CHAPTER I
CONCEPTUAL FRAMEWORK

1.0.0 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. One of the greatest changes brought about by the use of ICT in education is how students and teachers interact. It has allowed educators to create and deliver educational content to students in a variety of ways. Today, we use computers, the internet, and other ICT tools to take education to places that were never possible before. It has enabled educators to reach students in remote and marginalised areas. Students residing in developing countries have used these technologies to enrol on advanced educational courses.

As per National Educational Policy (NEP, 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 the introduction of various methods of teaching including flipped classrooms, 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 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. In comparison to face-to-face classrooms, online learning, according to research by the U.S. Department of Education, results in better learning outcomes for students. (Chakravarty, 2016). According to a 2021 Impact Report by the online learning platform Coursera, more than 20 million more people signed up for its courses in 2021, which is the same increase as was seen in the three years before the

pandemic. These increases are a result of the popularity of online learning becoming more widespread around the world, which has led to an increase in the number of remote students enrolling in Higher Education programmes and students from rural populations (Wood, 2022).

NEP (2020) states that institutions will be able to offer online programs and Open Distance Learning (ODL), if they are accredited, to expand their options, improve access, raise the gross enrolment ratio, and create chances for lifelong learning (Sustainable Development Goal Four). One of the recent and most innovative evolutions of online education is MOOC which stands for Massive Open Online Course. They use online platforms to deliver instruction and allow students to interact with one another and the instructor. They have become an effective platform for reaching many people who would not otherwise have access to education. To improvise students' level of engagement and learning outcomes, the potential of MOOC is still being tested and tried.

The MOOC has the potential to significantly expand access to education at all levels. Regarding education generally and Higher Education specifically, no one disputes its inventive potential. To develop and execute Open Educational Resources (OER), the Indian government created MOOC guidelines in 2017. The guidelines for 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. Universities now have the chance to team up with other organisations in the field, both at national and international levels, according to the new policy. This has increased the scope of education to include not just knowledge-based courses but also skill-based ones, which is in line with the Government of India policy about Make in India and Skill Development.

MOOCs provide an incredible method for placing high-quality education in the hands of every student be it from any field and course. It is high time for the system of Teacher Education to line up with current trends and also incorporate modern teaching methods in their day-to-day teaching practice. 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 adoption of MOOCs into education can bring about the necessary change and influence teaching and learning practises at all levels of Teacher Education. Apparently with this in mind, the Ministry of Human Resource Development (MHRD), Government of India, introduced the Annual Refresher Programme In Teaching (ARPIT) on 13 November 2018 for online professional development of in-service teachers using the MOOC platform SWAYAM. Teacher Education is one such professional course where competent teachers and Teacher Educators are being produced who need to know a variety of information and be updated with the knowledge explosion. 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 teaching practices. MOOCs in Teacher Education can act as an important way of teaching where learners are more self-reliant and don't depend much on teachers to get information.

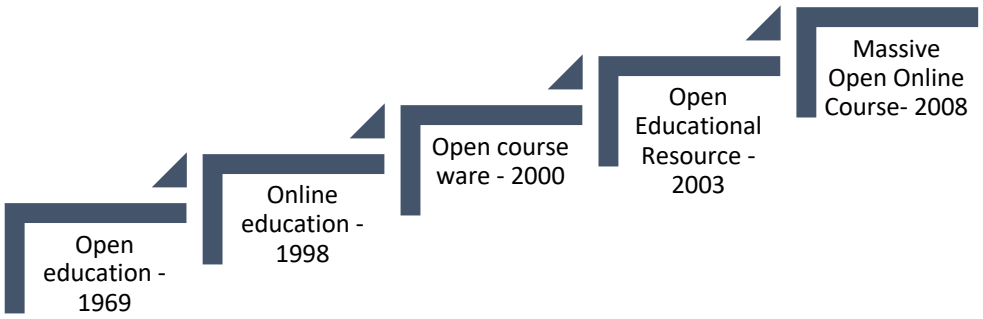
Out of the many courses being taught in professional courses like Teacher Education is Research Methodology. It is an essential course taught to both pre-service teachers and Teacher Educators (i.e. Student Teacher Educators) although its weightage at the master level is supreme where students have to prepare their 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.

1.1.0 HISTORY AND ORIGIN OF MOOCs

In the late 1990s, as personal computers and internet access became more widely available, teaching approaches gathered under the umbrella of e-learning grew in popularity. Since then, e-learning and open learning on the Internet have moved forward in a series of important steps. The UNESCO open-access initiative, which began in 2002, made it possible for people to read certain journals for free. The Creative Commons also announced its online licencing system within a few months. The communication networks that UNESCO set up helped it become well-known and used a lot in developing countries. UNESCO also held a Forum on the Effects of Open Courses Ware on Higher Education in Developing Countries. As a result of that Forum, the term “Open Educational Resource” (OERs) was created. Open Educational Resources are teaching, learning, and research materials that can be freely used, improved and repurposed by others for educational purposes. This is made possible by things like open licencing. The focus of UNESCO's OER initiative was on creating awareness among other states about the possibilities of sharing educational content as OERs (Oerr et al, 2015). The World OER Congress, held in June 2012 at UNESCO in Paris, also emphasized the need of promoting and utilizing OER to increase access to education at all levels, with a focus on lifelong learning. Institutions should be supported in their efforts to train and motivate teachers and other professionals to create and share high-quality, accessible educational resources that reflect local needs and the complete range of learners. It also aimed to promote OER research and make locating, retrieving and sharing OER easier. India has contributed extensively to OER through initiatives like NPTEL and ePG-Pathshala, and the country is an early adopter of it. Since 2014, the National Mission on Education through ICT has maintained a free software licence policy (Mishra, 2020). Open Educational Resources have been praised for their potential to increase access to Higher Education by multiple sources, including the National Knowledge Commission (2007). Many people believe that Open Educational Resources are the most important social innovation made possible by Internet technologies in the field of education.

FIGURE 1.1: *Timeline - Origin of MOOC*



Massive Open Online Courses have helped the OER movement in many ways. They are a very useful tool for sharing and accessing authentic Open Educational Resources. They aided the transition from simply providing openly licensed resources that could be reused and revised to providing open practices. These practices offer educational opportunities to an audience that was previously unable to access high-quality Higher Education through the use of OER in a course format with learning support (Arnold et al., 2015). MOOC is an innovative way of learning in the modern world. David Cormier coined the term MOOC, and the trend began in 2008. George Siemens, Stephen Downes, and David Cormier launched the first Massive Open Online Course in 2008, titled Connectivism and Connective Knowledge. After that, Massive Open Online Courses (MOOCs) proliferated worldwide. In 2011, Stanford's Sebastian Thrun and Peter Norvig launched an online Artificial Intelligence course. Due to the overwhelming response, both left Stanford in 2012 to find Udacity. Stanford colleagues Daphne Koller and Andrew Ng, both of whom were active in Stanford MOOCs, started Coursera in April 2012. In May, Harvard and MIT launched the EdX platform in collaboration. In The New York Times, Pappano (2012) refers to 2012 as The Year of the MOOC, indicating the spread of this phenomenon. Since 2012, the number of MOOCs has steadily and considerably increased.

1.2.0 MEANING AND DEFINITIONS OF MOOC

MOOC is an abbreviation that stands for Massive Open Online Course. The 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. MOOCs

are an emerging field in education that also encourages lifelong learning. MOOCs always have the following elements in common (Moe, 2014):

Massive: It refers to the platform's ability to accommodate a significant number 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, hybridMOOCs, etc, the term MOOC appears to serve as an umbrella term that applies to all types of courses, regardless of size (Blackmon & Major, 2017). 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: Without any entry prerequisites or course fees, it is open to students from all over the world, irrespective of their location, age, income, philosophy, or educational background. 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. Open means more than a monetary price to the pioneers who founded and championed the open movement; yet, in the common understanding the term open in MOOC can also refer mostly to the absence of course fees and institution registration. Anderson (2013) suggested six categories of openness:

- Expansion of education beyond geographical limits
- Freedom of speech
- Removal of constraints on learning content
- Enrolment without prerequisites
- Flexibility to choose one's own pace
- Provision of a free course

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 acquiring all of the experiences accessible in traditional courses, including educational content, peer interaction facilitation, activities, tests, receiving feedback, recognition alternatives like badges and certificates, and 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 term that has been defined in numerous ways across studies. According to the British online dictionary, a MOOC is a term for a free online course that is taken by a significant number of students. According to McAuley et al. (2010) and Vardi (2012), "Massive Open Online Courses are web-based courses taught by academics or professionals that may accommodate an unlimited number of students simultaneously." MOOCs are a continuation of the trend in innovation, experimentation, and the use of technology that was initiated by distance learning and online education to provide comprehensive learning opportunities (Siemens, 2013). According to O'Prey (2013), "Massive Open Online Courses (MOOCs) are free, available to a huge number of students simultaneously, and delivered via video lectures, online assignments, and exams." According to Chauhan et al. (2015), "a MOOC is an online course that is open to a large number of participants, has a predetermined length, and adheres to a set of pedagogical principles." The MOOC revolution is redefining education. MOOCs have also evolved in terms of their characteristic. MOOC consists of the following most basic characteristics (Rathee, 2018).

- It promotes autonomy in learning
- It has no limits on its enrolment
- All course components are made available online
- The majority of the components are free
- They don't impose any pre-requirements
- They are more suited to those who are highly self-motivated
- A web-based learning environment with open access and large-scale worldwide involvement
- For Web-based distance education, multimedia textbooks are available
- Allows students to have a more flexible learning approach
- It is extremely adaptable, low-cost, and reduces the need for teachers' involvement.

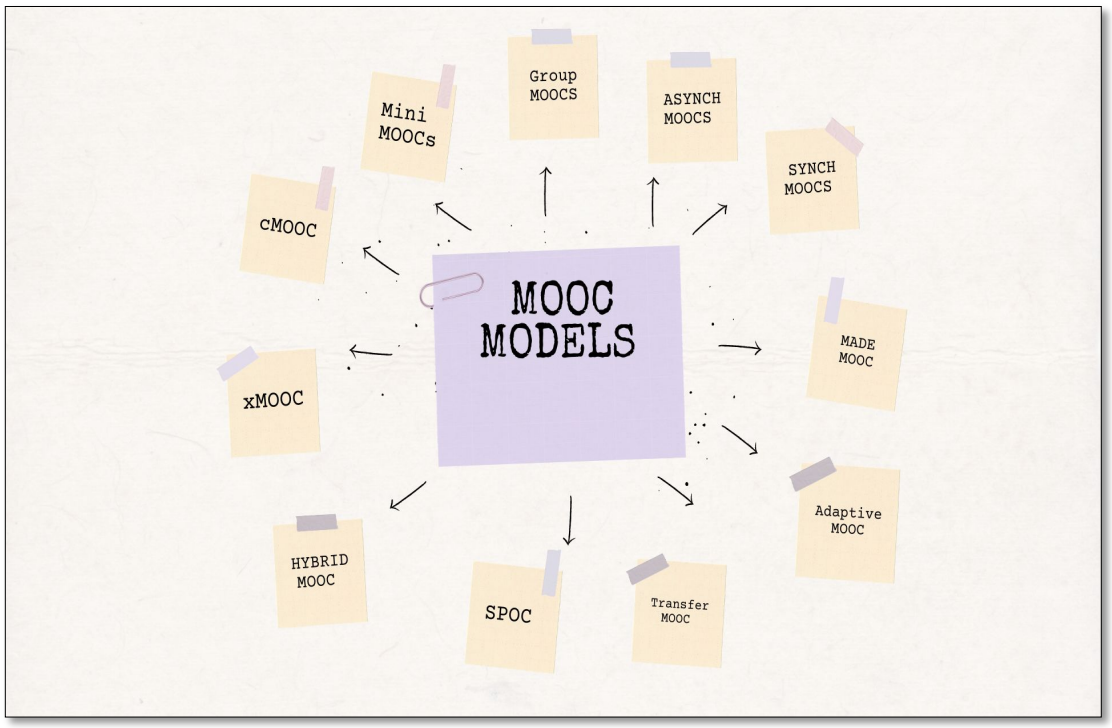
- MOOCs give professors the freedom to choose who they want to reach out to, even across institutional borders
- Having access to high-quality materials and exhibits
- Using auto-grading to provide students with fast feedback to maximise the use of a scarce resource, namely the instructor's time
- Encourage activities such as discussion-based learning and open-ended design projects
- Massive Open Online Courses provide opportunities for dropout students and aid in the reduction of student dropout rates. They can continue their courses using MOOCs such as class forums, video lectures, video conferences, and so on, and these interactions are linked to success
- Open Educational Resources in the form of MOOCs is a strategic way to increase education quality while also facilitating policy discourse, knowledge exchange, and capacity building.

MOOC is open to all, promotes student-centred learning, is flexible, and self-paced, works on student analytics for automatic grading, gives autonomy to professors to choose various contents, and promotes OER adoption. Hence, considering all these definitions, MOOCs can be described as An 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 and all components are shared online. There are also many models of MOOC based on the pedagogy followed and are described in the next paragraph.

1.3.0 MOOC MODELS

MOOCs are still in their early stages of development because they are a relatively new phenomenon. MOOC models have been identified by researchers all over the world. The numerous models of MOOCs are classed based on their differences in pedagogies and evaluation methodologies, as well as their underlying beliefs about successful learning. Bates (2014) reviewed the two most adopted models of MOOC called cMOOC and xMOOC.

Figure 1.2: *Models of MOOC*



1.3.1 xMOOC

It is also called extended MOOCs. It was originated by the professors of Stanford University and then adopted by MIT and Harvard instructors. A behaviourist, information transmission model is followed in this type of MOOC. Here special cloud-based software platforms are used to deliver the course and instructors have autonomy and freedom in the development and design of the course. Almost all the xMOOC have the following common design elements:

- Customized software or platform: This type of platform allows for the registration of large groups of people, storage and viewing of content, as well as automated assessment methods, and student performance tracking.
- Video Lessons: Instructors can create their videos or use videos from the internet. Initially, 50-minute video lectures were used, but today other video fragments or chunks are employed. The length of the courses is shrinking, with some now lasting only five weeks or less. Lecture capture, full studio production, and instructor desk-top recording have all been employed in the production of this film.

- Online assignments: Students take an online examination and receive immediate computerised feedback. These assessments are often administered during the course and are intended only to provide participants with feedback. These tests can also be used to give out certificates.
- Automated assessments: The assessments are prepared by the instructor and students get automatic scores and feedback after completing the test.
- Supplemental materials or resources: These may include copies of slides, additional audio files, URLs to other resources, and other web articles that participants can download.
- Discussion forums: These are sites where you can ask questions, get help, or share your thoughts on the course's material.
- Certificates and badges: Most xMOOCs offer some sort of reward for completing a course, usually in the form of a final computer-marked exam.
- Learning analytics: xMOOC platforms may gather and analyze participant data.

1.3.2 cMOOC

The cMOOC is also called Connectivist MOOC. Teachers in cMOOC are largely responsible for early instructional design and facilitation. It does not use a centralized platform to share information and resources instead, they employ various social media platforms. The major goal of a cMOOC is to increase knowledge by connecting and collaborating with peers. There is no formal assessment of learning outcomes, and learners participate in the content development process. Students can use tools like Twitter, Facebook, blogs, wikis, Google groups and other social networking sites to build their networks outside of the learning platform. cMOOCs use a model of learning called networked learning, which is based on self-directed students talking to each other through open and connected social media and sharing information through their contributions. There is no set curriculum and no formal relationship between teacher and student for delivering content or helping learners. Participants can learn from both the contributions of the community and their reflections on those contributions. So, unlike in xMOOCs, learning in cMOOCs happens when people share what they know with each other instead of when an expert gives information to students. To design a cMOOC four fundamental principles are considered including autonomy, diversity, interactivity, and openness (Downes, 2014).

In addition to the above-mentioned MOOC other models of MOOC are also being researched, adapted, and used around the world which include:

1.3.3 Hybrid MOOC

In Hybrid MOOCs, xMOOCs and cMOOCs are integrated. It has clear objectives, weekly reading assignments, discussions, expert webinars, and a calendar of upcoming activities, just like an xMOOC. The fact that students collaborated on blogs and there were no official exams, however, gave it some elements of a cMOOC. Hybrid MOOCs are an integration of processes, pedagogies, and features of different types of MOOCs, with an instructor present to facilitate the learning activity. A Hybrid MOOC seeks to strike a balance between the affordances and shortcomings of xMOOCs and cMOOCs so that they can be utilised in a larger range of learner contexts, environments, and activities (Alanazi & Walker Gleaves, 2019).

1.3.4 SPOC

Professor Fox of the University of California, Berkeley, proposed the SPOC concept in 2013, which is an acronym for Small Scale Private Online Courses. SPOCs bring together online resources and technology to boost personal interaction between instructors and students. SPOCs are implemented with students at the institutional level. The features, type, and nature of the content that must be delivered to students are determined by the faculty. Video lectures, interactive quizzes, and assessments with immediate feedback, discussion forums, and interactive labs are just some of the features that faculty can choose to add to their courses. After the onset of the Massive Open Online Courses wave, SPOC was created as a mixed teaching mode in the university classroom application process.

1.3.5 OTHER MODELS

Clark (2016) identified seven categories of MOOC typologies based on their functionalities:

- **Transfer MOOCs:** It takes current courses and puts them on a MOOC platform with the pedagogical assumption of transfer from teacher to learner, which is similar to traditional academic courses with lectures, short quizzes, assigned texts, and tests.

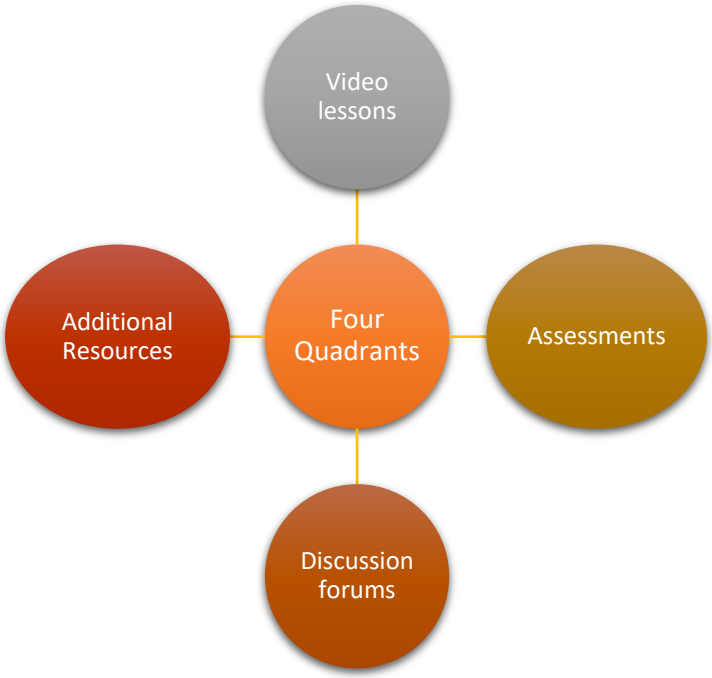
- **Made VOOCs(Vocational Open Online Courses)**: Here the goal is to learn new skills. These MOOCs use peer work and peer assessment to deal with high teacher-to-student ratios.
- **Synch MOOCs**: They have a set start date and clear end date and tend to have clear deadlines for assignments and tests.
- **Asynch MOOCs:** These don't have or have a lot of start dates and are more likely to have no flexible deadlines for assignments and tests and no set end date. They can be taken from anywhere at any time.
- **Adaptive MOOCs:** It lets you learn in a way that is best for you by using adaptive algorithms and dynamic testing and data collection on the courses. They lead students through the curriculum on different, individualised paths.
- **Group MOOCs**: It starts with small groups of students who work together to help students stay in the course. They all have mentors and rate each other on how hard they work and how well they do. Throughout the course, groups are formed and broken up.
- **Mini MOOCs:** They are better for specific topics and tasks with clear learning goals, and they offer more intense experiences that last hours or days instead of weeks.

Despite different models available in research studies the most common model accepted and adopted are xMOOC, cMOOC, and hybrid MOOCs. Institutions, private, and government sectors according to their needs and affordability can choose from the above-stated model to develop a MOOC. In all the above-stated models the MOOC quadrants remain the same which includes video lectures, discussion forums, additional resources and assessments leading to certifications and badges. The quadrants are described in the next paragraph.

1.4.0 QUADRANTS OF MOOC

The 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 an Indian indigenous platform called SWAYAM are in four quadrants which includes video lecture, additional reading material, assessment and an online discussion forum.

Figure 1.3: *The four major quadrants of MOOCs*



1.4.1 VIDEO LESSONS

The instructors prepare video lessons for the learners to understand the content. The videos are considered key components of the MOOC. Generally, instructors make use of five different types of video which include :

- Talking head video
- Live-action video
- Screen capture video
- Keynote or PowerPoint presentation video
- Open source videos

Students watch video lessons of the course to understand the content of the course. Videos sometimes also contain transcripts and activities in between. According to Chauhan, et al.,(2015), video provides self-regulated and independent learning. It has transformed traditional classrooms by replacing the “one-size-fits-all” approach with self-paced learning, and from teacher-centric to student-centric learning. The duration and quality of the video are also important while making a video. According to an empirical study conducted by Guo, et.al.,(2014), shorter videos with instructors talking heads are more

engaging. High-class pre-recorded videos are not engaging when chopped for a MOOC. Videos wherein instructors speak with enthusiasm and fast are more engaging.

1.4.2 DISCUSSION FORUM

A discussion forum 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 knowledge and also transfer. 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. The threads are the medium for the instructors to know where the students are facing challenges and where the course needs to be improvised. Onyema et al.,(2019) conducted a study on online discussion forums as a tool for interactive learning and communication. The study suggested prompt or timely feedback by teachers and administrators of online discussion forums. Grading of participation of students in online discussion forums and formulation of policies regarding the usage of the online discussion forum in schools.

1.4.3 ASSESSMENT

Assessment is another 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 MOOCs. The basic types of assessment found are.

- Automatic graded weekly quizzes: most of them are multiple-choice questions testing the content knowledge of the course content. Such a method provides a good chance to assess any topic that you are not sure about.
- Peer assessment : Open-ended questions are difficult for automatic grading; in such cases, a certain set of rubrics is given by the instructors to the learners to assess their peers. The rubrics guide students on how to add or subtract marks and evaluate an answer.
- Self-assessment: MOOCs provide students with an opportunity to assess themselves while learning and to understand their strengths and weaknesses. Self-assessment was argued to be the most suitable assessment method to correspond to the needs of these self-regulated learners and a potential solution to the high attrition rates and the patriotic grading bias during peer assessment. (Ventista, 2018).

Boud & Falchikov (2007) argued that assessment, rather than teaching, has a major influence on students' learning. The paper argued in favour of the self-assessment as the most effective and appropriate method of formative assessment when open-ended questions and essays in MOOCs are concerned

1.4.4 ADDITIONAL RESOURCES & ACTIVITIES

MOOC 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 instructors also allow students to download the PowerPoint presentation handouts for future reference. 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. Instructors should create materials that help students to apply what they are learning. The material should support and reinforce the video lessons. Always save the handouts and e-books in pdf format for easy accessibility to the students. MOOCs also incorporate games-based learning and many researchers in past have shown the benefits of using games in education.

1.5.0 GUIDELINES FOR THE 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 of 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: 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, colleagues or guest speakers.
- Determine content: Select pen articles, interactive presentations, learners' 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. In the past, researchers have highlighted numerous best practices and principles to consider when developing a MOOC. Some of the principles are explained in the next section.

1.6 .0 PRINCIPLES OF MOOC DESIGN

While there is no specific blueprint for building a MOOC, the emphasis is always on offering high-quality content and ensuring that participants can engage and learn from one another. While designing a MOOC some principles need to be considered to make the course effective (Drake et al., 2015):

- Meaningful: While creating content for the MOOC too many ideas should be avoided and content should be relevant to the topic being discussed. Any type of confusion in the content needs to be minimised and meaningful examples should be added in the materials developed. While in small classes mistakes are identified and observed they become tough in massive courses.

- Engaging: While certain students complete some modules of the course and do not stay till the end of the course, some enrol in MOOC only for the certificates. As numbers are high in MOOC it becomes challenging for instructors to engage all the students, so instructors should take utmost care in having engaging experiences in the course through games, activities, chats and emails.
- Measurable: The students should be able to track their progress and also instructors should know the progress of the students in the course. Automated assessment should be devised and also a mechanism for immediate feedback should be undertaken.
- Accessible: The goal of joining a MOOC is different for different individuals. Moreover, the place of accessing the course may also be different and care should be taken that they are available both on mobile and computers and students can access the course from anywhere. Sometimes the instructors can also make use of audio instead of video to minimise the bandwidth.
- Scalable: A MOOC course can be scalable if it has automated technologies. Instructors' contact with the students should be limited to managing progress, creating content and evaluating learners' progress.

Hence offering of a MOOC and its experience becomes engaging for both instructors and learners, if certain design principles are kept in mind. MOOCs are designed to promote active learning by providing opportunities for students to engage with the material, interact with other learners, and collaborate. By using these principles, MOOCs can provide an effective and engaging learning experience for students from all over the world. Such principles guide the instructor to make a course engaging and meaningful for the learners.

1.6.1 DESIGNING MOOC- BEST PRACTICES

It is essential to adhere to the MOOC development criteria when constructing a MOOC. Spyropoulou et al., (2014) identified the following best practices to design a MOOC by attending the most popular MOOC platforms and identifying their good practices. The platforms they selected were edX, Coursera, future learn, Udemy, Udacity and Iversity which were leading in the market in terms of enrolment.

Table 1.1: *Guidelines for Course curriculum development and their best practices*

Category	**Guidelines and Best Practices**
Structure	• The course is divided into sections or modules. • It includes activities that need to be completed in one week. • Learners are informed in advance of what they will learn in a week. • Every section contains at least one educational video. • In addition to video tutorials, each section has hypertext, questions about how to understand the video, exercises or tasks, a discussion topic, and other learning materials. • Learners know what activities will be done, when, and why at the start of each section. • Even after a course is finished, registered users can still see educational materials and parts of the course. • Students move through different parts (like weeks) of the course, which lets them see what they will learn next.
Duration	• Courses are usually broken up into 6–14 sections, each of which lasts one week. The courses last anywhere from 6 to 14 weeks.
Enrolment dates and deadlines	• The course description page tells students when and how they can sign up for classes. Registered students can join the course after the end of the course.
Engagement Time	• The recommended weekly time commitment for learners is between 3 to 4 hours and 10 hours.
Certification	• Upon successful completion of the course, learners receive a free certificate of attendance attesting to the participant's successful completion of the course, without identity verification. By paying a specified cost, a Certificate with identity verification is issued.
Communication and	• Faculty members encourage students to actively support a network of cooperation, with the participation of all

Collaboration	
Assessment	• During a course, people usually do activities with open answers, multiple choices, filling in gaps, and matching.
Download Ability	• It is best to be able to download the educational materials.
Educational Video	• • During educational videos, students are often asked to answer a simple question about what they just saw. • • At least 60% of the material from the educational MOOC is in the educational video. • The videos last anywhere from 5 to 20 minutes, depending on what they are about. • The size of the file can be up to 1 GB. There are pictures, charts, or diagrams in presentations. The videos are in 720p, which is also called High Definition. The instructions are clear, interesting, and easy for learners to follow. It also has examples to help you understand the ideas.
Presentation	• Presentations have useful additional information • PowerPoint, Keynote, and Prezi are all programmes that can be used to make presentations.
Document	• Each course has online literature, such as an e-book, that can be read. There are online articles in each course. • You can download the documents and essays for each course.
Audio	• The voice of the teacher is heard on the audio track of video lectures.
Quizzes	• Quizzes are part of the courses to help students learn more. • Quizzes come with feedback. • Quizzes are used to figure out how much a student has learned. • When needed, open-answer quizzes are used.

	• Quizzes are based on real-world situations to help students use what they've learned in the real world.
Wiki	• Students provide extra resources and topics for each course using wikis
Project	• Other students evaluate student projects

(Source: Spyropoulou et al., 2014)

After reviewing all the models and their components it was observed that many components were common in all models. In the present study, the researcher developed a MOOC by adopting many of the best practices above to make the MOOC meaningful, engaging, scalable, measurable and accessible. The researcher adopted an xMOOC model which includes the following components:

1. *Specially designed platform software*: The researcher designed a platform using WordPress and uploaded a course using LIFTERLMS.
2. *Video lectures:* The researcher developed video lectures on the content selected for the study. The video was divided into small chunks. It also had interactions in it to make it engaging.
3. *Supporting materials:* It includes additional materials for students including videos, links, pdf documents etc. relate to the content.
4. *Discussion space:* This feature on the LMS was utilised for participants to post questions, request support, comment on the course material, and make announcements.
5. *Certificates/Badges:* Students were awarded certificates or badges upon successful completion of a course based on a summative assessment.
6. *Personalised feedback and communication:* As and when required the researcher provided personalised feedback to students through emails and messages.

Hence MOOC consists of major four quadrants and imparts education to learners all over the globe. Although the quadrants in same in all the MOOCs but the approach to teaching and learning in MOOCs can vary from one model of MOOC to another. But developing a MOOC is not the end goal as the course also needs a platform to run and be available to learners from every corner of the world.

1.7.0 PLATFORMS FOR MOOCs: NATURE AND TYPES

MOOCs 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, OpenEdx, WordPress.

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. In the present study, the researcher adopted the Open Source Software called WordPress along with LIFTERLMS (details in Chapter 3) to upload the MOOC content.

1.7.1 MOOC PLATFORMS: GLOBAL SCENARIO

MOOC promote life -long learning and is being used by learner all around the world to get access to a world-class education. Below are the different types of well-known MOOC platforms based on their origin and type:

1.7.1.1 COURSERA

Daphne Koller and Andrew N. always wanted to give life-changing learning experiences to learners all around the world, hence in 2012, they founded Coursera. As of now, this platform provides access to many online courses and degrees from renowned universities all around the globe. Coursera has been in partnership with many universities across all

continents to provide world-class and affordable education. The courses are open to all and free in most scenarios but learners need to pay for getting certificates and they get financial assistance for it also. Nowadays Coursera provides the course with a hands-on project, degree programs, and courses on job-ready skills.

1.7.1.2 EdX

In 2012, Harvard and MIT announced the Edx platform. At the time, educational institutions across the globe struggled with difficulties such as limited access to high-quality education and skills gaps among students as a result of the rapid growth of technology. According to the 2020 impact assessment of EDX, it was built with three pillars in mind:

- Expanding access to quality education for all people worldwide
- Reimagining both on-campus and online education
- Using Research to improve teaching and learning outcomes

1.7.1.3 Udemy

This is an American MOOC provider founded in 2010 by Eren Bali, Gagan Biyani, and Oktay Caglar. Udemy was developed with the mission to improve lives through learning. It is the world's largest online learning destination. Students, instructors, government officials, and anyone interested in learning can gain skills to survive in the present world. Udemy offers courses from programming in IT to communication skills. It also proved trying program and subscription access for large-scale companies. It has its headquarters in San Francisco and offices in India, Denver, Ireland, and Turkey. In a 2020 special report published by Udemy, it was stated that people in India are learning Communication Skills are 60.6% and Business Fundamentals are 28.1% (Udemy, 2020).

1.7.2 EXAMPLES OF MOOC PLATFORMS: INDIAN SCENARIO

Globally, MOOC platforms are used to offer online courses, and India is no exception. In India, numerous MOOC platforms are used to deliver various courses. The following are some of India's most popular MOOC platforms:

1.7.2.1 SWAYAM

Study Webs of Active Learning for Young Aspiring Minds (SWAYAM) was launched on July 9, 2017, by the Ministry of Human Resource Development to provide a single platform and portal for all online courses, including higher education, high school, and skill sector courses. The SWAYAM courses are intended to fulfil the three guiding principles of India's Education Policy that are access, equity, and excellence. The list of coordinators and the level at which they design courses is as follows:

- AICTE (All India Council for Technical Education): for self-paced and International Courses
- NPTEL (National Programme on Technology Enhanced Learning): for engineering Courses
- UGC (University Grants Commission): for non-technical post-graduation education
- CEC (Consortium for Educational Communication): for undergraduate education
- NCERT (National Council of Educational Research and Training): for school education
- NIOS (National Institute of Open Schooling): for School Education
- IGNOU (Indira Gandhi National Open University): for out-of-school students
- IIMB (Indian Institute of Management, Bangalore): for management studies
- NITTTR (National Institute of Technical Teachers Training and Research): for the teacher training program

The mission of these SWAYAM's nine national coordinators is to provide the learners with the greatest possible curriculum. The current SWAYAM platform was created with the assistance of Google Inc. and Persistent Systems Ltd. by the Ministry of Education and NPTEL, IIT Madras. The courses in SWAYAM are free, but students must pay a fee to obtain credentials, which they receive after taking a proctored exam. The SWAYAM course is structured in four quadrants, which include, video lectures, reading material that has been specially created and can be downloaded/printed, self-assessment tests in the form of tests and quizzes and an online discussion forum to clear up any confusion. Credit and non-credit courses are available in SWAYAM. Overall, SWAYAM is an important resource for students in India who are looking to access free, high-quality education online.

1.7.2.2 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 at any scale.

1.7.2.3 IITBombayX

According to the home page of IITBombayX, it is an online platform made by IIT Bombay to offer Massive Open Online Courses to people in many different fields. They are experts in Hybrid MOOCs, which combine the best parts of flipped classrooms, online lectures, and face-to-face interactions with IITBombayX course instructors. IITBombayX offers four different kinds of MOOCs for different learning needs: edumooc, skill MOOC, teach MOOCs, and lifeMOOCs.

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 course focusing on Research Methodology in general and Educational Research in particular.

1.8.0 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 physically mode can enrol in such courses and get the benefits of online learning. In addition, MOOCs provide an

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. 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.

The University Grants Commission (UGC) has issued the Credit Framework for online learning courses through SWAYAM, Regulation 2016. This regulation advises universities to identify courses on the SWAYAM platform where credits can be transferred to the academic record of students. In addition, the All India Council for Technical Education (AICTE) released a gazette notification in 2016 and subsequently for the adoption of these courses for credit transfer. According to these regulations, no university is allowed to refuse any student credit mobility earned through Massive Open Online Courses (MOOCs).In 2021, the UGC introduced new regulations called the Credit Framework for Online Learning Courses through Study Webs of Active Learning for Young Aspiring Minds Regulations, 2021. These regulations enable universities across the country to offer 40 per cent 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 boundaries, jobs, 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 provide many business opportunities for making platforms and collaborating with universities like Coursera and Edx.

Hence, Massive Open Online Courses (MOOCs) are considered a welcome step that brings immense benefits to various stakeholders in the Indian education system. India has the second largest number of student enrolments in MOOCs, following the USA (Shah, 2018).

Therefore, it can be predicted that MOOCs will have a strong impact on the education system in India, improving standards and making quality education accessible across all fields with just a click of a button. However, despite the numerous advantages associated with MOOCs, several challenges arise in their implementation and development. The next section outlines some of these challenges.

1.9.0 CHALLENGES WITH MOOC

MOOCs are increasingly being viewed as a feasible option for millions of people looking for free or low-cost higher education. Although colleges and universities are excited to follow the MOOCs digital bandwagon, the widespread popularity of MOOCs in recent years has made concern among university authorities, who feel that this free and low-cost form of learning would eat away at their share in the market (Christensen et al., 2014). The other reason for concern in MOOCs is the dropout of courses. Some researchers argue that these courses are not effective learning tools, but rather technology-driven or business-oriented ventures, as many platforms charge fees for course access. Additionally, it is worth noting that the courses often feature lengthy and dull videos that fail to engage students, and there is a lack of innovation in the design of audio and video content within MOOCs.

Taneja and Goel (2014) pointed out certain challenges faced by MOOCs which include, a lack of courses in a language other than English, a lack of accreditation facilities, and courses being done from one university in one country that are hardly accepted by universities in other countries. Most of the MOOCs are free so it does not help the universities to get enough financial aid. In the technology platform information is stored in the cloud, and the instructors who make the best use of these technology systems have an advantage over others. But the choice of the best faculty with all facilities is a hectic task. Chauhan (2017) also outlined many challenges faced by MOOCs in India, like quality, diversified needs, technology infrastructure, and investment. The major challenges for MOOCs in India according to a study by Jaganatthan et al., (2019) include.

- Digital content developers: The creation of digital content requires digital content developers other than subject experts.
- Devices: To view the content and download it.
- Internet access: Some minimum bandwidth for students in rural areas.
- Language barrier: Not all MOOCs are multi-language.

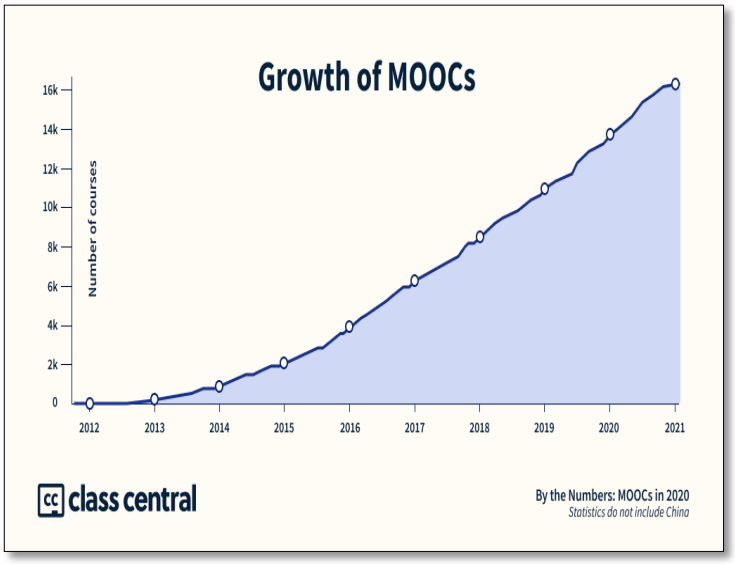
- Assessment and Evaluation: Where a significant amount of money has been invested, proper assessment procedures must be used.
- High dropout rate: One of MOOCs' main challenges is the high dropout rate.
- Motivation to learn: To overcome the dropout rate, motivation to participate and complete the courses is essential. The factors that would be employed to inspire the learners would include economic advantage, personal growth, and professional identity.

MOOCs are quite a new phenomenon and have been flourishing. Problems and issues are always there when a new learning method is introduced but it needs to be identified and addressed. At present, there is no definitive conclusion as to its value. Hence, researchers need to come up with new strategies and provisions for MOOCs which are needed to address the challenges that MOOCs are facing worldwide. Moreover, the pandemic also made educators around the world realise the importance of remote learning and took advantage, which leads to a steady increase in its usage and demand.

1.10.0 GROWTH OF MOOC AFTER PANDEMIC

The COVID-19 pandemic has greatly accelerated the growth of MOOCs, as individuals have increasingly turned to online learning to continue their education and professional development while adhering to social distancing measures. Even before the pandemic, the world faced significant challenges in ensuring access to education as a basic human right. Despite high enrollment rates in early grades across most nations, more than 250 million children were still out of school, and approximately 800 million individuals were unable to read or write. The COVID-19 crisis has caused unprecedented disruption to education, affecting learners and educators in nearly every country, ranging from primary schools to universities, technical and vocational education institutions, lifelong learning institutes, and skills development centres. By mid-April 2020, the pandemic had impacted 94 per cent of learners globally, equating to 1.58 billion children and youth in 200 countries, spanning from pre-primary to higher education levels (United Nations, 2020). According to a report by Class Central (2018), the modern MOOC movement surpassed 100 million learners in its seventh year. In 2018 alone, 20 million new students enrolled in at least one MOOC. By the end of 2018, more than 900 colleges had announced or launched a total of 11,400 MOOCs, with nearly 2,000 new courses added to the list during that year.

Figure 1.4: *Global Growth of MOOC from 2012 to 2021*



(Source: Shah, 2020)

When the coronavirus spread in 2020 many places around the globe had to go under strict lockdown, Education sector got disrupted. So to continue with the classes and not deprive students of their education, Higher Education institutes' started adapting virtual platforms to teach the students. One-third of the learners registered in a MOOC platform in 2020. The virus made people opt for online education and it helped universities to get learners in their online courses. In 2020 the MOOC market itself crossed 180 million learners also excluding China. It was found that 2800 courses and 19 online degrees were launched in 2020. Several factors have contributed to the growth of MOOCs during the pandemic, including:

- Increased access to online learning: The pandemic has made it clear that online learning is a viable and effective alternative to in-person education. This has led to a greater acceptance and adoption of MOOCs as a legitimate form of education.
- Higher Education institutions turning to MOOCs: Many universities and other Higher Education institutions have turned to MOOCs as a way to continue delivering course content to students during the pandemic. This has led to an increase in the number and variety of MOOCs available.
- The need for professional development: The pandemic has disrupted many industries and has led to a need for workers to upskill and reskill to adapt to changing job markets. MOOCs have become an attractive option for professionals looking to gain new skills and knowledge.

Hence the growth of MOOC during the pandemic showed its popularity among the learners. They enrol in a MOOC for a variety of reasons be it for curiosity, for fun, to gain skill knowledge or to acquire a certificate and play a variety of roles during their interaction with the course materials.

1.11.0 ROLE OF STUDENTS IN MOOCs

In a MOOC, the role of the student is to actively engage with the course material and participate in the learning process. This may involve completing readings, watching videos, participating in discussions, completing assignments and assessments, and seeking out additional resources as needed. There are several ways that students can get the most out of a MOOC:

- Set goals and create a plan: Before starting the MOOC, students should think about their learning goals and create a plan for how they will complete the course. This might include setting aside a specific amount of time each week to work on the course, setting deadlines for completing assignments, and breaking the course material down into manageable chunks.
- Engage with the material: To get the most out of a MOOC, students should actively engage with the course material. This might involve taking notes, asking questions, participating in discussions, and seeking out additional resources to supplement their learning.
- Seek help when needed: If students are struggling with the material or have questions, they should not be afraid to ask for help. Many MOOCs have support resources available, such as discussion forums, office hours, or tutoring services.
- Stay motivated: It can be easy to lose motivation when taking a MOOC, especially if the course is self-paced and there are no in-person interactions with instructors or classmates. To stay motivated, students should set achievable goals, break the course material down into manageable chunks, and celebrate their progress along the way.

Overall, the role of the student in a MOOC is to actively engage with the course material and participate in the learning process to achieve their learning goals. Based on engagements the students in MOOC are also classified into different groups in various researches. Some of the types of students in MOOC have been described in the next paragraph.

1.11.1 TYPES OF STUDENTS IN MOOCs

Students enrol in MOOCs for multiple reasons. Some students enrol to get certificates and get credits, others to explore the course out of curiosity while some just for fun. It has also been observed that some students enrol in MOOCs to make connections. A study done by Davis et al., (2014) explored motivations among learners to enrol in MOOCs courses. According to the study, students enrol in MOOCs because MOOCs are free and open, MOOCs build a social learning community, MOOCs satisfy interest, MOOCs are convenient: fitting around life, MOOCs update knowledge and improve CVs, and MOOCs provide professional development and lifelong learning. Although students enrol in MOOC for a plethora of motives and not all complete the course. Henceforth various learners who stay till the end of most of the course can be divided into three groups(Koller et al., 2021).

- Passive participants: they watch videos, participate a bit in discussion forums, attempt some quizzes also attempt the video quiz.
- Active participants: they take part in almost all the activities in MOOC including homework assignments, quizzes, exams, and peer-graded assignments to attain a certificate of accomplishment.
- Community contributors: they mainly participate in discussion forums.

Kizilcec et al. (2013) investigated student involvement in three computer science MOOCs in Coursera and discovered the following types of learners.

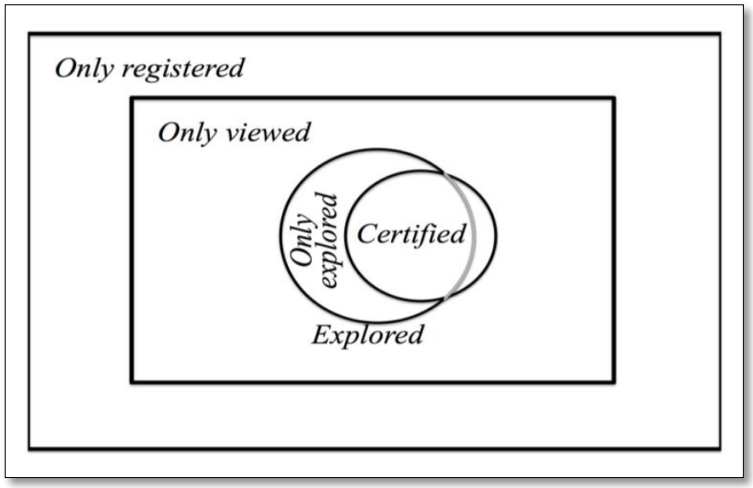
- Completing: students who completed the majority of the class's evaluations.
- Auditing: learners who did not do assessments quite often, if at all, and instead engaged in video lectures.
- Disengaging: learners who completed evaluations at the start of the course but later showed a significant drop in involvement.
- Sampling: students who saw video lectures for only one or two evaluation periods (in most cases, these students only watch one video).

Ho et al. (2014) investigated the first 17 MOOCs on the edX platform and came up with a four-category classification for the registrants.

- Only Registered: registrants who have never accessed the course
- Only Viewed: registrants who have accessed less than half of the available chapters
- Only Explored: registrants who have accessed more than half of the available chapters

- Certified registrants: registrants who have received a certificate

Figure 1.5: *Type of learners based on registration*



(Source: Ho et al., 2014)

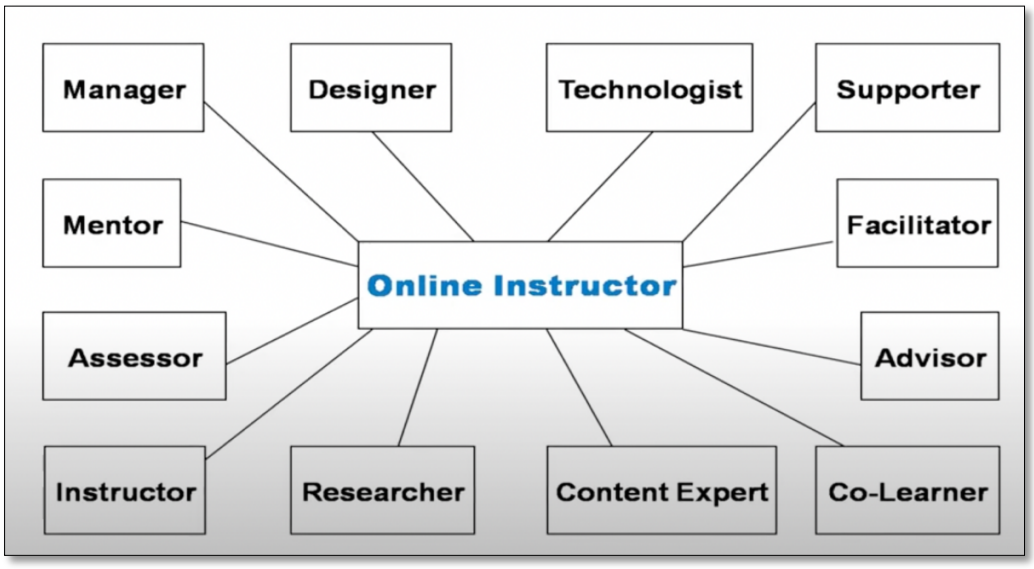
Although MOOCs are growing in number, the low completion rate among them is always a concern for researchers. Despite that, the above categories of learners in MOOC should always be taken into consideration by a teacher while deciding on delivering or not delivering a MOOC course to the learners, as different learners have varied types of interaction with the course contents and that should be the focus of making a MOOC and not the high dropout rates only. Here teacher's way of delivering and supporting the learners while the course is being run also plays a vital role to get students' attention to continue the course or leave in between.

1.12.0 ROLE OF A TEACHER IN MOOC

In a MOOC, the role of the teacher is to facilitate the learning process for students and provide guidance and support as they work through the course materials. This can involve designing and organizing the course content, creating and grading assessments, providing feedback to students, answering questions and offering assistance as needed. Teachers may also be responsible for leading live sessions or recorded lectures, facilitating discussions, and providing other forms of interactive learning opportunities. In a MOOC, the teacher may have a larger number of students than in a traditional classroom setting, so they need to use effective teaching methods and technologies to reach and engage all learners. In MOOC the teacher has various roles to play. According to Prof. Santosh Panda, in a

YouTube video on the development of MOOC, the portfolio of an online instructor in MOOC is wide, it takes many roles while making and implementing a MOOC including being a mentor, designer, instructor, content expert, etc that a 24*7 technology support is also required by the teachers (NOU21 ED01, 2021).

Figure 1.6: *Role of an online instructor*



(Source : NOU21 ED01, 2021)

In a study titled "The Role of the Teacher in a MOOC," Desinguraj (2020) asserts that the primary objective of a teacher in a MOOC is to facilitate self-directed learning among learners. The teacher's role encompasses activities such as aggregating and providing accurate information, amplifying learner understanding, modelling desired behaviours, and being consistently available for coaching or mentoring. Furthermore, the facilitator should possess adaptability and be willing to adjust their approach as necessary throughout the course.

The facilitator's active involvement in providing learning resources is crucial. They may also establish dedicated Facebook groups to foster external discussions among learners. Teachers with diverse teaching strategies have far-reaching implications, as they directly impact essential aspects of educational organizations, including funding models, recruitment policies, strategic alliances, and course production systems. Instructors can leverage various online platforms, such as Google, Facebook, Twitter, wikis, blogs, and social bookmarking tools, to make course materials and activities easily accessible to

students. Moreover, teachers should encourage students to select and utilize their preferred online tools for networking and collaboration with their peers.

In 2016, a survey was conducted among teachers of MOOCs at UNED (National University of Distance Education) in Spain, which is the country's first provider of MOOCs. The survey aimed to explore the teaching roles assumed by these instructors in both regular e-learning courses (at the graduate and postgraduate levels) and MOOCs. The most common response from the teachers regarding MOOCs highlighted a decrease in teacher presence and reduced interaction with learners during the course implementation. One teacher remarked, “In MOOCs, personalized attention to the learner is lacking.” Some teachers also expressed that MOOCs require greater upfront effort in course design compared to the effort required during course implementation (Gil et al., 2018).
Hence, it is evident that a teacher's role in a MOOC is crucial and extends from the course design phase to its implementation. They act as a facilitator of the course and also mentor students whenever it is required. MOOCs are being developed and experimented with in various courses worldwide and the researcher in the present study decide to develop a MOOC in the subject of Research Methodology.

1.13.0 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. Research Methodology provides learners with good training in doing research and becoming better researchers. It helps the student to think objectively and scientifically. Reading about Research Methodology enables learners to think practically about solving problems in the day to day life and promotes rational thinking. Learning about Research Methodology is far more than just a degree requirement, it’s a way of living. The skill acquired through learning this course helps students throughout their life. Every arena of the world is full of problems and doing systematic research is a tool to solve most of them.

The application of research methodology to daily problems enables individuals to seek thoughtful solutions. By developing the skills to systematically and passionately analyze problems, students can enhance their chances of achieving greater success and building confidence. Research Methodology is an unparallel opportunity to learn how one might better tackle any problem for which you do not have a readymade solution. The Research Methodology course can be considered the most rewarding and practical course in the entire educational experience of students (Leedy & Ormrod, 2013).

1.13.1 TEACHING AND LEARNING OF RESEARCH METHODOLOGY

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. Research methods courses are difficult to teach because the course subjects' technical complexity is high, and on the other hand student's interest in the material is often low. Any instructor who relies on a teaching approach based solely on a passive text lecture exam format runs the risk of driving student motivation and interest even lower (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 centres and innovative teaching approaches to teach Research Methodology including, the incorporation of real-world examples of research into teaching, online learning, MOOCs, etc.

1.13.2 RESEARCH METHODOLOGY IN TEACHER EDUCATION

Research Methodology is an important aspect of Teacher Education because it helps teachers to develop the skills and knowledge needed to conduct research in their field. Research is an integral part of Teacher Education because it allows teachers to improve their understanding of teaching and learning, and to develop evidence-based practices that can enhance student achievement.

Research Methodology is taught at both graduate and post-graduate levels in Teacher Education. Action research is also an important aspect of Research Methodology which is conducted by in-service teachers as well as pre-service teachers. Student-Teacher Educators are all the students studying in the Master of Education (M.Ed.) program in India and are prospective Teacher Educators, who undertake two Research Methods courses of introductory and advanced levels adding up to 8 credits in two years M.Ed. program. The dissertation is also a compulsory 8 credit component of the two years M.Ed. program. Each student has to submit a dissertation on a topic in the perspective courses at the end of the fourth semester. For conducting a dissertation basic Research Methodology is a must. Research Methodology covers maximum weightage in the UGC-NET exam which students appear for after their M.Ed. to become eligible to pursue research in the future and also for lectureship. Students struggle a lot when they appear for such exams as their basics with research are unclear. While the M.Ed. graduates are expected to do research, they are also expected to read research in all kinds of roles they assume as professionals. Research Methodology courses have two main objectives to equip students with skills and understandings to read educational research and to develop abilities to plan and conduct quality research. For many students, M.Ed. is the first formal occasion where they are introduced to research in Education (NCTE, 2014).

Courses on Research Methodology present students with the chance to acquire a comprehensive understanding of the research process, including important aspects such as formulating relevant research questions, designing studies, collecting and analyzing data, as well as effectively presenting research findings. The study of Research Methodology equips students with the necessary knowledge and skills to conduct high-quality research. In today's evolving data landscape, the teaching of Research Methodology has become increasingly crucial. While many students recognize the significance of Research Methodology in their postgraduate education, some express significant dissatisfaction with

the way the university structure and deliver these courses (Daniel, 2018). Hence teaching through MOOC for such a Research Methodology course might prove to be beneficial to students and also arouse interest among them for the same.

1.14.0 MOOCs IN TEACHER EDUCATION

According to the National Curriculum Framework for Teacher Education (NCFTE, 2009), a teacher should possess certain qualities and approaches. They should not consider knowledge as static or unquestionable but rather view it as a dynamic process embedded within the curriculum. Additionally, teachers should see children as active participants in the construction of knowledge and discourage rote learning. They should strive to create joyful and interactive learning experiences, employing learner-centred approaches, activity-based methods, participatory learning, projects, discussions, dialogues, observations, and field visits. Furthermore, teachers should integrate academic learning with practical, productive work. To prepare such teachers, it is essential for teacher educators or student-teacher educators to share the same educational philosophy and possess the necessary understanding and professional competencies. Achieving this goal requires a balanced combination of traditional teaching-learning pedagogy and the effective utilization of modern technological tools.

Most people assume that Student-Teacher Educators are those who intend to teach in a classroom; however, teaching is just one of the many career opportunities that open up with this degree. The knowledge and skill set acquired with a Master’s in Education can make a candidate marketable to other job markets including but not limited to non-profit organizations, social work, educational specialists for museums and community parks, curriculum sales, education policy development, private school consultation, corporate training, and writing SEO content for business websites. Employers are looking for leaders with a Master’s in Education who can communicate effectively, accommodate diversity, modify with change, and motivate others to achieve greater gains. The types of jobs one can obtain with a Master’s in Education are limitless. Hence an Educationist's job is to design the M.Ed. course in such a manner that it not only creates academicians but also unlocks the master key for any career door and supplies eligible human resources that the market is looking for (Pramanik & Gawarikar, 2015).

MOOC is an online mode of learning that will enable Student-Teacher Educators to make learning participatory, and joyful, making their learning more productive. MOOCs are not just tools to teach students; they are also being used to educate teachers, provide various learning experiences and meet their various learning needs. MOOC also has a promising future in its application to teacher professional development and it will promote the reforms in Teacher Education to some extent (Inchiparamban, 2017). The researcher conducted the study to update the Student-Teacher Educators on the use and adaptability of MOOCs for proficiency in Research Methodology, to create awareness among them on MOOCs as a mode of teaching-learning, and to break the traditional barriers in the process of teaching-learning. This study will introduce them to an alternate mode of learning and equip them with skills for online learning. and may in turn motivate the Student-Teacher Educators to make a MOOC for meaningful learning in their future classrooms.

1.14.1 PRESENT STATUS OF MOOCs IN TEACHER EDUCATION

Teacher Education is an important discipline to improve the quality of school education. According to Goel & Goel (2012), " 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 also 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'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 the chalk-and-talk method but moving more towards a 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 can provide a new avenue for teaching teachers to use educational technology in classrooms. 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 the 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. According to the findings, there is a growing demand for Teacher Educators to not only have a better understanding of MOOCs but also to give them the resources they need to create and incorporate MOOCs into their regular classroom practices. The Teacher Education program should prepare students to use new technology in the classroom 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 deliver knowledge and who truly care about students and their future success.

1.15.0 MOOCs: OPPORTUNITIES FOR FUTURE

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. According to Puspanadham (2019) with a smartphone penetration rate of 21.3 per cent, India is one of the most vibrant smartphone markets in Asia-Pacific. JIO-Reliance, a 4G internet provider with low costs, was introduced in 2016. MOOCs are one of the most potential platforms for improving the condition of education in India, with high and increasing smartphone usage, affordable smartphone internet, and many MOOCs easily accessible via smartphones.

To address the objective of increasing enrollment in higher education in India and ensuring access to quality education for all, Massive Open Online Courses (MOOCs) can serve as a significant option. As the demand for affordable, high-quality education rises among the youth and educational institutions and governments worldwide prioritize e-learning and

digital literacy, MOOCs have emerged as an integral part of the global education system (Subrahmanyam & Swathi, 2017). This aligns with the goals outlined in the National Policy of Education, which aims to raise the gross enrollment ratio in higher education, including vocational education, from 26.3% in 2018 to 50% by 2035 (NEP, 2020). Although MOOCs are widely used in IITs, IIMs, and several top-tier private colleges, MOOCs are poorly known in Indian universities in Tier-1 and Tier-2 towns. Many people outside of Higher Education have never heard of MOOCs, according to a study conducted in The Chronicle of Higher Education (2013) to determine public awareness. While the vast majority of poll respondents claimed they were familiar with Online Education in general, only 22% said they were familiar with MOOCs, and only 4% said they were extremely familiar (Kaur, 2019).

MOOCs in the future will create an efficient environment for providing online educational needs. Higher Education institutes should offer MOOCs in the future for the following reasons (Haywood & Macleod, 2015).

- To boost the reputation of the organization and make it an innovative institute
- Getting income from MOOCs through certificates, etc
- Indirect income in the form of fees paying student recruitment
- To act as the basis for Educational Research and Development for the taught online program
- To promote academic debate in the universities concerning the mode of instruction, pedagogy, and in-classroom teaching
- As a fun element to add excitement to the teaching-learning process
- To promote the belief in Open Education and be in and be associated with open activities
- To reach students out of education for too long and make education inclusive
- To work in collaborating with multinational companies working on Open Education
- To work in partnership with other peers in Higher Education institutes and colleges
- A desire to reach out to people who might not otherwise be able to get a university degree.

Institutions offer MOOCs for various purposes, including expanding education access, conducting experimentation, and extending their brand (Educause, 2012). Higher

Education institutes offering MOOCs can have multiple benefits. By becoming a leader in innovation, institutes will get an opportunity to collaborate with various third-party firms working in this field. Students' enrolment in institutes can increase and teachers in class will get various modes to adapt to. Teachers need to adopt MOOCs for stimulating fun and engagement among them, providing students with various modes of learning and also for their academic growth. MOOC showed exponential growth during Covid-19 and students at all levels enrolled in MOOC courses for a variety of reasons and numerous skills. The potential of such a course also needs to be tried and tested in professional courses like Teacher Education and with this objective the following research study was adopted.

1.16.0 RATIONALE

In India, the number of internet users has grown significantly, from only five million in the year 2000 to 755.8 million in recent times (Internet World Stats, 2021). This substantial increase in internet connectivity, particularly in developing countries, has led to the global accessibility of online content and interaction (Ahuja, 2018). MOOCs have emerged as a revolutionary force in the higher education sector. With an estimated 20-26 million children being born in India annually, it is projected that within the next 35-50 years, approximately 700 million to 1.3 billion Indian youth will require access to higher education (Kumar, 2018). Meeting this challenge and providing quality higher education to prepare them for their future careers is both an opportunity and a defining task for India in the 21st century. The National Council of Educational Research and Training (NCERT) highlighted the importance of exploring unconventional models of education such as distance learning, open learning, and flexible learning approaches in a position paper in 2006. They emphasized the need for flexible systems, forward-looking curricula, and a career-oriented focus aligned with the demands of the 21st century. It is crucial to engage the education system to play a significant role in improving the teaching and learning environment, making it more meaningful for both teachers and students. In this context, MOOCs provide a solution to these challenges by offering access to education for large populations. Moreover, MOOCs can deliver diverse and high-quality instruction that individual instructors may not be able to develop 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." The UGC chairman, who still teaches in an honorary capacity at IIT Delhi, explained why and how the UGC has to become a catalyst for change in an exclusive interview with the Deputy Editor of India Today, Kaushik Deka. 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. But now focus is to allow them to work with Ed-tech companies to improve their material and integrate it with current technology. The content can be housed on Ed-tech businesses' cloud platforms. Prospective employers can be onboarded by universities so that both recruiters and candidates are aware of each other's needs (Deka, 2022).

According to Chauhan (2017), there is a growing need to enhance the understanding of MOOCs among Teacher Educators and equip them with the necessary resources to effectively integrate MOOCs into their regular classroom practices. The National Educational Policy (2019) emphasizes the importance of encouraging and supporting teachers in the country to design and deliver MOOCs based on their areas of expertise. Additionally, it is crucial for faculty and Higher Education Institutions (HEIs) offering MOOCs to establish reliable and credible methods of student assessment and institutionalize appropriate mechanisms for delivering high-quality content in the online mode. There are several reasons why a teacher might want to develop their own MOOC:

- Reach a wider audience: MOOCs allow teachers to reach a global audience, as anyone with an internet connection can access the course. This can be especially useful for teachers who want to share their knowledge and expertise with a larger audience.
- Flexibility: MOOCs offer flexibility for both teachers and students. Teachers can design the course content and delivery method to fit their teaching style and schedule, and students can complete the course at their own pace.
- Professional development: Developing a MOOC can be a great way for teachers to enhance their professional development and showcase their expertise. It can also be a rewarding and fulfilling experience to create and share knowledge with others.
- Passive income: If a teacher charges for their MOOC, it can also be a source of passive income.

It is also important to note that developing a MOOC requires a significant investment of time and resources. Teachers should carefully consider whether they have the necessary resources and commitment to successfully develop and deliver it. Singh & According to Chauhan (2017), there is limited awareness among Teacher Educators in India regarding various MOOC initiatives, and sincere efforts are needed to enhance awareness about Indian initiatives aimed at promoting MOOCs in higher education, especially in the field of Teacher Education. In India, Teacher Educators generally exhibit resistance to innovation and experimentation in teaching methods, and their familiarity with modern classroom communication devices is also significantly lacking. (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. Despite the availability of some practises and research, a great number of educators and students are still learning about MOOCs as an educational endeavour. However, an increasing number of institutions are following the norm in their efforts to create open MOOCs and online learning to adhere to contemporary pedagogical trends, to make the institutions visible in the market for learning services and to reach larger communities of learners (Sekret & Morze, 2017).

According to Daniel (2018), Research Methodology equips students with the essential knowledge to improve their research skills and potentially pursue successful careers in research. However, research has consistently highlighted poor learning outcomes associated with research methods courses in universities. These courses are often described as pedagogically rigid, conceptually challenging, and lacking adaptability to future career paths. Students often perceive the content of research methods courses as disconnected from practical applications. They also encounter various challenges in learning Research Methodology, such as formulating research questions, comprehending theory or literature, grappling with data analysis, understanding technical terminology related to fundamental concepts, and lacking numerical skills for quantitative methods. Addressing the difficulties in teaching research methods courses is a challenging task due to the limited pedagogical research on innovative teaching approaches in this subject. MOOCs in Research Methodology can serve as a viable alternative for delivering these courses effectively. Despite the rapid growth of MOOCs in recent years, this format is still evolving and not yet fully established. To attract more students, MOOC providers need to focus on offering

improved learning tools rather than solely relying on providing high-quality multimedia materials online (Rai & Chunrao, 2016). While MOOCs have gained momentum globally, their implementation in India is still in its early stages. With the increasing connectivity, initiatives like Digital India, and a growing emphasis on online learning, it is an opportune time for the Teacher Education system to align with these emerging trends (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. From the review of the literature, the investigator did not come across any study, research, or investigation based specifically on developing a MOOC for Student-Teacher Educators. Therefore, the investigator was enthusiastic to work in this area and to develop a MOOC on selected topics of Research Methodology.

1.17.0 RESEARCH QUESTION

Through the present study, the researcher tried to find the answers to the following research questions.

- To what extent MOOCs can be effective for professional courses like Teacher Education?
- To what extent MOOCs can be interesting for professional courses like Teacher Education?
- To what extent MOOC can be developed for skill-based subjects like Research Methodology?

1.18.0 STATEMENT OF THE PROBLEM

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

1.19.0 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 MOOC on Research Methodology for Student Teacher Educators.
3. To study the effectiveness of the 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 on the following components:
    - Course structure and planning
    - Video Lessons
    - Discussion forums
    - Assessment
    - Additional resources
    - Feasibility
    - Instructor support
    - Overall effectiveness
5. To study the experiences of Student Teacher Educators in learning through MOOC.

1.20.0 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.

1.21.0 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 the two-year M.Ed. program across India.

1.22.0 OPERATIONAL DEFINITIONS OF THE TERMS

- Achievement in Research Methodology: Score secured by the Student Teacher Educators in an 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.

1.23.0 DELIMITATION OF THE STUDY

The study is limited to the topics, Introduction to Educational Research, Sampling and Types of Research Methods (Qualitative, Quantitative, and Mixed-Method) taught in the curriculum of M.Ed. first year.

1.24.0 STRUCTURE OF CHAPTERIZATION

The study is divided into the following chapters:

Chapter I: The conceptual framework of the study is described in detail in this chapter. The rationale for the current investigation is built in this chapter. This chapter discusses the feasibility of the study as well as the reasons for conducting it. The objectives of the investigation are also detailed in this chapter, along with the hypothesis, terminology defined and operationalized, and the study's delimitation.

Chapter II: The review of literature on the topic of MOOC is detailed in this chapter. This aided the researcher in choosing the sample, population, and methodology for the current study.

Chapter III: The methodology used in this study, as well as the plan and procedure used, are detailed in this chapter. It also throws light on the study's design, population and sample, development and implementation of MOOC, and data-gathering tools.

Chapter IV: The analysis of the collected data, testing of the hypothesis, and interpretation of the data collected are detailed in Chapter IV.

Chapter V: The findings of the study and discussion are presented in this chapter.

Chapter VI: This chapter provides a concise overview of the entire study, including a summary of the research findings, the implications derived from the study, recommendations for future researchers, and the overall conclusion.