DESIGN AND DEVELOPMENT OF MOBILE LEARNING APPLICATION

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Abstract: Access to the Internet and mobile devices provides a great opportunity for public to open and continuous education. Although mobile learning is not new subject in education but regarding to mobile technology features such as fast and easy accessibility, assimilates researcher, practitioner and educator's attention as channel to deliver their Instruction as well as many educational institutes, humane organizations and companies.
On the other hand design and development of mobile learning applications need careful cognitive processes and technical skills which might make it more difficult for educators to consider leveraging and developing mobile learning application by themselves in their curriculum.
This paper provided an overview report of previous studies conducted on mobile learning application and investigated challenges and difficulties of design and development of mobile learning application. Moreover in order to have better understanding of implementing a mobile learning application, a prototype of one mobile learning application is developed to educate and enhance motivation among adult to donate specific necessities for underprivileged students.
Keyword*: Mobile learning, m-learning, design and development, instructional design*

1. INTRODUCTION

The rapid development of technology has touched almost all aspects of life such as education. “It is almost impossible to think of education without also thinking about the many different kinds of technology used to support education” (Spector, 2012, P.8). New development of the Internet and mobile devices has impact on education and led mobile learning arises as potential part of educational system. “Recently the rapid growth of mobile technologies has leaded e-learning to a new era.”(Huang, Hwang, & Chang, 2010, P.1). On the other hand, mobile learning system can be applied to several ranges of users. “Mobile learning in past years has proven to be successful in many different contexts and with various target groups” (Kalloo & Mohan, 2012, P.2). Regarding this capability and extensive use of mobile devices such as smart phones and tablets, many schools, educational institutes and humanitarian organizations trying to advertise and educate people through mobile learning applications. “With the advanced technologies like GPS, RFID or sensors, mobile devices also provide context-related opportunities for users to enjoy their personal moment or explore their surrounding context from wherever they may be”(Huang, Hwang, & Chang, 2010, P.1).

Although mobile devices utilization is rising considerably (Danado & Paternò, 2014) and researchers predict that mobile learning has outstandingly influence on education (Alden, 2013) but design and development of mobile learning application consider as complicated progress for many institutions. “One main challenge is to identify how to design application development environments able to support integration of such technologies through intuitive mobile interactive environments. The challenge is further complicated by the limitations presented in mobile platforms with limited screen sizes, usage of touch-based interaction and heterogeneous contexts of usage. ” (Danado & Paternò, 2014,P.1).

Moreover, regarding to limitations of learning tools such as mobile application, fast and endlessly changes, there are priorities in design and development phase between content and context, instruction, interface, learning approach and... . “How do I create an environment to teach what I am trying to teach? The conundrum lies in the struggle between the ideal learning environment and the pragmatic solution based on available resources. Should an educator first consider technological decisions and the accompanying constraints that follow those decisions? Or should a traditional approach to create education based in instructional design and learning objectives be followed?” (Hanson & Shelton, 2008, P.4). Thus, there is a need to investigate characteristics of design and development a mobile learning application.

Moreover, this study looks into related literature review on current mobile learning and purposed design and development of mobile learning application which can be used as schema for educational institutions. Furthermore, charities and humanitarian organizations may look for simple, fast and easy access informing tool. Using mobile learning application for humanitarian activities might provide better facility as medium between donor and donee in the shortest time and quickest way.

2. RELATED LITERATURE REVIEW

2.1 MOBILE LEARNING HISTORY

Perhaps mobile learning study traced back to 1990 with project named Wireless Coyote which is conducted by Apple Classrooms of Tomorrow (ACOT). The study aim was to evaluate usability of wireless mobile computer for staff and student of Orange Grove Middle school (Manga & Lu, 2013).
By technology growth, usage of mobile technology in learning and teaching process got popular. Levine, 2002;

McGhee & Kozma, 2001; McKenzie, 2001 argued that "The movement of mobile wireless technologies in education is a recent trend, and it is now becoming the hottest technology in higher education". (Kim, Mims & Holmes, 2006, P.2). It seems one of the important mobile learning feature which enhances efficiency of education is benefit of mobility (Maginnis, White, & Mckenna, 2000). In 2003 a study conducted by Chen, Kao, and Sheu design and developed a bird watching system that helps students to use their mobile devices for data collection and watch bird. (Chu, 2014)

In another study which was conducted during 2005 to 2009 by JISC e-Learning program researchers tried to discover and clarify student's experiences of using e-learning technology and using mobile devices. They argued that "the mix of new technologies used by students and traditional ones supplied by course tutors and institutions was shifting patterns of study and causing a mismatch between the expectations of academic staff and the study habits of learners." (Kukulska-Hulme, 2010 ,P.4).

Wu et al. (2012) argued about mobile learning over 164 researches which is done during 10 years. They found that "the most topics of the mobile learning studies were currently based on the learning effectiveness and the evaluation of system".(Hou et al, 2014).

Kukulska-Hulme et al. (2009) conducted international survey in five countries to find connection between "mobile technology use in relation to life and learning". Based on their reports, referring to figure 1, participants use their mobile devices widely to " o create, collect and access useful resources, to communicate inventively in a variety of ways with other individuals and communities, and to make best use of time wherever they happen to be." (Kukulska-Hulme, 2010, P.6).

Australia
- Send photos of landmarks to friends to find out where I am
- Create e-resources with audio such as Powerpoint presentations
- Record things on my iPhone and replay them in the iPod function

Hong Kong
- Use the dictionary, listen to news to learn English
- Take photos of billboard advertisements and pictures in reference books
- Download a lot of books for reading

Portugal
- Enter contests and use my mobile to answer quizzes
- Listen to podcasts and class summaries
- Record music samples, share music with my students

Sweden
- Listen to educative radio shows
- Learn songs and words of songs
- Make calls to friends who are experts in a diversity of fields

United Kingdom
- Send texts and pictures to the Moblog community
- Listen to BBC podcasts while I cycle to work
- Read blogs when waiting for dentist who has free wifi in surgery

Figure 1: International survey in five countries to find connection between mobile technology use in relation to life and learning

2.2 MOBILE LEARNING DEFINITION

Many studies investigated the impact on mobile learning on learning process. Hoppe, Joiner, Milrad, & Sharples, 2003;Liu, Wang, Liang, Chan, Ko, & Yang, 2003; Hsu, Hwang, & Chang,2010; Sharples, Taylor, & Vavoula, 2007; Wong & Looi, 2011; Wong, Chin,Tan, & Liu, 2010; Zhang et al., 2010 discuss the advantage of using mobile technology and devices in teaching and learning processes in different courses such as "science, social science, and language course" (Chu, 2014)

However there are many different definitions for mobile learning based on its characteristic, but having access to educational context and environment without limitation of time and place are common definition between them (Serin, 2012).

2.3 MOBILE LEARNING EFFICIENCY

Mobile learning efficiency is extremely affected by quality of mobile applications. Hence mobile applications characteristics should be emphasized too in design and development part. Marty et al, 2013 discussed about user friendly element of mobile applications such as "intuitive and functionality" and highlighted developer should consist on user-centered solution design. Other researchers gave credit to real-time and connectivity features which enhance

learners actual time analysis and data gathering skills (Spain, Phipps, Rogers, & Chaparro, 2001). Baek, Cagiltay, Boling, & Frick, 2008; Norman, 1988 argued that mobile application should be "usable, applicable, and functional for a wide range of individuals" (Marty et al, 2013). Also it should be fun, engaging and pleasurable learning process (Ching, Shuler, Lewis, & Levine, 2009).
Despite mobile learning is widespread concept, apparently regarding to lack of relevant guidelines (Park, 2011) the most critical part of it, can be creating instructional environment and delivering educational materials through mobile applications.

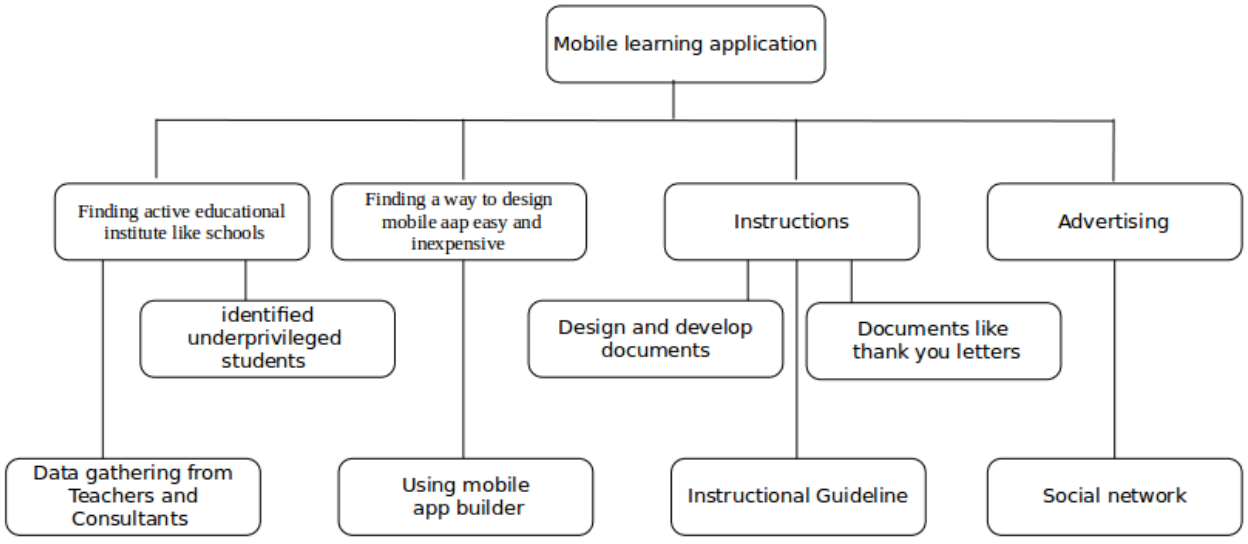
3. DESIGN AND DEVELOPMENT OF MOBILE LEARNING APPLICATION

The design and development of mobile learning application with no doubt is hard process which needs software programming knowledge, graphic design knowledge, instructional design knowledge, content localizing. Winn & Windschitl, 2001; Salzman, Dede, Loftin & Chen, 1999 argued about characteristic virtual learning environment. "they permit students to experience high levels of presence, they are interactive and they are autonomous" (Hanson & Shelton, 2008). Based on mobile application flexibility some educational institutes, universities or schools started to develop specific mobile applications for their students according to their curriculum and particular need. In 2010, Princeton University implemented their mobile learning services. Through this service and students can have "Access documents in multiple formats, post announcements, create threaded discussion posts, upload media as attachments to discussion boards and blogs, create content items within the course map, ...take tests, and receive push notifications for important course updates or changes" (Alden, 2013).

On the other hand, some researchers suggested that there must be learning strategy in design and development phase such as active learning, collaborative learning, authentic learning and multiple perspectives (Karagiorgi & Symeou, 2005). Although there many research in mobile learning but recent research shows that there are priorities in research which can have effect on better design and development phase. "1) teaching and learning strategies; 2) affordances; 3) theory; 4) settings of learning; 5) evaluation/assessment; 6) learners; 7) mobile technologies and interface design; 8) context awareness and augmented reality; 9) infrastructure and management; and 10) country and digital divide." (Hsu, Ching, & Snelson, 2014)

3.1 ANALYSIS PHASE

Analysis phase started by task analysis, referring figure 2. There were four major components in this phase and each step broke down to manageable component.



3.2. DESIGN AND DEVELOPMENT

The design and development of mobile application determined as hard procedure regarding to technical phase such as software programming, interface designing and familiarity with smart phone hardware. To avoid these types of intricacies, there are many mobile application builders which have been developed and help users to create their ideal custom mobile application.

Furthermore, unavailability of some infrastructure might be reason for unsuccessful integration of ICT based tools in education. "The major barriers were lack of confidence,

lack of competence, and lack of access to resources" (Bingimlas, 2009, p.1). According to literature review for design and development, identification of these steps (referring figure 3) seemed vital for successful application.

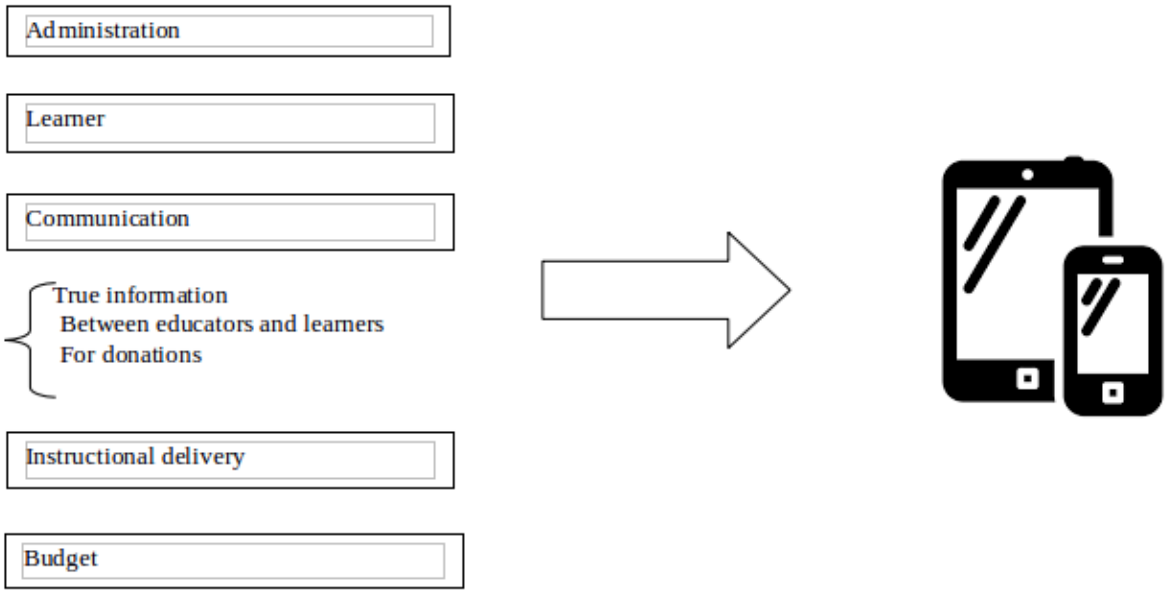


Figure 3: Identification vital steps for design and development

Since administrators and users of this system might not be influent in ICT skills, the system should be simple and operative to manage and use. Hence, figure 4 shows, this mobile learning application have 8 tabs: About us, Events, Services, Donation, Wishes, Guide and Facebook, Find us.

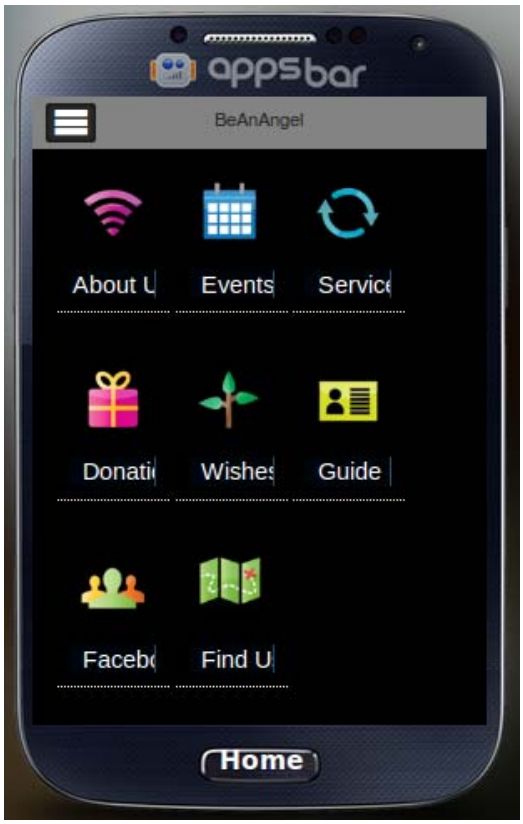


Figure 4: Eight major tab in design and develop mobile learning application

3.2.1 ABOUT US

Based on the first questionnaire donors prefer to have true and correct information about their target charity, therefore there should be space in application that alleviate the need, (referring figure 5).In this section the following information is provided: The application target, fast and simple direction to donation tab, introduction of the Institution.

Figure 5: About Us

3.2.2 EVENTS

Any occasion can provide opportunity for donation. It might be global events, local event or events that coordinated by target organization (referring figure 6). Thus there is a need to inform donors fast and informative. Based on the mobile application builder powerful platform, there are features for participants to add the event on their calendar or share it with others.

Figure 6: Events

3.2.3 SERVICES

To motivate donors and show the value of their action, Charities might prepare some services include sponsorship information such as social network free learning opportunity, highlighting community responsibility, participating in new and deeper community networks, targeting a new market (referring figure 7), Or sending happy birthday card or thank you letter from donee.

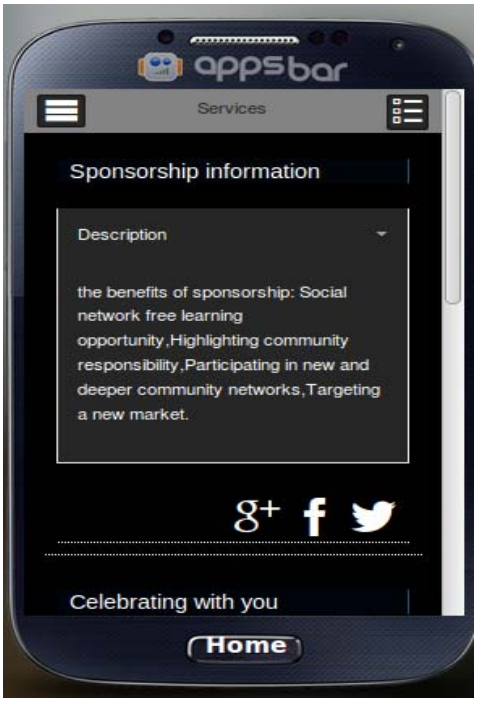


Figure 7: Services

3.2.4 DONATION

One of the main mobile application goals is providing fast, easy and reachable access to target market. In this case, regarding to information that provided for donors or based on their interest, they can give their personal information and mention what they want to donate through the mobile application for administrator (s) and due to organization principal, administrator (s) can coordinate better for collecting donation (referring figure 8). Also the organization have data base of donors contact for any updates.

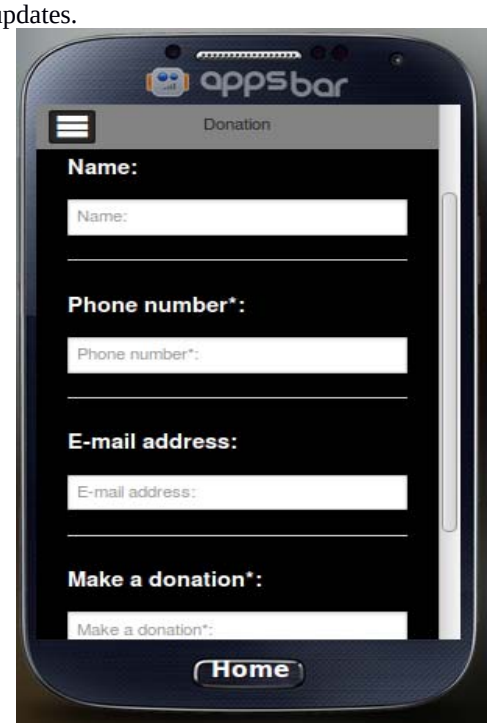


Figure 8: Donation

3.2.5 WISHES

Regarding to the growth of technology and better access to cheap mobile devices and telephone, nowadays using smart devices gradually increasing. However access to smart phone for underprivileged students or their family seems unlike but there is possibility that people how have contact with them like their teachers, their principals, have access to this mobile application and acting for specific need on behalf of them. Thus, administrator(s) can coordinate the new requests as well. (referring figure 9).

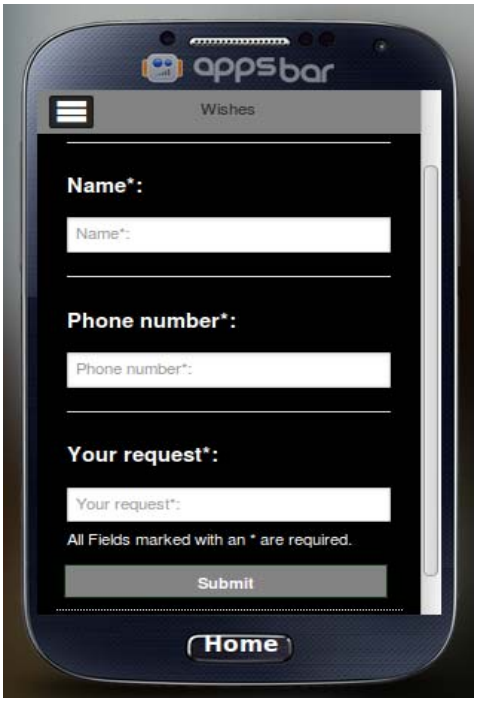


Figure 9: Wishes

3.2.6 GUIDES

The main target of this study which is design and develop mobile learning application, for sure there must be a part to cover learning and training (referring figure 10). This might be the most important part due to most of instruction from the organization can be delivered here. In this case there are virtual guidelines for working with selected social network (FaceBook), how to approach with underprivileged children, how we can promote helping others and how we can avoid of psychological traumas.

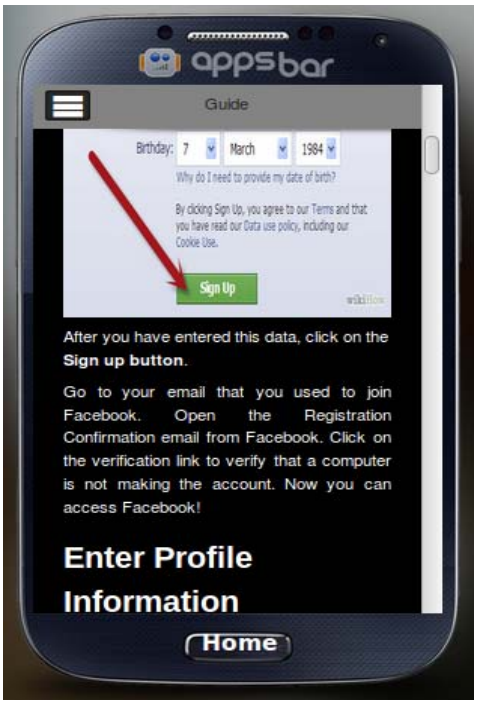


Figure 10: Guides

3.2.7 SOCIAL NETWORK

Barab and Duffy (2000) argued that learning happened in interaction and practice within the community. In this case social network can help to build a community to educate, motivate and update the participant (referring figure 11). In addition some features such as questionnaire be conducted through this tool.

Figure 11: Social Network

3.2.8 FIND US

To ensure people that organization is real and also they can find the nearest charity or organization it is important to give true and valid address such as e-mail, website, telphone number and people who are charge. (Referring figure 12)

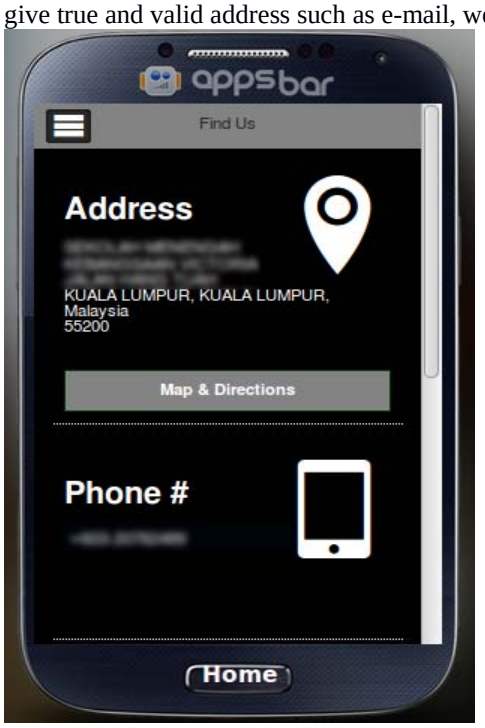


Figure 12: Find Us

4. IMPLEMENTATION

The real mobile application which can be installed on Android and OS operational system was ultimate production of this study. The summery of design and development process of mobile learning application prototype is mentioned below:

1) Creating research framework
2) Carry out task analysis in every step and navigate based on the map
3) Consulting from instructional designer and IT experts
4) Reviewing and modifying of instructions.
5) Implementing and improvement prototype and validation with instructional designer expert

5. CONCLUSION AND FUTURE RESEARCH

Many scholars have predicted that mobile technology and mobile learning applications will have huge impact on education. Technology growth and investment of considerable budget on developing mobile applications show that its might be the time for educator to touch this technology, have hands on experiences and face opportunities and challenges of mobile learning application in their teaching process.

Many companies offering their platforms free or inexpensive which enable teachers to have a better perspective of mobile applications even with less technical knowledge. Educators need to choose their teaching strategy based on strong framework, design accurate task analysis, obtain basic knowledge about major factors in design mobile application due to mobile device screen size, phone size and so on. Implement their prototype and evaluate assessment their product. In all these phases consulting with instructional designer may have positive influence on their procedure and increase their speed.

According to bloom taxonomy there are six steps (Knowledge, Comprehension, Application. Analysis, Synthesis and Evaluation) that lead students to higher level of thinking and learning (Bloom, 1984 ;Krathwohl, 2002). Mobile learning application as a popular medium should be evaluated if they bring creativity on to learners.

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