsequent adoption and resulting implementation of the curriculum framework require to be developed to address a specific context.

4. Developments

This *Mobile Learning Curriculum Framework* is the first attempt to systematically and comprehensively explore where and how mobiles should appear within educational provision. It is set out as a varied and fairly high-level description of material and motivation. Some of the issues raised, such as e-safety, present education systems with clear, universal and non-negotiable responsibilities. Other issues related to mobiles are part of a broader responsibility to maximise learners' employment prospects by adapting the curriculum to the impact of mobiles on the worlds of work. Finally, mobile technology includes the capability to extend the geographical and social reach of education systems and opportunities to enrich and enhance the nature of education.

Lowering some barriers to educational and enhancing the teaching and learning environments are the core of what might be considered mainstream mobile learning [18]. The

various headings (themes) and sub-headings (modules) in this curriculum framework represent a taxonomy, a way of representing and organising themes and content for the target audience. It is assumed that learning with mobiles is only part of a wider interaction between technology, in this case mobile technology, and society. Subsequently education fits into a wider agenda of the social, economic, ethical and philosophical change taking place as mobility and connectedness becomes more predominant within our societies.

The *Mobile Learning Curriculum Framework* presents itself through three broad learning objectives expanded on in the following section. Generally it can be summed up as to know about mobile learning, to facilitate mobile learning and to understand the implications of implementing mobile learning. These learning objectives are summarized below:

- Acquisition of domain knowledge (Knowledge as related to the domain content ("theory"). Comprehension of domain knowledge forms the basis of further meaningful interactions in the domain as the student is exposed to relevant issues towards active participation.
- Develop skills to enable mobile learning practice (Application as related to the practice of mobile learning.) The selection of relevant domain knowledge and associated presentation strategies should promote an appreciation of mobile learning as an academic discipline as well as a teaching and learning strategy. Through the learning of *mobile learning* the craft should be demonstrated and an appreciation of the consequences of decisions that involve ethical, societal, personal and community issues be imbued. Learners should gain these skills in a learning environment that reflect and mirror the intension.
- Understand the role and impact of the domain knowledge in relation to the application context. Critical evaluation and understanding related to the impact and affordances of mobile learning in context. Technologies in general and mobile cellular technologies in specifically have had a major impact on nearly every niche of society. The attainment of a range of cognitive and practical skills should be facilitated and assessed in an integrated way in the context provided by the modules in the themes outlined in the curriculum.

Specific learning objectives derived from the curriculum for courseware will need to reflect the needs of the target audience and organisational goals within the context of implementation and presentation. The objectives overviewed in the previous section maps onto related broad learning outcomes through appropriate assessment. The following section details the themes and related modules.

5. Themes and Modules

The mobile learning research has often been concerned and conflicted with the definition of mobile learning [19-21]. This has been an important activity in itself since it has reshaped values, priorities and emphasis, shifting away from technology as a defining attribute and towards the movement of the learner and the learning as key characteristics, as they cross contexts and environments. Some have taken this further and seen the mobility and connectedness afforded by mobile devices as being defining features of societies around the world and mobile learning as merely whatever learning best serves those societies. The proposed Framework attempts pragmatically to adopt such a broad, permeable, resilient and inclusive definition. Perhaps though the term mobile learning is itself exclusive and perhaps self-referential and thus creates barriers rather than transparency. The phrase learning with mobile devices may be a more obvious term for the learning in question and may encourage contributions and discussions not only with the self-identified mobile learning community but also activists and practitioners in open and distance learning or those working with health education or work force education.

Within the outline of the curriculum, the authors acknowledge that various interpretation for terms or concepts exist and therefore the intention behind the terms used are interpreted and expanded within the context of this curriculum framework.

The term *curriculum* is seen as the embodiment of a program undertaken by the target audience. The curriculum contains co-ordinated themes which constitute a coherent unity related to the content, approach and assessment. As no curriculum is value free, and attempts to design it as such underwrites a set of values in itself. The curriculum is presented with the expectation that institutions wishing to implement it would have to permeate their courseware with locally relevant societal values.

The articulated *Mobile Learning Curriculum Framework* consists of five themes as major constituents in inquiry and is further broken down into modules that represent themes within these areas as structured below:

- Theme: A theme is outlined as a distinctive concern within the domain.
  - Theme rationale: Provides the reasons, importance and value of engaging in the theme to the target audience. Presenting a broader view of the modules contained within the specific theme. In essence, each theme contains a set of related modules
- Module: A module is outlined as a unit covering a single topic within the theme.
  - Module rationale: Identifies the significance and impact of doing the individual modules; the benefits involved and getting a clear understanding of the content to be delivered as well as what the participants will learn from the module.
  - Challenges: to understand and identify the possible risks and any other factors that might be overlooked which may have a negative effect or hinder the delivery of the modules. Addressing these challenges is imperative to the success of the delivery and completion of the modules.
  - Content
  - Suggested adoption strategies
    - Reading
    - Delivery
    - Assessment
    - Building (y)our knowledge network

The first version outline is presented below.

The first version outline above accommodates aspects that touch on the impact of mobiles on people, societies and economies as well as the more practical aspects of integrating mobile devices within formal and informal environments. There are inter-relationships between all of these modules, and so, developing and delivering any courseware, should not be seen in isolation.

The proposed Framework is now being developed alongside the mobiMOOC initiative [22]. MOOCs (Massive Open Online Courses) are now an established global educational phenomenon. A MOOC "is a course where the participants are distributed and course materials also are dispersed across the web. This is possible only if the course is open, and works significantly better if the course is large. The course is not a gathering, but rather a way of connecting distributed instructors and learners across a common topic or field of discourse [23]". The first iteration of a MOOC devoted to mobile learning attracted over 200 active participants. The Framework and the MOOC represent in a very real sense expressions, one formal and top-down, the other community-based and bottom-up, of a wider desire to progress, consolidate and articulate mobile learning in useful, complementary and synergistic ways. The MOOC community is a valuable source of mobile learning experience, enriching the examples and the case studies, and valuable resource in terms of quality assurance and user feedback from practitioners working in typical target institutions.

Table 1: Mobile Learning Curriculum Framework Themes and Modules

Themes	1. The Impact of Mobiles on People, Communities and Societies	2. The Impact of Mobiles on the Economy	3. The Impact of Mobiles on Learning	4. The Nature of the Technology, Systems and Devices	5 Becoming Mobile
Modules	1.1 Mobile Life: Digital Identity, Online Communities	2.1 The Nature of Goods and Services	3.1 Mobile Learning	4.1 Nature of the Technology, Systems and Devices	5.1 Governance
	1.2 Mobile Learning: Knowing, Learning, Finding Out	2.2 The Nature of Work and Jobs	3.2 Formal Learning		5.2 Planning
			3.3 Informal Learning		5.3 Practicalities
					5.4 Agency and Control

6. Conclusions

This paper has reflected on the first phase that incorporated the identification and conceptualisation of the Mobile Learning Curriculum Framework as a first attempt to systematically and comprehensively explore mobiles use within educational provision. Themes and modules were identified and the design research methodology what guides the process was outlined. The need to adapt for contextual adoption was emphasised for implementation. Phase two, expert review, will further refine the conceptual curriculum framework towards re-examine through regional workshops for further validation.

Acknowledgements

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