"M-Learning": Implications and Challenges

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Abstract: *In 21st century, available new emerging technologies offer innovative & multiple dimensions of teaching and learning process for open, distance and formal education systems, but none of them has been as popular, readily available and accessible as mobile learning. The mobiles phones with latest features of technology version are most frequently used product by the learners in these day. As mobile devices are becoming ubiquitous, many educational scholars and practitioners have incorporated this technology with teaching and learning environment. Therefore, this new way to use technology help to re-design and reconstruct the education process in numerous ways. The m-learning has a provision of self-study, feedback, supports, teachers- students; students -students' interactions with regard to course content is possible to students. This is a wonderful quality of m-learning that it is available anywhere, anytime. Every technology has some strength and limitations therefore mobile devices have also some exception. There is a three main kind of challenges for mobile devices, first is in term of physical attributes; secondly challenges related with technology or operating systems attribute and third great challenge seems that there is lack of associations between the mobile software and mobile learning apps with the pedagogical, psychological and sociological approach of education. The extension of ICT through mobile device is helpful to resolve many challenges associated it. If m-learning can be used properly along with the ICT then it can make a difference to provide accessibility, equality and quality of education in the masses.*

Keywords: M-learning, *Education,* Paradigm, *Learning, Apps, Pedagogy*

1. Introduction

In 21st century, new emerging technologies have available and used by the open, distance and formal educational system for enhancing interaction between the teachers and learners such as video collaboration tools, open educational resources, social learning in online courses, 3d printing Skype, podcasting, Moodle, instant messaging (IM), blogs, wireless technology, portable, handheld devices have increasingly powerful multimedia, social networking, communication and geo-location (GPS) capabilities and consequently, mobile learning (m-learning) etc. Day by day, usages of these technologies are becoming easy and convincible. As well as new advanced technologies and products are being formed to facilitate the human beings. Over the last two decade years mobile learning fetched the research interest of scholars in term of significant projects at every level of education, workplaces, urban and rural areas around the world.

Although, new technologies offer innovative and multiple dimensions of teaching and learning process for all kinds of educational institutions, but none of these has been as popular, readily available and accessible as the mobile phones. The mobiles phones with latest features of technology version are most frequently used product by the learners in these day. As mobile devices are becoming ubiquitous, many educational scholars and practitioners have incorporated this technology with teaching and learning environment. Therefore, this new way to use technology help to re-design and reconstruct the education process in numerous ways.

2. Meaning of "M-Learning"

The term "m-learning" or "Mobile Learning" refers the use of Mobile technologies, such as cell phones, or any hand devices are used as a learning instrument to enhance interactive collaborative learning. Mobile learning is known as m-learning, u-Learning, personalized learning, learning while-mobile, ubiquitous learning, anytime/anywhere learning, on-the-go learning and handheld learning. No matter what you call it, mobile learning is an invaluable tool accomplishing recent trends in education such as personalised learning, project-based learning or collaborative learning. Mobile learning is considered to be the ability to use mobile devices to support teaching and learning (Mehdipour & Zerehkafi 2013). One of the best definition of mobile learning is given by O'Malley *et. al.,* (2003) that "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". With this regard, Haag (2011) explained that "multiple definitions of mobile learning already exist in the world of education and training, and some are even inclusive of laptop computers. However, ADL defines mobile learning or "m-learning" as the use of handheld computing devices to provide access to learning content and information resources. Mobile learning is also inclusive of many types of informal learning opportunities and is not only limited to formal training courses." Therefore, the mobile learning is considered when the focuses of teaching-learning process across the contexts and learning is on using mobile or any other hand devices that support teaching and learning.

3. "M-Learning": Extension of "E-Learning"

Right from the beginning, as the new technology is emerged as educationalists always take interest to utilise it as an education tool. Within the last two decade it is become too easy to someone to attach himself with the world at minimum cost and minimum efforts by using these kinds of technology. Gradually-Gradually as there is an extension of technology as the same way, approach and costs of the products (laptops, tablets, mobiles etc.) related with these technologies are becoming cheap, convincible, affordable and useable. One of the most frequently used device is mobile or cell phone with latest technology. There was a time when World Wide Web (e-learning) is considered the

most successful educational tool, but in the present era, mobile- learning has been taken its place. Many research studies, projects confirmed that "m-learning" takes place of "e-learning". The various studies confirmed that "m-learning" consist all of the basic features of "e-learning" as well as replaced many limitations of it. Additionally, the access of mobile web has grown up in multiple numbers rather than the PC internet access. There are many reasons like due to high speed of accessibility, less expenditures, easy connectible, more convincible in time, place, utilisation and the mobile technology is also replaced the wired and provides an wireless learning environment etc. In this context, Mehdipour & Zerehkafi (2013) explained that **"**E-learning can be real-time or self-paced, also known as "synchronous" or "asynchronous" learning. Additionally, e-learning is considered to be-tethered (connected to something) and presented in a formal and structured manner." Furthermore, in m-learning there is a provision of self-study, feedback, supports, teachers- students; students - students' interactions with regard to course content is possible to students. This is a wonderful quality of m-learning that it is available anywhere, anytime. Thus, m-learning is an extension of e-learning and it has wide availability as well as more flexibility in time and place.

4. Implications of "M-Learning"

As soon as, an advancement in the field of technology is occurred as rapidly the uses of these are found significance in the context of learning. With the advancement of technology, the approach, costs of the products on which this kinds of technology are become cheap, convincible in time and place, affordable, collaboratively in groups with Networked mobile and useable like, mobiles, tablets, laptops etc. In the context of various advantages of M-learning, (Attewell, 2005; Turker, Gorgun, & Conlan, 2006; Kumari & Singh: 2009; Mehdipour & Zerehkafi 2013 and Vishwakarma, 2015) defined that although m-learning is at a nascent stage, increased adoption of mobile devices will help m-learning to gain popularity in the learning sphere.

Personalized Learning: M-Learning through a mobile device makes learning truly personalized. It can be used as an add-on tool for the students. However, specified instructions, notes, discussion and specific links can be forward through SMS, MMS, e-mail to the students on personalised level in the specific context, 'specific difficulties' or specific need basis teaching and remedial teaching is possible.

Learner-Centric: The learners have the option to choose learning content based on their own interest, thus it becomes m-learning as a very learner-centric approach. Thus, it supports to the learning process rather than being integral to it just as a tool of teaching.

Self-Paced: Self-paced learning; instant availability of content and on demand support are the others salient features of m-learning. Therefore, in this context students get opportunities to learn on self-pace as they considered better to learn for themselves.

Independent & Collaborative Learning Experiences: It provides users the option to undergo training during non-working hours and encourages collaborative learning, peer interaction, and podcasting etc. Mobile learning can be used to encourage both independent and collaborative learning experiences among the students. This can also support to both kind of learning individualised and group based learning.

Content Consistency: The m-learning provides an option to users to obtain content material on consistency bases. As well as it also encourages their possibilities of learning according to their need and flexibility. In this regard, users of m-learning can remain focused on learning for longer periods.

On-demand Content & Evaluation: If some time users required some extra contents or miss some urgent contents for particular topic in this context on-demand learning contents option is available here for them. Thus, on-demand content is available for learners, they can avail the learning content by request as per their requirements. Moreover, m-learning afford a chance of self-assessment through periodically or topic based tests, where students can test themselves on basic factual information related to a particular topic. As soon as user completes a particular level of learning & assess his learning performance through a particular learning test based on the this level of learning, as he can reach at the next level of learning and then they can demands & get next level of content. Moreover, it helps learners to diagnose problems that require the support of teachers, experts for overcoming the problem.

Interactive Learning Environment: Mobile learning can also be combined with other modes of learning to provide an interactive learning environment to the learners. Therefore, users can interact with the peers, teachers and experts of the subjects on need bases.

Increased Productivity: The flexibility to access immediate job-specific information using mobile devices helps to increase the productivity of an individual. Along with it m-learning provides continuous and situated learning support to the users. Additionally, it provides potentially a more rewarding learning experience.

Bridge the Gap Between ICT & E-Learning: The people who are not more familiar with the ICT they can access and use e-learning through m-learning approach. Thus, m-learning bridge the gap between ICT illiteracy through mobile phone literacy.

Helpful for Reluctant Learners: Mobile learning helps to remove some of the formality from the learning experience and engages reluctant learners. Therefore, this a best features of m-learning that can arrange the learning-situations for the reluctant learners.

A Blended learning Approach: Learning can be disseminated in various ways, ranging from traditional classroom to distance learning, virtual instructor-led training, e-learning, m-learning, and so on. The recent trend in learning delivery is blended learning, which combines

different modes of learning, to make learning more effective and engaging. Blended learning combines the strengths of different learning modes and helps to best fit the learning context in an interactive learning environment. Along with the communication features of a mobile phone, many other learning activity are available here, such as sending media or texts into a central portfolio, or exporting audio files from a learning platform to your phone etc. Therefore, m- learning can be used to provide various types of learning activities to students.

With personalized learning, individuals approach problems in their own way, grasp ideas at their own pace, and respond differently to multiple forms of feedback (Hampson, Patton and Shanks, 2011). Thus, "m-learning" helps to raise self-esteem and self-confidence of the learners (Attewell, 2005 & Vishwakarma, 2015). The advancement in mobile both – networks and devices enhanced its advantages for the learning environment. The various uses of m-learning" construct a control over the main barriers of learning in the absence of interaction; lack of engagement of the learners in learning, lack of interest in the learning environment. Moreover, e-learning can be real-time or self-paced, also known as "synchronous" or "asynchronous" learning. Additionally, e-learning is considered to be —tethered (connected to something) and presented in a formal and structured manner. In contrast, mobile learning is often self-paced, un-tethered and informal in its presentation, because mobile devices have the power to make learning even more widely available and accessible, mobile devices are considered by many to be a natural extension of e-learning (Sharma & Kitchens, 2004). Mobile technologies have sparked the need for the strategies, applications, and resources necessary to support anywhere-anytime connections to formal and situational learning, as well as personal interest explorations (Wagner, 2005). Thomas (2005) posed the question: "How can this m-learning environment change teaching and learning?" and further Thomas suggested that the wireless connections provide attractive learning environments in a number of ways:

Ubiquity: Faculty and students have access to course information 24 hours a day, 365 days a year, wherever they are on campus.

Project Sophistication: Students projects created with laptops tend to be more sophisticated.

Compatibility: Students have access to the same hardware and software as faculty.

Emphasis on Learning and Teaching: Overcoming equipment problems allows greater time and resources to be devoted to pedagogy.

Savings: Replacing desktop computers with laptops, and replacing hard – wired networks with wireless ones translates into cost savings.

Standardization: A standard platform maximises access and minimises need for technical support (Thomas, 2005).

Thus, certainly there is many significant effects on E-learning are added by M-learning. The great challenges of e-learning is replaced by m-learning is in the perspective of accessibility, in this context Clark (2012) pointed out that mobile networks are currently accessible to upward of 90% of the world's population. Hence, on the bases of accessible and other practical utilities, UNESCO (2013) explored that mobile learning as a unique and significance contribution to achieving the Education for All (EFA) goals of increasing education access, quality and equality. The main focuses on three particular EFA goals as they relate to mobile learning:

- Improving levels of adult and youth literacy
- Improving the quality of education
- Achieving gender parity and equality in education (UNESCO, 2013).

Thus, one side, m-learning is supportive to enhance levels of young literacy, increase accessibility& quality of education, reduce gender disparities & overall helpful to promote inclusive education among the masses. On the other hand, Douch *et. al.* (2010) indicated that mobile technologies can improve professional development and teacher training in several areas:

Communication: Mobile devices can be used in conjunction with wireless broadband and video-call services like Skype to facilitate communication between teachers and mentors.

Self-Assessment: Video cameras can be used to record lessons, allowing teachers to reflect on their teaching practice and identify specific areas for improvement.

Innovation: Mobile technologies can be used in teacher education programs to challenge teachers to think creatively about mobile learning and develop the confidence to try new ideas (Douch *et. al.* 2010; Mehdipour & Zerehkafi, 2013).

Therefore, m-learning has a significance effect in the professional development of teachers, it helps to reduce the training costs. The m-learning is not only care for the educational trends but it also provides many imperatives to education like facilitate the process of teaching and learning, direct interaction between the teachers and learners, highly portable, easy to use, easily available instructions can be given in a personalised manner to learners consequently personal support can be provided to learners, helpful to persist on learning task, opportunities to self-assessment, prospects obtain to follow professionals at their own place regardless of time, expenditure and distance. In this way, m-learning contributes a lot in the teaching and learning process from the both ends; it has same significant to teachers as well as students. On the basis of its significance pedagogical thinkers deliberated that mobile technologies can be used as the potential learning tool for students. Thus, learning by mobiles takes place collaboratively in groups, the personalised learning based on mobile apps & games, riddles sustained to an excellent way to do the best engaged of learners in the process of learning with or without teachers.

5. Contribution of Learning Apps in "M-Learning"

M-Learning with networked facilitates learners to engage easily with their associates and technology to for better interaction from place to place, from time to time and from topic to topic. The mobile hardware, software and networking experts are working together for mobile software or apps. Moreover, the present concerns of m-learning, are to develop best mobile-apps (m-apps) that are very significance in term of learning. There are thousands of applications are explore on each and every subjects of Science, Math, Social Studies, English, Engineering & Tech, Arts & Music, and Health & other related subjects that are available at free or purchase version. The processing of these apps depend upon the different configuration of mobile devices and technology and available network services. These technologies and devices provides multiple options to users like to right on their mobile books, contains over meaning of words, Science lessons, most common words used in language. Some m-apps for learning are (i-Books, The Kindle apps, Google Chrome, search Engines, Google Maps, Brain POP Featured Movie, Best Books for Tweens, Pocket Body Lite, Video Science, Teaching with Technology Video Library, Tap To Talk, Fill The Cup, History Line, Pass the Past, m ABS Magic Phonics, Solve the Outbreak, NPR for iPad, Agnitus Games for Learning, Motion Math Zoom, My Script Calculator, Numbler Math Game, Khan Academy, Teacher Kit Too Noisy etc.,) available on of free or payment mode. Moreover, there are many other useable mobile applications that are available according to the needs of users. Thus, these all available mobile apps makes m-learning more useful rather than the other kind of interactivity, because many of these applications can be access free and also can be used with or without the accessibility of internet or web service. As a result, m-apps are also trying to associates with some basic concepts of learning.

Today, there is a flood of various software, hardware, applications and technology in each field of life. The field of education is not untouched with it, these mobile apps are promoting, supporting, accommodating and facilitating learning of the learners. Moreover, some m-apps have also provided various applications to the users like self-learning modules, listening, prompting, learning by doing, practice sets, recapitulation, home assignments etc. But there are many issues and challenges to resolve for mobile learning related with these m-apps. Firstly, there is a great need to consider the learner as the centre of learning whenever these apps are developed. Thus, all the mobile apps not considered the need of a learner as well as not well constructed in the guidance of an educationists & psychologists. Thus, all of these m-apps should be designed to fulfil the desire & curiosity of a child as a large in practical manner as a teacher. Hence, without any doubt the present and future era of technology concentrate on the learning through mobile or other hand devices. In future, there will be a flood of mobiles apps related to every parts of life as well as it will help to learners for learning all types of education at large. These m-apps would be a part of imparting education such as teaching, instructions, training, and indoctrination etc. In the present context, the m-learning and m-apps are also trying to associate some basic concepts of learning but in future there

will a great association between the technology experts and educationists, psychologists and sociologists for the better learning approach to m-learning.

6. Challenges for "M-Learning"

Every technology has some strengths and limitations, therefore mobile devices have also some exception. There is a three main kind of challenges for mobile devices, first is in term of physical attributes; secondly challenges related with technology or operating systems attribute and third great challenge seems that there is lack of associations between the mobile software and mobile learning apps with the pedagogical, psychological and sociological approach of education. The scholars working in the field of m-learning have shown many usability problems and challenges for using m-learning for better and appropriate results. These challenges & problems of m-learning are as follows:

Physical Attributes of Mobile Devices: "M-Learning" Challenges

There is a lack of standardization in physical attributes and operating systems of mobile devices. The research confirmed that there are many hand devices and mobile models; due to this there is a lot of variation in the screen size and colour schemes used in the mobile devices.

Lack of Standardisation in Screen Size, Key Size: Through the various reports related with m-learning, it is confirmed that there are many mobile users, they have their own selection and choice to use various hand devices or mobile sets. Therefore, there existed a lot of variation in the screen size and colour schemes used in the mobile devices.

Small Screen Size of Mobile Device: With the wide range of e-learning content around, a technology is required to repackage content for mobile platforms. The complexity of mobile learning increases when it comes to the display of large content.

Lack of Rich Graphical and Interactive Features: Currently, very few users possess mobile devices with very rich graphical and interactive features. This fragmentation poses a challenge for the developers of mobile learning technology.

Limited Computational Capabilities: The physical characteristics of mobile devices such as, dimension and weight pose a restriction in terms of computational capabilities and support for very rich content of learning.

Limited Battery Life of Mobile Device: The battery life of these devices is limited and is vulnerable to run out in limited time (Kukulska-Hulme: 2007 & Kumari & Singh; 2009).

Therefore, there is a great need for producers and hardware experts of mobiles to find out the appropriate solutions of these challenges related physical attributes of m-learning for the better utility and more significance of m-learning.

7. Technological Attributes of Mobile Devices: "M-Learning" Challenges

There is an absence of standardisation in technological attributes or operating systems of mobile devices. The research studies verified that there is a lot of variations in the technological attributes or operating systems used in the mobile devices.

Mobile Software and Operating systems: The challenge lies in packaging content for multiple screen sizes and mobile software or multiple OS platform of mobile devices.

Connectivity & Portability: The challenges such as connectivity & portability should be in the access of learners whenever the user needs to learn.

Unobtrusive: The learner can capture situations and retrieve knowledge without the technology becoming overly noticeable or imposing on the situation.

Adaptable: The technology can be adapted to the context for learning and the learner's evolving skills and knowledge.

Easy to Use: The learner can use the technology anywhere, to enable communication with teachers, experts and peers. As well as the technology is easily comprehended and navigated by people with no previous experience using it. In m-learning, there is a great flexibility of learning timetable and learning place for students. Thus they can learn anytime and anywhere.

Support Personal Learning: The technology can be personalized to suit the individual learner's abilities, knowledge and learning style. Thus, the technology of mobile and hand devices, is designed to support personal learning rather than general office work (Mehdipour & Zerehkafi, 2013).

Some other challenges related with technology are such software portability, software agent support, caching to save on limited resources design flexibility, scalability, risk of sudden obsolescence, meeting required bandwidth for nonstop/fast streaming, number of file/asset formats supported by a specific device, content security or copyright issue from authoring group, multiple standards, multiple screen sizes, multiple operating systems, reworking existing e-learning materials for mobile platforms etc. (Maniar *et. al.* 2008; Elias, 2011 & Crescente and Lee, 2011). Therefore, there is a great need to resolved with these challenges related to physical attributes technological challenges of mobile and hand devices by the technology and software experts for the more significant results of m-learning.

8. Social and Educational Challenges: "M-Learning" Challenges

The great challenge for m-learning, is a lack of associations between the mobile software & mobile learning apps and psychological, pedagogical & sociological aspects of education. The scholars simplified that there is a lack of association between the social & educational issues used for m-learning.

Accessibility and Cost Barriers for End Users: The main challenge to low cost mobile or hand devices should be to the entire learners. Moreover, the access, availability of mobile network should be approached on nominal cost.

Multi-Cultural Support to Learning: At largely, m-learning is available for learners with same cultural support, that kind of learning could not draw learners' attention properly, thus, m-learning should be provide across many contexts of the learners with a sustainable approach.

Psychological Support to Learning: It is a big challenge for m-learning that demand to make instructions personalized & that can suit the individual learner's abilities, knowledge and learning style, and also is designed to support personal learning. For the pedagogical support, educationists and psychologists concentrates on all kind of changings required in m-learning to facilitate learning and also to control over the risk of distraction of learners. As well as these experts also think how the students' personal and academic lives interruption can be solved in an easy & smooth way.

Theoretical & Pedagogical Issues: There are many issue related with the development of an appropriate theory of learning for the mobile age and prepare a design of technology to support a lifetime of learning. Thus, there is a need to link m-learning analysts with the learning theories and pedagogy of education. This is a great challenge to drive the dynamic interplay of mind and culture, knowledge and meaning, and reality and experience with the help of m-learning.

The Acceptance From Society and Education Community: Finally and the most important challenge that no one of the advance concept based on technology can never be able to replace the significant of class room teaching and a teacher. Thus, there is a great need to find acceptance to m-learning from the society as well as from education community.

In addition to these social and educational challenges, there are some barriers to mobile learning include the high costs associated with equipment, connectivity, maintenance, technical support and teacher training; health-related issues; a lack of policy support and governmental investment; and/or a lack of interest and awareness on the part of policymakers and the public; and negative social attitudes that see mobile phones as disruptive devices that students use primarily to play games, chat with friends and potentially engage in inappropriate behaviours such as cheating and cyber-bullying (Mehdipour & Zerehkafi (2013). The challenges presently outweigh the advantages of m-learning. Therefore, there is a great requirement to work on these challenges with help of the various experts from education, psychology and it demands to work collectively with interdisciplinary and dynamic approach.

9. Final Words

Without any doubt, although some issues still need to be resolved for the end-to-end mobile learning solution, after that m-learning has its own significance and unique features that offers tremendous potential to learners. One of the best use of m-learning is explained by Mehdipour & Zerehkafi (2013) that "mobile learning can happen anywhere: in a classroom, at the dining room table, on a bus, in front of a science exhibit, and anywhere. Portability is not as important as the ability of the learner to connect, communicate, collaborate, and create using tools that are readily at hand. We have got them working as part of the m-learning project. We are using the seductive power of these new technologies to re-inspire young learners who are dropping out of traditional learning. Research and development has been ongoing for the last two years and many learners have already been trying out these approaches and contributing to their development." Thus, mobile learning is not just about the technology, it should be related with the learners. The learner should be at the centre of the learning and the technology should be able to allow learners to learn in their own context. Additionally, Vavoula and Sharples (2009) stated that mobile learning is a social rather than technical phenomenon of people on the move, constructing spontaneous learning contexts and advancing through everyday life by negotiating knowledge and meanings through interactions with settings, people and technology. The appropriate use of ICT can play very significance role in enhancing the learning. The extension of ICT through mobile device is helpful to resolve many challenges associated it. If m-learning can be used properly along with the ICT then it can make a difference to provide accessibility, equality and quality of education in the masses.

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