

A Sustainable Approach to Teaching-Learning Process through M-Learning

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Abstract— The evolution of hand held computing devices like laptops, Personal Digital Assistants (PDAs), smart phones and tablets has paved the way to the ubiquitous learning. The conventional distance learning has already been supplemented with e-learning using mobile devices for effective teaching-learning process. In fact, the term e-learning has been transformed in to mobile learning or m-learning due to inevitable invasion of technology in to our lives. M-learning has addressed the critical challenge of taking education to masses through digitization and bridging the digital divide in developing countries. Embedding m-learning in the teaching-learning process has provided an entirely different dimension to address the sustainability issues in Education Sector. In this paper, we have discussed the need and benefits of m-learning along with the pros and cons pertaining to various mobile devices being used for teaching-learning while on the move. The study also includes the pedagogical implications of m-learning and its sustainability issues.

Keywords—*Mobile Learning; Sustainability; Teaching Learning Process; ICT, Smart Phones; Tablets.*

I. INTRODUCTION

Mobile learning is the ability to obtain or provide educational content on hand held computing devices such as PDAs, smart phones and tablets [1]. Owing to the continuous development of wireless and mobile technology, the m-learning is rapidly becoming the norm of e-learning. From toddlers to senior people are digitally communicating with each other. M-learning has invaded the e-learning scene due to its keys features like independency of the age of the learner, time and place of learning. M-learning provides better connectivity which leads to more interactivity among people. It is learner centered highly flexible and easily adaptable methodology for teaching-learning process. M-learning promotes collaborative learning with higher involvement of the educator as well as learner. The courses taken up through this learning methodology have shown better completion rates and higher retention of the learners in the course work due to interactive nature of learning. But there is a need to look for ways to integrate mobile computing into e- learning to make

courses more accessible and portable. In this study, we have discussed the need and benefits of m-learning as well as advantages and disadvantages related to various mobile devices being used for m-learning along with the pedagogical implications of the methodology and its sustainability issues [2].

II. NEED AND BENEFITS

The class room teaching has its limitations which do not allow the learners as well as educators to explore their full potential. An educator can get assistance of technology as per his/her requirement by integrating technology in class room i.e. by setting up a smart classroom having internet connectivity and by developing multi-media content for the subject to be taught. Though it can increase the effectiveness of teaching-learning process but still it lacks the freedom which a learner requires to grasp maximum content. The heterogeneous group of learners with different learning capabilities makes it more complicated as some of the learners are not able to match the pace of educator but few may cross the same, thus defeating the purpose of smarter learning. This simply translates that the smart classroom teaching is more inclined to facilitate the educator than the learner. Mobile allows teaching and learning to extend beyond the traditional classroom; in case of distance learning, user of portable devices can break the tether of home computer. Portable computing/communication devices such as laptops, PDAs and smart phones connected to wireless networks enables mobility and facilitate mobile learning. Mobile technologies also support learning experiences that are collaborative, accessible and integrated with the world beyond the classroom [3-4]. Moreover the homogeneous group of learners can learn at their own pace anytime and anywhere. Some of the key benefits of m-learning are:

1. Anytime and anywhere learning methodology which allows the learner to access the coursework or e-content even on the move at flexible time.
2. M-Learning encourages in social learning by allowing the learners to explore the potential of social media to connect to the contemporary learners taking up same coursework or the adroit of the subject.

3. Mobile learning brings several opportunities to engage the learner on a digital and social level outside his/her regular work which is entirely different from the traditional trainings at work place.
4. M-learning is a self paced learning as per the capability of the learner beyond the boundary of place and time.
5. Learner focused teaching-learning process allows the heterogeneous group of learners to adapt to the coursework as per their learning capabilities.

Mobile computing /communication devices offer a unique opportunity for the educators and learners in different kinds of instructional settings to capitalize on the flexibility and freedom provided by these devices. However, these benefits demand new pedagogies and new approaches to delivering and facilitating instruction. Learning will involve learners making meaningful connections to resources and other people. The ability to instantly publish their observation and reflections as digital media will empower learners to become investigators of their own environment. M-learning will greatly enhance the distributed collaboration and mobile team opportunities [5].

III. M-LEARNING RESOURCES

There is an assortment of mobile computing devices which are responsible for implementing the m-learning for efficient and effective teaching-learning process. In this section of the paper we will discuss the use of the various devices in the m-learning along with their pros and cons [6-9].

A. PDA (Personal Digital Assistant)

PDA's are affordable and portable computing devices which allow students as well as teacher to work ubiquitously without being dependent on the desktop computers. PDA's are seeing more use in class rooms for quizzing and trivia programs along with grade and assignments tracking tools. A PDA is getting popular for e-learning as it has computing capabilities, provides internet access, networking feature, WiFi equipped device with calendar, note pad, address book and productivity tools and due to its pen/stylus input interference. One can play audio, video, flash movie, can edit document or web content. Further, it support IM, text messages and students can use them to create present projects and conduct research.

The various pros associated with PDA's are large screen, computing/communication tools in one device, text/ data entry are possible, store various information in password-protected database, organize and classify it effectively, group, sort and filter your records and even search through them, compose prioritized to do lists, create trusted reminder system (including recurrence tasks settings), use advanced RTF editor for your notes, export data to different formats: MS Excel, HTML, XML, Text or CSV, manage multiple databases for different kinds of information and create not only categories, but also sub-categories.

But there are certain cons associated with PDA's which

restrict their use are they are their weight and size as they are heavy can't fit in pocket, not sufficient for entering long e-mail or text, fragile and delicate, costs and time limitations and their scope is very limited.

B. I-POD

The iPods are portable media players manufactured by apple inc. allows users to download music, audio books, podcasts, photos and videos. The mobile device provides numerous advantages which allow it to be used for m-learning. Students can use it for recording and listening to audio and video lectures. Students can exchange information files, revise the course book, collaborates on projects, review coursework and prepare for exams, showcase their work and share project result. Though an iPod is small enough to fit inside the front pocket still it has huge storage capacity.

The device comes with lot of advantages accompanied with some disadvantages like its expensive to buy, it's provides one way communication, it's not interactive, it can't play music purchased in iTunes in other (software) mp3 players, it can't be used as a mass storage media, it has a small screen and most of the iPods don't have the recording facility.

C. USB DRIVE

An USB Drive is a mass storage device which can store entire course work and audio-video files if required for sharing and submitting to instructor. The size, speed, portability and huge storage capacity of the device has made is very popular. Its universal compatibility with all the computer systems has made it ideal support device for e-learning. It lacks in versatility as it is a single purpose device and can be used for mass storage only.

D. E-BOOK READER

E-books readers are used to download, store and read text based material. They can store hundreds of e-books, newspaper and magazines. Magnification and highlighting feature facilitate easy reading and marking of text, and full text search makes it easy to find specific passages. An e-books reader is very useful for the research scholars to download and study the research paper on the move. It facilitates a large screen for easy reading. An e-book reader provides digital books marks and highlighters, full text search capacity in addition to portability. Despite its several advantages, there are certain limitations of the e-book reader like it's a single purpose device with limited computing capabilities, it can be hacked easily, it does not have well designed life, it requires power to charge, it can affect your eye sight and cost a significant amount of money.

E. SMART PHONE

A smart phone combines a series of computing capabilities and many other requisite features like dictionaries, encyclopedias, News, weather and stock markets, video calling (Skype, Tango, etc.), games and entertainment, e-book reader, language translators, retail store finders, mobile tag readers (see QR code), converters (money, measurements),

magnifying glass and mirror, internet radio, flashlight, music identifier, YouTube viewer, voice recorder, emergency message sender, compass etc. E-learners can download audio and video lectures and podcast to their smart phone. They can play audio, video and flash movies, display and edit documents; access e-mail and web content, send IM and text messages and uses the phone for mass storage. In addition to the above applications user can also access information and research globally. Thus a smart phone combines a multitude communication and computing features in one compact device. A smart phone is an ideal portable mobile device for m-learning despite of few disadvantages like its virtual keyboard which makes text entry inefficient for longer e-mails or text, its cost is close to a PC, it starts hanging with larger amount of data and it requires regular updates with latest version and if the new version take more data the mobile start getting slow down.

F. ULTRA MOBILE PC

An ultra mobile PC is same as standard tablet PC but in a smaller package but it is studded with several key features like audio, video, WiFi, internet, networking, browsing, gaming etc. Students can download audio and video lectures and podcasts to their UMPCs, create and edit course related assignments, surf the web, send e-mails, IMs and text messages and log on to course web sites from distance. UMPCs enable global collaboration scientific experimentation and research. The main advantages of the device are ultra small portable PC, sensitive screen so it require a light touch to operate and power and performance far superior to any PDA or Smartphone. Handfuls of disadvantages associated with the device are its high cost, non-pocket able size and it requires comparatively high power although it remains below a conventional laptop.

G. LAPTOPS/TABLET PC

The most complete and functional system of all portable devices, laptop/tablet PCs comes with Bluetooth, WiFi and is internet enabled. Students can download audio and video lectures and podcast; create and edit course related assignments; surf the web; send e-mails, text messages, images, and log on to course web site at home or while on the move. This provides the high level interactivity among students, lecturers and the rest of the information. It is the perfect collaboration of scientific experimentation, researches and understanding.

The advantage of using a laptop is mobility. Its light weight, size and portability allow us to use it in almost any time and anywhere. Another attribute of this mobility factor is being able to connect to the Internet using wireless technology and therefore have access to the latest information at all times. This capability is made possible by either being in close proximity to a wireless Internet connection or use a cellular broadband-based wireless connection plugged into the laptop. Laptop/tablets PCs are great for students who need to take their work with them. They provide the most power and capabilities of all the portable devices. All good things have a

down side and laptops have a set of weaknesses inherent in their design. They can get easily damaged if we drop it from the height. Laptop/tablet can be stolen very easily. If we face any problem in desktop machine then it can be easily handled by changing that particular part that is causing problem which is not very expensive whereas in laptops we have to change the whole machinery which is very expensive depending on the model and brand of that laptop. Technically laptops are not upgraded by changing only one part of the machinery but on the other hand PCs' can be upgraded easily.

IV. SUSTAINABILITY ISSUES

M-learning is an incredible application of Information and Communication Technology (ICT) in education, as it is a sustainable approach towards teaching-learning process making optimum use of technological advances addressing all the three dimensional of sustainability viz. economic growth, social progress and environmental protection. The use of ICT in education via M-learning is contributing in the economic growth of the nations as the industry of online education and certification is now being powered by hand held mobile computing devices. The growth in the ICT sector has been directly making a positive impact on ubiquitous learning and finally on the economic growth of the country. M-learning has been generating employment by satiating the knowledge hungry people. The data traffic generated through m-learning is phenomenal. The audio-video lectures taken up by the learners contribute not only to the growth of telecom companies but it has a role to play in the economy of the nation due to economy of scale involved in the process. M-learning allows learners to connect to the remote educators, subject experts as well as co-learners virtually. The social connection achieved is so huge that it could have never been possible in the conventional class room teaching-learning process. Thousands of learners can interact on a single learning platform to enhance their knowledge leading to progress of the society at large. The physical boundaries get broken and the knowledge spreads lightening fast to make M-learning as one of the catalyst of the social development. A lot of resources get saved when the class room teaching methodology has been replaced by m-learning. The ubiquitous nature of the m-learning gives it an edge to conserve the consumption of a large of number of resources which would have been used in case of conventional classroom learning. It is not only the fuel of the vehicle being used to reach a class room which get conserved but also a large amount of one of pertinent educational aids i.e. paper get saved. This mode of teaching-learning influences the environment a lot. But there is a darker side of the technology which should be addressed to. M-learning may earn us plenty of carbon credits but it may cause health implications due to excessive exposure to Electromagnetic Radiations. The isolation and emotional instability of the learner caused due to constant use of technology for learning may threaten the social aspect of the sustainability. The e-waste is another matter of critical concern caused due to constant advances in the mobile technology posing a threat to environmental sustainability [10].

V. CHALLENGES

There are few challenges which can defeat the purpose of e-learning or m-learning if not addressed. The first one is that it could give tech savvy learner an advantage over non technical learner. The disparity can create a different level of digital divide among the learning community/students. Another challenge is checking the regularity of the learner taking up e-learning courses because it is very easy to fake or cheat the educators when you are on the m-learning mode instead of tradition classroom mode. Further, the methodology is embedded in the classroom teaching, it gives the rigid connectivity in the classroom but it is tough to connect multiple devices in the single class because of its learner centered nature and each learner set a level according to their need. The challenges not only come from the learner side but the educational enterprises may also play the trick by launching a new high tech package for the same old dull and boring content. In addition to the two way challenges being put forth by learners as well as educators, the sustainability issues of the technology in education is the other matter of serious concern [11-12].

VI. CONCLUSION

The advancement in the ICT and mobile technology along with hand held computing devices has opened new avenue of opportunities in the education sector through ubiquitous learning or m-learning. This any time and any where learning has transformed the teaching-learning process for better. M-learning has addressed the vital challenge of bridging the digital divide in developing countries through digitization of educational content. Embedding m-learning in the teaching-learning process has provided a new dimension to address the sustainability issues in Education Sector. In this paper, we have discussed the need and benefits of m-learning along with the pros and cons pertaining to various mobile devices being used for teaching-learning while on the move. The study also includes the pedagogical implications of m-learning along with its sustainability issues. It has been concluded that the m-learning is not the substitute of the conventional class room teaching but it can be a supplement to the same and can co-exist in order to achieve the optimum leverage to achieve economical, social and environmental sustainability in the education sector.

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