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DEVELOPING AND IMPLEMENTING A MOOC IN EDUCATIONAL TECHNOLOGY FOR STUDENT TEACHERS AND TESTING ITS EFFECTIVENESS – AN EXPERIMENT

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ABSTRACT :

A MOOC may be defined as a model for delivering learning content online to any person who wants to take a course with no limit to attendance. In the present study, a MOOC in Educational Technology was developed and implemented on student teachers. The quasi-experimental pre-test post-test non-equivalent group design was used for this purpose. The sample of the study were student teachers undertaking the Bachelor of Education (B.Ed.) programme in teacher training institutions affiliated to the University of Mumbai and located in Mumbai and Navi Mumbai. While the experimental group was provided with the MOOC, no treatment was given to the control group. Researcher-constructed Achievement Test in Educational Technology (used as both, pre- and post-test) was used to test the performance of the student teachers after the MOOC was implemented. The data was analyzed using parametric tests namely the t-test and Wolf's Formula. The findings revealed that the treatment was effective in bringing about an improvement in student teachers' knowledge and understanding about educational technology.



KEYWORDS : Massive Open Online Courses, MOOC, educational technology, student teachers, quasi-experimental pre-test post-test group design.

INTRODUCTION

Even though technology continues to make major impacts in the field of education, the teacher still remains at the helm of learning. Transitioning from a traditional classroom and specializing in one subject to a classroom in which learning is infused with the use of various technological aids and requires a teacher to be multi-faceted, the role of the teacher has now been raised to that of a guide and a facilitator. Therefore, it becomes essential that teachers today keep renewing their knowledge and also get comfortable with using technology.

As working professionals, teachers could turn to MOOCs to keep themselves up-to-date with recent developments, not only in their field of expertise but also in several other aspects such as the use of technology in education. This, in turn, may quite possibly lead teachers to come up with their own MOOCs and thereby make significant contributions to the society.

NEED FOR THE STUDY

The 21st Century classroom is a plethora of technological tools and equipment. It is not only the presence of these tools that makes a difference but also their many, varied applications in learning. The students

of today, being techno-savvy, would actually learn better if this technology were to be used for the purpose of instruction. It, therefore, becomes absolutely essential that the teacher of today also becomes techno-savvy to some extent. As a teacher, teaching a technologically-forward generation of students, it necessitates that the teacher knows what, when, and how to use technology in education.

Several studies have reported that there has been a transformative infusion of technology in education. More and more students are getting hooked onto technology and it is time that educators start using technology in their teaching. eSchool News (2013) reported that more than half the students in grades 6–8 have access to a tablet computer. Also, Project Tomorrow's survey reported that more than 364,000 students use technology including the use of Internet to complete their homework and Facebook to collaborate with classmates for school projects.

The Times of India (2010) reported that education in India is transitioning from rote learning to tech-based learning. Laptops, CDs, and eLearning now adorn classrooms. According to this report, IT is not only coming to the help of students but also of the faculty. Additionally, statistics reveal that 77% of teachers believe that the use of technology in classroom motivates students to learn. Other than that, 76% teachers are of the opinion that using technology enables them to respond to a variety of learning styles.

The researcher, therefore, believes that it is time that teachers in India realize the importance of educational technology not only for the benefit of their students but also for their own careers. Thus, there is an urgent need for the teachers to get out of the bondage of traditional means of teaching and learn newer ways to teach that include using technological tools. Like Bose, S. (2010) rightly cautions that if technology integration does not happen in teacher training, it could leave teacher trainees unprepared for integrating technology when they teach.

As reported by Jain, B. N., et. al. (2014), MOOCs have tremendous potential in the non-formal sector such as in teacher education. And this is where a MOOC in educational technology may come to the aid of those who are already teaching in reputed educational institutions as well as those aspiring to be teachers. This course will take these teachers on a journey of educational technology and give them a strong and satisfactory reason to make use of the same in their teaching profession. The outcome of the study could help teachers and would-be teachers to be better equipped with the knowledge of educational technology and, indeed, make their instructions and classrooms truly that of the 21st Century.

OPERATIONAL DEFINITIONS OF TERMS

Massive Open Online Course

This refers to the Massive Open Online Course that the researcher developed in Educational Technology for student-teachers, comprising of the following modules:

- Module 1: Educational Technology – Getting Started
- Module 2: The Benefits, Limitations, and Disadvantages of Using Technology
- Module 3: Tools You Can Use in the Classroom
- Module 4: Tools You Can Use in the Classroom and Beyond
- Module 5: The Computer and The Internet
- Module 6: What about the Infrastructure?
- Module 7: All about e-Learning
- Module 8: Instructional Design – An Upcoming Field
- Module 9: Where Are We Headed?
- Module 10: The Future

Each module in this MOOC consists of topics having content in the form of text, images, and links to videos and additional reading materials. Each module ends with a summary followed by an end of module assessment, either in the form of a quiz or essay. This MOOC is available on the learning management system, Eliademy and is available at <https://eliademy.com/app/a/courses/da79ccdba3>.

Student-teachers' Performance (Achievement) in Educational Technology

This refers to the knowledge and understanding gained by the student-teachers in Educational Technology based on the content of the MOOC, created by the researcher, which they have undertaken.

OBJECTIVES OF THE STUDY

1. To develop and implement the MOOC in Educational Technology
2. To study and compare the pre-test scores in the subject of Educational Technology of the experimental and control groups
3. To study and compare the post-test scores in the subject of Educational Technology of the experimental and control groups
4. To study the effect size of the treatment (undertaking the MOOC in Educational Technology) on the experimental group

HYPOTHESES OF THE STUDY

1. There is no significant difference in the pre-test scores in the subject of Educational Technology of the experimental and control groups.
2. There is no significant difference in the post-test scores in the subject of Educational Technology of the experimental and control groups.

SAMPLE AND SAMPLING TECHNIQUE

The sample was first year student teachers undergoing the Bachelor of Education (B.Ed.) programme in nine teacher training institutions affiliated to the University of Mumbai.

The sampling technique used was purposive sampling. Data was collected from those colleges that gave permission for the same. The colleges were then randomly assigned as experimental and control groups by the lottery method.

METHODOLOGY

The quasi-experimental pre-test post-test non-equivalent group design was used in the study.

$O_1 X O_2$

$O_3 C O_4$

Where,

O_1 and O_3 = Pre-test

O_2 and O_4 = Post-test

X = Experimental Group

C = Control Group

Data Analysis

While the t-test was used to test the hypotheses of the study, the Wolf's Formula was used to determine the effect size and magnitude of the experimental programme.

FINDINGS AND INTERPRETATIONS

1. There is no significant difference in the pre-test scores of the *Educational Technology Achievement Test* of both the experimental and control groups. (t ratio = 1.54, $p > 0.05$)

No significant difference was seen in the pre-test scores of the experimental and control groups. This indicates that the student teachers in both groups are at the same level of knowledge and understanding of educational technology. This, in turn, implies that both, the experimental and control groups, were equal before the experiment was conducted.

The student teachers' performance in the *Educational Technology Achievement Test* was conducted before the treatment and so, this would be based on their previous knowledge of educational technology. It was

seen that the student teachers in both groups were moderately aware of the basic concepts of educational technology but their knowledge of the ICT tools and technology including Web 2.0 tools was good. This could possibly be because these student teachers use these ICT tools and technologies regularly. We live in times where social media presence is a necessity and most people including these student teachers are inhabitants of several social media platforms. Another tool very commonly used is Wikipedia since information on almost anything is available here and usually the Wikipedia link is the first in the list of search results spewed by search engines including Google. Other than that, blogs are a household name on the worldwide web today. From showcasing your hobbies to writing about absolutely anything, a blog is considered a credible point in one's curriculum vitae.

Other than Web 2.0, the student teachers seemed to be well-versed with the basic parts of a computer and infrastructure requirements but they were marginally aware about instructional design including Bloom's Taxonomy probably because they have never been exposed to these concepts. They were also slightly aware about modern techniques of classroom instructions including flipped classroom and blended learning. Again, this could be because they may have only heard about these techniques at the superficial level while not really going in depth into or using them in their lesson plans. It was also seen that the student teachers possessed sufficient information about distance education most probably because they may have either done a course or programme through distance learning or may know somebody who has done so.

Therefore, a probable reason for the two groups being equal could be that the student-teachers in both groups have used or are at least aware of the tools and techniques that constitute educational technology. Moreover, the teacher training institutions, where these student teachers receive training, also use, if not the latest technology, at least some ICT tools and gadgets to impart instructions. A well-equipped teacher training institution would have at least a computer laboratory, strong Internet facility, and other tools such as overhead projectors and whiteboards. Bhattacharjee, B. and Deb, K. (2016) state that in modern times, education demands that teachers have knowledge of ICT and skills to use them in the teaching-learning process. They also state that integrated technological knowledge during teacher training helps prospective teachers to know the world of technology in a better way whereby it can be applied in the future for the betterment of the students. Smith, J.J. and Greene, H.C. (2013), through their study, noted that pre-service teachers using e-learning technologies to enhance their learning reported improved lesson planning, improved lesson implementation, visual interpretations of best practices, modeling, and peer and university instructor feedback as successes of an e-learning project. Challenges, however, included participants' frustrations of being overworked and overwhelmed with the technical problems associated with e-learning. Overall participants judged the e-learning project as a very positive aspect of their teacher training.

Additionally, the society being so technology-driven has put pressure on everybody to not only be aware of but also use the latest gadgets and therefore, the latest technology. An unspoken mandate of being "technologically available" has become crucial in today's times. From using the latest smartphones to constantly updating social media profiles, technology has been in an overdrive in the recent years. Not only personal but professional uses of these technological advancements indicate that we remain "technologically available" at any given time. This is true even for the would-be teachers. From receiving assignment reminders on WhatsApp to submitting reports through an email to preparing lesson plans for a smart classroom, it can be safely assumed that these trainee teachers are in-sync with at least some of the latest in technology.

Thus, the student-teachers in the experimental and control groups were found to be similar in their knowledge and understanding of educational technology, thereby equalizing them before the experimental programme could be implemented.

2. There is a significant difference in the post-test scores of the *Educational Technology Achievement Test* of both the experimental and control groups. (t ratio = 1.93, p = 0.05)

A significant difference was seen in the post-test scores of the experimental and control groups. This indicates that, statistically, the two groups differ in terms of their knowledge and understanding of educational technology at the post-test stage.

EXPERIMENTAL GROUP

The post-test was conducted after the culmination of the experimental programme, that is, the undertaking of the MOOC in Educational Technology by the experimental group. Considering the performance of the student teachers in this group on the *Educational Technology Achievement Test*, it was seen that the student teachers in the experimental group showed an increase in their knowledge and understanding of educational technology.

It was observed that these student teachers had mastered the basic concepts of educational technology while their knowledge and understanding of the ICT tools and techniques were greatly enhanced. While they were already in-tune with the basics of the computer, the infrastructure required for an ICT-enhanced education institution, and distance education, they did well on topics such as instructional design and modern instructional techniques such as flipped classroom and blended learning.

It was found that the experimental group performed better than the control group. The most probable reason, in this case, could be the exposure of the experimental group to the MOOC in Educational Technology. The content covered in the MOOC was supported and enhanced by the use of images and links to additional reading materials and YouTube videos. Each module in the MOOC was structured as: Introduction, objectives, main content, concluding thoughts, summary, and references. A module was followed by an end of module assessment, either in the form of a quiz or an essay question, which most likely helped participants check their understanding of a particular module.

Punia, Y. (2017), through his study, states that the advent of MOOCs in the classroom helps in getting the student move towards knowledge rather than just information. The inclusion of MOOCs as a medium of instruction, either solely or as a supplement, does result in better achievement of the students.

CONTROL GROUP

As done for the experimental group, a post-test was conducted for the control group, too. Considering the performance of the student teachers in this group on the *Educational Technology Achievement Test*, it was seen that the student teachers in the control group were more or less at the same level in their knowledge and understanding of educational technology at the post-test stage.

The control group was not provided the treatment, that is, they were not exposed to the MOOC in Educational Technology developed by the researcher. It is quite possible that the presence of a focused, streamlined technique to know and understand the nuances of educational technology could have helped the student teachers in this group to gain and enhance their knowledge and understanding of educational technology.

While the control group had adequate knowledge of the basics of educational technology and computers, and Web 2.0 tools, there did not seem to be an enhancement in this knowledge at the post-test stage. They remained unaware of things they were unaware of at the pre-test stage. One such topic was instructional design and its various aspects. This could most probably be because they have not been taught or have read up on this topic. Concepts of flipped classroom and blended learning, too, remained unexplored in case of the control group.

Thus, it can be safely assumed that exposure of the control group to instructions, which will help them solidify their base of educational technology, will make them better equipped for the future. In fact, Goswami, C. (2014), in his paper *Role of Technology in Indian Education*, provides valid reasons for the use of technology in education. These include capital deepening, high quality labor, and technical innovation. The author lists some of the technological tools used in classrooms and how these benefit instructions. The author also emphasizes the importance of the *Education Technology Project*, undertaken by the Government of India, and how it aims to improve quality of education at all levels, reduce wastage and stagnation, and introduce new methods of teaching and innovation. As a starting point, the MOOC in Educational Technology, developed by the researcher, could come to their aid.

3. The experimental programme, that is, the MOOC in Educational Technology, developed by the researcher, was moderately effective in bringing about a gain in the knowledge and understanding of educational technology of the student teachers in the experimental group. (Wolf's $d = 0.48$)

The MOOC in Educational Technology, developed by the researcher, dealt with varied topics from educational technology and ICT. The reasons for choosing educational technology and ICT as components of the MOOC were the ever-growing insurgence of technology in the field of education, highly techno-savvy generation of students, and modern classrooms equipped with the latest technological tools and gadgets. Considering these, the researcher deemed it important that future teachers must be in sync with not only the latest technological advancements in education but also build a firm foundation of educational technology before entering their classrooms. To quote Bose, S. (2010), "teachers need to be taught, during teacher education programs, through methods that integrate Information and Communications Technology (ICT) so that they may be prepared to integrate ICT when they teach in schools."

It was also taken into account that these student teachers have busy schedules and may not be in a position to do another course along with their ongoing programme. The MOOC was such that it could be undertaken at any time and from anywhere. It was self-paced and the student teachers could do it at their own convenience. This was found to be true in case of the present research study. The student teachers, while narrating their experiences, said that they usually went through the MOOC when they had free time at home or in their teacher training institutions or when they were traveling.

The student teachers also pointed out that this MOOC acted as a stress-buster or a break from their regular chores. This could probably be because, through this MOOC, the student teachers in the experimental group got a chance to study something other than their regular syllabus in a different manner. The fact that they are comfortable and efficient in using their smartphones also probably made it easier to course through the MOOC.

Additionally, their tasks and assignments, which require writing and/or typing, was replaced by quizzes (present in eight modules of the MOOC) that were faster and provided them with instant feedback. It is important to note here that the student teachers definitely preferred (as pointed out by them while sharing their experiences) the multiple choice questions to the essay ones (present in two modules of the MOOC).

Coming to the content of the MOOC, most student teachers thought that the modules helped them in some way or the other and would be beneficial in their upcoming internship period. Topics such as tools especially Web 2.0 tools, ADDIE and other instructional design models, Bloom's Taxonomy, flipped classroom, and blended learning propelled them forward in their teacher training to a great extent. It helped them in their Enhancing Professional Capacities (EPC) Course 3 *Critical Understanding* of ICT of their B.Ed. syllabus. As per some of the experiences shared, the knowledge gained by undertaking this course gave them "an upper hand" over their classmates by helping them work on their related assignments in a more knowledgeable and efficient manner. Moreover, the student teachers studied ICT and educational technology through an instructional technique that made use of the same rather than the conventional lecture method.

Yet another reason for the MOOC being accepted by the student teachers was the availability of an e-certificate upon the completion of the course, which can be added to their curriculum vitae or to their professional LinkedIn profiles. The e-certificate acted as the final reward for the student teachers.

Thus, it can be said that the MOOC in Educational Technology was effective to some extent and proved beneficial to the student teachers in one way or the other.

RECOMMENDATIONS BASED ON THE STUDY

Based on the findings of the present study, the researcher has the following recommendations to make.

- Online courses such as MOOCs can prove extremely advantageous to those students undergoing distance learning and residing in locations far away from their educational institutions.
- Since students today are technologically advanced, it also becomes imperative on the part of teachers to become technology-savvy. They must be aware of and keep their array of tools up-to-date.
- Both, pre-service and in-service, teachers must be ready to adapt to newer teaching methodologies that

include the use of the latest technological tools and gadgets so as to connect with their students.

- Teachers could come up with their own online courses. In that way, they would not only cater to their own students but to students globally.
- Initiatives such as developing an online course would also lead to sharing of intellect and other resources between teachers and students world over, thereby, encouraging collaborative learning.
- Moreover, teachers can look forward to MOOCs for their professional development, too.
- Considering the rise of the use of ICT in the education sector, it becomes important that policy makers formulate policies which will help in funding facilities such as computer laboratories and the Internet.
- Educational institutions can collaborate with each other to promote fraternity and harmony through knowledge-sharing.

CONCLUSION

A need to infuse teacher training with new technologies has been felt. It is mandatory to make in-service teachers equipped to teach in 21st Century classrooms. A MOOC, as an instructional technique, could go a long way in helping pre-service and in-service teachers advance in their careers in terms of knowledge gain, keeping abreast of latest developments, and professional development.

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