Innovation in Action: Exploring the Effectiveness of a MOOC in Teacher Education

Shama P. Ansari and Ashutosh Biswal*

Abstract

MOOCs are Massive Open Online Courses that are open and accessible to those with a stable internet connection. There is no kind of biasness concerning caste, creed, gender, etc. for its enrolment and registration which makes learning through MOOC inclusive. Learners can select any course of their choice irrespective of their previous background. The courses are also free in most cases and there are provisions for financial assistance in the case of paid courses. MOOCs have discussion spaces where students can talk with other learners from different regions and of differing backgrounds. The course provides students with self-paced learning and learning at their own convenient time. People who are doing a job and lack time to study in physical mode can enroll in such courses and get the benefits of online learning. Though MOOC has gained momentum worldwide, MOOCs in India are in a nascent stage. The Teacher Education programs should prepare students to use new technology in the classroom to meet the demands and aspirations of students in the twenty-first century. To fulfil these educational demands of students, we require teachers who know how to deliver knowledge and who truly care about students and their future success. The researchers in the present study developed a MOOC for pre-service teacher educators and studied its effectiveness with the help of an achievement test prepared and validated by the researchers. The developed MOOC enabled students to get acquainted with a new method of learning, compelling them to use various authentic open educational resources available on the online platform, enabling self-paced and flexible learning. The analysis indicates that MOOC was found to be effective in enhancing pre-service teacher educators' achievement. The findings support the idea that pre-service teacher educators need to be trained for developing Massive Open Online Courses in their respective subjects by utilizing the various free open-source software available online.

Keywords: *MOOC, Pre-service teacher educators, research methodology, quadrants, achievement*

Introduction

Massive Open Online Course (MOOC) has evolved as a critical type of Open Distance Learning. These courses are Massive because there is no limit on the enrolment of students in these courses. It is considered Open because anyone from anywhere with the internet can access it and it is Online because all course components like instruction, testing, and discussions are done online. MOOC can be defined as a course that has no limits on its enrolment; it may have a set start and end duration, is open for all irrespective of the background, all components are shared online, and has features of video lectures, discussion forums, online assignments and assessments leading to certifications. MOOCs are open and accessible to all with a stable internet connection. There is no kind of biasness concerning caste, creed, gender, etc. Hence, learning through MOOC is considered to be inclusive. Learners can select any course

of their choice irrespective of their previous background. The courses are also free in most cases and there arte provisions for financial assistance in the case of paid courses. MOOCs have discussion forums where students can talk with other learners from different regions and backgrounds. The course provides students with self-paced learning and learning at their own convenient time. People who are doing a job and lack time to study in face-to-face mode can enroll in such courses and get the benefits of online learning. According to Goel & Goel (2013), "Open Distance Learning through MOOCs has great potential to be infused in teacher education in both pre-service and in-service modes which seems to be a neglected area. Teacher education in India has a slow pace in getting access to modernization and has not yet integrated the technological innovations for transacting education." The researchers in the present study developed a MOOC for Pre-service teacher educators and studied its effectiveness with the help of an achievement test developed and validated by the researcher. The developed MOOC enabled students to get acquainted with a new method of learning, compelling them to use various authentic open educational resources available on the online platform, enabling self-paced and flexible learning among them.

Present Status of MOOC In Teacher Education

Teacher Education is an important discipline to improve the quality of school education. According to Goel and Goel (2013), "Teacher Education is a discipline which educates the progressive generations on what has gone by, where we are, where we want to go, and what we like to create, observing healthy, meaningful and long life. Innovations in Teacher Education are very rare. It may be attributed to various factors. Novel ideas do not incubate because of adverse external conditions. There are wide gaps between the visionaries and actors. So, very often the innovations have a short life and die down in the institutions, where these originate. Sometimes, the most innovative programs fail in the formal system, because, these are beyond the view & purview of the apex bodies." Teacher Education Programs largely follow traditional methods of teaching and infusion of modernization is very slow. The programs are always novices to new modes of teaching in India, teacher educators are reluctant in adopting or experimenting with innovative teaching approaches. It is crucial to remember that teaching isn't essentially a field that's known for creativity, so change can be tough. As science and technology are advancing in India, the methods of teaching are also not confined to the 'chalk-and-talk' method but moving more towards methods which focus on the need of students. However, the outlook of teachers towards adopting such innovative approaches to teaching is a big challenge (Parvin, 2021). Teacher Education Programs should prepare students to use new technology in the classroom in order to meet the needs and aspirations of students in the twenty-first century. To fulfil these educational demands of students, we require teachers who know how to enhance the learning experiences of students and who truly care about students and their future success.

Review of Related Literature

The researcher reviewed few studies on the development and implementation of MOOC. Uppal (2019) and Inchiparamban and Pingle (2017) developed and implemented a MOOC and found that MOOCs can significantly enhance knowledge and awareness among teacher educators and B.Ed. students. Similarly, Najafi et al. (2014) demonstrated that integrating MOOCs into school-based courses as self-study tools can improve test scores, although they underlined a potential issue with platform sustainability. Griffiths et al. (2015) observed no significant difference between students' learning through blended MOOCs and traditional

methods in university settings, suggesting that MOOCs offer a unique learning style. Andone and Mihaescu (2018) commended MOOCs for promoting self-paced learning, while Israel (2015) highlight the challenges of incorporating MOOCs into conventional classrooms despite their potential as excellent resources. Cohen and Soffer (2015) as well as Goncalves et al. (2016) highlighted MOOCs' flexibility and their role in developing 21st-century skills, especially in teacher education. Janssen et al. (2016) emphasized the importance of teacher involvement in MOOC design, and studies like Oakley et al. (2016) identified key factors for MOOC popularity, including material accessibility and practicality. Research across various studies highlights the potential of MOOCs in enhancing knowledge among educators and students, offering a flexible and self-paced learning environment.

Need for the Study

The Indian government recognizes the value of MOOCs in promoting Entrepreneurship, Education, and Training, and has set aside funds in its budget to support the creation of more MOOCs. The government's recent initiatives to provide quality education for people at all levels will be dependent on the expansion of online learning. To increase the enrolment in higher education in India and to provide quality world-class education to all, MOOC can be a viable option. Given the increasing need of youth to pursue excellent higher education at affordable prices, as well as the importance placed on e-learning and digital literacy by educational institutions and governments worldwide, Massive Open Online Courses are becoming an integral part of the global education system (Subrahmanyam & Swathi, 2017). MOOCs are the new revolution sweeping the Higher Education sector. India's defining task and opportunity for the twenty-first century is to provide good higher education and to prepare young people for their livelihoods and careers. MOOC is the answer to all these problems and can provide access to education to any massive population. MOOCs can offer students more engaging and effective instruction than individual professors might be able to create on their own (Daniel, 2012).

Although MOOC has gained momentum worldwide, MOOCs in India are in a nascent stage. Efforts need to be taken to maximize the engagement among learners, monitor their learning, and make learning interesting so that the dropout rate can be minimized. This study aims to provide pre service teacher educators with not only a new platform for teaching and learning but also prompt them to adopt such practices in the future. It also seeks to provide a path for pre-service teacher educators to get acquainted with an innovative teaching-learning platform, promote professional development, create awareness for MOOCs and equip them with 21st-century technical skills. The investigator did not find any studies, research, or investigations especially focused on developing a MOOC for pre-service teacher educators during the review of the literature. Consequently, the researcher was eager to undertake the present study in this field and to develop a MOOC on the selected topic of Research Methodology and test its effectiveness.

Objectives of The Study

- To develop a MOOC in 'Research Methodology' for pre-service teacher educators.
- To implement the developed MOOC in 'Research Methodology' on pre-service teacher educators.
- To study the effectiveness of the developed MOOC in terms of the achievement of pre-service teacher educators

Hypothesis

The following null hypothesis was formulated and tested at the 0.01 level of significance.

H_0: There is no significant difference in the post-test mean achievement score of the control and experimental group in Research Methodology.

Terminology

MOOC: MOOC stands for Massive Open Online Course. It can be defined as an online course hosted on a platform that can enroll many students simultaneously, may have a set start and end date, is open for all irrespective of the background, all components are shared online, and has major components like video lectures, discussion forum, online assignments and assessments leading to certifications and badges.

Pre-service Teacher Educators: Students enrolled in the two-year M.Ed. program across India.

Achievement in Research Methodology: Score secured by the pre service teacher educators in an Achievement Test in 'Research Methodology' prepared by the researcher.

Research Design

The present study is quantitative and an experimental study was adopted. The research design used was quasi-experimental. In this design, an experimental procedure is applied but all extraneous variables are not controlled (Christensen et al., 2014). Here, manipulation of the independent variable is carried out but there is no random assignment of individuals to the control and experimental group. The design adopted was a pretest-posttest non-equivalent control group design was adopted. The independent variable used was MOOC and the dependent variable was the achievement in 'Research Methodology' of pre-service teacher educators.

Population and Sample of the Study

The population consist of all those items, objects or things which are having certain characteristics common in all and are of interest to the researcher. The present study population comprises all the pre service teacher educators studying in the two-year M.Ed. programme in India in the academic year 2021-2023. Since 2015, the duration of the M.Ed. programme has been increased from one year to two years. Due to this, several M.Ed. colleges started facing difficulties in getting sufficient enrolment (Rohilla, 2020). Hence two institutions from Gujarat state with sufficient enrolment were chosen to conduct the research i.e. Department of Education, Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda, Vadodara and Kameshwar College of Education, affiliated to Gujarat University situated in Ahmedabad. The only factor for choosing the institution was the convenience of the researcher to be able to get access to the pre service teacher educators and get permission and full support of the authority to collect data.

Research Tool

An achievement test in 'Research Methodology' was constructed by the researcher. The same achievement test was used both in pre-testing and post-testing (i.e. before and after the implementation of the developed MOOC) of the control and experimental group. It was prepared in both English and Gujarati language. The achievement test was constructed keeping the topics to be taught through MOOC in mind. So, the achievement test comprised questions relating to three broad topics of 'Research Methodology' constituting of introduction to research methodology, types of research methods and sampling in educational research. Before constructing the achievement test in Research Methodology a blueprint was prepared by the researcher. The achievement test consisted of 50 multiple-choice questions and was of 50 minutes duration. The achievement test was prepared using multiple choice question options in Google form. The questions prepared by the researcher took into consideration all three levels of the cognitive domain i.e. knowledge, understanding and application. The items in the test were divided uniformly among all three broad topics. The developed achievement test was validated by the subjects and language experts. All suggestions and comments were incorporated into the final achievement test.

Development of the MOOC

MOOCs are Online Courses with the capacity to enroll unlimited students, open to all and consist of components like video lessons, assessments, discussion forums and additional resources. It also consists of a platform to host the Course. The researcher developed the MOOC, along with its different quadrants and platform, to host the MOOC. The following steps were involved in this process:

- Self-enrolment in MOOC to understand its basics and technology
- Selection and analysis of content for MOOC
- The content selected for MOOC was then divided into three Specializations
- WordPress was selected as a Content Management System to design the website
- Designing various web pages on the platform WordPress
- Selection of an LMS –plugin called LIFTERLMS to develop the course
- Development of Quadrants for MOOC including video lessons, discussion forums, assessments and additional resources.
- Making the quadrants interactive and engaging.
- Assembling the Quadrants in the Course Builder feature of the LIFTERLMS. i.e. planning the lesson and modules.
- Developing Additional elements of MOOC

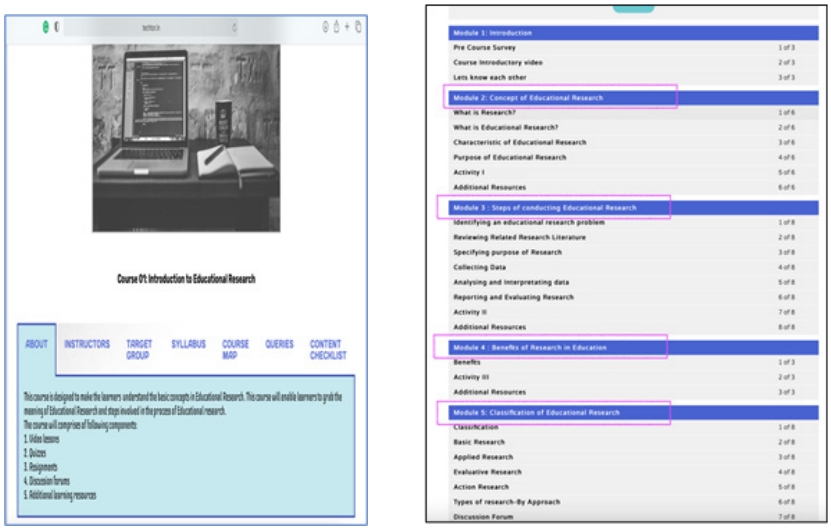


Figure 1: Home Page of Course 1

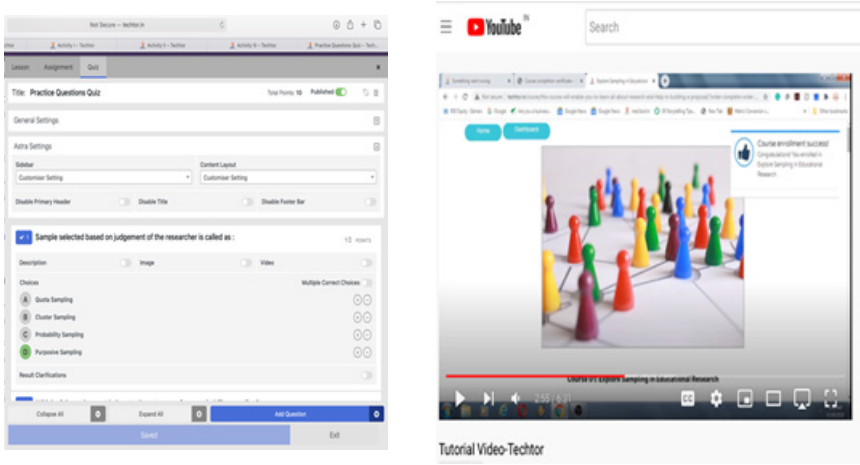
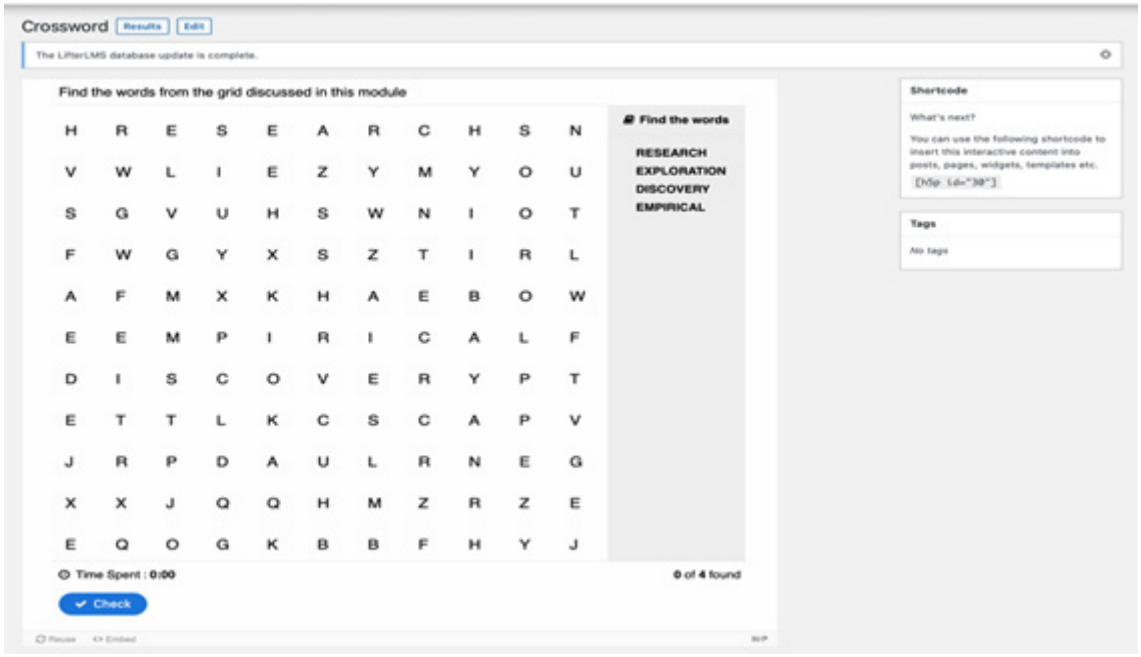


Figure 1: Some quadrants of MOOC (i.e., Video lessons and assessments)

- Development of an e-Manual to assist users in understanding how to effectively and efficiently use the course.
- Development of a Tutorial Video



Games/Activities in the MOOC

- Development of an Orientation Presentation on MOOC for the experimental group
- Validation of the MOOC by experts-The storyboards along with the manual, instructional video and link of the course was initially shown to five research scholars in field of education. These were mailed to the scholars and their valuable feedback on the Course was sought. They were also asked to fill a google form to provide their feedback. All their comments and views were noted and changes were done in the Course wherever required. Subsequently, it was shown to experts in the field of Education and Education Technology. The feedback was noted and changes in the Course were made accordingly. After the validation of the Course, it was finally ready for pilot testing.
- Piloting the MOOC- A pilot testing is done majorly to find the feasibility of a tool or programme. As per Christensen et al. (2014) when conducting an interned based study, the researcher should self-pilot as well select some participants to complete the Course. This will enable the researcher to know whether the Course works properly in the browser. Hence the first piloting was done by the researcher to see whether all Course components were working properly. Further researcher decided to implement it on student teacher educators of M.Ed. first year. An online google form was circulate in groups for consent to participate in pilot study. Student teacher educators other than the sample were finalized on whom the MOOC was implemented. They were also provided with the manual. Once the pilot testing once over, researcher made the minor modification in the Course, as

suggested by them. The entire Course was finally available on TECHTOR.in .

Implementation of the MOOC

The study was carried out in September 2021, when institutions were getting back to normal after the second wave of the COVID-19 pandemic, and the majority of the students and teachers were working from home. The researcher sent an email to different instituting running two years M.Ed. Course in Gujarat, to get permission to conduct the study. Data were collected from the experimental and control group during the implementation phase. Pre-test and post-test were administered in both the control and experimental group. The Massive Open Online Course was implemented in the experimental group and the control group was taught through the Conventional method. Here, 'conventional method' means the method adopted by the teachers in the control group to teach their students and as it was the time of Covid-19 so conventional method mainly comprised of online teaching on Zoom and Google Meet platforms. MOOC was developed to evaluate its effectiveness in terms of student achievement. After the researcher got permission from the head of the department to implement the MOOC in the experimental group, the steps to implement the Course began. The first step was to make a WhatsApp group wherein all the students enrolled in the batch of M.Ed. first year of 2021-23 were asked to join. In the last week of September 2021, a virtual meeting was conducted using the platform google meet, and a link for the same was shared on the WhatsApp group. Pre service teacher educators of the experimental group were introduced to the topic of the Massive Open Online Course. The researcher also explained to students about the new platform TECHTOR and ways to get access to it. The experimental group was also instructed on how to register on the platform and enroll in the Course.

Data Analysis and Interpretation

To achieve objective 3 of the present study, i.e., to study the effectiveness of the MOOC in terms of the achievement of student-teacher educators in 'Research Methodology' and to test the null hypothesis a comparison of the post-test score of the experimental and control group in achievement test was done. In the present study, the pretest was conducted for the purpose of matching.

Table 1.2 shows the summary of the results after applying descriptive statistics on the post-test scores of the achievement test on the experimental group and control group in the Research Methodology.

Table 1.2: Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of post-test scores of Experimental Group and Control group in Research Methodology.

Groups	N	Mean	SD	SE
Control	40	26.00	5.18	0.82
Experimental	40	29.88	3.12	0.49

The comparative scores of the post-test in 'Research Methodology' of the experimental group and control group are given in Table 1.2. It is evident from Table 1.2 that the mean achievement score of the experimental group and control group in 'Research Methodology' were 29.88 and 26.0 respectively. The mean achievement score of the experimental group was found more than that of the control group in 'Research Methodology'. The standard deviation of the experimental group and control group mean were found to be 3.12 and 5.18 respectively. Comparing the standard deviation of the experimental group and control group, it was found that the experimental group was more homogenous in comparison to the control group. Standard error was also found to be less in the experimental group as compared to the control group. The

mean score of the experiment group in the post-test and the less standard deviation could be due to the implementation of MOOC. To find whether the difference in the mean scores was significant or by chance and to test the null hypothesis, i.e., "There will be no significant difference in the post-test mean achievement score of the control and experimental group in 'Research Methodology' non-parametric statistic Mann-Whitney U-test was used. The detailed summary of the Mann-Whitney U-test is given in Table 1.3 which is followed by the analysis.

Table 1.3: Summary of Mann-Whitney U- Test for Achievement in Research Methodology of Experimental and Control group with Sample Size (N), Sum Ranks (∑R), U- Value, z-Value and significance level

Groups	N	∑R	U- Value	z- Value	Significance Level
Experimental	40	2036.00	1216.0	4.018	0.000
Control	40	1204.00			

As seen in Table 1.3 the sum of the ranks of the group taught through MOOC and the control group taught through the conventional method were 2036.00 and 1204.00 respectively with 40 student-teacher educators in each group. The Z-value was 4.018 and the u value was 1216.00. Referring to the table for normal probability (Table A of Sigel, 1956) under null Hypothesis (H0) of z, for z<=4.018, the two-tailed probability was found to be 0.000 which was lesser than our decided significance level (α) i.e., 0.01. Therefore, the null hypothesis, i.e., "There will be no significant difference in the post-test mean achievement score of the control and experimental group in 'Research Methodology' was rejected and it could be believed that the group who studied through the Massive Open Online Course and the group who were taught through a conventional method different significantly in terms of their mean scores in achievement test of 'Research Methodology'. Moreover, from Table 1.2, it can be seen that the mean achievement score of the experimental group is higher than the mean achievement score of the control group which can be due to teaching the experimental group through MOOC. Thus, it can be concluded that the MOOC in 'Research Methodology' was found to be effective in enhancing the achievement of student-teacher educators in 'Research Methodology'.

Findings of the Study

From the analysis and interpretation of the data the following findings have been derived:

The Massive Open Online Course was found effective in terms of significantly enhancing students, teacher educators' achievement in 'Research Methodology'.

Discussion and Conclusion

Teacher education programs largely follow traditional methods of teaching and infusion of modernization is quiet slow. The programs are mostly aversive to new modes of teaching. In the present study, a Massive Open Online Course was developed for student's teacher educators in the subject of Research Methodology. This Massive Open Online Course was hosted on a platform named TECHTOR, and had four major quadrants in the form of interactive videos, discussion forums, assessments and additional materials. The MOOC was found to be effective in terms of significantly enhancing students' achievement in Research Methodology. This finding was supported by the studies of Inchiparamban (2017), Alturkistani et al. (2018), Ismail et al. (2018), Andone and Mihaescu (2018), and Uppal (2019) and Tzovla et al (2021), who implemented Massive Open Online Course in Educational Technology, Data

Science, Food and Beverage presentation, Web Technologies, ICT Integration in Higher Education and a Professional Development MOOC respectively and found it to be effective in enhancing the achievement. The most probable reason for the success of the present study could be the exposure of the group to a Massive Open Online Course divided into chunks of three specialized courses; the content in the course was taught through interactive videos, support of additional materials after every video, assessments, discussion forums, activities and through variety of online software, with online support available for all enquiries through WhatsApp. In addition to these student teacher educators also received badges after each module and certificates at the end of the course. Student teacher educators also had the advantage to check their own learning though the embedded quiz in the videos and watch the videos again and again to revise the concepts. The 'Research Methodology' course which is an important component of curriculum for student teacher educators and not only for conducting research and writing the thesis but also for developing rational thinking. Majority of times lecture method is being used for its transaction, although learning by doing, cooperative learning, computer-assisted simulation, video based learning, electronic mind map (Lehti and Lehtinen 2005, Rohilla 2020, Tungprapa 2015, and Mekonnen 2020) have also been tried, tested and proved to be effective.

In the present study an attempt was made to develop MOOC in area of Research Methodology and provide students teacher educator with a unique mode to learn using interactive videos, discussion forums, additional resources and automated quizzes. Student teacher educators had positive reaction towards the course and also preferred to learn other topics though this method. A possible explanation for this might be that students learn better when they have control over their learning (Hardway & Stroud, 2014).

The COVID-19 pandemic and the subsequent lockdown affected all the sectors in the country. As colleges and universities got closed teachers resorted to online learning. Experimentation with different platforms began and MOOCs emerged as one of the major sources of remote learning. Although MOOC was not a new concept before the pandemic and has been in existence since 2009, its acceptance among learners increased during this period. MOOCs are not only accessible from anywhere but also accommodate massive students at the same time at no extra cost. They provide a platform where students from arts can learn a subject of science, with only one requirement and that is interest in learning. Higher education institutes from around the globe, from various fields are trying their best to make MOOCs and reach millions of students but its infusion in the area of teacher education in general and M.Ed. programme in particular is still limited. The present study attempted to develop a massive open online course for pre service teacher educators in the subject of research methodology. The distinguishing features of the course development were that it had interactive videos, modules with numerous lessons, a variety of additional resources, a personalized open-source platform to host the MOOC, ample opportunities for students to get support from the instructor, automated assessment and set start and end date which where flexible. This MOOC was effective in terms of the achievement of student-teacher educators. The student-teacher educator found the course interesting, self-paced, fun, and engaging and they also preferred to learn other topics of 'Research Methodology' through MOOC in the future.

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