LEARNING THROUGH SMARTPHONES - IN THE CROSSROADS OF DIGITAL REVOLUTION.

An analysis of the attitude and perception towards m learning among the college students in Coimbatore, India

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Abstract
Advancements happening in the mobile phone technology have tremendous influence in the lifestyle of everyone- make calls, take photos, make payments, watch TV programs, access news and information and so on. This change reflects among the student community too and they find it more comfortable to use mobile phones for learning. When m learning is formally integrated within an institution, the prospects are endless as the students who use mobile devices can record or store information, can download lecture materials from the institution website, access and share information and data with their peer groups and so on. The specific objectives of the study are to analyze the factors influencing the attitude of the students towards m learning and to analyze the factors influencing the perception of the students towards m learning. A Quantitative Cross Sectional Survey method was used to understand the attitude and perception of the students in Coimbatore towards m learning. The students were administered with a structured closed ended questionnaire and the sample size was 148. Various attitude statements based on the constructs of TAM including Perceived Usefulness, Perceived Ease of Use and Perceived Interaction were used to analyse the attitude and perception of the students. The results of the study show a favourable setting for the implementation of m-learning among the university students. Majority of the respondents of the present study opined that as learning through mobile phones was found easier, their learning ability had increased. With this increased learning ability, they were able to increase their skills, comprehend better and also improve their knowledge.

Key words: m- learning, TAM, India, mobile phones, students

1.1.1 Introduction

Technology is a rudimentary factor for all activities of the information society. The role of technology in determining the way we live, communicate, share information, collaborate, socialize and the way we interact and learn is significant (Hall, 2001). The use of ICTs is a part and parcel of our everyday life. Among the ICTs, mobile phones are the most widely and universally accepted gadget.

Advancements happening in the mobile phone technology have tremendous influence in the lifestyle of everyone- make calls, take photos, make payments, watch TV programs, access news and information and so on. This change reflects among the student community too and they find it more comfortable to use mobile phones for learning.

The use of mobile devices for conveying and sharing educational content is referred to as mobile learning or m- learning.

As the use of mobile phones is so prevalent among the students, mobile learning has also taken its roots in the education spectrum.The doors for this new forum of learning opened up with the widespread usage of mobile phones. Low cost for the purchase of devices and reduced prices for access of network as well as Internet are the major reasons for this universal adoption of mobile phoneseven in low-income countries. Mobile phones endorse the use of anytime and anywhere learning transcending the traditional presence- based classroom teaching and learning. The flexibility in learning whenever the learner has time or inclination to do so has brought in a new facet for learning.

With the use of mobile phones, the learner is found to be more engaging in the learning process and also is able to collaborate with a group for learning. Their high level engagement with mobile phones echoes in their increased motivation for learning and sharing education content among their peer groups through mobile phones. The mobility in learning opens up more avenues for students, teachers and also the institution. Such shifts build up the ways of altering the education system, for instance metamorphose the modalities in formal and informal learning.

In the last decade, M- learning or mobile learning has become the latest trend across all educational sectors around the world. The Horizon Report, 2011 had predicted that mobile technologies will have a significant and instantaneous effect on the teaching and learning environment across the globe within next five years (Johnson et.al., 2011).

As the learners are seized with the concept of mobile learning, the other stakeholders of the education system also need to swim along the tide. Now, the teachers are faced with the need to support and upgrade themselves with the use of ICTs in their teaching approaches. At the same time, the higher education institutions need to be adept in identifying ways to incorporate ICTs in the learning that will balance with the institutional policies and resources.

When m learning is formally integrated within an institution, the prospects are endless as the students who use mobile devices can record or store information, can download lecture materials from the institution website, access and share information and data with their peer groups and so on.

1.1.2 Mobile learning in India

The development of any nation is highly dependent on how the next generation is prepared for the future. Through education, the young minds can be tuned in the desirable manner. Farsighted and visionary education system will make incredible changes in how we train the youngsters. As mobile phones play a vital role in the daily routine of everyone, especially the youth, India has a felt need to remodel its education system also and more actively adopt m learning for delivering education content.

Like other countries, India too is experiencing a communication revolution with the ubiquitous presence of mobile phones. Mobile phones have made immense changes in the means of communication and the lifestyles of the people who reside in rural and remote areas too. With nearly 1.28 billion people as its population, India is a thriving market for smart phones. Statistical reports from IAMAI and Nielsen reveals that India has the 2nd largest number of internet users and many of them are from rural and nearly half of the smart phone users belong to the age group of 18-24 years.

The education system of India is one of the largest in the world and more than half of the population in India falls under the learner category, including school students, employee trainees, and sometimes the elderly too. The expanse of the beneficiaries calls for a new and fresh outlook towards the education content delivery system. A definite and remarkable development on par with the developed nations is witnessed in the Indian education system. However, the best features of m learning could be harnessed to provide essential educational solutions to even the last mile population of India. M- Learning could be tailor made based on the needs of the regional and rural population and thereby overcoming the language barriers and area specific impediments.

As a technology device mobile phones are more user friendly, small and compact that is portable, along with affordable cost has led to the high proliferation of mobile phones, which contributes to the exponential growth of mobile learning. Government initiatives like distribution of Akash Tablets at schools,

remarkable implementation of Digital India and the focus on new forums of learning like NPTEL (National Programme on Technology Enhanced Learning) and MOOCs (Massive Open Online Courses) will enable the technology enabled learning, more specifically M-learning move in the right direction.

The Mobile and Immersive Learning for Literacy in Emerging Economies (MILLEE) project in India is a research-based initiative that investigates how mobile phones can be used to enhance English language skills (Kam et al., 2009).

In particular, this project seeks to reach out to low-income students in rural areas who have had minimal access to traditional education systems.

The role of teachers will add more value to the efforts for the successful execution of m- learning India. The content providers must possess the technical skills to integrate the mobile devices in the education delivery system. If m-learning is implemented full fledged, then necessary training for such technology-content integration must be provided to the teachers.

However, the use of mobile devices for learning has raised social and cultural concerns among the teachers and the institutions of Asian countries. The teachers feel that mobile phones in formal education system can be distracting as there are no strict measures till now to combat exposure to harmful content, engagement in cyber bullying and other inappropriate behaviours.

The global spend on education by 2020 is expected to double to USD 8 trillion. The expenses for incorporating the m-learning ecosystem may go up to USD 70 billion. Increased demand for mobile devices, more opportunities for content providers and other components of m-learning ecosystem will play a vital role in the economical development of the nation.

If the world puts its energy and resources behind the Global Goals by 2030 initiative, then an essential pillar of attaining Goal 4 (Quality Education) would have to be m-learning.

1.2. 1 Theoretical Background

With the widespread adoption of m learning across the globe, research activities are also gearing up to identify the factors leading to the acceptance of m learning, effectiveness of m learning and so on. The most popular and widely accepted model in the study of technology and its use is Technology Acceptance Model (TAM, Davis, 1989). In order to identify the factors that leads to the use of mobile phones for learning by higher education students a modified TAM model had been discussed in the International Journal of Technical Research and Application. According to this model, the users' attitude towards m learning is influenced by three factors namely, Perceived Usefulness, Perceived Ease of Use and Perceived Interaction. These three factors are affected by an external variable, Mobile Readiness of the User.

1.2.2 Need for the Study

The UN Sustainable Development Goal 4 mentions that obtaining quality education is the foundation to creating sustainable development. The lack of quality education can be attributed to lack of adequately trained teachers and low opportunities provided to rural students. Hence, the need to look out for ways of improving the existing structure and means of education becomes very imperative, especially in developing countries like India. The need to look out for a smart education system is high in India as it faces biggest challenge of huge population to cater intertwined with scarcity of qualified and trained teachers to reach the students of the rural and remote areas. Mobile phones are one of the most important ICT tools used by the youth. To a great extent, the students use mobile phones for education purposes in an informal manner. The ubiquitous presence and the all-pervasive features of mobile phones can contribute effectively and efficiently to the learning process of the students. In such a setting, there is a need to study the attitude and perception of the students regarding the use of mobile phones in their formal education system. This will help in formulating the ways and means of addressing the education needs of the students and at the same time focus on achieving quality education.

1.2.3 Objective of the study

Based on the above background, the specific objectives of the study are:

- To analyze the factors influencing the attitude of the students towards m learning
- To analyze the factors influencing the perception of the students towards m learning

1.3 Review of Literature

Several studies based on understanding the attitude of students towards m learning were considered for the review of literature. The basic evaluation of an education system is how well the learner is able to score in their course of studies. Studies prove that with the m-learning tools, the students are able to improve or score higher in comparison to traditional or conventional learning (Chandran, S, 2010). In a study by Ali, R. A., Rafie, M., & Arshad, M. (n.d.-) the respondents mention that, in addition to high scores their knowledge level also has increased through m-learning.

Micro learning, a new and effective way of learning was identified as an outcome of m learning through a study by Habitzel, Mark, Stehno&Prock, 2006. They further observed that people can learn more effectively if "information" is broken down into smaller, more easy-to-comprehend units which can be sent through mobile phones in whats app or other messaging applications.

M- Learning has become a booming market in the education scenario. Several mobile applications are found sometimes free of cost or for a nominal charge that gives required learning solutions for the students. In this way, mobile learning applications are found to be effective among the respondents of the studies by Ansari &Tripathi, 2017 andBansal, T., & Joshi, D. (2014).

As the youth are the major users of mobile phones and carry it wherever they go, learning through mobile phones also has become ubiquitous- anytime and anywhere. Studies by Bansal, T., & Joshi, D. (2014) and (Vyas& Singh, 2014) come in support of this statement.

Due to ubiquitous presence of mobile phones, availability of and access to content also has become instant, whenever the student or teacher wants it. The search for suitable content is immediately fulfilled and this idea was represented in studies like Fouzdar, K., &Behera, S. K. (2017) and Bansal, T., & Joshi, D. (2014).

There are moments when the students feel they have less or no activities to be involved with. They feel bored and the time is wasted. With m-learning prospects, the students feel that such dead times are now transformed to productive time (Fouzdar, K., &Behera, S. K. (2017), Anthony, Golden, & Regi, August 2017).

When learning materials are available through mobile phones, the students begin to feel learning more enjoyable and interesting(Wang, M., Shen, R., Novak, D., & Pan, X. (2009), Ali, R. A., Rafie, M., & Arshad, M. (n.d.-). In addition they also actively participate in the teaching and learning process and thereby provide a fresh outlook to this process.

Instant access to learning materials, instant communication between teachers and students are some of the benefits of mobile phones and this way, the students feel that so much time and effort could be saved (Padmanathan&Jogulu, 2018, Rakesh Narayan Patil et al., 2016, Ali, R. A., Rafie, M., & Arshad, M. (n.d.-). This is possible again only if there is mobile readiness among the students and as well as the teachers.

Mobile phones are highly personalized medium (Bansal, T., & Joshi, D. (2014) and hence the active involvement of the students in the learning process will enable them to clarify the concepts more clearly, remember the subjects more and also make them learn with more concentration. In addition, it helps to improve their creativity (Anthony, Golden, & Regi, August 2017). Such features of m-learning add more value to the course of study (Fouzdar, K., &Behera, S. K. (2017).

A user perspective on how convenient and easy it is to use mobile technologies for learning purposes is required for full fledged implementation. The small and compact size of the mobile phones facilitate in carrying wherever we go and enables the learner to access their educational content anytime and anywhere and thereby make more productive time (Orlando& Joel, 2013, Ansari &Tripathi, 2017, Alhajri, 2016 &Vyas& Singh, 2014).

The operation of mobile phones is very simple and it is very compact and that is why it has captured the hearts of so many. Studies on m-learning also reinstate this fact as the respondents consider m-learning appealing as

mobile phones are easy to use and they are able to take it anywhere they go (Sudhakaran&Pachaiyappan, 2017). Another facet to this ease of use was that many of them were familiar with all features of mobile phones and hence learning through mobile phones was convenient and faster to do (Bikumulla, Seyal, Rahman, Ramlie, &Rahman, 2015, Rakesh Narayan Patil et al., 2016).

As mobile learning offers the feasibility of reading and writing in the mobile

Effective and efficient learning will happen only when there is a good relationship between the student and the teacher. With the advent of mobile phones, the communication between the students and teachers happens anywhere and anywhere and results in a shift in their relationship. This increased communication between students and teachers (Orlando & Joel, 2013, Wang, M., Shen, R., Novak, D., & Pan, X. (2009), Alhajri, 2016, Bansal, T., & Joshi, D. (2014), Ali, R. A., Rafie, M., & Arshad, M. (n.d), Rakesh Narayan Patil et al., 2016, Vyas& Singh, 2014) is considered to be one of the best results of m- learning. The teachers are able to lend their support in clearing doubts and giving suggestions immediately for the students whenever required (Orlando & Joel, 2013, Vyas& Singh, 2014). With the help of mobile phones, immediate and quicker feedback becomes possible and helps in improving or modifying the approach from both the students and the teachers (Orlando & Joel, 2013, Alhajri, 2016, Vyas& Singh, 2014)

Communication with their own class mates and other peer groups for learning purposes happens in a variety of ways. They are able to exchange class notes and other information, ask questions to them, involve in discussions with them and thereby results in exchange of ideas among them (Wang, M., Shen, R., Novak, D., & Pan, X. ,2009, Anitha, Fouzdar, K., &Behera, S. K. ,2017, Rakesh Narayan Patil et al., 2016).

Collaborative learning is another facet of mobile learning. As the students are able to connect and communicate among themselves from anywhere and anytime, they are able to discuss and exchange ideas and find collaborations in their learning process. (Alhajri, 2016, Bansal, T., & Joshi, D. 2014). As a corresponding benefit, it was found that

phones itself, the learners feel more easy to undergo it than class room learning (Anitha) and hence makes learning more personalized (Sudhakaran&Pachaiyappan, 2017). In this fast changing world, time is more important and with flexibility in learning anytime and anywhere m-learning is more convenient and faster(Bikumulla, Rakesh Narayan Patil et al., 2016).

social interactivity of the students with their peers and teacher increased (Bansal, T., & Joshi, D. (2014).

The respondents of the study by Vyas& Singh, 2014 mentioned that through m-learning the social strata barriers are broken. M-learning is taken up by anyone who is in possession of mobile phones and hence the social strata do not exist here.

The perception and attitude of a person towards the novel way of learning has to be more positive for its full fledged implementation. The perception of the students were found to be positive (Padmanathan&Jogulu, 2018) as they considered mobile learning to be exciting (Sudhakaran&Pachaiyappan, 2017), an appealing learning tool (Alhajri, 2016).

There was high enthusiasm and initiative among the students to learn through mobile phones (Chandran) and the teachers too found the mobile phones useful for learning and felt happy about it (Alhajri, 2016). As a result the students felt satisfied in using m- learning (Sulaiman&Dashti, 2018) and develop a positive attitude towards using mobile phones for learning purposes (Bikumulla&Bhovi 2018).

1.4 Materials and Methods

This study used a Quantitative Cross Sectional Survey method to understand the attitude and perception of the students in Coimbatore towards m-learning. Besides, the study also attempted to find out the mobile readiness of the students to adopt m-learning in their formal education system. The study was conducted in Coimbatore city located in Tamil Nadu, India. The students pursuing undergraduate programmes and post graduate programmes from various colleges were drawn as the respondents of the study.

The students were using mobile phones for various purposes including learning with less or no awareness of the scope of m- learning. A non-probability convenience sampling technique was used.

The students were administered with a structured closed ended questionnaire. Around 175 questionnaires were distributed among the students and 148 responses were finalized to be complete and full for the analysis of the study. The final sample was determined to be 148.

The questionnaire consisted of questions probing the demographic information of the respondents and a separate section was used for analyzing the attitude and perception of the respondents using various attitude statements based on the constructs of TAM including Perceived Usefulness, Perceived Ease of Use and Perceived Interaction. The attitude scale consisted of 23 statements measuring the constructs adapted from the TAM model using a 5-point Likert Scale.

Statistical tools including Kruskal Wallis test, Mann-Whitney test and Cross tabulation were used for analysis purposes.

1.5 Results

The results of the study show a favourable setting for the implementation of m-learning among the university students. With digital revolution in all walks of life, it is time for the higher education to turn its focus on digital content delivery too.

Table No. 1 Distribution of respondents based on gender, age, education and monthly family income

N= 148

Particulars	N	%
Gender of the respondents		
Male	64	43.2
Female	84	56.8
Age of the respondents		
17-19 years	61	52
20-23 years	77	41.2
Above 23 years	10	6.8
Education (pursuing) of the respondents		
Undergraduates	103	69.6
Post graduates	39	26.4
Others	6	4.1
Monthly Income of the respondents		
Less than Rs.10,000/-	15	10.1
Rs. 10,001/- to Rs. 20,000/-	34	23
Rs. 20,001/- to Rs. 30,000/-	21	14.2
Above Rs. 30,000/	78	52.7

The results of the study in Table No. 1 show that there is a near equivalent gender distribution among the respondents. Majority of the respondents belonged to the age group between 17 and 23 years and among them many were pursuing undergraduates. More than 70% of the respondents belonged to the monthly family income group of more than Rs. 30,000/-.

The attitude and perception of the respondents towards m learning were analysed based on the constructs of the TAM model, Perceived Usefulness, Perceived Ease of Use and Perceived Interaction in terms of their gender, age group, education and monthly family income.

There were very little gender differences in the present scenario for access to education and mobile phones as well. The present study reveals that gender of the learner cannot bring differential outcomes from m-learning and hence the attitude towards m-learning in terms of perceived usefulness, perceived ease of use and perceived interaction

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remains similar among male and female respondents.

Table No. 2 Results of Kruskal Walis Test showing the effect of 'Age' on the respondents on their Attitude towards m-learning

Sub Division	Constructs	Chi-Square	Df	Asymp. Sig.
a)	Perceived Usefulness	6.822	2	**.033***
b)	Perceived Ease of Use	6.508	2	**.039***
c)	Perceived Interaction	2.535	2	.282

*significance value at 0.05

As shown in the Table No. 2 the results revealed that there was a significant relationship between the age group of the respondents and how they perceived the usefulness and ease of use of mobile phones while using it for m learning. The analysis of the mean ranks of age groups with their attitude towards m learning revealed that the age group of 21-23 years perceived the m learning highly useful and also easy to use in comparison to other age groups. However, the interactivity and social connectivity was perceived in a similar manner by the respondents of all age groups.

Table No. 3 Results of Kruskal Wallis Test showing the effect of 'Education' on the respondents on their Attitude towards m-learning

Sub Division	Constructs	Chi-Square	Df	Asymp. Sig.
a)	Perceived Usefulness	.515	2	.773
b)	Perceived Ease of Use	6.763	2	**.034***
c)	Perceived Interaction	3.426	2	.180

*significance value at 0.05

Table No. 3 shows that there is a significant relationship between the education of the respondents and how they perceived the ease of using the mobile phones for m learning. Through years of continuous use and technical knowhow, the ease to use mobile phones increases. This reflects in the mean rank of perceived ease of use which is considerably higher among the learners from post graduate level than the under graduate learners.

Learning is a universal need and does not differ according to differing economic backgrounds. In addition, the outcomes of learning are also democratic. The technical expertise to use it exists among people from all economic strata. Hence, we can find that the respondents from different monthly income groups viewed the usefulness of m-learningand ease of using mobile phones for learning purposes in a similar manner.

1.6 Discussion

The primary factor for successful deployment of m learning in the education eco system is the mobile readiness of the learners and teachers. Though most of them are regular users of mobile phones, not everyone will be willing to use it for learning purposes. The attitude statements provide a good scope for discussions of the results of the study and hence have been taken into consideration.

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The involvement of the users is more important in adoption of any new technology. The students are heavy users of mobile phones and hence they feel more personalized when involving in m-learning process and the respondents of the present study revealed their high level of involvement in learning through mobile phones which correlates with the findings of the studies by Shen, R., Novak, D., & Pan, X. (2009), Ali, R. A., Rafie, M., &Arshad, M. (n.d.-).

Time is a crucial element in the functioning of a system. As mobile phones enables access to course content and other support materials for learning instantly and quickly, so much of time is saved in terms of access to content which is supported by the findings of the studies by Padmanathan & Jogulu, 2018, Rakesh Narayan Patil et al., 2016, Ali, R. A., Rafie, M., &Arshad, M. (n.d.-). In addition to minimum time to access the course content, another interesting factor in m learning is the low or no cost involved. The learning materials or courses are available as free downloads or with low cost like NPTEL, MOOCs in India. Such factors again build up the development of m learning in our country. In support to the studies by Ansari & Tripathi, 2017 and Bansal, T., & Joshi, D. (2014) more than 3/4th of the respondents feel that m-learning will minimize the cost to access course content.

Majority of the respondents of the present study opined that as learning through mobile phones is found easier, their learning ability is increased. With this increased learning ability, they are able to increase their skills, comprehend better and also improve their knowledge like the respondents of the studies by Bansal, T., & Joshi, D. (2014). The respondents of the present study also felt that mobile phones have revolutionized and simplified the teaching - learning process.

M- learning is a new player in the education scenario. Hence the students find it more appealing and attractive. As mentioned by Orlando & Joel, 2013 and Alhajri, 2016, the respondents of the present study also responded that mobile learning brings more opportunities and new ways of learning. With so many elements to influence, the learners are found to be highly motivated to learn through mobile phones as was the case in studies by Ali, R. A., Rafie, M., & Arshad, M. (n.d.-)-

Though most of the respondents of the present study were found to have mobile phones with storage capacity of 10 to 20 GB, they still feel that storage capacity of mobile phone has the capacity to have an impending effect on mobile learning. Having the course content in their own devices enables the students to access the content easily and thereby help them to learn more as we can see in studies by Orlando & Joel, 2013, Ansari &Tripathi, 2017, Alhajri, 2016 &Vyas& Singh, 2014. The majority of the respondents of the study were found to have mobile phones with display size of 6 to 8 inches and also felt that display size of the phone affects their learning process when done for a longer duration.

The use of mobile phones for learning purposes goes beyond using them for communication alone. Technical knowhow is required to use the applications and navigate through the process. Nearly 99% of the respondents owned a smart phone and nearly 70% of them felt they possessed the technical skills to use mobile phones for learning and found it to be more users friendly and comfortable.

The primary and major function of mobile phones is communication and that leads to improved communication between learners and teacher as can be seen through various studies Orlando & Joel, 2013, Wang, M., Shen, R., Novak, D., & Pan, X. (2009), Alhajri, 2016, Bansal, T., & Joshi, D. (2014), Ali, R. A., Rafie, M., &Arshad, M. (n.d), Rakesh Narayan Patil et al., 2016, Vyas & Singh, 2014. Also it leads to more and increased exchange of ideas and discussion among the peer group. Mobile learning helps them to share information with other learners which is also represented in the studies by Wang, M., Shen, R., Novak, D., & Pan, X., 2009, Anitha, Fouzdar, K., &Behera, S. K. ,2017, Rakesh Narayan Patil et al., 2016

The most important factor that defines the success of the learning process as such is the evaluation and monitoring of the students. Through the present study, it can be understood that at this stage, there were very little avenues for evaluating and monitoring the students in the m-learning process. Such difficulties are

expressed byOrlando& Joel, 2013, Alhajri, 2016, Vyas & Singh, 2014.

On the one side, mobile phones as personalized medium act as an advantage and is useful for the better performance of the students. However, there is a lapse side of it which leads to less personal communication among the students which reduces the team work and collaboration among them which is also revealed in Alhajri, 2016, Bansal, T., & Joshi, D. 2014.

1.7 Conclusion

Though the presence and use of mobile technologies in our everyday lives enables immediate access to content on our fingertips, we need to understand that the role of a teacher can never be ignored at any point of time in the lives of students.

Enabling people with quality education is one of the pertinent ways to achieve sustainable development. Apart from impetus on the of improvements in the quality of life for the locals, we need to assure them the access to inclusive education that will provide them necessary tools to identify feasible ways of solving their problems.

The dearth in the availability of properly trained teachers and schools with adequate facilities along the prevailing inequality in the opportunities for the rural students are some of the basic reasons for the lack of quality education. To provide a quality education to the disadvantaged children, we need to make optimum investments for

educational scholarships, teacher training workshops, school building and improvement of water and electricity access to schools.

In spite of the huge potential of mobile learning, there are evidences that point the reluctancy that exists among the schools and education systems for full-fledged utilization of the new technologies.

However, the need now is to identify and implement smarter ways of m-learning in the prevailing system along with the help of smart pedagogies and reforming existing spaces in the education so as to facilitate their development (Hayath, 2017).

M-learning in India is functioning in India either as an informal sector or a subsidiary of the formal education system. Undoubtedly, learning through mobile phones has a lot to offer the students and the teachers. However, the multi ethnicity in India poses a serious obstacle in how this concept is imbibed by the students and conceived by the teachers as such. Hence the policy makers for the future of m-learning in India need to consider this factor while devising country wide deployment of this technology.

Acknowledgement

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