CHAPTER - 1

INTRODUCTION

1.0 INTRODUCTION

Mobile Learning is a modernistic solution to the educational problems in this rapid development of wireless communication and sensor technologies. Wireless technology has provided wonderful handheld devices like cellular smart phone, Tablet PC, Personal Digital Assistants (PDA) and note book computers etc. These wireless enabled devices are more functional and powerful for their storage capacities and transfer of data. They are of small size, light weight, reusable, portable, cheaper and user-friendly, where the users can fetch their important data anywhere. These handheld devices are the major scientific innovations of the century and have become more popular across the globe and they are also marvelous devices which can be used for educational purposes effectively [Liu, 2007, Massey, Ramesh & Khatri, 2006; Peters & Ben Allouch, 2005; & Pownell & Bailley, 2000]. The development of digital media technology in the twenty first century has led to a rapid development of moving images as an educational medium. Higher education is experiencing a paradigm shift in how video-based learning resources are delivered. Internet technologies have enabled the delivery of interactive video-based learning while technologies like handhelds have enabled the flexibility of learning [N.Maniar, E.Bennett, S. Hand and G.Allan 2008].

“The enormous use of mobile phones and wireless devices has enabled a long expected dream of learning anywhere, anytime, any data, in any network, on any wireless device” as shown in figure 1.1.

Mobile learning can be defined as

(i) ‘Mobile learning is a kind of electronic learning which is based on the use of mobile devices anywhere at any time’. These devices must support wireless communication technologies (GPRS, GSM, IEEE802.11, Bluetooth and infrared) which have a possibility to present teaching materials and to realize synchronous and asynchronous communication between learners and teachers [Georgiev. T. Georgieva. E, Smrikarov. A., 2004, Evgeniya.G,Angel S. Tsvetozar.G].
(ii) ‘Mobile learning is a special electronic learning supporting mobility and needs existing E-learning application improved from media content to transmission technology’. Mobile learning takes wireless communication instead of wire communication in E-learning to build the network platform, since both mobile learning and E-learning are systems on network technology environment [ANANI Adi, ZHANG Deng-yin, Li Hai-bo, 2008]

(iii) ‘Mobile learning is a method in which wireless and mobile technology is used for education by extending access to a desktop based on-line environment to handheld devices such as mobile phones or wireless devices used as part of a mobile community [Farooq 2002].

(iv) ‘Any activity that allows individuals to be more productive when consuming, interacting with, or creating information, mediated through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity, and fits in a pocket or purse’[E-learning Guild].

(v) ‘The exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and learning’[MoLeNet]

![Figure 1.1 Mobile Learning Concepts & Skills](image)

Education is a process by which a person’s body mind and character are formed and strengthened, thus enabling a person’s holistic development of personality through
knowledge [K.Balaveera Reddy]. Electronic learning is a learning environment supported continuously by evolving, collaborative processes focused on increasing individual and organization performance [Robert K Logan, www.managersforum.com/elearning/index]. Electronic learning is acquisition of knowledge distributed and facilitated primarily by electronic media. This form of learning currently depends on networks and computers but likely to evolve into new systems consisting of variety of channels (Eg.wireless satellite) and technologies as developed and adopted [Tim.L, Wentling, Consuelo Waight, James Gallaher, www.learning.ncsa.uiuc.edu / papers / eleranlit.pdf].

Learning performance of students can be improved by providing right content at the right time and at the right place to the right devices and through the right network. Through mobile learning, watching the video significantly increases student knowledge of the subject area. Mobile learning environment relies heavily on video based material, which is displayed on a mobile device with a small screen, where the effectiveness of the learning experience will be inhibited. While developing video based content for learning or teaching, presentations involve cost efficiency and quality. Any mobile learning systems describe the benefits to the students and improve their performance through video based learning. The visual representation of a lecture on video usually gets more attention to any subject [Devinder Singh & Zaitun A.B., 2006].

Mobile learning can be used to support a wireless online virtual community i.e. linked to a campus server. This would enable students who are interacting with their handheld devices to merge their learning experiences in a shared collaborative environment both synchronously and asynchronously [Farooq, 2002]. Mobile learning also offers another vision using handheld devices in wireless classroom environments consisting of laptop computers, PDA’s mobile phones and wireless access points. The access points connect to the wired network and the internet. Wireless classrooms can also be used as a replacement for conventional, instructional and Electronic learning (E-learning). Students in a classroom are able to access distributed resources such as electronic libraries, on-line databases, personal file and database collections, real time data and laboratory [Kabara, 2000]. A real-time interactive wireless classroom uses pocket PC’s and notebooks connected via wireless network to the internet. This enhances learning experience by increasing the interactivity between instructor to student, student-to-student and also provides immediate hands on experience into the daily lecture [Devinder Singh & Zaitun A.B., 2006].
Multimedia application information including video, audio files, phone calls, voice recognition, still images, mobile, web, interactive media can be delivered between server and client through many kinds of transport techniques (protocols) such as WAP, E-mail, SMS and MMS and HTTP. Mobile learning is the integration of data service and mobile service. Mobile learning uses the power of the network to enable learning of many things, at anytime, anywhere, at any place in the modern age of technological innovations [ANANI Adi, ZHANG Deng-yin, Li Hai-bo, 2008].

Mobile learning uses the latest mobile phones and wireless network technology to achieve the effectiveness of the learning process. It offers more interactivity, greater flexibility, more functionality, reusability, interoperability, accessibility and educational experience with a single device. This project is focused on the usage of video lesson in education using mobile learning system which paves way to the improvement of learner’s knowledge, performance, achievements and individual learning system and also to develop their problem solving skills. The main motivation of the research is to attract student’s attention and motivate them to learn difficult subjects and also to find alternative methods to ensure practice for students in the field of mobile learning.

**1.1 BACKGROUND OF THE STUDY**

Education has been from ancient times, an integral part of life of any person, communication has been the starting point for any activity. It started with signs and gestures. Oral communication came later and helped passing knowledge from present generation to the next. Every civilization had its own method of teaching and learning. The colonial system of education transformed traditional education into classroom education (Black board) across the globe. British Emperors introduced classroom system all over the world to overcome traditional teaching and learning methods which paved way for enjoyment. The latest gift of science to mankind is perhaps the mobile phone together with a bunch of wireless devices. This has started and will continue to be the most effective means for learning and gaining knowledge. At present mobile phones and wireless devices serves as important tools for high end learners who continue their education “Learning while Earning”. The present situation compels an adult to earn while learning. Communication and technology play a major role in the field of education system. These devices will facilitate learning at all levels and for all persons, boundaries of the learning system is as shown in figure 1.2.
1.1.1 Conventional Learning

Chalk and talk – This was the methodology for imparting knowledge. This method means a face-to-face environment, reading attention and concentration from learners. Areas could be attended to by question-answer device and supplemented by group study among classmates like group discussions team projects, group presentations, individual assessment through quizzes and tutorials [Heckman & Owens 1996]. And also it has some disadvantages of lack of learning resources in a conventional classroom. Student’s interaction is limited in a large classroom, poor feedback from students on the delivery of lectures [Devinder Singh & Zaitun A.B., 2006].

1.1.2 Instructional Learning

Conventional learning, then improved to Instructional learning. Lab Manual – Instructions are given in the lab manual on how to do the experiments in the lab. Equipments User Manual – to inform that how to operate the instrument or equipment. For
example, Fire extinguisher user manual to instruct how to use and its operation, Electronic equipments – user manual gives information about safety measurement and communication.

1.1.3 Electronic Learning (E-learning)

E-learning is commonly referred to the intentional use of networked information and communication technology in teaching and learning. The term E-learning comprises a lot more than online learning, virtual learning, distributed learning or web-based learning. As the letter ’E’ in E-learning stands for the word ‘Electronic’, E-learning would incorporate all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices (CEMCA, 2006). E-learning refers to use of electronic applications and processes to learn. E-learning applications and processes include web-based learning, computer-based learning, virtual classrooms and digital collaboration. Content is delivered via the internet, intranet, extranet, satellite TV, CD-ROM and Blu ray with multimedia capabilities [ISP, 2004].

E-learning is defined as individualized instruction delivered through public (internet) or private (intranet) computer networks. E-learning is also referred to as online learning, web-based learning (WBL) and the virtual classroom. E-learning was first called as ’internet-based training’ and later ‘web-based training’. Today these terms are still being used, along the variations of E-learning [Jugon, 2003].

Technology is much more than computers in the classroom. According to Lovelace (1999) there are two types of E-learning: Asynchronous or self-paced and synchronous or instructor-led. The degree of interactivity, sophistication and expense is different in each of the types. E-learning is not traditional computer-based learning (CBL). Neither is it downloaded to a hard drive like CBL; rather, it is stored on a server and accessed over a network by a web browser. E-learning programs are saved on the internet / intranet and can be accessed anytime, anywhere, regardless of the computer platform, as long as the user has subscribed to an internet service provider (ISP).

E-learning also known as ‘Web-based learning’ and ‘Internet-based learning’, means different things to different people. The following are few definitions of E-learning:

- E-learning is the convergence of learning and the internet. [Bank of America Securities]
• E-learning is the use of network technology to design, deliver, select, administer and extend learning [Elliott Masie, The Masie Center].

• E-learning is internet-enabled learning. Components can include content delivery in multiple formats, management of learning experience, and a network of community learners, content developers and experts.

• E-learning provides faster learning at reduced costs, increased access to learning and clear accountability for all participants in the learning process. In today’s fast-paced culture, organizations which implement E-learning provide their work force with the ability to turn change into an advantage [Cisco Systems].

The most accepted definition for E-learning is: ‘The use of technologies to create, distribute and deliver valuable data, information, learning and knowledge to improve on-the-job and organizational performance and individual development’

E-learning offers – individualized learning, group learning, virtual learning, flexible studying and tools for teachers. Collaborative learning requires communication technologies either in the form of e-mail, shared workspace, or video conferencing in order to provide learners with the means of group oriented learning and discussion exchange between lecturer and group of learners. Collaborative learning allows direct contact between the instructor and group of learners through communication technologies ranging from e-mail and share workspaces to video conference systems.

E-learning is a learning environment which supports continuous collaborative with focuses on increasing individual and organization performance. It is the acquisition and use of knowledge distributed and facilitated primarily by electronic media. E-learning may incorporate synchronous or asynchronous access and may be distributed geographical by with varied limits of time. E-learning is mostly targeted towards PC users using fixed line access to internet.

1.1.4 Mobile Learning (M-learning)

1.1.4.1 History of Mobile Learning

MLearn 2002 was the first European workshop on Mobile and Contextual learning held at the University of Brimingham. Mlearn 2003 was the first conference held in London. Both were supported by the European Commission, and spawned the start of a series of international conferences on Mobile and Ambient Learning. The first fully
international conferences was in Rome in 2004 with delegates attending from Australia, Finland, Germany, Greece, Israel, Italy, Spain, Switzerland, UK and USA. MLearn 2005 in Cape Town was a key research and networking event for researchers, strategists, educators, technologists and practitioners from all over the world. Attracting participants from more than 60 countries, the mlearn series has become the world’s largest conference on mobile learning and emerging ambient technologies. MLearn 2006, the 5th World Conference on mobile learning, in Canada, continued to stimulate critical debate on and research into theories, approaches, principles and applications of mobile devices for promoting learning. Australia, through the efforts of a small group of enthusiastic professional holds a leading position in the development of mobile learning and conferring the hosting of the conference at Melbourne in recognition of the status of Australia within the International Community. Mlearn 2007 also saw the formation of the International Association for mobile learning.

Mobile learning currently exploits both handheld computers and mobile telephones and other devices that draw on the same set of functionalities. Mobile learning using handheld computers is obviously relatively immature in terms of both technologies and pedagogies, but is developing rapidly. It draws on the theory and practice of pedagogies used in technology enhanced learning and others used in the classroom, the community, and takes place, as mobile devices are transforming notions of space, community and discourse [Katz and Aakhus 2002; Brown and Green 2001] along with investigative ethics and tools [Hewson, Yule, Laurent and Vogel 2003]. The term covers personalized, connected, and interactive use of handheld computers in classroom [Perry 2003; O’Malley and Stanton 2002], in collaborative learning [Pinkwart, Hoppe, Milrad and Perez 2003], in fieldwork [Chen, Kao and Sheu 2003]. Mobile devices help and support corporate training for mobile workers [Gayeski 2002; Pasanen 2003; Lundin and Magnusson 2003] and are enhancing medical education [Smordal and Gregory 2003], teacher training [Seppala and Alamaki 2003], music composition [Polishook 2005], nurse training [Kneebone 2005], and numerous other disciplines. They are becoming a viable and imaginative component of institutional support and provision [Griswold, Boyer, Brown et al. 2002; Sariola 2003; Hackemer and Peterson 2005]. The first comprehensive handbook of mobile learning was published on October 2005 [Kukulska-Hulme and Traxler 2005], but accounts of mobile distance learning are still infrequent [John Traxler (IRRODL, 2007].

New concepts emerging in mobile learning [Kukulska-Hulme and Traxler, 2005] forthcoming are:
Technology-Driven mobile learning: Some specific technological innovation is deployed in an academic setting to demonstrate technical feasibility and pedagogic possibility.

- **Miniature but portable E-learning**: Mobile and handheld devices are used to re-enact approaches and solutions already used in conventional E-learning, perhaps porting some electronic learning technology such as a Virtual learning environment (VLE) to these technologies or perhaps merely using mobile technologies as flexible replacements for static desktop technologies.

- **Connected classroom learning**: The same technologies are used in classroom settings to support collaborative learning, perhaps connected to other classroom technologies such as interactive whiteboards.

- **Informal, personalized, situated mobile learning**: The same technologies are enhanced with additional functionality, for example location awareness or video-capture deployed to deliver educational experiences that would otherwise be difficult or impossible.

- **Mobile training / performance support**: These technologies are used to improve the productivity and efficiency of mobile workers by delivering information and support just-in-time and in context for their immediate priorities [for Gayeski 2002]

- **Remote / rural development mobile learning**: This technology is used to address environmental and infrastructural challenges and it also deliver and support the education where conventional E-learning technologies would fail, often troubling accepted developmental or evolutionary paradigms.

### 1.1.4.2 System of Mobile Learning

Mobile learning is defined and conceptualized in terms of devices and technologies; in terms of the mobility of learners and the mobility of learning, and in terms of the learners experience of learning with mobile devices such as PDAs, smart phones or wireless devices [John Traxler, 2007].

The figure 1.3 shows the general classification of mobile learning system, it allows learners to collaborate through an on-line or off-line interaction with teachers and other learners. The educational process becomes more flexible and in-turn meets the need of lifelong learning. Mobile learning can also be a good educational tool for challenged
persons. The use of wireless, mobile, portable, and handheld devices are gradually increasing and diversifying across every sector of education in these developed and developing nations. The above pattern of learning will improve the students understanding and retaining capacity for a long time which will be helpful to the students preparing for their academic, competitive and entrance exams. In case of unavoidable circumstances, if a student is unable to attend the practical sessions; the practical lab sessions can be digitalized so that the student can go through the live lab experiments with mobile devices.

![Diagram showing the classification of m-learning systems](image)

**Figure 1.3 A General classification of m-learning systems**

[E.Georgieva, T.Georgiev A.Smrikarov, 2005]

Mobile learning also avoids the necessity of copying matter written by the instructor on boards. Students can make use of web browsing, Multimedia Message Service (MMS), to comprehend same notes in a short duration. Sometimes part-time engineering students are so busy in their jobs where they are unable to browse the internet or view e-mail; mobile learning provides the flexibility to go through lessons by sending the lessons to student’s mobile devices.

Video is a powerful medium for the teacher to impart. A video based learning system engaged students in conversation and debate on the subject matter and, in some cases video’s can highlight theoretical concepts when teaching specific subjects. The student could get more detailed information about the subject within 15 to 20 minutes. This is less expensive and less time consuming. The student can observe the information on the subject visually which is more efficient than reading. Revising the learned subjects is also made easier by watching video lesson and listen the subjects during the time of travelling.
The student can use the video as the alternate or supplemental sources for his learning. In the adult point of view academics are very boring and vague. The teacher can develop the video for this type, and the student can use this as the supplemental source of learning which will be helpful and also motivate him to learn the difficult topics. Visual is more advantage than his/her reading, if (s)he watches the video two or three times the observation of the particular subject will increase automatically.

1.1.4.3 Characteristics of Mobile Learning

The characteristics of mobile learning as given in Mlearn 2002 - Mlearn 2011, WMTE’02 conference proceedings, is described in figure 1.4.

**Accessibility:** Technology enabled equipments have made mobile connections easier and cheaper even to remote areas including islands and peaks where defense personal and tribal people who are nowadays coming into normal stream of life by way of education. Mobile learning system is a boon to people living in such areas as they can easily learn by various means GSM, GPRS, Wi-Fi etc. without teacher and a classroom wherever which is not possible.

**Flexibility:** In case the user’s mobile is non-functional due to some reasons, mobile learning facility can be made use of some other phone since everyone in the family have a mobile phone nowadays.

Figure 1.4 Characteristics of Mobile Learning

11
**Immediacy:** Course material sent through mobile phones can reach the learners immediately. In mobile learning system students can use the study materials immediately as and when uploaded and can read comfortably during their available time and the same can be stored and retained for a longer duration.

**Interactivity:** Mobile learners can interact or react easily and immediately with the coordinator or with co-learner’s leading to flexibility. Learning becomes agreeable and meaningful.

**Mobility:** MOBILE the word itself clearly states that it can be taken to any place at any point of time. This facilitates ongoing learning at different locations at any point without any interruption.

**Privacy:** Learners who move from rural to urban area are not acceptable to the modern environment. They feel discomfort while studying with others who had learnt through English medium. Mobile learning provides privacy when compared to others sources like conventional learning. This also gives the facility of individual attention.

**Portability:** Modern equipments in the new scientific world like smart phones provide third generation technology for convenient handling by children to senior citizen. Modern smart phones are weightless, equipped with clear pictures and upgraded with the required modulations with internet facility. Portability provides an additional advantage to mobile learners.

**Reusability:** Mobile learners can go through the subject many times till they are familiar with that subject and can go through the subject repeatedly as it is stored in mobile and will be retained for a longer period and can be transferred to other systems which are easily accessible.

**Reliability:** Mobile learners’ can easily rely on the up gradation of which, however course material cannot be interpreted or be made specific to a particular learner. But learners can exchange their views and thoughts with their co-learners compared to all source mobile material uploaded are reliable and be accessed with no significance.

**Security:** A protection system has to be provided in mobile phones to guard against virus.
1.1.4.4 Reason for preferring Mobile Learning

- In conventional learning, the learner can clear his/her doubts and acquire knowledge only in a particular place at a particular time. But in mobile learning one can go through at any place, any time and (s)he can retrieve as many times as (s)he can till (s)he is clear of his/her subject.

- In conventional methods one has to restrict to particular teacher to whom the subject is allotted, in mobile learning (s)he can use many resource persons teaching the subject at one point.

- In the conventional method there is possibility of missing a lesson. The age factor and professional limitations play a major role in conventional studies but in mobile learning a learner can read at any age at any profession. Mobile learning is easily accessible to female learners when compared to males as it is easy and compact, safe and as the option of learning at any time.

- In conventional learning children are not attracted and do not show interest in learning but in mobile learning they show special interest as it is visualized and more of playing in nature.

1.1.5 Comparison of Conventional learning, E-learning and M-learning methods

Table 1.1 Provides the advantages of mobile learning when compared with conventional and electronic learning.

<table>
<thead>
<tr>
<th>Conventional learning</th>
<th>Electronic Learning</th>
<th>Mobile Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students may travel a long distance to the classroom learning.</td>
<td>Students may travel to an internet site or to the computer system or Computer lab or internet lab</td>
<td>Students may learn anywhere, anytime, anyplace, on any wireless device, any data, on any network.</td>
</tr>
<tr>
<td>The learners should have chalk &amp; board, projectors and classroom environment</td>
<td>E-mail, chat, video conferencing, computer conferencing and web casting</td>
<td>Short message service (SMS), multimedia message service (MMS), voice calls, video calls, voice chat, conference calls</td>
</tr>
<tr>
<td>The learning materials can be delivered through chalk &amp; board and printed materials.</td>
<td>Learning materials can be delivered through e-mail, internet, intranet / extranet, chat and conferencing.</td>
<td>Learning materials can be delivered through wireless internet connectivity (Wireless LAN), Wireless Fidelity (Wi-fi), Bluetooth, General Packet Radio Service (GPRS), Global Mobile System (GSM), Wireless Application Protocol (WAP) for the many communication technology.</td>
</tr>
<tr>
<td>Group discussion, team projects, presentations, quizzes are effective.</td>
<td>Individualized learning, collaborative learning and situated learning</td>
<td>Individualized learning, personalized learning and self-study</td>
</tr>
<tr>
<td></td>
<td>Conventional learning</td>
<td>Electronic Learning</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Lack of resources in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>conventional classroom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students have to be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>assembled in a classroom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in a particular location</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limitless geographical areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>like computer lab / internet labs</td>
<td></td>
</tr>
<tr>
<td>Less collaborative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>learning approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single format (writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>on the board) of notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Students may take the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>notes in the classroom]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning materials are</td>
<td></td>
<td></td>
</tr>
<tr>
<td>developed by the teacher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or subject experts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning materials are</td>
<td></td>
<td></td>
</tr>
<tr>
<td>developed through use of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the team approach, web</td>
<td></td>
<td></td>
</tr>
<tr>
<td>designers, graphic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>artists, animators,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>producers and subject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>experts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black board, green board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and project screen</td>
<td>Computers (Desktops), and laptops</td>
<td>Mobile phones, smart phones, Personal Digital Assistants (PDAs), Tablet PCs, note book computers, iPod, iPad or any other wireless devices.</td>
</tr>
<tr>
<td>Poor feedback from the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>students in delivering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the content in the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>classroom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust of environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning materials in the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>form of papers and printed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>books</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immovable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-face lecture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture-based</td>
<td></td>
<td></td>
</tr>
<tr>
<td>communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication technologies are used LAN, Blue tooth.</td>
<td></td>
<td>Communication technologies are used Wireless LAN, Wi-Fi, Blue tooth, GPRS, GSM and WAP</td>
</tr>
<tr>
<td>Communication technologies are used Wireless LAN, Wi-Fi, Blue tooth, GPRS, GSM and WAP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate feedback from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactivity is fast,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>so the feedback also</td>
<td></td>
<td></td>
</tr>
<tr>
<td>immediate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dustless learning and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>teaching environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Dust free environment]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dustless learning &amp;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>teaching environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Dust free environment]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning materials in the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>form of digital can be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>stored in the hard disk,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD-ROM, Pen drive etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portable, small in size,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>light weight, personal,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>greater flexibility,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>reusability, mobility and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>interoperability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-paced, un-tethered,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>informal learning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.2 STATEMENT OF THE PROBLEM

The main purpose of the research study is to analyze the effectiveness of mobile learning by identifying suitable parameters. These parameters were used to evaluate the effectiveness and usage of video lessons its influence on the performance of student’s learning capability.

1.3 PURPOSE OF THE RESEARCH STUDY

Education is more important in this modern world for survival and for cordial relationship with others. Today everyone across the globe wants to know about the past, the present and the future. In the past, with knowledge of the importance of education, it was taught in many ways. In current political scenario, every nation wants to overpower others. Hence, all nations are allotting more funds to education, next to defense. In most of the countries, science has provided a way to deliver education to all through mobile phones, satellite communication signals helps transmission from orbit across the globe and as mobile with Nano technology which has become an integral part of life. Nano technology has brought all the required modern facilities together in the form of handy equipments. Learning in older methods is costlier and time consuming and now mobile learning has overcome the education methods where mobile phones can be used for converting ancient learning method and other modes to modern method at an economical cost and user-friendly.

Most research reveals drop outs starts at secondary school level as it is the age of adolescence. Mobile learning provides individual, all convenient facilities to study. Mobile learning also provides an opportunity for graduates to pursue their higher education. Community radio broadcast learning material can be clearly listened to over mobile phones in frequency modulation wavelengths and if needed can be recorded and replayed whenever necessary. Some smart phones even have the facility to record automatically at a particular time and keep it safe for the learner to listen during free time and / or before the examination.

1.4 NEED FOR THE RESEARCH STUDY

Learning is a sequence of process for developing new intuitive ideas, feelings convergence and gain that may be proliferated through knowledge. There are several methods of learning like individual learning, interactive learning, collaborative learning and group learning for getting knowledge. Engineering education gets the best support from science and technology. The standard of education for adult level is very important to
ensure good results for learners. Need to improve the adult’s education with additional source of learning because they need to get the openings from Industries, IT companies, Government, Public and Private sectors with the good grade. The purpose of selecting the research study of mobile learning system is to improve the students’ learning performance by providing the right content at the right time, the right place, with the right device, through the right network, to the right learners, by means of synchronous and asynchronous communication. Students show special interest in watching a video lesson particularly in mobile phones or wireless handheld devices due to easy handling and compactness. The utilization of wireless handheld devices such as mobile phones, PDA in mobile communication develops a new technology called wireless network technology to process the data for creating, storing, retrieving, importing, exporting and to transfer in the required format. Thus the wireless network technology is ubiquitous. The mobile phones are sophisticated and cost effective, economical and have many uses. Its performance is good and excellent in all aspects related to all other advanced technology. The rapid development of manufacturing and production engineering process has brought down the cost of mobile phones. Nowadays, the wireless handheld devices are smaller in size, easy in operation, high speed data transfer and greater flexibility at all the times.

Many research scholars have carried out research work in countries such as UK, USA, Malaysia and Taiwan on learning through wireless handheld devices explained in Chapter 2. Research studies revealed that learning through wireless handheld devices in the mobile learning system adopts the learner’s knowledge and performance. Hence, an innovative research study has been attempted through this research work, to identify the Effectiveness of video lessons using Mobile Learning Technology for teaching learning process. Since, the mobile learning system provides the supplemental source of material in the field of teaching and learning, this educational process will become more flexible and will in-turn fullfill the needs of lifelong learning. Mobile learning system can also be a good educational tool for disabled people and need to enhance the conventional classroom teaching and learning in a unique and innovative approach.

1.5 APPROACH OF RESEARCH STUDY

In view of the objectives of the study, research has been designed to study the effectiveness of video lessons using mobile learning technology in the undergraduate engineering students and teachers in higher education institutions. The study is analytical and descriptive in nature. The design of the study involves the following processes:
i) Conduct the survey of students learning styles, habits and learner type
ii) Conduct, entry behavior test for students
iii) Collection of general information from students, teachers and related it to mobile learning websites.
iv) Exhibiting video lessons using mobile learning technology
v) Conduct, post test for students
vi) Collection of questionnaire survey for students and teachers in mobile learning

1.6 RESEARCH QUESTIONS

The study aims at assessing the problems on research objective and addresses the following research questions.

1. Is mobile learning more effective than e-learning and conventional learning?
2. What are the factors that influence technical experience, learning experience and learners experience to the mobile learning technology?
3. Usage of video lessons, How video component is useful in engineering education system?
4. How the video lessons are effective in teaching and learning medium?
5. The impact of mobile learning on students behavior performance

1.7 OBJECTIVES OF THE RESEARCH STUDY

• To study the use of educational video lessons on selected topics of the circuit branches of engineering.
• To develop delivery mechanisms for video lessons through mobile phones and other wireless devices for students and teachers.
• To measure the learning outcome of students.
• To analyze the impact of video lessons on the performance of students on learning.
• To compare the effectiveness of mobile learning with conventional and other electronic learning methods.

1.8 HYPOTHESES OF THE RESEARCH STUDY

The hypotheses of this research study have been found, forty parameters for assessing the effectiveness of mobile learning of teachers and students and behavior performance of the students in the area of education. The hypotheses have been grouped into five categories, namely,
Category 1: Hypotheses relating to the difference between the assessments of teachers with respect to the effectiveness of mobile learning technology.

Category 2: Hypotheses relating to the difference between the mean ranks of parameters assessed by the teachers with respect to the effectiveness of mobile learning technology.

Category 3: Hypotheses relating to the differences between the assessments of students with respect to the effectiveness of mobile learning technology.

Category 4: Hypotheses relating to the difference between the mean ranks of parameters assessed by the students with respect to the effectiveness of mobile learning technology.

Category 5: Hypotheses relating to the difference between the mean value of control group, experimental group1 (E-learning) and experimental group2 (M-learning) assessed by the students with respect to the behavior performance.

A total of 41 hypotheses have been prepared and presented as five categories.

CATEGORY 1:

Hypothesis 1: There is no significant difference between the assessments of teachers of different departments with respect to the effectiveness of mobile learning technology.

Hypothesis 2: There is no significant difference between the assessments of teachers with different designations with respect to the effectiveness of mobile learning technology.

Hypothesis 3: There is no significant difference between the assessments of teachers with different years of teaching experience with respect to the effectiveness of mobile learning technology.

CATEGORY 2:

A. Mobile learning frame work Model – I – Osman’s Model (Teachers)

Hypothesis 4: There is no significant difference between the mean ranks of parameters in Mobility of Technology assessed by the teachers with respect to the effectiveness of mobile learning technology.
Hypothesis 5: There is no significant difference between the mean ranks of parameters in **Mobility of Learning** assessed by the teachers with respect to the effectiveness of mobile learning technology

Hypothesis 6: There is no significant difference between the mean ranks of parameters in **Mobility of Learner** assessed by the teachers with respect to the effectiveness of mobile learning technology

B. **Mobile learning framework Model – II – Koole’s Model (Teachers)**

Hypothesis 7: There is no significant difference between the mean ranks of parameters in **Device Aspect** assessed by the teachers with respect to the effectiveness of mobile learning technology

Hypothesis 8: There is no significant difference between the mean ranks of parameters in **Learner Aspect** assessed by the teachers with respect to the effectiveness of mobile learning technology

Hypothesis 9: There is no significant difference between the mean ranks of parameters in **Social Aspect** assessed by the teachers with respect to the effectiveness of mobile learning technology

Hypothesis 10: There is no significant difference between the mean ranks of parameters in **Device Usability** assessed by the teachers with respect to the effectiveness of mobile learning technology

Hypothesis 11: There is no significant difference between the mean ranks of parameters in **Interaction Technology** assessed by the teachers with respect to the effectiveness of mobile learning technology

Hypothesis 12: There is no significant difference between the mean ranks of parameters in **Social Technology** assessed by the teachers with respect to the effectiveness of mobile learning technology

C. **Mobile learning framework Model – III – Amin’s Model (Teachers)**

Hypothesis 13: There is no significant difference between the mean ranks of parameters under **Impact on video lesson** assessed by the teachers with respect to the effectiveness of mobile learning technology.
Hypothesis 14: There is no significant difference between the mean ranks of parameters under **Acceptance Level** assessed by the teachers with respect to the effectiveness of mobile learning technology.

Hypothesis 15: There is no significant difference between the mean ranks of parameters under **User Friendliness** assessed by the teachers with respect to the effectiveness of mobile learning technology.

Hypothesis 16: There is no significant difference between the mean ranks of parameters under **Didactic Efficiency** assessed by the teachers with respect to the effectiveness of mobile learning technology.

Hypothesis 17: There is no significant difference between the mean ranks of parameters under **Technical Feasibility** assessed by the teachers with respect to the effectiveness of mobile learning technology.

Hypothesis 18: There is no significant difference between the mean ranks of parameters under **Different Learning Methods** assessed by the teachers with respect to the effectiveness of mobile learning technology.

CATEGORY 3:

Hypothesis 19: There is no significant difference between the assessments of students of **Different Departments** with respect to the effectiveness of mobile learning technology.

CATEGORY 4:

A. Mobile learning framework Model – I – Osman Model (Students)

Hypothesis 20: There is no significant difference between the mean ranks of parameters in **Mobility of Technology** assessed by the students with respect to the effectiveness of mobile learning technology

Hypothesis 21: There is no significant difference between the mean ranks of parameters in **Mobility of Learning** assessed by the students with respect to the effectiveness of mobile learning technology

Hypothesis 22: There is no significant difference between the mean ranks of parameters in **Mobility of Learner** assessed by the students with respect to the effectiveness of mobile learning technology
B. Mobile learning frame work Model – II – Koole’s Model (Students)

Hypothesis 23: There is no significant difference between the mean ranks of parameters in **Device Aspect** assessed by the students with respect to the effectiveness of mobile learning technology

Hypothesis 24: There is no significant difference between the mean ranks of parameters in **Learner Aspect** assessed by the students with respect to the effectiveness of mobile learning technology

Hypothesis 25: There is no significant difference between the mean ranks of parameters in **Social Aspect** assessed by the students with respect to the effectiveness of mobile learning technology

Hypothesis 26: There is no significant difference between the mean ranks of parameters in **Device Usability** assessed by the students with respect to the effectiveness of mobile learning technology

Hypothesis 27: There is no significant difference between the mean ranks of parameters in **Interaction Technology** assessed by the students with respect to the effectiveness of mobile learning technology

Hypothesis 28: There is no significant difference between the mean ranks of parameters in **Social Technology** assessed by the students with respect to the effectiveness of mobile learning technology

C. Mobile learning frame work Model – III – Amin’s Model (Students)

Hypothesis 29: There is no significant difference between the mean ranks of parameters under **Impact on video lesson** assessed by the students with respect to the effectiveness of mobile learning technology.

Hypothesis 30: There is no significant difference between the mean ranks of parameters under **Acceptance Level** assessed by the students with respect to the effectiveness of mobile learning technology.

Hypothesis 31: There is no significant difference between the mean ranks of parameters under **User Friendliness** assessed by the students with respect to the effectiveness of mobile learning technology.

Hypothesis 32: There is no significant difference between the mean ranks of parameters under **Didactic Efficiency** assessed by the students with respect to the effectiveness of mobile learning technology.
Hypothesis 33: There is no significant difference between the mean ranks of parameters under Technical Feasibility assessed by the students with respect to the effectiveness of mobile learning technology.

Hypothesis 34: There is no significant difference between the mean ranks of parameters under Different Learning Methods assessed by the students with respect to the effectiveness of mobile learning technology.

CATEGORY 5:

Hypothesis 35: There is no significant difference in the acquisition of information by students taught through the video using mobile learning over e-learning and conventional learning.

Hypothesis 36: There is no significant difference in the scope of knowledge by students taught through the video using mobile learning and e-learning over conventional learning.

Hypothesis 37: There is no significant difference in the extent of comprehension by students taught through the video using mobile learning and e-learning over conventional learning.

Hypothesis 38: There is no significant difference in the ability of application by students taught through the video using mobile learning and e-learning over conventional learning.

Hypothesis 39: There is no significant difference in the achievement between male and female taught through the video using mobile learning and e-learning over conventional learning.

Hypothesis 40: There is no significant difference in the achievement between affiliated colleges and deemed universities taught through the video using mobile learning and e-learning over conventional learning.

Hypothesis 41: There is no significant difference in the achievement between urban and rural taught through the video using mobile learning and e-learning over conventional learning.
1.9 SCOPE OF THE RESEARCH STUDY

In the mobile learning technology the video lesson was developed by experts and technical teachers who hold masters and doctorates degree. The video can be used for supplemental source of material for teaching and learning process. Mobile learning system is the wireless and paperless technology in the field of teaching and learning. Hence the developed video lesson can be used for teaching and learning in engineering colleges and polytechnics across the nation.

1.10 WIRELESS DEVICES ARE USED FOR RESEARCH STUDY

Figure 1.5 shows the different wireless devices used in the research study, definition of the wireless devices as follows:

**Smart phones:** These are hybrid devices which combine the abilities of cellular phones and PDAs. They are smaller than PDA and bigger than cellular phones where windows mobile, android or other operating systems are used. It should have internet browsing. Smart phones are potentially successful which are used in the mobile learning education system.

**Cellular Phones:** The lower version of these devices can be used mainly for voice communication, sending and receiving short message service (SMS). Some of the disadvantages are low memory and low data transfer rate. Cellular phones of higher versions can be used to internet access via GPRS technologies and their price continuously decreases.

**Tablet PC:** It is one of the latest mobile devices; it has a full range of abilities as personal computers. Some of these do not have keyboard but have software to recognize hand written text. It is relatively expensive.

**Note book Computers:** On the one hand, they have the same abilities as desktop personal computers, on the other hand they are of small size and support wireless communication technologies and prices are still high.

**iPad/iPods:** The user interface is built around the devices, multi-touch screen and virtual keyboard. The iPad includes built-in wi-fi and cellular connectivity on select models. An iPad can shoot video, take photos, play music, and perform internet functions such as web-browsing and emailing. Other functions like games, reference, GPS navigation, social networking etc., shall be enabled by downloading and installing apps.
1.11 WIRELESS COMMUNICATION TECHNOLOGIES USED IN RESEARCH STUDY

Global Mobile System (GSM): In GSM network the data or information can be exchanged to the learners in two ways, viz short message service (SMS) or multimedia service (MMS). The SMS is limited to 140 characters where storage capacity is less thereby video messages cannot be sent through SMS. MMS services can be used to send the video and audio files to the learners. MMS contains the text, images, still pictures, graphics, audio and video files.

General Packet Radio System (GPRS): GPRS is the packet-switched radio transmission from wireless connectivity in the mobile phones. The transmission data speed is four times that of the GSM network. GPRS is not the replacement for Bluetooth, GPRS transmission of data through mobile phones using internet connectivity. In the GPRS network Time Division Multiple Access (TDMA) and Frequency Division Multiple Access (FDMA) modulation techniques can be used, as the video files have large storage space. Compression techniques can be used and transmitted through these modulation techniques. This data can be divided into packets and frames transmitted to mobile phones with the microwave of high bandwidth frequency. The data rate is 56 to 114 Kbps and frequency range is 2.4GHz, the geographical area is around 100 metres.
**Blue Tooth:** Blue tooth is the wireless communication technology for transmitting over a short distance with a lower speed. The data rate is 1 Mbps that covers the geographical area of around 10 metres and frequency range is 200MHz. The name blue tooth is borrowed from the name of Harald Kind of Denmark which is Harald Bluetooth. The Bluetooth technology is connected to the Piconet or PAN [Personal Area Network]. It consists of two devices viz., minimum and the maximum of seven devices. The Bluetooth technology can work within the classroom or lab. It is cost effective to transmit video or file to the mobile phones. A small device is connected with the computer or laptops, transmits the data from the computer to the mobile phones or wireless devices, but the data rate is slow.

**Wireless LAN:** WLAN is a wireless computer network that links two or more devices using a wireless distribution method (OFDM) within a limited area such as a home, school, computer laboratory or office building. This gives the user, the ability to move around within a local coverage area and still be connected to the network and provides connection to the wider internet.

*Figure 1.6 Wireless Technologies used in Mobile Learning*

**Wireless Fidelity (Wi-Fi):** Wi-Fi is a wireless networking technology that allows computers and other devices to communicate over a wireless signal. It
describes network components that are based on one of the IEEE 802.11 standards developed by the IEEE and adopted by Wi-Fi Alliance.

**Infrared (IR):** Infrared is a wireless mobile technology used for device communication over short ranges IR communication has major limitations because it requires line-of-sight which has a short transmission range and is unable to penetrate walls. IR wireless is the use of wireless technology in devices of systems that convey data through infrared (IR) radiation Infrared is electromagnetic energy at a wavelength or wavelengths somewhat longer than those of red light. The shortest wavelength IR borders visible red in the electromagnetic radiation spectrum, the longest wavelength IR borders radio waves. IR wireless is used for short and medium range communication and control. Some systems operate in line-of-sight mode, this means that there must be a visually unobstructed straight line through space between the transmitter (source) and receiver (destination).

The figure 1.6 shows the wireless communication technologies which are used for the research study. A local area network that uses high frequency radio signals to transmit and receive data over distances of a few hundred feet; uses Ethernet protocol.

**1.12 SELECTED FRAMEWORKS OF RESEARCH STUDY**

Several frameworks and models have been reviewed for acquiring in-depth knowledge and concepts that support research objectives. The researcher has selected three models of theoretical and practical frameworks for this research study. In first model framework Osman derived three mobility concepts definition on mobile learning i.e. Mobility of Technology, Mobility of Learning and Mobility of Learner as shown in figure 1.7. Second framework model for mobile learning is Koole’s FRAME model, which represents three Venn-diagram circles as Device, Learner and Social aspects. The intersections where two circles overlap contain attributes that belong to both aspects. The attributes of the device usability and social technology intersections describe the affordances of mobile technology [Norman 1999]. The intersection labeled interaction learning contains instructional and learning theories with an emphasis on social constructivism. All three aspects overlap at the primary intersection mobile learning in the centre of the Venn diagram [M.L.Koole, 2009] as shown in figure 1.8. Third framework model for mobile learning is Amin’s practical experience of mobile learners’ response i.e User Acceptance, User friendliness, Didactic efficiency, and Technical feasibility of the
system [A.H.M. Amin, A.K.Mahmud, A.I.Z.Abidin and M.A.Rahman, 2006]. From the literature study, found 40 parameters are related to all three frameworks in the mobile learning, these parameters were identified and included in the questionnaire indicator.

![Diagram of Mobile Learning with Mobility of Technology, Mobility of Learning, and Mobility of Learner]

**Figure 1.7 Osman’s definition of mobile learning**  

![Diagram of Mobile Learning showing Device aspect, Learner aspect, and Social aspect]

**Figure 1.8 Koole’s FRAME [Framework for the Rational Analysis of Mobile Education] - A Model for Mobile Learning Framework (2009)**

1.13 ASSUMPTIONS AND DELIMITATIONS

The survey regarding acceptance of mobile learning technology, was conducted in Tamil Nadu, a South Indian State. The respondents are from Electronics and Communication Engineering, Electrical and Electronics Engineering and Bio-Medical Engineering areas. The video lesson used for the survey was Electro Cardio Graphy (ECG) and Electromagnetism. The research purpose video lesson is common to all the branches.

1.13.1 Assumptions

Assumptions in this research study:
• All elitist are honest in providing, data and information

• Comments expressed by the participants like students; teachers and head of departments are unbiased.

• The achievements of the students and teachers are indicators of the effectiveness of learning in terms of the knowledge and performance that the user acceptance of the mobile learning technology.

**The teacher**

• Qualification ranges from M.E./ M.Tech and Ph.D

• Designations of teachers are: Assistant Professor, Associate Professor and Professors

• All teachers belong to the Department of Electronics and Communication Engineering, Electrical and Electronics Engineering and Bio-Medical Engineering.

**The Student**

• Only second year students are included in the study

• The students are from various parts of India. The survey regarding acceptance of mobile learning in engineering education was conducted at engineering colleges and deemed universities of Tamil Nadu. Therefore, the respondent from Tamil Nadu is significant.

1.13.2 Delimitations

The scope of the research study is delimited by the following aspects.

• The study is delimited to the engineering institutions of northern part of Tamil Nadu on which the video lesson is the basic engineering subject. Hence the data should not be generalized to the entire state.

• The study is delimited to the affiliated colleges and deemed universities of northern part of Tamil Nadu covering three districts on which mobile phones or wireless devices are permitted inside the campus.

• The data collected for the study concern to activities of three departments ECE, EEE and BME, because Electrocardiography – video lesson is common for ECE and BME and Electromagnetism is common for ECE and EEE.
1.14 STRUCTURE OF THE THESIS

The detailed structure and content of this thesis are illustrated in figure 1.9

The Chapter 1 begins with introduction to the role and the use of educational video lessons in education system especially in the field of electronic learning and mobile learning, wireless devices and wireless communication technologies used for the research study, purpose of the study, need for the study, statement of the problem, research objectives, hypotheses, approach of the study, scope of the study and structure and contents of thesis chapters.

The Chapter 2 review of literature provides introduction to concepts, framework designs, tool developments, mobile learning used in education, acceptance and effectiveness of mobile learning. It also provides the information about the strength and weakness of conventional learning, E-learning and M-learning.

The Chapter 3 research methodology discusses the framework of the study, research design, instruments developments, and data collection methods and data analysis plan.

The Chapter 4 analysis and findings presents analysis of the effectiveness of video lessons using mobile learning technology, testing related to hypotheses and analysis of the performance of the students from learning outcome.

The Chapter 5 offers the summary of the research work, major findings, conclusions and recommendations and suggestions for future research.

References and annexure are given at the end of the thesis.
Figure 1.9 Structure and contents of Thesis

Chapter 1
Introduction to mobile learning in engineering education, need for the study, research objectives, statement of the problem, research questions and hypotheses

Chapter 2
Review of literature, analysis of existing research literature, research journals and reports

Chapter 3
Research framework, research design and research methodology of the research study, data collection process and plan

Chapter 4
Analysis of data findings, comparison of mobile learning, electronic learning and conventional learning

Chapter 5
Major findings, conclusions, recommendations and suggestions for future research