

MOOCS: TECHNOLOGY DRIVES THE FUTURE OF HIGHER EDUCATION

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ABSTRACT

Massive Open Online Courses, MOOCs, are growing considerably popular as they are seen to be benefitting teachers, students, and the various stake holders of education. The educational institutions of higher learning are re-evaluating the online options. Given the increasing number of students and a dearth of qualified teachers, the new technology is gaining tremendous significance. MOOCs is a very promising concept and is rapidly evolving. The technology makes learning possible from wherever and whenever giving a new dimension to the tutor tutee relationship. This alleviates the need to meet real-time to facilitate learning, unlike the conventional teaching. At the moment there is a lot of demand and focus on developing MOOCs for all disciplines of education. This is predicted to benefit students located at different locations, remote locations as well, and they receive quality education from experts.

Keywords: Online, Education, MOOCs, SRL, Learner's Engagement.

Introduction

In current times the number of learners far outnumbers the available number of qualified teachers. There is a need for alternative methods of imparting quality education. With the rapid advancement of technology, MOOCs is appearing to be an emerging imminent tool which will facilitate students to learn using Information Technology infrastructure in addition to reducing the gap between available and required instructors. Dave Cornier, University of Prince Edward Island, coined the term MOOC in the year 2008 while referring to the course 'Connectivism and Connective Knowledge'. The course was introduced by Downes and Siemen in 2008 at the University of Manitoba, Canada [1, 2]. Truly speaking the existence of 'MOOC concept' can be traced back to 2000. Two courses, *Fathom and All Learn*, which were introduced in 2000 can be compared in many ways to the present popular MOOC courses. The years 2007 and 2012 are very important in the evolution of MOOCs. The first popular MOOC course was introduced in 2007 in Utah State University which was joined by 50 online students from 8 countries. Years 2011-12 can be considered as the milestone period for MOOCs. The first successful MOOC course which witnessed the enrollment of 1,60,000 students was introduced in the year 2011. 'Artificial Intelligence' was the course and it was introduced by Sebastian Thrun and Peter Norvig. They later started Udacity which is a platform used by many universities to host their courses. In the year 2012 two more major MOOC platforms were started namely, MITx and EdX by Massachusetts Institute of Technology and Harvard University respectively [1].

Learning is a continuous process and is greatly aided by the technological tools. As technology is advancing, accordingly electronic media-based E-learning is too gaining significance. The 'E' of learning in addition to electronics encompasses everything, engaging, easy [3], exciting, energetic, excellent, enthusiastic, extended [4]. A lot of evidence based on research affirms that MOOCs is becoming a popular and significant option for higher learning.

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Evolution in Education**Fig. 1: Evolution of Education**

Fig.1 summarizes the major steps in the evolution of education. The beginning of education can be traced back to pre-literate societies many hundreds of years ago. Peter Gray [5] in his article has emphasized that the need for education and schools were many including religious and secular. Initially during the time of hunters and gatherers and when agriculture came into existence, the emphasis was more on survival and food. The children of the house were involved in the survival business with their elders. When the labor and work became streamlined then education and schools for children got importance. The article [6] describes how difficult it was to make education compulsory for the children even after the survival was not an issue. The children were forced to work with their family in fields and factories. Before the formal education the basic skills and knowledge necessary for survival were passed on from one generation to other through oral instructions or imitation. Cave paintings depict how the humans of prehistoric period preserved their knowledge [7]. The knowledge was then transmitted to other generations and to the people who visited the places from other geographical locations. The images, symbols and paintings were the beginning of some form of writing [7]. This can also be considered as the beginning of 'Boards', which later evolved as the most important means to impart and test knowledge in formal schools [7]. Slowly the old ways were replaced by formal education and schools. According to Ciprian Baciu [7] this may be the result of lack of caves or storage space for their signs, symbols and paintings. The first formal school has been found in Egypt's Middle Kingdom [8, 9], though the education was said to be limited to royals. Libraries were also found in few towns [9]. Scott [10] has described in detail the various stages in the evolution of education. It describes how education evolved and then had to be made free and compulsory for the poor kids who were forced to work as labor. Apart from the social revolutions few inventions helped the education to spread among the students. It includes papers and printing press. The invention of paper and printing press revolutionized the formal education [11]. Hannah [12] has described in detail about the educational advancement through the printing press.

Printing press not only makes it possible to have mass production of educational materials but also it makes possible to create pictures and diagrams to help make education more understandable and interesting for the students. With passage of years the pillars of formal education, the schools and colleges, grew exponentially in terms of technology utilized to impart education. The technologies like colored printed materials, various books, computers, overhead projectors, photocopy machines, calculators etc. have made teaching and learning interesting and understandable [13]. The use of internet and related technologies (e-learning) revolutionized education [14]. Zatkan [15] has in detail described the evolution of e-learning. They have emphasized that the evolution of e-learning depends upon various factors including the development in Information and Communication technologies, web, various web platforms, MOOCsetc. They have also emphasized on the importance of MOOCs in the future of e-learning. MOOCs is the revolutionizing technology in e-learning. There is a big difference between traditional courses and MOOCs. For a MOOC the learner decides what, how and when she wants to learn and as it is completely voluntary it requires motivation.

Key Concepts/Characteristics of MOOCs

MOOCs is conceptualized not only to provide high quality education everywhere and for everyone, but also to provision for very large scale, free of cost, open for all access learning and interactive participation with the use of Internet. These are courses that are characterized by a **Massive** number of enrolled students, **Open** and free to all on **Online** digital web-based **Course** platforms [16]. But many courses offered online are charging fees for the courses and they too are generally being referred as MOOCs. These are e-learning platforms and are very close to MOOCs. They are similar to MOOCs in terms of the enrollments which is massive in most of the cases [17]. Every MOOC is e-Learning but all e-Learning is not a MOOC.

MOOCs have following distinguishing characteristics which make it so important for the learners [2]:

- **Massive-** The enrollment is massive. This is the key characteristic of any MOOC course. The massive enrollment is caused by the other salient features given below which makes it so popular among learners.
- **Open-** The courses are open for all. Anyone from any country or place can enroll and mostly it is free of cost. This is the most important characteristic of MOOC courses. It makes distance learning possible.
- **Online-** Various web-platforms are used for the MOOC courses. Initially the course materials were sent to the students by post. But the advent of internet and various IOT technologies have made the MOOC courses more reachable. The learners only need any electronic device having the requisite web platforms supporting the particular course. Mostly the lectures are pre-recorded and are streamed by the users. Occasionally they may have live lectures or meet ups among the fellow learners.
- **Coursework-** All the MOOC courses are designed for specific timeframe. After completing the structured syllabus, the students need to appear for test which has to be cleared to ensure the certification. The test is designed to check the knowledge gained by the student during the coursework.

With MOOCs learning is possible anywhere anytime without needing the constant supervision of the instructors. Self-Regulated Learning Strategies (SRL) probably will be of immense relevance and will be supportive. Till date not much experimental data is available for MOOCs.

Factors Affecting MOOC Courses

• Learner's Engagement and Persistence

Lot of researches suggest that learner's engagement plays a critical role in the success of teaching and learning[18, 19, 20]. Four important dimensions are associated with the Learner's engagement in MOOCs. These are Social, Emotional, Cognitive and Behavioural. Many researchers [21, 20] have studied these four aspects of Learner's engagement. Deng et al. [21] have developed a MOOC Engagement Scale (MES) to measure learner's engagement. Liu et al. [20] have developed a Bidirectional Encoder Representation from the Transformers-convolutional Neural Network (BERN-CNN) to automatically detect emotional and cognitive engagement. These data then help in finding out the learner's achievement which is the most important factor in the successful completion of MOOC courses.

▪ Self-Regulated Learning

The faculty presence is low in all online MOOCs type learning environments. The onus is higher on the learner to take decisions and responsibilities with respect to how and when to study. A student's ability to regulate self is a critical factor for learning in these platforms. Zhen Shao [22] has studied the self-regulated learning aspect in detail. A theoretical model has been developed and data has been collected for the same. The result shows how important and related are the self-efficacy, self-enjoyment, self-development and social norms to the successful continuance of the MOOC courses. Ernesto Panadero [23] in his review has studied and compared the various SRL models. He in his review has mentioned the need to train teachers about the self-regulated model. Zimmerman's SRL model [24] emphasizes on three feedback cycles- plan, practice and evaluation. Fig.2 enlists the key points from Zimmerman's SRL model [25] which if followed can help the learner to complete the MOOC courses fruitfully.

▪ Social and Other Factors

Zhen Shao [22] has listed many other factors responsible for the successful completion of MOOC courses. It includes social factors too. He has discussed how society can influence a learner towards completing the MOOC courses. The social platform of MOOC can encourage discussions and act as discussion forums [26]. It helps the student to stay motivated and continue with the MOOC courses. According to his study 'professional development' aspect has the most impact on the students pursuing technical fields. His study also includes personal factors, family factors, social factors, gender etc. as the ones affecting the completion of MOOC courses.

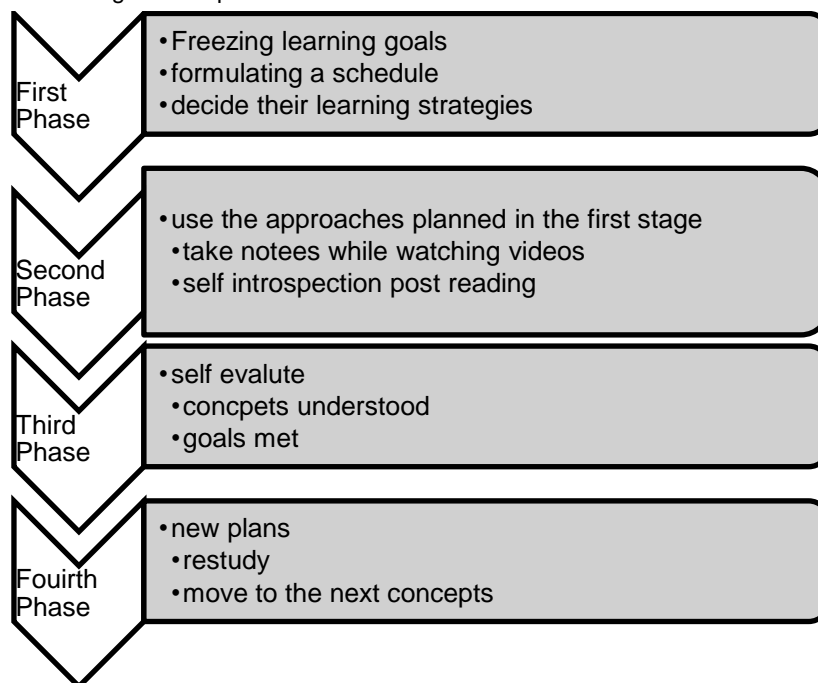


Fig. 2: Zimmerman's SRL Model to Learning in MOOCs

▪ Institution

The role of institution cannot be ignored for the success of MOOC courses. The course structure and its design can play a crucial role in contributing to the drop outs of MOOC courses [27]. The enrollment rules and the availability of network and/or computers or other devices are other important factors affecting the success of MOOC.

• The Indian Scenario

India is a multilingual, diverse and a very large country. There are stark imbalances in the education and its quality in different geographical regions. Moreover, there is a significant shortfall of qualified faculty for higher education. It is evident that given the limited resources and the vastness of the nation, the mere expansion of formal education system will not be a solution. To overcome these

challenges and to make higher education accessible to all students, the Indian Government foresees MOOCs as a very effective option. The platform is an optimal alternative for providing quality education from qualified experts to the Indian student community all over the country wherein everyone receives education at par. Population of India aged between 18-23 increased to 148,503.66 thousand persons in 2020 from 61,826.06 thousand persons in 1971 showing an average annual growth rate of 1.81%. [30]. Availability of many free or affordable MOODLE platforms have broadened the choices for MOOC. Udemy, Udacity, Canvas Network and Coursera are few among them. People are much better placed to start any MOOC course due to the MOODLE platforms. The popular ones are highlighted in Fig.3. These platforms provide environments for collaborative learning. The learners can collaborate with each other. The platforms provide excellent ways to study and learn.

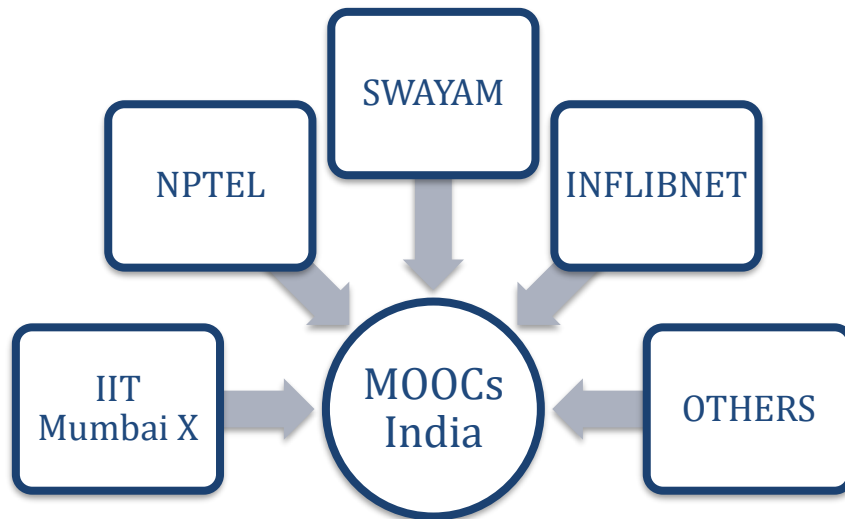


Fig. 3; MOOCs in India

• **The World Scenario**

After the first successful launch of MOOC course in 2011 the world has come a long way in this field. More than 900 Universities [24] has offered MOOC courses and the number is increasing day by day. Most of these courses are free of cost. The most platforms of MOOC across the world includes Coursera, P2PU, Udemy, Khan Academy, Udacity and EdX, Fig.4

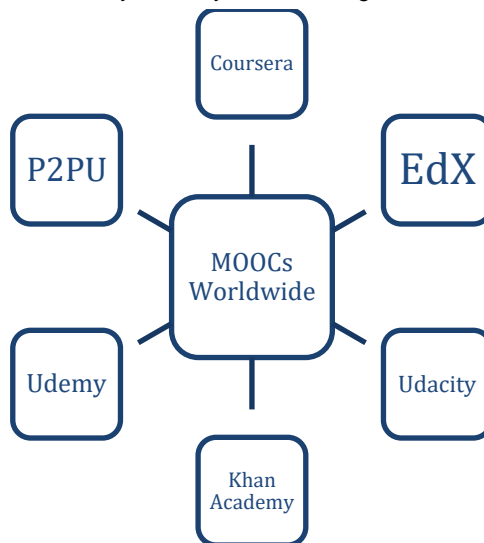


Fig. 4: Popular MOOCs worldwide

In addition to these platforms many countries like India, Mexico and Thailand are offering their country specific MOOC platforms. Around 220 million students have enrolled in MOOC courses so far [24]. The number is increasing day by day. The pandemic has certainly made MOOC more popular. Some of these are free to access, some charge certification fees. Quite a few are on non profit basis. Fig 5 lists profiles of some of the popular platforms.

Table 4: Profiles of the popular MOOCs

MOOC	Profit/Non-Profit	Free to Access	Certification Fee
IIT MUMBAI	No	Yes	No
NPTEL	Yes	Yes	Yes
SWAYAM	No	Yes	Yes
Coursera	Yes	Yes	Yes
EdX	No	Yes	Yes
Khan	No	Yes	Yes
Udemy	Yes	Both	Yes
Udacity	Yes	Yes	Yes
P2PU	No	Yes	No

- **Role of Technology**

Technology has become an integral part of our life. It has changed every aspect of life, including education, medical field, business, industries and day to day life. Education has gained a lot from the recent technological advances. Remote learning and anytime learning has become possible due to technology. Number of students taking higher education always decline due to many factors. Financial and social being the major ones. Continuing higher education becomes difficult for the students, mainly in developing countries. Technology has come up as a saviour for these students. There are many reasons supporting the claim. Distance reduces to zero due to the possibility of online teaching which is totally dependent upon technology.

Recently, we have witnessed a huge boom in software technology. Many online platforms have come into picture which has provided plenty of options according to a particular requirement. Many platforms have the discussion forums which is creating a learning environment where students can talk to each other as well to their teachers. Many platforms have been designed to specifically meet the requirement of teaching and learning by creating an environment similar to offline teaching. Advancement in hardware technology has also helped the education. The cost of the devices as well as storage is decreasing day by day. They are becoming accessible to the students even with weaker financial backgrounds.

Blended mode is another option which has emerged in education. It combines the classroom teaching with online teaching. The teacher and students are connected through the web. It enhances the available information and knowledge. The teaching and learning become more interesting and engaging. MOOC has no doubt opened a new era in education. It has been designed in such a way that all the requirements of teaching learning are taken care. It has course structure, learner's goals, possibility of interaction between teacher and learner, evaluation and assessment options [32]. So we can say that MOOC is a complete learning institution in itself and is on hinged on the Electronic technology

- **Challenges and Opportunities**

The most important challenge in MOOC is engagement of the learner. As there are no campus classes to attend and no regular teacher present, the learner needs to be self-motivated and self-disciplined to complete the MOOC course. The major problem in MOOC courses is its drop-out. Studies reveal that around 7% of the enrolled students completes the courses [28]. Suhang et al. [28] has used regression models to predict the course completion of the students after studying their behavior in first week of their course. They have concluded that the assignment performance in the first week is a strong indicator to predict the future of the student in the course.

The most important opportunity of MOOC is its availability to all. The remote location is not a barrier in case of MOOC. We may also think that the underprivileged are more benefitted from MOOC. But results are mixed as highlighted in [29]. The paper discusses how social, cultural, financial factors are affecting the underprivileged students to enroll in the MOOC courses. The access to equipment, network connectivity is some of the factors affecting the enrolment of these students.

MOOC is the future of education. It fits in today's world. The self-paced learning helps the learner to take up the courses as and when required. They can gain knowledge and certificates according to their interest and need at any age. Also, the learning does not affect any other parallel work/engagement as the MOOC courses can be taken up remotely with flexibility in timings. But along with these advantages, MOOC courses have few drawbacks which needs to be handled by the learner and institution. The course design must be such that the students remain engaged with the courses. Also, the courses must be beneficial so that the students are motivated to complete them. Self-regulated learning is the key to successfully complete the MOOC courses. The society and family must also motivate the students to complete the courses. And of course the Electronic Technology will continue to play a key role in facilitating the platform.

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