
AN EXPERIMENTAL STUDY OF USE OF SMS AS A DIGITAL LEARNING TECHNOLOGY AMONG UNDERGRADUATE STUDENTS

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Abstract: Nowhere in the human history, have we come across a small gadget that it had become an integral and indispensable constituent in our everyday life. Its prevalence among the youth is that it had become part and part of their routine life. Many are not ready to leave home without their mobile phones. Soon after the students join in the college, their utmost necessity is the mobile phone. M-Learning is gaining momentum across the globe among the educationalist. Among all the associated technologies of the mobile, SMS is found to be the most used technology and a most successful communication tool. When SMS is being accepted as a promising communication tool, the study aimed at exploring how it is accepted as a learning tool. Little is understood about the factors of SMS when provided as a learning tool. This study aimed at exploring the impact of SMS-Learning among the Visual Communication Undergraduate students of the regular stream when provided as an additional support media for learning. The main objectives are to measure the achievement levels of students as a result of using SMS for learning, based on the DeLone and McLean Model 1992. When provided as digital technology tool how the 'System Quality' and 'Information Quality' of SMS-Learning, affect 'Use' and 'User Satisfaction'. To learn how 'Use' and 'User Satisfaction' of SMS-Learning, affect each other reciprocally. To find out how 'Use' and 'User Satisfaction' affect the 'Individual Impact' and how the 'Individual Impact' leads to the 'Intention to Reuse the System of SMS-Learning,' in addition, it understood the advantages and disadvantages of SMS-Learning from the learner's point of view. The findings of the paired-sample t-test indicated that there is a marked difference between the pretest and posttest scores of the students with the condition ($t = -99.016$, $P = 0.000$).

Keywords: Information Quality, M-Learning, SMS-Learning, System Quality.

Introduction: Though several ICTs are applied to enhance student's education, being a low-cost technology and with its increased capabilities and functionalities, now much emphasis is being placed on the use of mobile technologies for learning termed as 'Mobile Learning' or M-Learning. The importance and the growth of M-Learning are well understood from the increasing publications published from all over the world. A much evident example is of UNESCO's attempt, in conducting Mobile Learning Week (MLW) every year and in 2017 it had entered into the sixth year to look into the feasibilities of how mobile could be leveraged to improve education and accelerate the learning [1].

SMS – A Veritable Tool for Learning: Due to its nature of technological convergence, mobile has many technologies associated with it. Among them, Shot Message Service (SMS) is found much admired for being ubiquitous, low-cost, reliable, Personal and the most reachable[2]. Studies have found that the teens prefer SMS for its convenience [3]. Besides, it is the simplest technology which can work on all platforms of any operating system of mobile. Most of all, with the increasing penetration especially in developing countries, the use of SMS is fruitful and economical for learners in both formal and non-formal education. A range of applications on the utilization of SMS as a teaching and learning tool has been cited which includes, question-answering application [3], learning vocabulary [4], learning supports for technical courses [5 & 6], and communication supports students and tutors [7]. Even more interesting, SMS also has the potential to be manipulated so that users not only can access information but also have the ability to contribute information as well [8]. By this, the concept of mobile audio-wikipedia was developed with the combination of SMS and text-to-speech technologies [9].

Need for the Study: Most students in the higher education institutions possess a mobile phone and are active users of SMS. On an average, a student sees through at least fifty to hundred messages a day, and in some cases, 150 to 200 messages are transpired with their peers. It is habitual of students to read their lessons when examinations close in and the SMS can play the role of a recapitulation system and help them 'keep in touch' with their subjects well ahead of the examinations. Though the SMS is not a comprehensive learning tool, it has proven its success as a blended form with the regular system of learning. Nevertheless, little is understood about the factors which contribute to the success of SMS-Learning as the scarcity in the literature in applying a theory or a model to measure the information success of SMS-Learning is obvious. This study aimed at exploring the success factors, which play a role in the accomplishment of the SMS-Learning [9].

Research Objective: The main objectives of the study were to measure the achievement levels of undergraduate students as a result of using SMS for learning. To find out how 'System Quality' and 'Information Quality' of SMS-Learning, influence 'Use' and 'User Satisfaction'. To learn how 'Use' and 'User Satisfaction', influence each other reciprocally. To know how 'Use' and 'User Satisfaction' influence the 'Individual Impact' and to understand how 'Individual Impact' leads to the 'Intention to Reuse the System'. Besides it also studied the advantages and disadvantages of SMS-Learning from the learner's point of view.

Review of Literature: Information System (IS) researchers have shown a lot of interest in factors and processes affecting users' adoption and use of information technology (IT). They have applied two dominant research approaches in their studies: technology acceptance and Information System Success [10]. Both of them try to explain why users accept or reject information systems and how user acceptance is affected by system design features.

Information technology acceptance research has developed multiple competing models each with a different set of acceptance determinants. Examples of the models include Innovation Diffusion Theory (Rogers, 1995), Technology Acceptance Model (Davis, 1989), Theory of Reasoned Action (Fishbein and Azjen, 1975) and Model of Information System Success proposed by DeLone and McLean (1992 & 2002). The basic concept underlying these models links individual reactions and intentions to the actual use of the Information System [11].

In an IS success study the main area of interest has been in the impacts of the system either at an organization or individual level. At the organizational level, the success is typically analyzed with economic measures like the return on investment. At the individual level, many researchers have relied on user satisfaction as an indicator of IS success. A typical user satisfaction study enumerates attributes of the system and analyzes them separately making it a potentially useful diagnosis for system design but user satisfaction is a weak predictor of system use [10]. As a result of this, user satisfaction is not an adequate indicator of Information System Success but IS success measurements should combine satisfaction with other success dimensions like system use, system quality, and benefit constructs.

Theoretical Constructs: Two things are associated with SMS-Learning. First is the Information quality. Will it be able to deliver the concept correctly when it has a restriction of having only 160 characters? Next, is the System of learning through SMS viable, when it is mainly considered as a communication tool? How do students accept it as a learning tool? It is imperative that we understand and measure these factors. And hence the factors such as 'System Quality', 'Information Quality', 'System Use', 'User Satisfaction' from D & M model (1992) [9] and 'Individual Impact' scale from TAM model were adopted for the study. Besides, it also included the Variables related to Socio-Economic Factors such as Age, Gender, Class of Study and Monthly Income of the family and the 'Intention to Reuse the System' for the study. Based on the review the study devised 'Information Quality' Scale as well as 'System Quality' Scale to measure the Information Success of SMS-Learning.

Research Design: This study adopted the **Quasi-experimental study** and a pretest/posttest was considered to measure the differences. While the experimental study deals with the achievement of the students, a survey of the participants attempted to decipher the influence of the theoretical constructs of the study.

Sample Selection: The study considered the undergraduate students of Visual Communication Course as its sample. There is an array of courses offered by the university, among all courses the feasibility of incorporating mobile into the learning of Visual Communication course students seems to have many prospects. The students use most of the mobile technologies Audio, Camera, the Internet etc., as the students have subjects like photography, Videography, Audio production, Commercial broadcasting etc., which could be completed using the mobile technology. 375 students volunteered to participate in the study and a purposive Sampling technique was adopted to collect the data.

Tools and Techniques:

Development of SMS-Learning Contents: The subjects Advertising for I BSc and Photography for II BSc were selected for the SMS intervention. Important Definitions and concepts of the subject were chosen and developed as SMS-Learning material. The study was conducted during the month of April – May 2014.

Validity of the Tool: To ensure the validity of the tool, the developed SMS contents were checked by the six faculty members who handled classes for them. They checked the Information Quality of the developed SMS contents for its Relevance, Accuracy, Understandability, Completeness, Reliability, Conciseness, Format, Currency and Timeliness of the provided SMS.

Survey Instrument: A survey instrument was used to collect the post responses of the sample. The instrument comprised four sections; I- relating to demographic variables such as Age, Gender, Year of study and Monthly Income, II- pertaining to the mobile phone use and access, III – dealing with the nature, frequency and usage of SMS and finally the IV - concerned with the theoretical constructs of the study. The Information Quality scale consisted of nine items such as Relevancy, Accuracy, Understandability, Completeness, Reliability, Conciseness, Format, Currency and Timeliness of the provided SMS. The System Quality scale consisted items such as Ubiquity, Flexibility, Convenience, Mobility & Portability, Personalization, Contextual, Learner Centric, Ease of Use, Data quality, Economization, Reachability, Supplementation, and Connectivity. A single item scale was used to measure the overall Information Quality as well as the System Quality of SMS for Learning. The individual impact was measured using six statements adapted from Davis et al., according to SMS learning. Finally, the Intention to Reuse SMS was also measured using the statements provided. All of these constructs were measured using seven point interval Scale.

Semi-Structured Interview: Besides, a semi-structured interview was conducted to get the qualitative aspect of the study in terms of advantages as well as the disadvantages of SMS-Learning. Two questions were considered for the qualitative interview. 1. What are the advantages of SMS-Learning? and 2. What are the disadvantages of SMS-Learning? Ten students who volunteered for the interview were considered for the qualitative study.

Reliability of the Survey Instrument: To ensure the reliability of the created instrument, Factor analysis, and Cronbach's Alpha test was performed. Factor analysis was done to ensure the created scales were unidimensional. A principle component analysis was used for extraction of items to load. The items, which had Eigen values more than (0.075) and fit into single component were considered for constructing the 'Information Quality Scale' and items which had (0.064 and more) fit into a single component were considered for creating 'System Quality Scale'. This study with an alpha value of (.918) for 'IQ', (.923) for 'SQ' and 'Individual Impact & Intention to Reuse' (.838) was excellent and good to proceed for the goal. Thus the devised scale found to have a good internal consistency as well unidimensionality in its scale creation.

Experimental Procedure for the Study:

Stage – I Pretest: The researcher fixed appointment with each of the college on different dates and kept a fill up the blank type of test for all I year and the II year students. Pretest comprised 20 fill up the blank questions pertaining to their subject Advertising for I year and Photography for II year. The test scores were noted for all the samples.

Stage – II Intervention of SMS treatment: Through the promotional mode of delivery 2 SMS was sent to the students' at 6.30 pm as the majority of the students preferred SMS in the evening time. I year students received SMS for Advertising and II years for the subject Photography. The SMS were sent from April 10th to May 10th. Important concepts from each subject were identified and send to them for 30 days 10.4.2014 to 10.5.2014. The study was conducted during 2014.

Stage – III Posttest and Data Collection: After 30 days the posttest was kept and the responses from students were collected using the questionnaire. To avoid the subjects becoming sensitive to the material and the possibilities of improving their posttest scores, a different set of questions were administered to the students during pretest and the posttest.

Stage IV Qualitative Insights of SMS-Learning: Further, a semi-structured interview was accompanied to get the qualitative aspect of the study in terms of advantages as well as the disadvantages of SMS-Learning. Ten students volunteered for the interview and their insights about the advantages and disadvantages of SMS-Learning were gathered.

Out of 375 students, twenty of them were absent to the classes on the day of posttest and data collection and they were excluded from the study. And it was found that 14 of the respondent's responses were found incomplete and were not considered as the sample and finally the considered sample was 341 students.

Data Analysis: Descriptive tests, paired sample T-test, Linear and Multiple Regression were used to analyse the data for statistical inferences using the SPSS package version 20.

Key Findings: The results of the paired-samples t-test showed that there exists a significant difference between the scores of the students before and after the intervention of the SMS treatment. The mean of pretest is significantly different from the mean of the posttest with the condition ($t = -99.016$, $P = 0.000$). This revealed that the intervention of the SMS treatment to the students exhibited statistically greater scores in their posttest with (Mean value = 16.1554, SD = 2.90170) than the pretest scores before the SMS intervention (Mean = 1.9267, SD = 1.67083). The 95% confidence interval for the difference is (-14.5139, -13.94608). This demonstrated that the student's score was increased from level one to level four (pretest mean = 1.9267 and the posttest Mean = 16.1554). There was a three time a better improvement in the scores of the student. Those who are in the first level in the pretest had gone to level third and fourth level.

When studied for the influence of 'Socio-Economic Factors', 'System Quality' and the 'Information quality' on the 'Use of SMS-Learning', it accounted for 60% of the variance and were significant at .005 level. When observed for the individual predictors, it revealed that 'Information Quality' and the 'System Quality' of the SMS-Learning were found Significant at .001 and .001 level, with the beta value for the 'System Quality' ($B = 0.509$) and 'Information Quality' ($B = -.401$).

The 'System Quality' as well as the 'Information Quality' of the sent SMS do influence the overall user satisfaction, for the SMS-Learning. With the beta value for 'System Quality' ($B = 0.563$) and the 'Information Quality' ($B = .324$) and both were significant at .001 level.

The study also found that both the 'Use of SMS' for learning and its satisfaction by the learners reciprocally influence each other and they both are significant at .001 level with the value ($B = .197$) and ($B = .197$). Besides both the 'Use' as well as the 'User Satisfaction' together influence the 'Individual

Impact' and found to be significant at .001 level with the beta value ($B = -.009$) and ($B = .802$). The created 'Individual Impact' had a positive influence on the 'Intention to Reuse the System' and found significant at .001 level with the ($B = .736$)

Demographic variables such as Age, Gender, Year of study and the Students Family Income does not have a say on the factors 'Use', 'User Satisfaction', 'Individual Impact' and 'Intention to Reuse the System'. It was found that the Socio-Economic Factors of the students does not play a role in the use of SMS for learning. Irrespective of their socio-Economic Factors they all preferred SMS-Learning System and there was an overall improvement in their performance. SMS technology is not new to them and they were already ardent SMS users.

When looked into their qualitative perspective of SMS-Learning System among the students, they felt learning through SMS is personal, convenient, novel, immediate, short and simple, interesting and engaging. They also said it is easy to learn and easy to store it for their future reading and possible for revision during their free time. Limited capacity, lack of interaction was the disadvantages felt among the students while learning. It led to a focused learning where online learning is found information overload.

Conclusion: We cannot isolate ourselves from using technology for learning. Now it is the era of digital revolution with digital natives having more access and knowledge of technology than ever before. Learning is also shaped by the technological determinism and technological convergences and both are readily offered by the mobile technologies. This study is a humble effort in the M-learning environment which has promising benefits for learning. One can access the internet through his mobile though there is no separate internet connection. Moreover, the deployment of infrastructure for the internet connection all over the country requires a huge investment. In that case, one must think of exploiting the readily available technology the learner already owns and particularly when he is already familiar with the know-how of the technology. This study found that the quality of the 'Information' as well as the 'System' for SMS-Learning have a strong influence on the 'Individual learning' and leads to the 'Reuse of the System' for learning in the future. Instead of investing heavily in the internet services, mobile learning is a viable, economic alternative suitable for the developing countries. Besides this makes possible the just-in-time learning when they travel too (Sripriya & Thomas, 2014). M-Learning is the future of learning. Not only SMS, all the associated technologies of mobile could also be exploited for learning. Many of them especially the girl children from rural places withdrew their education due to distance, in that case, M-Learning is a boon for them to gain knowledge. Not only SMS, all the associated technologies of mobile could be effectively utilized to impart education to the needy. The government and educationalist must think about incorporating mobile into the educational system because this is the only technology all the members have access. This is the only technology which reaches the unreachable. Only through education anybody can elevate their living standards. SMS learning is a drop but learning a concept every day through SMS for a period in small chunks will result in the improvement in their learning.

Jeff Hawkins, the inventor of the Palm Pilot, was quoted in [2] as saying, 'one day, 2 or 3 billion people will have cell phones, and they are not all going to have pcs ... the mobile phone will become their digital life'. **Marshall McLuhan puts it 'Medium is the Message' now 'Message is also a Medium of Learning'.**

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