

## Paper 165 – Full Paper

### Designing Social Constructivist Mobile Learning Activities for HEI Courses in Malaysia

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#### Abstract

*Higher education (HE) students work within a complex learning environment in which demands a greater need for support. The mobile phones due to its portability affordance could be exploited as a means to support HE students' learning. However, in designing mobile learning activities through the mobile phone there is a need to establish theoretical guidelines. Social constructivist is chosen as a basis for the guidelines due to the social nature of mobile phones which emphasized on communication and collaboration. In this paper several social constructivist frameworks were reviewed in order to derive a summary of attributes for a social constructivist mobile learning environment. The attributes concluded are contextual based activities, reflection based activities, collaboration based activities and multiple perspective based activities. Through the list of these attributes, possible mobile learning activities are discussed which main aim is to support HE students' learning. Therefore, the mobile learning activities designed and developed based on these attributes should be theoretically sound as this study is part of a research which focus seeks to discover if mobile phones could be used as another supportive learning platform for HE students in Malaysia.*

#### 1. Introduction

Mobile phones are a common communication tool for young adults aged 16-24 as illustrated by Colley & Stead (2004) in their research developing mobile learning tools for students in this age group. Mobile phones are also relatively inexpensive as opposed to a laptop. Similar to the trends in other countries, it is not unusual for Malaysian students in higher education institutions (HEIs) to own a mobile device. Mobile phones have the potential to be used as part and parcel of students' learning as their "technologies are familiar, personal, universal, non-intrusive, lightweight and cheap, to be woven into every waking moment, among a myriad of other activities and in all manner of social settings and groups" (Traxler, 2008, pg18). In other words mobile phones appear to offer the notion of learning any time and anywhere, as they are portable and convenient to use for higher education (HE) students.

The 2009 Horizon Report (Johnson, Levine, & Smith, 2009) rated mobile learning as a technology to watch in HEIs. It has become vogue for some HEIs to deliver meaningful content and services via a mobile device throughout the campus. In the United States, Duke University equipped each new student with an iPod while Abilene Christian University provided iPhones to incoming students in their connected campus project. Other American universities such as Stanford, George Fox, Montclair State University and University Austin, Texas, have developed mobile applications for the campus community such as a campus directory and maps, current events and other campus-related information. This trend is also

mirrored in university-wide initiatives being implemented by Oxford University, Bath University and the Open University in United Kingdom. In Australia, Curtin Technology University and Queensland University of Technology have reported implementations of mobile learning initiatives. Athabasca University, Canada has also begun implementing campus-wide mobile applications with their library information system. Common to all of these examples are the use of the mobile phone as a means of information delivery in order to support and manage learning of the courses offered.

Meanwhile in Malaysia mobile learning is in its infancy. The Open University of Malaysia has begun to introduce their version of mobile learning in a few of its courses. There were also small reported projects being carried out, for example mobile services being used for library services in a public university (Shahriza, Karim, Darus, & Hussin, 2006). While in 2009, Abas, Lim & Woo reported a mobile learning HEI initiative to complement the face-to-face tutorials and online discussion which highlighted the usefulness of SMS (short message system). However, there are no studies that combine several applications of the mobile phones in a more holistic manner to support the delivery of learning for Malaysian HE students. This is the main research aim in which this paper will contribute is the basis of the design of these mobile learning activities.

Zawacki-Richter, Brown & Delpont (2007) have already reported on a survey of 88 HEIs from 27 countries on the institutions expectation of mobile learning. One of the main concerns of these institutions was the impact of mobile technologies on teaching and learning. Of the 83 respondents, 64 believed that mobile learning will “be very helpful in enhancing teaching and learning independent of time and space” (pg3). However, they do not suggest how. Nor is there an accepted model that exists for a broader based implementation of mobile phone applications that will accepted by HE students. This is the focus of this study, the need to create a suitable model for mobile learning activities to support the learning of HE students. This paper is making small steps towards creating this model.

O’Malley et al (2003) defined **mobile learning** as “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” (pg6). This is the term that will be employed through this research which depicts a more any time and anywhere sense of learning to support HE students. The term **mobile learning activities** used in this study means activities that involve using a particular mobile phone application for students to construct their learning. For example, when students are collaborating together to complete a project using SMS to communicate with each other. **Social constructivist learning environment** is the design and implementation of the learning opportunities for HE students that are based on social constructivist principles. A key part of HE students’ experience must relate to how they are taught and how they may be encouraged to reflect, understand and provide feedback upon the context of their studies as proposed by the social constructivist principles. The guideline for the design of social constructivist learning environment through mobile learning is the foundation of this paper.

The role of mobile phones in this study is as a supporting delivery mechanism in order to bring about a greater sense of ‘always-on’ learning and a wider context for learning opportunities. This means that learning does not stop within the four walls of the lecture room but it can also be reflected and reconstructed anywhere as posited by Thomas (2005).

There are many reasons to bring forth mobile phones in particular as the chosen mobile device in the current HEI learning scenes. The UK Joint Information Systems Committee (JISC) (2005) noted the synergy between mobile technologies and learners, citing it firstly as due to the fact that these devices are part and parcel of the modern life and secondly because “tools for learning in 21<sup>st</sup> century institutions need to reflect on changing expectations of

how, when and where we learn, and that they should motivate learners to become more active and engaged in their learning” (pg26). Thus, providing learning activities through mobile devices could engage the type of students in HEIs nowadays. Furthermore, Collis & Moonen (2001) posited that a learning environment for HE students should present a large variety of possibilities to support flexible and contribution-oriented learning. Hence there is a need for a research into ways to implement mobile phone applications to support learning and to gauge if these applications could assist HE students in their learning particularly in the Malaysian context.

This paper aims to explore the theoretical basis and to offer guidance for the design of mobile learning activities. It is part of a larger study to gain an understanding of how mobile learning activities can support students’ learning in Higher Education. The mobile learning activities’ design is based upon selected applications of the mobile phones with the main objective of designing a supporting mechanism for a designated HEI course. The study does not narrowly focus only on a single mobile phone application but on several applications in combination. These applications such as SMS or podcast are chosen by the HE students in terms of their familiarity and their perceived usefulness to support their study in the initial study. Hence, the design of the study encapsulates the use of these chosen applications for learning support in a more holistic manner than the usual evaluation of single mobile learning applications.

Mobile learning is complex. There are many aspects that a researcher needs to consider in designing in such a versatile and portable environment. As illustrated by Naismith, Lonsdale, Vavoula & Sharples (2004), the “challenge for the educators and technology developers of the future will be to find a way to ensure that this new learning is highly situated, personal, collaborative and long term; in other words, truly learner-centred learning” (pg36). Rochelle (2003) noted that there are learning values that appealed to both students and teachers in the mobile learning environment for example to enrich social practices and also to individualise feedback. Besides understanding the learning opportunities of different features of the mobile phones that could be made available for the students, the design for mobile learning activities to accompany a HEI course should also be based on a strong theoretical learning foundation. Wishart (2007) listed seven possibilities for theories and motivational concepts that could be recommended as foundation of a design for mobile learning environment ranging from behavioral to social constructivist theory. However, these are as yet untested empirically. She stressed that through mobile technologies “learning can also be seen to be effective when control is appropriately distributed among the learners through collaborative working within a shared environment” (pg6). Thus students are central to the learning design within a learning context that involves mobile devices; hence this follows social constructivist learning principles.

## **2. Social Constructivist Principles as Building Blocks**

Sexton (1997) pointed out constructivism cannot be illustrated as a single approach but rather is made up of a progression of concepts ranging from a social based perspective to a more radical constructivist view. Nevertheless, the one common overarching feature is that learners construct knowledge out of their own experiences. With mobile devices offering opportunity for collaboration and involving context and an audience in learning the social constructivist perspective that allows a role for others in a learner’s construction of knowledge is most appropriate. Social Constructivism has arisen from the works of Lev Vygotsky (1896-1934) whereby social contributions are core of the theory. Van de Veer (2007) pointed out that Vygotsky’s theory centralized the fact that that “in order to understand the inner mental processes of human beings, we must look at human beings in their sociocultural context” (pg21).

Social constructivism is associated with a long history of constructivism as a theory of knowledge development. Duffy & Cunningham, (1996) and Fox (1997) used the umbrella metaphor to illustrate the wide range of theories under the constructivist scope. Nevertheless, the one common overarching feature is as discussed by Jonassen (1999) and Carnell & Lodge (2002) is that the crux of constructivism is meaning making. This act of meaning making is derived through natural process and embedded in activities within a context. Jonassen (1999) also notes that learning is a social activity as the learner interacts with others and also the environment around them. This means that meaning and understanding is derived from social encounters within the student's context. This is summarized by Blanck (1990) as mental activity that resulted from "social learning, of the interiorization of social signs, and of the internalization of culture and of social relationships" (pg44). This indicates that learning is mental activity that is created through negotiating meaning with others in a given context. Thus learning activities to be implemented for this study will require students' reflection to include mental activity based on events that take place within their social context.

Furthermore, Vygotsky emphasized the need for a holistic approach to a study when he used 'the chemicals in the water metaphor' (Vygotsky, 1978); these cannot be separated to be studied as the whole meaning will be lost. This approach is taken by this study as the focus is on the holistic sense of undertaking the mobile learning activities via the mobile phone applications. There is neither concentration on a single activity nor a single mobile phone application, but a multitude of activities and applications selected on the students preferences. The social constructivist approach and mobile learning fit well together. Mobile learning is very much a student-centered activity yet also promotes social connection as emphasized in the explanation of mobile learning characteristics cited by Leung & Chan (2003). They noted that learning could be derived through social aspects such as the collaborative nature of using mobile phones. Students can also be connected to either reflect upon just-in time learning incidents and to construct meaning in the context of learning scenarios. The central tenet of social constructivism is that human action is mediated by tools or artefacts that can be a technological tool or a communicative system such as a language (Vygotsky, 1878). Since social constructivism posits that learning is constructed thorough social environment, in this research the mobile phone and its ubiquitous characteristics is viewed as a tool to help construct students' learning within this social environment.

Moreover, social constructivists posit that the language used in a culture shaped the reality of the context the learner is in. This is indicated when Gergen (1985) argued that the knowledge of the world is obtained through human experience mediated by language while the categories of language are situated and extracted through social interaction. This means that reality is socially constructed by communicative interactions within a social context. The student constructs knowledge in terms of his or her own social experiences of using the mobile learning activities to help support their learning.

In order to develop a sound design for mobile learning activities other work on constructivist learning environment attributes needs to be considered. In Table 1, the reviewed Jonassen's (1999) framework for designing a constructivist learning environment, Fosnot's (1996) general principles of constructivist learning environment and, Knuth & Cunnigham's (1993) pedagogical goals for constructivist learning environments in the light of potential use for this study. Whilst described as constructivist these actually include social constructivist principles such as dialogue, co-operation and collaboration. In the rightmost column there is the summarized overlapping attributes from the three different proposed frameworks to derive a comprehensive list of conceptual guidelines that underpin social constructivist learning environments. Through the summary, it is noted that learning activities derived are on which student take ownership of their own learning, situated in context, provides multiple view

points and multimedia, permits engagement of students, promotes collaboration and recognizes reflection.

Nevertheless, it was felt that these guidelines are not enough to base the design of the mobile learning activities. There must also be comparison of a social constructivist attributes. Thus, Bonk & Cunningham (1998, pg34) list of attributes of a social constructivist learning environment were compared against the summary of Table 1. This process enabled to derive the following list of social constructivist attributes for a learning environment suitable for mobile learning activities to be designed and developed further for this study.

Bonk & Cunningham (1998, pg34) social constructivist learning environment attributes that can be applied for teaching practices were reviewed. This is to ensure a more comprehensive social constructivist principle to build the mobile learning activities for this study. These attributes comprises of:

**Authentic problems:** Learning environments should reflect real-world problems for the students to develop interest, deeper knowledge and skills.

**Team choice and interest:** Group learning activities will be meaningful in both process and product oriented if it is build on common interest or experience.

- **Social dialogue and elaboration:** Activities should be multi-solution to promote student-student and student-lecturer dialogue. Activities should also promote idea sharing and conversations of different perspectives.
- **Process and reflection:** Besides individual students reflection, there should also group processing on experiences as part of the learning activities.
- **Lecturer explanations, support and demonstration:** The facilitator is expected to provide explanation, elaboration and clarifications when requested.
- **Multiple viewpoints:** Provide different types of examples or explanation and different materials.
- **Collaboration and negotiation:** Promotes negotiation of meaning, building agreement, discuss conflicts and general social interaction.
- **Learning communities:** Joint responsibilities for learning for ownership of learning. Technology can be used to facilitate idea generation and knowledge building within this community of peers.
- These attributes are compared against the summary in Table 1. Through this process, it can concluded that the learning activities that should be designed to support HE students' learning founded on a social constructivist learning principles should provide multiple point of views from various resources, are situated in a context, permit students' engagement in process and reflection, promote dialogue amongst lecturers and peers, emphasize on collaborations and, recognize reflections. Therefore there are four main categories of mobile learning activities that are aligned with social constructivist learning principles and could be designed and implemented for HE students. These four are for contextual based activities, reflection based activities, collaboration based activities and multiple perspectives based activities. These

<b>Knuth &amp; Cunningham (1993) Pedagogical Goals (*)</b>	<b>Fosnot (1996) General Principles</b>	<b>Jonassen's (1999) Framework</b>	<b>My Summary</b>
Provide experience with <b>knowledge construction process</b> : Students take on responsibility on strategies & methods	<b>Learning proceeds towards the development of structures</b> : Upon meaning making, students progress to shifts in principles (self-organization) that are generalized across experience.	<b>Constructive articulation and reflection</b> : Upon observation, learners will need to articulate their reflection in order to build into their existing mental models.	Learning activity that is student centered allows students to take ownership of their own learning
Provide experience for <b>multiple perspectives</b> : Students engage in activities to enable them to evaluate alternative solutions of problems			Learning activity that provides multiple point of views from various resources
Embed learning in <b>realistic &amp; relevant contexts</b> : Students need to equate learning & connect to respective situations	<b>Disequilibrium facilitates learning</b> : There is a need for students to explore and generate possibilities to either affirms or contradicts their investigations in meaningful context.	<b>Authenticity in complex and contextual situation</b> : learning tasks need to be situated in the natural real-world context.	Learning activity that is situated in a context
Encourage <b>ownership &amp; voice</b> in learning process: Students determine issues & directions	<b>Learning is not the result of development</b> : The process of learning that requires students to raise questions, and generate own opinions is part of learning.	<b>Active manipulation and observation</b> : learners' engagement in meaningful tasks and they observe the outcome of their manipulation	Learning activity that permits students engagement
Embed learning in <b>social experience</b> : Students understanding is influenced by social interactions which is reflected through collaborations	<b>Dialogue within a community engenders further thinking</b> : Student-centered discussions to defend, prove, justify and communicate ideas in their community in order to rise to the level of shared-meaning	<b>Cooperation through conversation and collaboration</b> : Collaboration through tasks is another way of learning. This achieved through conversations for learners' to be part of knowledge-building community.	Learning activity that promotes collaboration
Encourage the use of <b>multiple modes of representation</b> : Students need to be exposed to various mediums of communication			Learning activity that accords for multiple media
Encourage <b>self-awareness of the knowledge construction</b> process: Students ability to explain why & how they know (metacognition)	<b>Reflective abstraction is the driving force of learning</b> : There should be a form of reflection such as journal writing, representation in multisymbolic form and discussion on strategies.	<b>Intentional reflection and regulatory</b> : As depicted, "technologies need to engage the learners in articulating what their learning goals are in any learning situation, and then support them" (pg9). If learners know their goals and reflect the process of achieving them, they are able to construct new knowledge better.	Learning activity that recognizes reflection

(\*) Knuth & Cunningham (1993) Pedagogical goals was further discussed by Honebein (1996)

**Table 1: Summary of Learning Principles of Social Constructivist Learning Environment**

categories will serve as guidelines but the detailed designs will be needed to be based on many other factors such as students' choice of applications on their mobile phones.

### **3. Discussion**

Through the four main categories derived, the design of recommended mobile learning activities based on social constructivist learning principles are further explained:

**Contextual based activities:** Duffy & Jonassen (1992) posited that learning activities “should provide contexts and assistance that will aid the individual in making sense of the environment as it is encountered” (pg5). This means that there could be activities designed to make use the multiple context the students are in. For example, HE students could be asked to collect pictures and videos to enhance their ePortfolio which could also be as evidence of their field work.

**Reflection based activities:** According to Bednar et al. (1992), “learning is a constructive processing which the learner is building an internal representation of knowledge, a personal interpretation of experience.” (pg30) This indicated that learning is an active process in which meaning is developed based on the students' thinking process. The evaluation of this process can be captured in the students' reflective awareness of their own thinking as this implies that the students can monitor both the content structure of knowledge development and also the constructing process of knowledge representation. Furthermore, Dunlap & Grabinger (1996) posited that successful students are able to analyze what they do through their deployed schemes for them to evaluate their value. These students do this through the reflective process. Hence, a mobile learning activity that allows for reflections could be for the lecturers to send reflective questions through SMS to the HE students after each class. The students can even discuss these questions through a class moblog (moblog is a blog specifically built for the mobile phone screen).

**Collaboration based activities:** Collaborative activities are another method to design mobile learning activities that suit the nature of the mobile phone as a communicative tool. Collaboration is also the essence of constructivist learning environment. Dunlap & Grabinger (1996) supported collaboration activities as they argued that through working in groups, students are able to refine their knowledge through argument, structured controversy and reciprocal teaching and learning, which could lead to a shared-meaning of the content. An example of a mobile learning activity that the students could do in groups is to create podcasts together in reference to the content of the course. These podcasts could be downloaded in their mobile phones to be heard in small pockets of time for revision and reflective sake.

**Multiple Perspectives based activities:** Different views can be received through various other types of sources. Dunlap & Grabinger (1996) stated that existing knowledge could serve as a point of reference or as foundation for new knowledge to build on. Hence there could be a space for information to trigger reflections on a designated content. One would aspect that information does not come from only one source of information in a social constructivist learning environment, but rather through different types of information and even from different media. One mobile learning activity that can be envisaged is the usage of moblog to place various types of information from ‘small-bites’ (short notes) of text to podcasts to eBooks. These various media of information could provide multiple perspectives for students on a content of the course.

Honebein, Duffy & Fishman (1993) illustrated the need to generate and evaluate alternative perspectives for designated content as “constructivist learning focuses on skills and strategies, rather than facts and rote memorization” (pg106). This means that there must be a space in the design of mobile learning activities such as SMS for students to discuss, argue, comment or support opinions.

Therefore through the social constructivist learning environment, possible mobile learning activities can be designed and developed to support HE students' learning.

#### **4. Conclusion**

The crux of this study is to capitalize and deploy mobile learning applications in the form of a series of organised learning activities as a supporting mechanism to ensure HE students' learning is reinforced outside of the classroom. There is a great need to base this design on a learning theory that supports the characteristics of a mobile device in which social constructivist seems suitable for.

Social constructivist learning guidelines in this study will provide guidance and integration in order to design, implement and evaluate the proposed mobile learning environment enabling a holistic view of mobile learning activities through the mobile phone.

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