



*Journal of Advances in
Science and Technology*

*Vol. VIII, Issue No. XV,
November-2014, ISSN 2230-
9659*

**BRINGING LANGUAGE LEARNING TO MOBILE:
A REVIEW OF MOBILE ASSISTED LANGUAGE
LEARNING**

AN
INTERNATIONALLY
INDEXED PEER
REVIEWED &
REFEREED JOURNAL

Bringing Language Learning to Mobile: A Review of Mobile Assisted Language Learning

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Abstract – Mobile devices have become an essential gadget to be owned by people of any age group. Services, features and utilities provided by a mobile device is unparalleled in any form of technology gadgets which create its huge popularity and ownership in the entire world. The ubiquity of mobile devices can be exploited to provide learning to not only the rich and well-off people but also to the people who happen to be in the most underprivileged, unfortunate, and socially backward sections of the society. In this study, we try to find out that how the current mobile technologies will help in boosting the Mobile Assisted Language Learning (MALL), is there enough research works to properly support MALL and whether the technology used in MALL applications are simple enough to be even used by common nontechnical language learners and teachers. The study will also provide some future research works for the new readers.

Keywords — M-Learning, E-Learning, Mobile Assisted Language Learning.

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I. INTRODUCTION

Mobile Learning (M-learning) owes its rapid rise to the advancements in wireless networks especially cellular network technologies. M-Learning is often called as an extension of e-learning (Electronic Learning). E-Learning term was first used in mid-1990's which includes all learning activities which are done with the help of computers or internet. Some of the mediums used for E-Learning are CD-ROM's, DVD's, Websites, Specialized applications etc. M-Learning uses mobile device to provide learning content to its users which are delivered via the use of internet. Internet is provided to mobile devices with the help of wireless technologies such as Wi-Fi (IEEE 802.11 set of network protocols), Cellular technologies (3G or 4G cellular protocol), Bluetooth etc. Mobile devices are characterised by their small form factor, portability, pocket-friendliness, an internet enabled interactive device which allows its user to surf internet, purchase goods on E-Commerce sites, send text & messages, listen & view audio video contents etc. Mobile devices are normally kept at a close proximity with its user. With all these features and more, mobile devices are very suitable to disrupt the conventional learning landscape. It acquires an incredibly unique position as it allows learning to happen at any time, place or situation to their user which is generally fixed in nature in conventional mode of learning. Mobile devices are tiny computers which are generally much less powerful than their desktop counterparts but are powerful enough to easily handle daily tasks. M-Learning do depends upon a mobile computing device and internet which derives its structure from E-Learning, but they

have also some major differences which are shown in table 1.

Table 1 Table showing differences between E-Learning and M-Learning

Characteristics	E-Learning	M-Learning
Operating systems used	Windows, Linux, Mac OS etc	Android, Symbian, iOS etc
Learning Location	Fixed or in a classroom setting	Mobile or learning on the go
Device used to provide learning	Desktops, laptops, projectors etc	Smartphones, palmtops, tablets etc.
Learning intention	Intended to acquire skill or gain in-depth knowledge	Gain quick knowledge about something or support an underway learning process
Structure	Well-structured	Loosely structured
Learning mode	Formal	Need not be formal
Learning content size	Larger contents covering plethora of topics	Smaller contents with focus on providing knowledge to specific topic
Timeliness	Time-bound or strictly timed	Loose in its timing
Learning content presentation	Complex, rich and highly detailed to cover all the topics.	Targeted, easy and small duration contents

M-Learning has a huge potential in providing learning outside the classroom setting or a formal environment by providing learning content depending upon the situation, location, or mood of the learner. M-Learning benefits from the popularity of mobile devices. The penetration of mobile devices for students below K-12 grade is huge which is shown in a survey by Grunwald Associates [1] that points out that 8% students in grades 3 to 5 carries a smartphone every day which increases to 28% students in middle

school and up to 51% in high school students. Survey also finds out that 36% of family have access to iPod touch, 78% have access to laptops, 24% have access to a E-reader, 46% have access to tablet and 77% have access to smartphone while access of children to these devices are less as only 27% children have access to iPod touch, 52% have access to laptops, 11% have access to E-readers, 34% have access to tablets and 43% have access to smartphones. Table 2 shows the acceptance percentage of M-Learning by the parents in providing learning to their children as calculated by the survey. The table clearly shows that parents are highly interested in the usage of M-Learning apps & contents to teach the children especially the parents of younger children. The survey definitively proves the answer to the question that whether these devices could be used to provide M-Learning to students.

Table 2 Table showing the acceptance percentage of parents of using M-Learning in teaching their children

Learning Benefit	K-2	3-5	6-8	9-12	Total
Promote curiosity	84%	74%	70%	77%	76%
Teach reading	79%	69%	63%	62%	68%
Teach math	75%	72%	63%	59%	67%
Foster creativity	71%	62%	58%	64%	64%
Teach problem solving	73%	62%	56%	59%	63%
Teach science	72%	60%	59%	60%	63%
Teach foreign languages	71%	60%	59%	59%	62%

M-Learning cannot only help younger children or students but is also helpful for the human workforce employed in a company. A survey by Larmer Brown [2] performed against organizations in United Kingdom tries to extract the benefits, obstacles & required optimal situations in providing learning via M-Learning by the organizations. The study was performed against 155 respondents between the period July to September 2012. The study points following result as shown in figure 1-4. It may be noted that the term mobile workforce depicts the employees working away from the office which is found in 85.2% of organizations under the study. Fig 1 shows that the classroom is still the preferred way to deliver training, but e-Learning also do not lag behind which also corroborates with Fig 2 which shows that even if the workforce is not mobile i.e, it is office based, classroom is still preferred over e-Learning but not with a large margin. Figure 3 & 4 show the advantages & obstacles of M-Learning, respectively. The figures clearly show the impact & the importance of M-Learning for providing learning to mobile workforce.

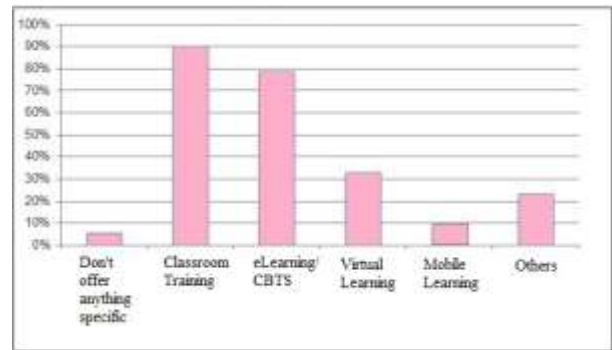


Fig. 1 Figure showing the method of training the mobile workforce.

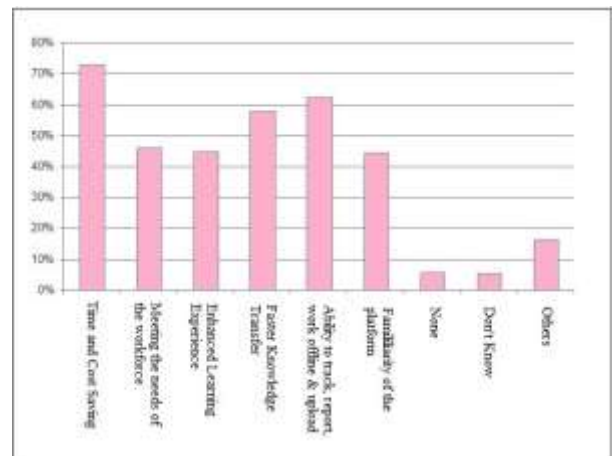


Fig. 2 Potential advantages of Mobile Learning in organizations

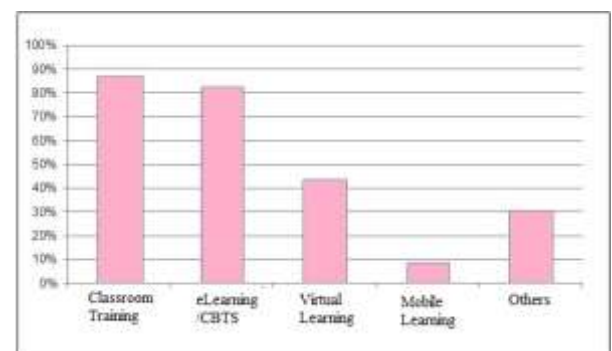


Fig. 3 Figure showing the access methods of learning by the office-based workforce.

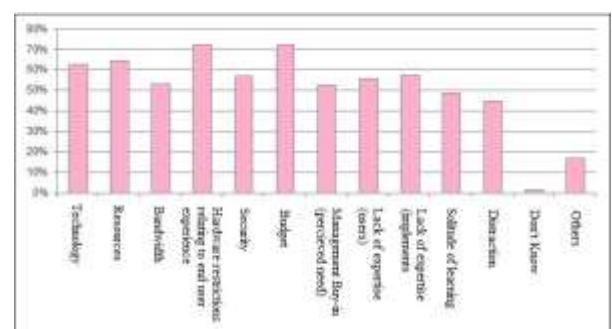


Fig. 4 Figure showing obstacles to mobile learning in an organization.

One of the areas where M-Learning can greatly help learners in getting interactive and intuitive learning is Language Learning. Mobile Assisted Language Learning is considered as an extension of M-learning for assisting learners in language learning. Conventional Means of language learning faces some serious shortcomings which can be viewed in the Language Trends survey. Language Trends survey 2012 [3] is an annual report published by CfBT Education Trust which is a UK based charity aimed to provide educational services for public welfare. Some of the key findings of this report are:

- Nearly all primary schools are prepared to provide foreign language course within class time. 80% of them are confident to meet the statutory requirement in KS2 by 2014.
- 23% of all primary school may have no staff member with language competence higher than GCSE and approx. 8.5% of all primary school may have no language expertise at all amongst their staff.
- Only 11% of secondary schools have necessary arrangements to allow students continue to learn the same language learned in KS2. This is because secondary schools reject the learning provided in KS2 due to inconsistency or lack of sufficient progress.
- There is a significant gap between state and independent schools in providing language learning. For instance, nine out of ten independent schools offer students, second foreign language (FL2) whereas only 61% of state schools provide the opportunity to take FL2 and even to a small percent of students (5% or less).

The report shows that Language Learning courses although taught by schools, cannot be scaled to higher grades when the student switches or promotes from its grades. The repetition of the primary language syllabus or the renewed effort of teaching the language basics shows the waste of teacher's and student's learning time. Mobile Assisted Language Learning (MALL) can easily avoid this wastage. Some of the ways that MALL can provide learning are:

- Short Message Service (SMS): M-Learning Projects using SMS as a M-Learning tool are experimented by various universities namely Kingston University (UK) [4], University of Helsinki (Finland) [5], Sheffield Hallam University (UK) [6], University at Norway [7] etc.
- Microblogging (Mobile blogging): Micro blogging is the blogging feature of the Mobile 2.0. Micro blogs are characterised by blog messages under 160 characters on a social media platform. Lots of research's [8]–[10]

are going on to effectively use the microblogging platforms such as twitter to be used as a M-Learning platform.

- Ambient Intelligence and Augmented Reality: Ambient Intelligence as defined by Carlos et al [11] as a means to enrich & safeguard people lives by getting feedbacks of their interaction with environment. Augmented Reality augments the user experience of the world by superimposing information or objects over the image or video data. M-Learning can greatly benefit from Ambient Intelligence [12], [13] and Augmented Reality [14]–[17] which can make learning intuitive and easy.
- Global Positioning System (GPS): Location can enable diverse MALL applications. GPS generally used to find one's location can also be used to augment learning by providing knowledge depending upon user's location. Some notable researches [18], [19] show the various ways GPS service can be used to assist MALL.
- Tablet Computing: Cellular devices such as cell phones, feature phones, smartphones etc. and small handheld devices such as iPods, PDA's (Personal Digital Assistants), palmtops etc. are though used to support M-Learning but they face the challenges of small screen, small battery life, small memory, limited speed and slow processing power. Tablets are much more powerful than mobile devices and can support desktop like applications. Researchers are constantly trying to find new ways to use tablets in M-Learning [20], [21].

This paper aims to provide a comprehensive research brief of the status of Mobile Assisted Language Learning in current context. This aim will be reached by performing following tasks:

- Choosing a robust research methodology to understand the current state of the research.
- Searching and analysing the last ten years of research publications in Mobile Assisted Language Learning.
- Put forward some future research issues.

II. RESEARCH METHODOLOGY

For getting a comprehensive review, we extracted research publications from last ten years i.e., 2003 to 2013. The papers were selected from Google Scholar database. Google Scholar database was started back in November 2004 which contains more than 86 million [22] articles, patents and citations. Google

Scholar aims to index all types of research that is published in any part of the world in its database. Google Scholar allows basic search modifiers to help making query to its database. Some search operators are

(+term) - Must include the term

(-term) - Must exclude the term

(*term) - * acts as a wildcard to match any word or phrase

() – Parenthesis groups multiple search term or operators

“term1 term2” – Quotation marks group multiple text to act as a single search unit.

(term1 AND term2) – Indicates to only search for both the terms

(term1 OR term2) – Indicates to search any one term or both

(allintext: text) – Indicates to search all of the text in any part of the website or document.

According to a data driven marketing website [23], there are at least 42 search modifiers for Google Scholar but this author only list those search modifiers which was used in making their own query to Google Scholar database. The search term used to make the query was:

Allintext:"mobile learning" +"cell phones" +smartphones +"mobile technologies" +"language learning" +language

A total of 213 results were returned by the Google Scholar database. It is to note that the selected duration of 2003 to 2013 was supplied to search algorithm by another option provided on the site and not included in the search term. It was because this author can't find any useful search modifier for it. This author selected only following 10 literatures for analysing since they seemed most relevant, highly cited & most impactful publications.

III. LITERATURE REVIEW

A *Kukulska-Hulme* [24] in the research paper describes the direction in which evolution of MALL is undergoing. To understand the evolution, the author undergoes some case studies namely JISC Case Studies in Wireless and Mobile Learning which lists out the benefits for learners such as better engagement, motivation, better understanding of course matter and better suited for collaborative or group learning, A project at The Open University examined the usage of personal mobile devices by students & faculties to find out the actual ways the teachers & learners engage with their mobile devices

to extract the learning & teaching activities and their intersection in their daily lives. The study recommends the evolution in these directions: find out the ways how mobile & wireless technologies can help contextual learning, find out the scope for continuation of learning,

Viberg et al [25] in their research paper present a study of literatures between the years 2007 to 2012. The result was analysed to extract research approaches, theories, models, methods, linguistic knowledge and skills. The study also finds out the ways MALL was being researched, what are the ways in which mobile technologies help the acquisition of knowledge development and linguistic knowledge, what statistical frameworks was used to carry the study of MALL, what research methods & approaches are used to examine MALL and what are the research challenges in the MALL research and what are suggestions to improve MALL if any.

Liwei Hsu [26] aims to examine the cross-culture end-user's perception of MALL. For this, author created a study of 45 participants from seven different countries with these proposed constructs for analysis which are the constructivism, applicability and technological affordances of MALL. The content of the study was to learn the 20 popular snacks in Taiwan's night market along with their preparations & cooking procedures. Statistics used to analyse result were Kruskal-Wallis ANOVA and Dunnett's T3 multiple comparison tests. The test showed that there was a significant difference in the usage of MALL in different proposed constructs between participants from different cultural backgrounds.

Jack Burston [27] created a study to facilitate researchers in providing a comprehensive literary background of MALL from its very origin year 1994 to the end of 2012. The author also provided briefs for 90% of the literatures used in the study. Author also points out that nearly 60% of the MALL frameworks or implementations are published outside the relevant journal but in the conference proceedings, academic dissertations, project reports etc. Author finds only 575 literary works in the area of MALL.

Glenn Stockwell [28] tries to find the emerging issues in MALL. In the study, the author first performed the literature reviews of the current state of research. Then a framework was used on the literature study that can differentiate between physical, pedagogical, and psycho-social dimensions issues. The study also finds the better practices from CALL & M-Learning that can be used in MALL. Finally, paper put forwards 10 principles for all stakeholders of MALL such as teachers, students, school administration etc. to effectively integrate mobile learning to language learning environment.

Miangah et al [29] find out the effective ways of learning, advantages and disadvantages of using mobile technologies by students and professionals in

learning. The advantages pointed out by the authors were portability in carrying the device; connectivity that allows to connect to other devices, data collection networks or in creating shared networks for common access; social interactivity; learner collaboration and data exchange; context sensitivity to time & location; individuality or personalization of learning contents. The disadvantages put forward were: reading difficulty on a small screen, limited multimedia capabilities, limited storage space, not designed for educational purposes such as solving tasks, performing assignments etc.

Sandberg et al [30] try to find out whether mobile learning in form of a serious game can allow efficient learning and can it replace a human teacher for learning. For this, they marked schools in three groups in a quasi-experimental pre- and post-test design. The marked schools are also called as condition as they undergo different experimental conditions. The first schools only used the Early Bird program to teach English language to students. The remaining two schools used the Early Bird program as well the tailor-made mobile application developed for this study. Students from remaining schools were allowed to have & use the mobile phones & application and were sent on the zoo trip. Second school students submitted their mobile phones after the end of the trip on the same day while third school students used the mobile applications for two weeks after the zoo trip ended. Before the test happened, an English vocabulary test (pretest) was conducted and posttest was also conducted after the trip. The results were analysed & compared, and it was found that there was very less learning benefits for students under different conditions from the three schools. The only significant difference was condition 3 students outmarched condition 2 students in terms of passive word knowledge and condition 2 students on active word knowledge.

George M Chinnery [31] tries to find the introduction of MALL, how MALL is implemented and advantages & disadvantages. *Robert Godwin-Jones* [32] describes different android & iOS mobile apps that enable MALL such as Lonely Planet, eStroke, Pleco, ChinesePod, Anki, Quizlet, Wordreference.com's app, Conjugation Nation etc. Some projects that enable MALL are Micromandarin, CLUE, Cloudbank etc. *Yeonjeong Park* [33] performed a study to better understand the characteristics of mobile learning in the respect of distance learning. For this, the author achieved three goals: Comparing the mobile learning with electronic learning and ubiquitous learning to describe the technological attributes & pedagogical constraints; modification of Moore's transactional distance (TD) theory to adopt two more distance learning; classification of literatures with the help of this new types of mobile learning.

IV. FUTURE WORKS

Mobile Assisted Language Learning has opened a new avenue of learning by making the learning on-the-go, specific, easy & unstructured. There are many ways that MALL can be further used to improve learning which are described as below:

- MALL research faces the lack of empirical studies of how exactly the mobile technologies help learners in individual's language skills and what learning strategies should be used by learners in improving their language skills with the help of the mobile devices. These Empirical studies will help the future researchers in getting the research direction, viability, current state of research and better understanding of results extracted from large datasets performed over a longer period of time.
- There is a need of performing even more studies to ascertain newer ways to implement M-Learning by using the mobile technologies to help learners in assisting & improving their reading, writing & pronunciation skills as well as the understanding of core of grammar of additional languages undertaken.
- There is a need of developing even more models, frameworks & theories to further develop MALL and make it viable enough to separate from other form of learning like CALL (Computer Assisted Language Learning), MIS (Management Information Systems) classrooms etc.
- Pedagogical research can benefit if time management in learning a course by a learner can be ascertained and analysed if any additional language learning can be learned successfully in the same time frame.
- Can newer technological paradigms like cloud computing, Machine learning, Data Science etc. help the student into better grasping of the core concepts of a language under learning.

V. CONCLUSION

Mobile Assisted Language Learning has lots of scope in empowering students in getting language learning in an unobtrusive, easy and straight-forward way. Mobile Assisted Language Learning will greatly benefit from the growth of M-Learning. Various literatures showed that MALL & M-Learning is best utilized when it is used to deliver learning which is specialized and focussed on a particular topic instead of trying to deliver detailed or full course over it. Researchers are constantly trying to find newer ways to integrate M-Learning in our modern lives so that

we can learn anytime we want, anywhere we want and also without requiring too much of our attention or interaction to the learning device by constantly understanding the learning context, mood, timing, situations etc. A good M-Learning system should augment our daily lives with learning by providing appropriately placed, timed, relevant & needful information. M-Learning has started to rise in the last decade, but much work needs to be done to allow it to grow at the same rate as other enabling technologies such as 3G or 4G cellular networks, smartphones, mobile OS such as android, iOS, rich & interactive display screens, speech recognition, audio-video analysis etc. and to create more immersive, interactive learning.

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