EFFECTIVENESS OF MOBILE-LEARNING MODULE FOR TEACHING ENVIRONMENTAL EDUCATION

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Abstract

The present study investigated B Ed trainee teacher's ability to learn the course of "Environmental Education in Indian Perspectives" using a mobile learning module which was availed to them through the Edmodo mobile app. The experimental study was conducted on 50 B Ed trainee teacher's from B Ed college at Nagpur City using the pre-test post-test control group design. Their environmental awareness was also assessed using standardized test which was taken as a covariate. The results obtained showed positive significant difference in their achievement while using mobile learning module for teaching environmental education. The study encourages prospects of using mobile learning modules as independent LMS within higher education in near future.
Key words: *mobile, learning, teaching learning, learning module, environmental education*

India, being a steadily developing country still holds about 35% of the illiterate population. There are several reasons for education not being able to reach properly, common reasons being geographical challenges, regional barriers, gender issues, socio-economic inequity, lack of infrastructure and non-favorable environment in particular, the academically liable content and untrained teachers. (Datta & Saha-Mitra; 2010). With the advances in technology, advent of a new system of education emerged in the late 80's and 90's called as E-learning. The concept created a revolution by making use of desktop and laptop computers and took educational learning to a 3-dimensional level. (Balaji et. al; 2016). Further technological advancement led to the evolution of handheld portable devices and wireless technology and gave rise to a new concept of "M-learning" which is the instructional technology transmitted via mobile devices such as Smartphone, I-pad, laptops, table tops etc. (El-Hussein & Cronje; 2010). Mobile learning is thus more focused on the mobility of the learner and is increasingly becoming popular. It reflects how the society has overwhelmingly supported the mobile population and is ready to accept any changes for the betterment of the future. (Mehdipour & Zerehkafi; 2013). Balaji et al.; 2016 have defined M-learning or Mobile learning as "gaining the knowledge or skills via mobile device technology instantly and at any place". Similarly, Quinn, C.; 2000 has defined mobile learning as "Mobile learning is learning through mobile computational devices". In recent times, mobile devices, particularly smart phones have gained much popularity due to their versatile and multi-functional services for daily life, in particular adolescent children. In teaching learning process, these devices help to overcome the temporal and physical boundaries of the classroom and help to make information omnipresent by overcoming the boundaries of time and place for learning which is a great advantage for students. (Carvalho, L. & Ferreira, M. J.; 2015).Thus, it can be considered that mobile learning clearly is the future in Indian Education and will survive a long time

due to the suitability of facing the challenges of the Indian education system. This review paper is aimed at highlighting the current application of M-learning in Indian education and how the future can be predicted as reflected by the current trends.

Environmental Education is a process that allows individuals to explore environmental issues, engage in problem solving and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and develop the skills to make informed and responsible decisions. It includes the knowledge, understanding, awareness, sensitivity, attitude, skill and participation in activities that lead to the resolution of environmental challenges. It is an organized effort to teach how natural environments function, and particularly how human beings can manage behavior and ecosystems to live sustainably (Azadani, et. al., 2013). It is a multi-disciplinary field integrating disciplines such as biology, chemistry, physics, ecology, earth science, atmospheric science, mathematics, and geography. Considering the relevance of Environmental Education, the syllabus proposed by National Curriculum Framework (NCF-2005), for all levels of school education, aims at generating among young learners an awareness of and sensitivity to the total environment in a holistic manner and the problems associated with it. Thus, it becomes mandatory for the teachers to have a deep understanding of the subject and disseminate approved knowledge to the future generation.

Objectives:

i. To develop Mobile-learning module for Environment Education in Indian Perspective for B Ed trainee teachers; ii. To study the effectiveness of Mobile-learning module for Environment Education in Indian Perspective in terms of : a. Achievement of B Ed trainee teachers b. Reaction of B Ed trainee teachers; iii. To compare the effectiveness of Mobile-learning module for teaching Environment Education in Indian Perspective with those studying through traditional method of teaching for B Ed trainee teachers; iv. To compare the effectiveness of Mobile-learning module for teaching Environment Education in Indian Perspective with those studying through traditional method of teaching for B.Ed. trainee teachers when environment awareness is taken as a covariate.

Hypotheses

i. There will be no significant difference between the mean achievement score of the pre-test and post-test of B Ed trainee teachers studying through Mobile-learning module. ii. There will be no significant reaction of the B Ed trainee teachers towards the Mobile-learning module. iii. There will be no significant difference between the mean achievement score of the B Ed trainee teachers studying through Mobile-learning module with those studying through traditional method. iv. There will be no significant difference between mean achievement score of the B Ed trainee teachers studying through Mobile-learning module with those studying through traditional method when environment awareness is taken as covariate.

Variables:

Independent variables: Mobile-learning module for teaching subject "Environmental Education in Indian Perspectives".

Dependant variable: Achievement scores and reaction of the B Ed trainee teachers.

Concomitant variable (covariate): Environmental awareness.

Methodology

In this study, the experimental research method has been used using the pre-test post-test non-equivalent group design. The selected samples (50 B Ed trainee teachers) were subjected to a pre-test using the self-prepared Criterion Referenced Test (CRT) and the standardized test for environmental awareness. The samples were then divided into two groups. The control group (25 B Ed trainee teachers) was taught by traditional method i.e. lecture method. The experimental group (25 B Ed trainee teachers) was enrolled in M-learning group and allowed to self study the subject through the module. After completion of the study period, post-test for both the groups was administered.

Instruments Used

Self-prepared Criterion-Referenced Test (CRT) was used to analyze the achievement of the students by pre-test post-test method.

A self-prepared reaction scale was developed to collect the feedback about the module from the students who used it to study the subject "Environmental Education in Indian Perspectives".

The environmental awareness was assessed using the standardized test Environment Awareness Ability Measure (EAAM) Test by Praveen Kumar Jha.

Statistical techniques

To achieve the objectives and to test the hypotheses in the present study, the data was tabulated and statistical values namely Mean, Standard Deviation, t-value were calculated using online software. Chi-squared test and ANCOVA have been applied for data analysis.

Data Analysis and Interpretation

After the analysis of the data, the following key outcomes were obtained from the present study-

Objective 1: To develop Mobile-learning module for *Environment Education in Indian Perspective* for B Ed trainee teachers:

The module was divided into a set of four sub-modules based on the four units of the course. Each sub-module was further divided into four sub-units according to the topics. Each unit was presented in concise form within info-graphics (MS Power Point form) which was included separately with the sub-modules. Useful audio-visual links were added wherever suitable. The B Ed trainee teachers were enrolled in the Edmodo class, where they were allowed to self study and view the module through their mobile devices like Smartphone"s, Tabs, iPads, Laptops etc.

The mobile learning module covered all aspects of the subject "Environmental Education in Indian Perspectives" was suitable for teaching B Ed trainee teachers. The execution of the module through the "Edmodo app" was successful and apt for this course.

Objective 2a: To study the effectiveness of Mobile-learning module in terms of achievements of B. Ed. trainee teachers for Environment Education in Indian Perspective.

To analyze the data for this objective, the mean value and standard deviation of the Pre-test and Post-test of the experimental group was calculated. The values were incorporated in the t-test formula to calculate 't' value. The calculated value for 't' was

compared to the tabulated value of 't' to determine the level of significance. The data is presented below in table 1.

Table 1 Calculation of 't' value for Pre-test and Post-test of Experimental group

Test	Number of samples	Mean	S.D.	Calculated 't' value
Pre-test (E)	25	19.24	5.34	4.6692*
Post-test (E)	25	27.64	7.23	

*Significant at 0.01 level / **Significant at 0.05 level

There was significant difference between the mean achievement scores of the B Ed trainee teachers before (pre-test) and after (post-test) studying through the mobile learning module. The result was found significant at level of significance 0.01. Thus, the mobile learning module was very effective for teaching subject "Environmental Education in Indian Perspectives" to B Ed trainee teachers.

Objective 2b: To study the effectiveness of Mobile-learning module in terms of reaction of B Ed trainee teachers for Environment Education in Indian Perspective

To analyze the data for this objective, the reaction of the students was tabulated and the Chi-squared test was applied to each question of the reaction scale. The calculated value of χ^2 was compared to the tabulated value of χ^2 to determine the level of significance. The percentage of all five reactions of B Ed trainee teachers was determined for each question. The final conclusion was drawn about the effectiveness in terms of the reactions of the students. The data is presented below in table 2.

Table 2 Chi-squared test values for reaction scale

Sno	Segment	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	Instruction through the mobile learning module	17.2*	33.2*	10.8**	26.8*	28.8*	45.6*	13.6*	32*	28.4*	11.2**
2	Presentation of content	23.2*	42.8*	18.4*	58.4*	11.2**	65.2*	14.6*	25.6*	30*	26.4*
3	Technical aspects	26*	24.4*	21.2*	29.2*	32.8*	15.2*	22.8*	16.8*	32.8*	14.8*
4	Evaluation and feedback	73.6*	15.6*	22*	30.8*	51.2*	72.8*	65.2*	51.2*	13.6*	72.8*

* Significant at 0.01 level/ ** Significant at 0.05 level

The module was found effective and apt for teaching subject "Environment Education in Indian Perspectives" to B Ed trainee teacher in terms of the reaction of students. The module was effective on ground of:

a. Instruction through the mobile learning module
b. Presentation of content
c. Technical aspects
d. Evaluation and feedback

Objective 3: To compare the effectiveness of Mobile-learning module for teaching Environment Education in Indian Perspective with those studying through traditional method of teaching for B. Ed. trainee teachers

To analyze the data for this objective, the mean value and standard deviation of the Post-test of control group and Post-test of the experimental group was calculated. The values were incorporated in the t-test formula to calculate 't' value. The calculated

value for 't' was compared to the tabulated value of 't' to determine the level of significance. The t value is given in table 3.

Table 3 Calculation of 't' value for Post-tests of Control and Experimental group

Test	Number of samples	Mean	S.D.	Calculated 't' value
Post-test (C)	25	23.24	4.83	2.4695**
Post-test (E)	25	27.64	7.23	

* Significant at 0.01 level / ** Significant at 0.05 level

There was significant difference between the mean achievement scores of the B Ed trainee teachers studying through traditional method and studying through the mobile learning module. The result was found significant at level of significance 0.05. Thus, the mobile learning module was effective than traditional method for teaching subject "Environmental Education in Indian Perspectives" to B Ed trainee teachers.

Objective 4: To compare the effectiveness of Mobile-learning module for teaching Environment Education in Indian Perspective with those studying through traditional method of teaching for B. Ed. trainee teachers when environment awareness is taken as a covariate

To analyze the data for this objective, the mean value and standard deviation of the scores of post-test of control group and experimental group was calculated. Similarly, the mean value and standard deviation of scores of the standardized test for environmental awareness was calculated. The values were incorporated in online software to run ANCOVA and determine the 'F' value. The data analysis result is presented in table 4 (a) and 4(b).

Table 4 (a). Details of dependant variables (post- tests of control and experimental groups)

Sample set	Observed Mean for Achievement test	Adjusted Mean for Achievement test
A (Control)	23.24	23.58
B (Experimental)	27.64	27.30
Total	25.44	25.44

Table 4 (b). Summary of ANCOVA analysis

Source	Sum of Squares (SS)	df	Mean Square	F value	P
Adjusted Mean	170.99	1	170.06	6.09**	0.017291
Adjusted Error	1319	47	28.09		
Adjusted Total	1489.99	48			

* Significant at 0.01 level / ** Significant at 0.05 level

There was significant difference between the mean achievement scores of the B Ed trainee teachers studying through traditional method and those studying through the mobile-learning module when environment awareness was taken as covariate. The result was found significant at level of significance 0.05. Thus, the mobile learning module was effective than traditional method for teaching subject "Environmental Education in Indian Perspectives" to B Ed trainee teachers, when environment awareness was taken as covariate.

Educational Implications

The presents study is based on the utility of mobile-learning module for teaching of environmental education. The successful application of the concept on B Ed trainee teachers entails that may have the following educational implications in future: i. Mobile-learning may be included for courses run by colleges to provide more comprehensive knowledge resources to students, particularly in courses for teacher education.; ii. Subjects like environmental education which are a combination of

several social and scientific aspects may be taught through mobile applications. iii. Mobile learning may be adopted by open schools and universities offering distance learning course. It may act as an advanced form of online learning eliminating the need to go to cyber cafes for internet surfing. iv. Awareness programs may be taken up through mobile-learning. It may include any aspect i.e. environment, social cause, value education etc. v. Mobile learning may prove to be a boon for rural and remote areas in India where facilities such as schools and internet cafe are lacking. vi. At present, the internet seems to be like an ocean where knowledge is scattered and cannot be judged or chosen by students. With help of mobile-learning modules, a teacher may be able to provide students with the correct, authentic and selected information which will avoid unnecessary confusion.

Conclusion

On the basis of this study, the following conclusions can be drawn: 1) At present, mobile-learning is not very popular within B Ed trainee teachers of Nagpur city. Traditional method of teaching is still common in colleges. 2) The new generation has welcomed the technological advancements with open arms as evident from the availability of mobile devices with students at college level. 3) The Educational apps can equally be popular and useful as seen in this study. The Edmodo app facilitated the study of subject "Environmental Education in Indian Perspectives". 4) Mobile-learning is a better platform for a vast subject like environmental education where content of choice like text, audio-visuals, messages, quiz, polls etc can be added without much investment or infrastructure. 5) Mobile learning can be used as blended learning to provide a better learning platform for students. 6) Mobile learning without blending may be suitable for use within higher education at formal and informal systems.

References

Agrawal, B. L. (2013). Basic Statistics. Anshan Publications [ISBN – 978-818-4829-0679]

Asthana, S., & Divedi, D. K. (2015). A Study of Environmental Awareness among B.Ed. Students of Dehradun District, Uttarakhand. International Journal of Scientific and Innovative Research, Vol. 3(1), pp.125-130

Azadani, E. N., Karimian, A. A., & Moradi, H. (2013). Students understanding of environmental components and its relationship with the awareness of their parents (A case study on secondary school students in Esfahan, Iran. Bulletin of. Environmental Pharmacology & Life Science, Vol. 2(12), pp.71-79

Balaji, R. D., Al-mahri, F., & Malathi, R. (2016). A perspective study on the content management in E-learning and M-learning. E-print arXiv: 1605.02093. Retrieved from http://arxiv.org/abs/1605.02093

Balasubramaniana, K., Jaykumar, V., & Fukey, L. N. (2014). A study on student preference towards the use of Edmodo as a learning platform to create responsible learning environment. 5th Asia Euro Conference 2014, Procedia - Social and Behavioral Sciences, Vol. 144, pp. 416 – 422

Best, J.W., & Kahn, J. V. (2003). Research in Education, Prentice Hall of India Pvt Ltd, 9th Edition [ISBN: 978-81-203-2833-4]

Carvalho, L. & Ferreira, M. J. (2015) Mobile devices in school in teaching learning process- the roadmap. Proceedings of EDULEARN15 Conference 6th-8th July 2015, Barcelona, Spain, 4623 – 4634

Dziuban, C. D., & Elser, W. K. (1974). Criterion referenced test: some advantages and disadvantages for science instruction. Science Education, Vol. 58(2), pp. 171-174

Datta, D. & Saha-Mitra, S. (2010). M-Learning: Mobile enabled technology. Innovations@ Mobiles

El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining Mobile Learning in the Higher Education Landscape. Educational Technology & Society, Vol.13 (3), pp. 12–21.

Ferry, B. (2009). Using mobile phones to enhance teacher learning in environmental education, in Herrington, J, Herrington, A, Mantei, J, Olney, I and Ferry, B (editors), New technologies, new pedagogies: Mobile learning higher education, Faculty of Education, University of Wollongong, pp. 45-55.

Garrett, H. E. (2005). Statistics in Psychology and Education, Paragon International Publishers [ISBN: 978-81-892-5300-4]

Goundar, S. (2011). What is the Potential Impact of Using Mobile Devices in Education? Proceedings of SIG GlobDev Fourth Annual Workshop, Shanghai, China, Paper 16 [http://aisel.aisnet.org/globdev2011/16]

Jadav, S. G., & Shinde, G. N. (2012). M-Learning: Understanding the Scope and Technologies International Journal of Computer Science and Technology, Vol. 3(2), pp. 452-454

Kaur, A., & Bhullar, M. S. (2013). New Method of Learning: M-Learning (Mobile Learning). Proceedings of the World Congress on Engineering and Computer Science, Vol.1, pp. 3-7

Kearney, M., & Maher, D. (2013). Mobile learning in maths teacher education: using i-pads to support pre-service teacher's professional development. Australian Educational Computing, Vol. 27(3), pp.76-84

Kumar, A., Tewari, A., Shroff, G., Chittamuru, D., Kam, M., & Canny J. (2010). An Exploratory Study of Unsupervised Mobile Learning in Rural India. Conference: Proceedings of the 28th International Conference on Human Factors in Computing Systems, CHI 2010, Atlanta, Georgia, USA, pp. 743-752

Laughran, J. (2014). Pedagogy of teacher education. In: Gunstone R. (eds) Encyclopedia of science education. Springer, Dordrecht

Looi, C-K., Zhang, B., Chen, W., Seow, P., Chia, G, Norris, C., Soloway, E. (2011). Mobile inquiry learning experience for primary science students: a study of learning effectiveness. Journal of Computer Assisted Learning, Vol.27 (3), pp. 269-287

Mangal, S. K., & Mangal, U. (2009). Essentials of Educational technology. PHI Learning Private Ltd, New Delhi [ISBN- 978-81-203-3723-7]

Mehdipour, Y., & Zerehkafi, H. (2013). Mobile Learning for Education: Benefits and Challenges, International Journal of Computational Engineering Research, Vol. 3(6), pp 93-101

Mishra, S. K. (2012). Environmental awareness among senior secondary students of Maheshwar and Mandleshwar, Dist.-Khargone (M.P.). International Journal of Science and Research Publications, Vol. 2 (11), pp. 1-3

Moursund, D. (2005). Introduction to information and communication technology in education. University of Oregon, USA. http://uoregon.edu/ %7emoursund/ Books/ICT/ICTBooks.pdf [viewed 23 July 2017]

Narayanasamy, F. S., & Mohamed, J. B. K. (2013). Adaptation of Mobile Learning in Higher Educational Institutions of Saudi Arabia. International Journal of Computer Applications, Vol. 69(6), pp 34-38

Paliwal, S., & Sharma, K. K. (2009). Future Trend of Education – Mobile Learning Problems and Prospects. ICAL 2009 – poster papers, pp. 657 -659

Rana, S.S. (2014). A Study of Use of Mobile Phones for Teaching & Learning Purpose. International Journal of Science and Research, Vol. 3(6), pp. 2765-2767

Sarrab, M., Elgamel, L., & Aldabbas, H. (2012). Mobile Learning (M-Learning) and Educational Environments. International Journal of Distributed and Parallel Systems, Vol. 3(4), pp 31-38

Sengupta, M., Das, J., & Maji, P. K. (2010). Environmental awareness and environment related behavior of twelfth grade students in Kolkata: effects of stream and gender. Anwesa, Vol. 5, pp. 1-8

Singh, Y. K. (2010). Research Methodology. APH Publishing Corporation, New Delhi [ISBN – 978-817-7648-9638]

Sung, Y-T., Chang, K. & Liu, T-C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. Computers & Education, Vol. 9, pp. 252-275

Tabachnick, B. G., & Fidell, L.S. (2013). Using multivariate statistics (6th edn). Pearson Publications [ISBN – 978-020-5849-574]

Tinjala, P., & Gijbels, D. (2012). Changing World: Changing Pedagogy. In: Tynjala P., Stenstrom M.L., Saarnivaara, M. (eds) Transitions and Transformations in Learning and Education. Springer, Dordercht [ISBN – 978-94-007-2312-2]

Tripathi, H. (2016). Effectiveness of Blended Learning Using LMS-Edmodo in Teaching Economics at Higher Secondary Level. The International Journal of Indian Psychology, Vol. 3(3-10), pp. 74-83

Vujin. V., Petrovid, N., Isljamovid, S., Vuk, D. & Senegacnik, M. (2011). Mobile learning and improvement of environmental education. Conference Proceedings, 14th Toulon-Verona conference "Organizational excellence in service" University of Alicante, Spain, pp-1253-1263 [ISBN – 978-88904327-1-2]

Quinn,C. (2000). mLearning: Mobile, Wireless and In-Your-Pocket Learning. Line Zine.

Website References
1. https://en.m.wikipedia.org
2. https://gadgets.ndtv.com
3. https://www.edmodo.com
4. https://www.epa.gov
5. https://www.stastisticsolutions.com
6. https://www.techrrival.com
7. https://www.upsidelearning.com
8. https://www.yourarticlelibrary.com