DEVELOPMENT AND IMPLEMENTATION OF A MOOC IN RESEARCH METHODOLOGY FOR STUDENT TEACHER EDUCATORS

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ABBREVIATIONS

Sr. No	ABBREVIATIONS	FULL FORM
1	MOOC	Massive Open Online Course
2	ODL	Open Distance Learning
3	IT	Information Technology
4	NEP	National Education Policy
5	GER	Gross Enrolment Ratio
6	SDG 4	Sustainable Development Goals
7	ARPIT	Annual Refresher Programme in Teaching
8	MHRD	Ministry of Human Resource and Development
9	SWAYAM	Study Webs of Active–Learning for Young Aspiring Minds
10	UNESCO	United Nations Educational, Scientific and Cultural Organization
11	OER	Open Educational Resource
12	NPTEL	National Programme on Technology Enhanced Learning
13	NEMICT	National Mission on Education through Information and Communication Technology
14	MIT	Massachusetts Institute of Technology
15	xMOOC	Extended MOOC
16	cMOOC	Connectivist MOOC
17	SPOC	Small Private Online Course
18	VOOC	Vocation Open Online Course
19	LMS	Learning Management System
20	AICTE	All India Council for Technical Education
21	NPTEL	National Programme on Technology Enhanced Learning
22	UGC	University Grants Commission
23	CEC	Consortium for Educational Communication
24	NCERT	National Council of Educational Research and Training
25	NIOS	National Institute of Open Schooling
26	NCERT	National Council of Educational Research and Training
27	IGNOU	Indira Gandhi National Open University
28	IIMB	Indian Institute of Management Bangalore
29	NITTTR	National Institute of Technical Teachers Training and Research
30	UNED	National University of Distance Education
31	IIT	Indian Institutes of Technology
32	M.Ed.	Master of Education
33	NCTE	National Council for Teacher Education

34	NCFTE	National Curriculum Framework for Teacher Education.
35	HEI	Higher Education Institutions
36	B.Ed.	Bachelor of Education
37	SD	Standard Deviation
38	MAT	MOOC Awareness Test
39	ICT	Information and Communications Technology
40	ANOVA	Analysis of Variance.
41	SJSU	San Jose State University
42	ADDIE	Analyze, Design, Develop, Implement, and Evaluate
43	DFPS	Digital Fluency Perception Scale
44	CBPS	Community Building Perception Scale
45	POGIL	Process-Oriented Guided Inquiry Learning
46	URL	Uniform Resource Locator
47	CMS	Content Management System
48	TECHTOR	Technology Tutor
49	MAC	Macintosh
50	H5P	HTML5 Package
51	MCQ	Multiple Choice Question
52	SA	Summative Assessment
53	FA	Formative Assessment
54	PNG	Portable Network Graphic

DEVELOPMENT AND IMPLEMENTATION OF A MOOC IN RESEARCH METHODOLOGY FOR STUDENT TEACHER EDUCATORS

INTRODUCTION

Information & Communication Technology (ICT) has evolved the way we teach and learn and has opened up new avenues for education. ICT in education refers to the use of computers, software, and other digital resources to facilitate learning and teaching. It can be used to support a range of educational activities, including delivering content, facilitating communication, providing feedback, and assessing student progress. As per National Educational Policy (2020), " *India is a world leader in information and communication technologies as well as other cutting-edge fields. The Digital India Campaign is assisting in the transformation of India as a digitally enabled society with a knowledge economy. While education will be key in this transition, technology will be critical in improving educational procedures and outcomes; thus, the interaction between technology and education at all levels is bi-directional."* Leveraging technology in education has led to introduction of various methods of teaching including flipped classroom, blended learning, game based learning and also online learning. Many higher education institutes have adopted this online learning by creating virtual classrooms. The cost-effective, flexible, and self-paced nature of online learning makes students to attend classrooms during their own free time, and they can also get an opportunity to interact with other students and faculties in a virtual mode. One of the type of online learning is Massive Open Online Courses (MOOC). They have the potential to significantly expand access to education at all levels. To develop and execute Open Educational Resources, the Indian government created MOOC guidelines in 2017. The guidelines for massive open online courses (MOOCs) stressed the importance of storing the online courses created under the policy on a national portal called Study Web of Active Learning for Young Aspiring Minds (SWAYAM), where students can gain access to the educational materials created by the subject matter experts without cost. This is an innovative platform that provides education to students from school to university level. It seeks to remove the digital divide and provide quality education to one and all through online mode.

According to Goel & Goel (2013), " O*pen 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 purpose of teacher education in India is to provide aspiring teachers with the knowledge, skills, and expertise necessary to effectively educate and support their students. It is designed to prepare teachers to understand the needs of their students and to use research-based teaching strategies to help them achieve academic success. Teacher education programs in India also aim to help teachers develop the professional habits and dispositions necessary to be successful in their careers, such as the ability to communicate effectively, work collaboratively with others, and continuously reflect on and improve their own teaching practices. MOOCs in teacher education can act as an important way of teaching where learner are more self-reliant and don't depend much on teachers to get information.

Out of the many courses being taught in professional course like teacher education is research methodology. It is an essential course taught to both pre service teachers and student teacher educator although its weightage at master level is supreme where in students have to prepare their own dissertation. It is no longer possible to complete the preparation of teacher educators without having a sufficient foundation in a range of research aspects (NCTE,1998). The course can bring positive changes in the attitude, mindset, teaching, and learning of student teacher educators. Developing a MOOC in this subject can help them get a concrete understanding of the subject and the necessary skills to carry out research in their respective interest areas. The study is an attempt in this direction. The researcher in the present study developed a MOOC for student-teacher educators and studied its effectiveness. The developed MOOC enabled students to get acquainted with a new method of teaching-learning, compelling them to use various authentic open educational resources available on the online platform, enabling self-paced and flexible learning among them, and introducing them to an alternative mode of learning.

MEANING AND DEFINITIONS OF MOOC

MOOC is an acronym for a Massive Open Online Course. These courses are massive because there is no limit on the enrolment of students in the course. 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 is the new bubble in education that promotes lifelong learning too. MOOCs always have the following elements in common (Moe, 2014):

Massive: It refers to the capacity of the platform to accommodate large numbers of students. However, there are courses with considerably smaller enrolments that are also referred to as MOOCs, presumably because of the potential for a wider audience. Despite the use of various terminology like sMOOC, hybrid MOOCs, etc, the term MOOC appears to serve as an umbrella term that applies to all types of courses, regardless of size (Blackmon & Major, 2017). Massive also refers to the scope of the course to accommodate the large numbers of learners. It refers to both the experiences of students and the system's structure. To make a course huge, it must not only be open to all students but also provide a similar learning experience to all students.

Open: It is open to people all over the world, irrespective of their location, income, ideology, age, or level of education, and they do so without any entry prerequisites or course costs. The OER movement pioneered MOOCs by removing course content and learning materials from conventional ownership and authority systems and promoting them as free, ubiquitous, and remixable in the creative commons. Depending on the license options chosen by the course team, the Creative Commons license implies that the course author maintains the copyright but grants specific licenses for reuse.

Online: The mode and manner of course access and engagement are referred to as online. The entire course is provided entirely online. A student is expected to complete all aspects of the online course, including lectures, assignments, extra materials, assessments, and communication.

Course: The term course refers to obtaining all of the experiences that are available in traditional courses, such as 1. educational content, 2. enabling peer interaction, 3. games, tests, and giving feedback, 4. recognition options such as badges and certificates, and 5. a study syllabus. As a result, a course requires registration with the instructional group as well as a set time frame for completion.

MOOC is a phrase that has been defined in a variety of ways in different studies. MOOC is a word that represents a free course that is studied online by a large population, according to the British online dictionary. As per McAuley et al. (2010) and Vardi (2012), MOOCs are online courses that are web-based and taught by professors or professionals that can accommodate an unlimited number of students at the same time. According to Siemens,(2013), “the MOOCs are a continuation of the trend in innovation, experimentation, and the use of technology, which was launched by distant learning and online, to give learning possibilities in a comprehensive way.” MOOCs, according to O'Prey (2013), are free courses, available to a large number of

learners at the same time, and delivered through video lectures, online assignments, and assessments. According to Chauhan et al. (2015), “a MOOC is an online course that can be attended by a large number of people, has a set duration, and follows a set of pedagogical guidelines.”

Hence, considering all these definitions, MOOCs can be defined as, online course which has no limits on their enrolment may have a set start and end duration, are 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. MOOCs are hosted on a platform or a website for the learners to enrol in it.

PLATFROMS FOR HOSTING MOOCs - NATURE AND TYPES

MOOC are courses that run on a platform on which it is hosted and run by the institution or the organisation. Hence to upload a MOOC and manage all its components, an online platform is required. Example of such platform is Coursera, EDx, future learn, khan academy, Miridax, open study, Udacity, and many more. Out of all this, 36% of the global MOOCs are hosted on Coursera (Shah, 2018). These platforms for hosting MOOCs are divided into three categories according to their origin (Pernias-Peco & Lujan-Mora, 2013):

- *Institutional MOOC*: Here the institution interested in providing MOOCs has its infrastructure and all the facilities. But it requires a high cost to implement although has access to all the technology used and also holds control of it. Ex- MOOCs in China

- *Proprietary platforms*: The second option is to stick to proprietary platforms, which normally involves signing a deal with the developers. Ex- Coursera

- *Open-source software*: A third alternative is to utilize platforms that allow the developer to provide the courses available for free. Ex- Moodle and OpenEdx.

It's also interesting to note that any institution can contribute to a MOOC by either establishing a technology platform that can support all of the MOOC's components or using existing open-source software. There are numerous examples of platforms i.e. proprietary, open source and institutional with huge enrolments being run both in India and global level.

PLATFORMS FOR MOOCs-INDIAN SCENARIO

MOOC platforms are being adopted globally for providing online courses and India holds no such exception. Various MOOC platforms are used here for offering diverse courses. Following are some of the major MOOCs platforms used in India:

SWAYAM

The Ministry of Human Resource Development introduced the study Webs of Active Learning for Young Aspiring Minds (SWAYAM), on July 9, 2017, to provide the only platform and portal for online courses, including all higher education, high school, and skill sector courses. To achieve the three cardinal principles of India's Education Policy that is access, equity, and quality, SWAYAM was launched. Nine national coordinators in Swayam focus on providing the best content to the learners. NPTEL (National Programme on Technology Enhanced Learning), a collaborative initiative of the IITs and IISc, marked the beginning of SWAYAM's journey in 2003. It was India's first attempt to offer online courses in the fields of engineering, science, and humanities. SWAYAM is one of the projects included in the digital India flagship program. With assistance from Google Inc. and Persistent Systems Ltd., the Ministry of Education, NPTEL, and IIT Madras built the present SWAYAM platform. To raise the Gross Enrolment Ratio (GER) from 20 to 30 percent by 2020, SWAYAM seems to be a suitable approach. The courses in SWAYAM are available free of cost although students need to pay some amount to avail certificates, which they get after enrolling in a proctored exam. The course in SWAYAM is based on 4 quadrant approach which includes, Video-based lectures, Reading material that can be downloaded/printed, Self-evaluation exercises using tests and quizzes and an online discussion board for asking doubts

MooKIT

IIT Kanpur created and developed mooKIT, an open-source MOOC management platform. mooKIT is an easy-to-use system for professors, students, and system administrators. It was created with "Internet Novices" in mind. Because of its unique architecture, it can be easily customized and is cost-effective.

IITBombayX

According to IITBombayX's main page, it is an online platform developed by IIT Bombay to offer Massive Open Online Courses to individuals from a variety of areas. The advantages of flipped classrooms, online lectures, and in-person interactions with IITBombayX course teachers are all combined in hybrid MOOCs, which are their areas of expertise. For a variety of learning needs, IITBombayX offers four different types of MOOCs: edumooc, skill MOOC, teach MOOCs, and life MOOCs. All the courses on IITMumbaiX, and mooKIT were either need-based or for learning a skill. The courses are not part of the curriculum of any degree program. The courses on SWAYAM are of two types one is a credit course which is taught for one semester as part of the program and the second non-credit course for awareness and continuing education Although a variety, of courses, are being offered in the indigenous platform discussed herein, there is a shortage to courses focusing on research methodology in general and educational research in particular. The MOOCs on all the platforms consists of major four quadrants which includes video lessons, discussion forums, assessments and additional learning resources.

QUADRANTS OF MOOC

A massive open online course developed in this study is based on the four quadrant approach also used by SWAYAM in India. The courses hosted on SWAYAM are in four quadrants which included video lectures, additional reading material, assessment, and an online discussion forum. The instructors prepare video lessons for the learners to understand the content. The videos are considered key components of the MOOC. Students watch video lessons of the course to understand the content of the course. Videos sometimes also contain transcripts and activities in between. Students also have the facility of taking down notes while pausing the videos. Students can also download the videos and watch them later. According to Chauhan, et al.,(2015), video provides self-regulated and independent learning. It has transformed the traditional classrooms by replacing the "- size-fits-all" approach with self-paced learning, and from curriculum/teacher-centric to student-centric learning. The second quadrant is a discussion forum, which is an electronic space in MOOC wherein students discuss their experiences with each other. It is also a platform where students can learn from each other as well from others' experiences. It's a space to share and transfer knowledge. In discussion forums, students get an opportunity to start their threads or take part in a thread already created by the instructor or the other learners. Assessment is an important component of MOOC.

Platforms provide a variety of assessment facilities for students to check to assess their learning. It also helps other peers to take part in the evaluation process by making use of peer evaluation. Both formative and summative types of assessment are used in MOOC. MOOC also provides students with additional resources where students can learn extra about their course content. the resources include worksheets, exercises, quizzes, resource lists, e-books, pdfs, and handouts. Some instructs also allow students to download the PowerPoint presentation handouts for future references. Such supplementary materials help students to dive in through a variety of resources on a specific content topic and it also helps them to filter out the useful resources available on the internet which is authentic and valid for the course.

GUIDELINES FOR DEVELOPMENT OF A MOOC

Developing a MOOC is a step-by-step approach that provides an effective platform for creating interesting instructional materials aimed to enlighten a large number of learners. Based on their MOOC experience, Manallack et al. (2016) developed the following principles for MOOC creation and implementation.

- Stating the aim
- Participating in an online MOOC
- Selecting a MOOC platform
- Deciding on subject matter/content
- Determining governance/budget
- Designing the MOOC
- Pilot testing the MOOC
- Promoting the MOOC
- Managing the MOOC

Siemens (2012), also gave out nine easy steps to plan and run a MOOC which included:

- Topic- i.e., Select a topic of interest, what you already teach.
- Audience- Make a course for students, academics, peers or anyone with a genuine interest.
- Find someone to teach with - Include other experts, colleague or guest speakers.
- Determine content – Select pen articles, interactive presentations, learner' content etc to be included in the MOOC.

- Plan spaces of interaction- emails, chats, social media etc might be utilised.
- Plan interaction – determine the wheatear it will be live or asynchronous
- Plan your continued presence- be active in all interactive spaces with students
- Learner creation- Promote peer feedback in your course
- Promote and share- Share work through presentations globally, with peers' students etc.
- Iterate and improve- keep the contents of the course dynamic and update it regularly.

In general, constructing a MOOC is a creative and fascinating process, and with a disciplined framework, they give good motivation for developing engaging instructional materials intended to educate as many people as possible. The developed MOOC is beneficial for the educational community for various purposes.

BENEFITS OF MOOC

MOOCs are open and accessible to all with a stable internet connection. There is no kind of biasness concerning caste creed, gender, etc. So learning through MOOC is considered to be inclusive. Learners can select any course of their choice irrespective of their previous background. There are no restrictions on boundaries as students from Indian universities can enrol in a course from Cambridge University, UK. The courses are also free in most cases and provide financial assistance in paid courses. MOOCs have discussion forums where students can talk with other learners from different places 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 physical mode can enrol in such courses and get the benefits of online learning. In addition, MOOCs provide opportunity to realise the sustainable objective of delivering inclusive and high-quality education to all, as well as opportunities for lifelong learning. According to Chakravarty (2016), "MOOCs help to pursue our area of interest while doing a job or studying, people from different geographical locations can come together, learn and connect online. Sitting at home, students will be able to learn from the best university and best educators. MOOCs can help in self-paced learning as there is no time scheduling for these courses. In India where gender discrimination leads to lesser educated girls, MOOCs can be very beneficial. MOOCs help people in professional development and also sharpen their skills. It helps in fulfilling the learning thirst and won't limit a doctor from joining a dance MOOC or a musician from undertaking a Human resource course.

UGC issued Credit Framework for online learning courses through SWAYAM, Regulation 2016, and advised different Universities to identify courses where credits can be transferred to the academic record of the students for courses done on SWAYAM. AICTE has also put out a gazette notification in 2016 and subsequently for the adoption of these courses for credit transfer. As per these regulations, no university shall refuse any student for credit mobility earned through MOOCs. UGC's new regulations in 2021 called Credit Framework for Online Learning Courses through Study Webs of Active Learning for Young Aspiring Minds Regulations, 2021 allowed universities across the country to offer 40 percent of all courses in a program online via the SWAYAM platform. This will enable more and more educators to develop and adopt MOOCs for their learners. A study conducted by Pandit, (2016) reveals that " in a country like India, where most people are residing in remote areas and do not have adequate access to skill enhancement and quality learning, MOOC can play a pivotal role." As per a study conducted by Kaur (2019), the major advantages of MOCs in higher education are scalability, free education, removal of other constraints of boundary, job, etc. MOOCs force professors to improve their lectures, develop futuristic designs to ensure students keep up, bring people together from different parts of the world, and provides many business opportunities for making platforms and collaborating with universities like Coursera and Edx.

Hence, MOOCs are a welcome step that comes with immense benefits to various stakeholders of the Indian education system. India enrols the second largest number of students in MOOCs after the USA (Shah, 2018). It is thus predictable that MOOC's impact is going to be felt strongly in the education system in India in improving standards and availability of quality education in all fields with the click of a button. Despite of all the advantages associated with MOOC it has not been explored much in teacher education field.

PRESENT STATUS OF MOOCs IN TEACHER EDUCATION

Teacher education is a critical discipline for improving school education quality. According to Goel & 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 abide by traditional teaching methods, and modernization is also slow to take hold. The programs are always new to the latest modes of instruction. In India, teacher educators are hesitant to adopt or experiment with innovative teaching approaches. It's crucial to remember that teaching isn't 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 chalk and talk method but moving more towards method which focuses on the need of students. But the outlook of teachers towards adopting such innovative approaches to teaching is a big challenge (Parvin, 2021).

MOOCs have brought a disruption in the education sector and all sections of society are adopting this method of teaching. Massive Open Online Courses (MOOCs) can open up new opportunities for teachers to use educational technology in the classroom. Singh and Chauhan (2017) investigated 156 teacher educators' awareness of MOOCs across sub-categories such as concept awareness, usability, technology, current practices, and policy guidelines in a study. According to the findings, teacher educators have a fundamental understanding of MOOCs, including their strengths, delivery methods, and advantages. However, there is some confusion about MOOCs' importance in teacher education. Indian MOOC projects such as SWAYAM are still poorly understood. The results show that there is an increasing need for teacher educators to not only have a better grasp of MOOCs but also to provide them with the tools they require to build and integrate MOOCs into their regular classroom practices. To meet the needs and ambitions of students in the twenty-first century, the teacher preparation program should equip students with the skills necessary to integrate modern technology into the classroom. To fulfill these educational demands of students, we require teachers who know how to deliver knowledge and who truly care about students and their future success.

TEACHING AND LEARNING OF RESEARCH METHODOLOGY

Research methodology is an important course taught to students in their post-graduation education although some components are also present in undergraduate education. The course helps students to understand research, and its process and also identify problems for research, and develop research strategies. Research methodology is also an important component of various competitive exams at the national level. Knowing research methodology helps in various fields such as government organizations, NGOs, private companies, etc. This also enables teachers to conduct research at the school level. Although a research methodology

course is a must for a post-graduate degree requirement the way it is being transacted is always challenging. It has always been looked upon as a course difficult to reach and learn. Since the technical difficulty of the course material is high and the student's interest in the material is usually low, teaching research methodologies courses can be challenging. Any teacher who exclusively uses a passive text lecture exam style runs the risk of further decreasing student enthusiasm and interest (Ball & Pelco, 2006). Students tend to say that research methodology classes are uninteresting, difficult to understand, or irrelevant to their daily lives (Dion, Coxe, & Carne, 2011). Nevertheless, educators around the globe are adopting various approaches which include the use of mind maps, project-based learning, learning by doing, and blended learning approaches, and found positive student envelopment and reactions towards the approaches.

According to Shinde (2016), the quality of educational research in India is on the decline. This is due to poor teaching and understanding of research methodology. Looking at the literature, it is quite evident that there are concerns about teaching research methodology. So focus should be more on adopting approaches that are found to be interesting and also easy to understand. The major challenge here also is to take a learner-centric course that appeals to students and also minimizes student burden from just grabbing a lot of information to an approach where students find the course fun and simple to learn. Hence it is essential to adopt and explore student-centred and innovative teaching approaches to teach research methodology including, the incorporation of real-world examples of research into teaching, online learning, MOOCs, etc.

REVIEW OF RELATED LITERATURE

A review of related literature is an important component of conducting research. The most crucial task after undertaking a research study is to go through literature already existing in the area and acquaint with the available body of knowledge. The purpose of literature review according to the University of Melbourne (2013) is "to determine what is known on the topic, how well this knowledge is established, and how future research might best be directed". Conducting a literature review helps the researcher in building knowledge and gaining insights on the topic undertaken. The reviews of the study are categorized as under:

1. Study related to awareness of MOOC

2. Study related to teachers' and students' perception of MOOCs
3. Study related to teachers and students' factors and motivations to adopt MOOC
4. Experience of teachers and students in using MOOC
5. Studies conducted on different components or quadrants of MOOC
6. Studies conducted on drop-outs in MOOC
7. Studies conducted on the development and implementation of MOOC
8. Studies conducted in the area of teaching-learning of research methodology

IMPLICATIONS OF THE REVIEW OF RELATED LITERATURE

A review of related literature focussing on various components of MOOC was done to get knowledge on previous studies done so far in this area. The researcher reviewed a total of 70 studies relating to awareness, perception, motivation to adopt MOOC, its quadrants, design, development, implementation, and teaching-learning of research methodology. The researches reviewed have the following implication for the present studies:

- MOOCs are generally courses with the facility or capacity to enrol a large number of users and minimum instructors' interference and support.
- MOOCs are a technological alternative to transforming learning for students. It has benefits like a flexible environment and the development of 21st-century skills.
- Awareness about MOOC and its uses among art students' general teachers' education, in particular, is moderate to low.
- MOOCs are found to be more effective in a learner who is intrinsically motivated, mature, and likes to do independent work. Students in post-graduation have a higher bend towards the usage of MOOCs.
- When students have control over their learning, they become more actively engaged in the process.
- Although a few studies have been done abroad, there is a dearth of study on the development and implementation of MOOCs in India. Only 2 studies were found by the researcher on the development of MOOC in India. One on teacher educators and one on B.Ed. students.
- There is a dearth of studies where MOOC has been developed by the instructor. In most cases, the MOOC is adopted from commercial platforms and implemented in the classroom in stand-alone or blended forms and effectiveness is observed.
- MOOCs promote self-paced and flexible learning.

- To design an effective MOOC it should be learner-centred, flexible in duration, easy materials, and practical day-to-day life experiences.
- These studies found that using MOOCs was mostly motivated by curiosity, personal reasons, certificates, and a desire to learn new things fill in knowledge gaps, advance in their careers, stay competitive in the workplace, and leverage the flexibility offered by MOOCs
- Institution should adopt platforms that support various forms of assessment like self, peer, and automatic assessment.
- Teacher candidates are satisfied with MOOCs and find that they have a beneficial impact on their opportunities for personal development and learning
- Drop out in MOOC is inevitable and there exist various forms of learner engagement in MOOC. Even if students don't complete the course contents, they still have explored some components after their registration on the platform. The major reason for students not completing the course is nonresponsive to instructors, delay in response, long videos, and personal reasons.
- Institutions should develop their own MOOC platform and degree course-specific MOOC on it so that even if commercial platforms are taken down, they still have their courses running.
- MOOCs are effective when videos are divided into chunks or small segments of 8 to 10 minutes. Shorter videos were found more engaging.
- MOOCs are found to be very effective in skill-based courses.
- Although blended learning, project-based learning, video-based learning, and mind maps have been explored in to teach research methodology, the researcher was unable to find any study where MOOC was used to teach research methodology

The purpose of the review of literature is to find the studies already done and also to find the research gaps. A review of research in the present study also helped the researcher with the points that need to be kept in mind while designing and developing a MOOC. Many of the research done in past are focusing on integrating a MOOC already developed and hosted on commercial platforms and finding its effectiveness by implementing it in the traditional classroom. Not much emphasis is done to develop and implement a MOOC and find it effective among learners in India. After reviewing 70 studies the researcher concluded that although MOOC has been explored in teacher education none of the studies has been done on developing a MOOC for M.Ed. students. In addition to this researcher was unable to find a study wherein

a MOOC on research methodology has been developed and implemented at the post-graduation level. Hence, the present study is an attempt in this direction to develop and implement a MOOC in research methodology for student-teacher educators and find its effectiveness. For this purpose, the researcher has developed a MOOC on selected certain topics of research methodology taught in Master of Education.

RATIONALE

Whereas there were just 5 million internet users in India in 2000, there are currently 755.8 million (internet world stats, 2021). Global audiences may now access online material and interactions due to this enormous increase in internet availability, especially in developing nations (Ahuja, 2018). The higher education industry is experiencing a MOOC revolution. In India, where 20–26 million babies are born annually, between 700 million and 1.3 billion young people are expected to need access to higher education during the next 35–50 years (Kumar, 2018). India's greatest challenge and potential in the twenty-first century are to provide good higher education and to equip students with the skills they need to support themselves and pursue employment. The NCERT stated in a position paper from 2006 that it should explore alternative methods of education such as on-demand learning, distance learning, and open learning. Today's youth now require flexible systems, futuristic curricula, and job orientation for the twenty-first century. It is important to encourage the educational system, which should be a key player in designing the teaching-learning environment and making it a more meaningful experience for both teachers and their students. 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 instructors might be able to create on their own (Daniel 2012).

According to Punia, (2017), “the advent of MOOCs in the classroom helps in getting the student move towards the knowledge section rather than the information. The inclusion of MOOCs as a medium of instruction, either solely or as a supplement does result in better achievement of the students.” In an exclusive conversation with Deputy Editor of India Today, Kaushik Deka, the UGC chairman—who continues to teach in an honorary position at IIT Delhi—explained why and how the UGC must act as a catalyst for change. The UGC chairman stated that online degrees are not a replacement for traditional classes. These are added benefits. The goal is to reach as many people as possible with education. Online schooling is a huge

help in this regard. Our prior regulations on digital education were restrictive. It was believed that colleges would have all of the necessary infrastructures to develop and host digital material. However, the present emphasis is on enabling them to collaborate with ed-tech businesses to enrich their content and combine it with modern technology. Cloud systems used by edtech companies may house the content. Universities can onboard prospective employers so that recruiters and candidates are aware of each other's requirements (Deka, 2022).

According to Chauhan (2017), there is a growing need to give teacher educators a thorough understanding of MOOCs as well as the resources they need to create and incorporate MOOCs into their traditional teaching methods. According to Singh and Chauhan (2017), teacher educators are still not very aware of the many MOOC programs in India, and sincere efforts are needed to raise awareness of these initiatives to promote MOOC in higher education generally and teacher education explicitly. In India, teacher educators are reluctant to innovate and try new teaching techniques, and their familiarity with modern classroom communication tools is often minimal (Dixit,2014). Most of the time lecture method is adopted in the classroom and sometimes teachers make use of ICT components like videos, PowerPoint slides, or audio to teach students. Students most often have no knowledge about MOOCs courses available on various platforms neither they are made aware of the same by their teachers.

Daniel (2018) claims that research methodology equips students with the knowledge they need to conduct better research and potentially succeed as career researchers. Poor learning outcomes have been repeatedly linked to research methodology courses across various universities. They criticize the courses for being pedagogically rigid, cognitively difficult, and rigidly adaptable to students' prospective career trajectories. Many research methods courses' content, in the opinion of their students, is disconnected from real-world issues. Students also mention a variety of difficulties with learning research methodology, such as framing research questions, grasping the theory or literature, having trouble performing data analysis, not understanding the technical language used to describe basic concepts, and not having enough numerical knowledge to deal with quantitative methods. Because there is a lack of pedagogical research on creative approaches to teaching the subject, it is difficult to address the challenges of teaching research techniques courses. MOOC in research methodology can act as a good alternative for the transaction of the course.

Despite the recent huge growth of MOOCs, this model is still under development and hasn't completely become established. Instead of just functioning as online libraries for high-quality

multimedia content, MOOC providers must put more emphasis on attracting young students by offering better tools for learning and only then will their efforts be successful (Rai & Chunrao, 2016). Even while MOOCs have gained popularity across the globe, they are still in their infancy in India. It is the right time for the teacher education system to align with the current trends due to growing connectivity, initiatives like Digital India, and a greater emphasis on online learning (Singh & Chauhan,2017). UGC recently in April 2022 published the guidelines for pursuing two academic programs simultaneously in hybrid, physical or online mode. This policy will also promote more institutes to offer MOOC programs to students so that the problem of student attendance and being present in two places at the same time is solved. 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 can provide student teacher educators not only a new platform for teaching and learning but will also promote them to adopt such practices in the future. It will provide a path for future 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 was unable to find any studies, research, or investigations especially focused on creating a MOOC for student-teacher instructors during the review of the literature. As a result, the researcher was motivated to work in this field and to create a MOOC on a few specific chosen research methodology areas.

STATEMENT OF THE PROBLEM

DEVELOPMENT AND IMPLEMENTATION OF A MOOC IN RESEARCH METHODOLOGY FOR STUDENT TEACHER EDUCATORS

OBJECTIVES

The researcher had formulated the following objectives to complete the present study in a step-by-step approach.

1. To develop a MOOC on research methodology for student teacher educators.
2. To implement the developed MOOC on research methodology for student teacher educators.
3. To study the effectiveness of developed MOOC in terms of achievement of student teacher educators.

4. To study the effectiveness of the developed MOOC in terms of the reaction of student teacher educators to the components i.e.:
    - Overall effectiveness
    - Course structure and planning
    - Video lessons
    - Discussion forums
    - Assessment
    - Additional resources
    - feasibility
    - Instructor support
5. To study the experiences of student-teacher educators in learning through the developed MOOC.

HYPOTHESIS

The following null hypothesis was formulated and tested at the 0.01 level of significance.
There is no significant difference in the post-test mean achievement score of the control and experimental group in research methodology

EXPLANATION OF THE TERM USED

MOOC- MOOC stands for Massive Open Online Course. It is defined as an online course hosted on a platform that can enrol many students simultaneously, may have a set start and end date, 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.

Student teachers educators- All students enrolled in M.Ed. two-year program across India.

OPERATIONAL DEFINITIONS OF THE TERMS

- Achievement in research methodology – Score secured by the student teacher educators in an online achievement test in research methodology prepared by the researcher.

- Effectiveness in terms of reaction towards MOOC- Effectiveness in terms of reactions towards MOOC is the intensity index of 4.0 and above in a five-point reaction scale in terms of individual components and all the components as a whole.

DELIMITATION OF THE STUDY

The study is delimited to the topics, introduction to educational research, sampling, types of sample, and types of research methods (qualitative, quantitative, and mixed-method) taught in the curriculum of M.Ed. first year.

RESEARCH DESIGN

Research design is a blueprint prepared by research for giving direction to the entire research study. The present study is quantitative and an experimental study is 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. As the quasi-experimental has various designs under it, pre-test post-test non-equivalent comparison group design was adopted. The design of the present study is diagrammatically represented as follows:

Experimental group	**O1**	**X**	**O2**
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Control group	**O1**	**C**	**O2**

O1- Pre-test
X – experimental group
C- control group
O2 – Post-test
Dash lines indicate an absence of random assignment

Here two groups were selected conveniently by the researcher, wherein one group was assigned to the control group and one to the experimental group. Both the groups selected are non-equivalent (as the name of the design suggests) and to make them equivalent on the dependent

variable the pretesting is carried out. Pre-testing in a non-equivalent group design is of utmost importance because it will determine how the groups are compared initially. Based on the pre-test, both groups are made equivalent. Matching is one of several strategies for equating participants across one or more variables. Thereafter implementation of the MOOC is carried out in the experimental group. At the end of the implementation procedure, the post-test was executed on both groups. Post-test scores were used to find out how much effective the MOOC was in enhancing the achievement of the student in the subject of research methodology.

POPULATION OF THE STUDY

The population consists of all those items, objects, or things that have certain characteristics common in all and they are of interest to the researcher. The present study population comprised of all the student teacher educators studying in the two-year M.Ed. program in India in the academic year 2021-2023. According to the 26th annual report published by NCTE, India in 2020-21, the total no. of M.Ed. courses recognized as on 31st March 2021 is 1274 and the total intake in M.Ed. approved as on 31st March 2021 is 62,845 students.

SAMPLE OF THE STUDY

For the present study sampling process adopted was convenience sampling based on the permission granted by the institution for conducting the research and implementing the massive open online course. In 2015, the M.Ed. program had two years of duration instead of one year. Hence many M.Ed. colleges started facing difficulties in getting sufficient enrolment. (Rohilla, 2020). Hence two institutions from Gujarat state with sufficient enrolment were chosen conveniently 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 pre-test was attempted by 51 student-teacher educators of the Department of Education, Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda, and 46 student-teacher educators of Kameshwar College of Education. Based on the results of the pre-test matching was carried out and both the group were made equivalent consisting of 40 students teacher educators in both groups. So the final sample was 40 student-teacher educators in each of the experimental and control groups. Accordingly, the sample consisted of 80 student-teacher educators studying in the M.Ed. program, 40 in each control and experimental

group. Student teacher educators of the Department of Education, Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda were taught through Massive open online course, and students teacher educators of Kameshwar College of Education, affiliated to Gujarat university, Ahmedabad were taught through conventional method.

TOOLS FOR DATA COLLECTION

To achieve the third, fourth & fifth objectives of the study three tools were prepared by the researcher which included an achievement test, reaction scale, and a post-experimental interview schedule.

Achievement test

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 the research methodology a blueprint was prepared by the researcher. The achievement test consisted of 50 multiple choice questions and was 50 minutes duration. The achievement test was prepared using multiple choice question options in the google form. The question prepared by the researcher took into consideration all three levels of the cognitive domain i.e. Knowledge, understanding, and application.

Reaction scale

To achieve objective three of the experimental study a Likert-type five-point reaction scale was prepared by the researcher. This reaction was prepared using the linear scale in the google form. The scale had 35 statements relating to the overall reaction of student-teacher educators towards the developed massive open online course and items about the videos, discussion forums, assessments, additional resources, overall planning, feasibility, etc. The five indicators

that were utilized to get the reactions were strongly agreed, agree, undecided, disagree, and strongly disagree.

Post Experimental Interview Schedule

According to Christensen et al., (2014), "an interview with the participant following completion of the experiment, during which all aspects of the experiment are explained and the participant is allowed to comment on the study". Consequently, after the experiment was over and the reaction scale and achievement test were implemented on the student-teacher educators, the researcher randomly selected 12 students from the experimental group of 40 student-teacher educators and carried out an interview. The research had prepared an interview schedule of 25 open-ended and close-ended questions which included, general information about the participants, overall experience with the MOOC, the challenges faced in any of the quadrants during the implementation process, suggestions on improvement of the course as well as suggestion for future MOOC developers and users.

PHASES OF THE STUDY

Starting from the development of the massive open online course and the tools, to the analysis of the data different phases were involved.

Phase 1-Development of MOOC and tools for data collection

The development of the massive open online course was the first and foremost phase involved. Here various steps for the development of MOOC were carried out, tools for data collection including achievement tests for pre and post-test, a five-point Likert type scale to get reactions of the student teacher educators towards the developed massive open online course, and post-experimental interview schedule was developed.

Phase 2-Implementation of the MOOC

Before the implementation of the MOOC and the tools, permission was taken from the concerned authority in both the institutes of control and experimental group. Then pre-test was conducted on both the experimental and control group and matching was carried out. Then

MOOC was implemented in the experimental group. After the intervention, the post-achievement test was implemented in both the control and experimental groups, and a reaction scale was implemented in the experimental group.

Phase 3-Data Analysis

After the collection of the data, descriptive statistics were carried out on the post-test achievement score of both the control and experimental group. Then hypothesis was tested using the Mann-Whitney U test and the reaction scale was analysed using frequency, percentage, and Mann-Whitney U test.

DATA COLLECTION

The study was carried out in September 2021, when institutions were getting back to normal after the second wave of the pandemic, and the majority of the students and teachers were working from home. The researcher sent an email to different instituting running 2 years M.Ed. courses in Gujarat, to get permission to conduct the study. The institution which replied to the email and gave permission was taken as a sample for the study. A formal letter approved by the guide was then sent to the institution which agreed to be the control group. Data were collected from the experimental and control group during the implementation phase. Pre-test was 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. The data collection process lasted for around 3 months. Thereafter the same pre-test was again administered as a post-test on both the experimental and control group. Both the groups were separately invited for a google meet and the google link for the post-test was shared among both groups. The data for the post-test was collected in January. Once the post-test was administered to the student teacher educators of both experimental and control groups, a reaction scale was implemented on the experimental group. Twelve students from the experimental group were randomly selected by the researcher to conduct the post-experimental interview. The interview schedule had 25 questions of mixed nature including both open-ended and close-ended questions. The main aim of conducting the interview was to the know experience of the students in learning through MOOCs, the challenges faced by the students during the implementation of the MOOC, and also their suggestions for future developers of a MOOC and prospective learners in MOOCs, in the near future. The interview

was conducted via phone and each interview lasted for around 30 minutes. Every student teacher educator explained the purpose of conducting the interview and permission was taken for recording their voice for analysis purposes

DATA ANALYSIS

In order, the determine the effectiveness of developed MOOC the data collected through achievement tests, reaction scale, and post-experimental interviews was analyzed and interpreted. The researcher used the Mann-Whitney U which is a non-parametric equivalent of a t-test and used when purposive or convenience sampling is used instead of random sampling to test the hypothesis. Achievement test scores of the control and experimental group were analyzed using the mean, standard deviation, and standard error of the mean. To analyze the reaction scale frequency, percentage, and intensity index were used. The data collected from the interview schedule was analysed by content analysis.

MAJOR 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' achievement in research methodology.
- The Massive open online course was also found effective in terms of the positive reaction of students towards it.

DISCUSSION

Teacher education programs largely follow traditional methods of teaching and infusion of modernization is also very slow. The programs are always novice to new modes of teaching (from chapter 1). In the present study, a massive open online course was developed for student teacher educators on 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. The most probable reason, for this study, could be the exposure of the experimental 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 through a variety of online software, and online support for all inquiries through WhatsApp. In addition to this student teacher educators also received badges after each module and certificates at the end of the course. Student teacher educators also had the privilege to check their learning through the embedded quiz in the videos and watch the videos again and again to revise the concepts. The other reason for the MOOC being effective for student teacher educators may be because most of the learners here are mature learners who are independent and prefer self-directed learning.

The prime purpose of the study was never to compare the conventional method of teaching with MOOC. Both the method have their advantages and shortcoming. The data in the present study revealed that MOOC is more or less effective than the conventional method of teaching research methodology hence it can be used as an alternative where in shortage of staff teaching research methodology is there, can be used as supplementary material to enhance conventional method, can be used as a resource for blended learning, for remote students, students with a working background and many more. Overall the MOOC was effective could be because of the change in the mode of learning, introduction to a new platform, variety of learning resources being provided to student-teacher educators, interactive videos, all resources at one place, continuous guidance through WhatsApp, timely feedback on assignments, daily progress report, learning at any preferred time, user-friendly interface of the platform, mobile-friendly courses, and not many technical challenges. Another possible explanation for this might be due to the planned and organized manner in which the MOOC was implemented.

CONCLUSION

The 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 existed 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 with no extra cost. They are a plethora of platforms 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 MOOC and reach millions of students

but its infusion in the area of teacher education in general and M.Ed. programs, in particular, is still limited.

The present study attempted to develop a massive open online course for student teacher educators on the subject of research methodology. The platform for hosting the MOOC, its quadrants, a manual, tutorial video, and an orientation presentation were developed by the researcher and implemented on the student teacher educators. 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 were flexible. This MOOC was not only effective in terms of achievement of student-teacher educators but they also had a positive reaction for the same. 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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