INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.542

MOOCs: A Strategy for Education in the Digital Age

Sunil Taneja

Associate Professor, Department of Computer Science, Government College, Aharwala (Bilaspur), Yamunanagar,

Haryana, India

ABSTRACT: Digital Learning and Online Education has emerged as a powerful contender for the next new education technology. Although the previous technological breakthroughs that have failed to live up to their initial promise, I strongly believe this time really is different. Several online courses are being run that has taught many thousands of students in a variety of topics. Millions of people around the world use Massive Open Online Courses (MOOCs) to learn for a variety of reasons, including: career development, changing careers, college preparations, supplemental learning, lifelong learning, corporate E-Learning & training, and more. MOOCs have dramatically changed the way the world learns. The human experience of online education is about to change; we should understand the issues behind the phenomena. Technology is touching every aspect of society and changing it dramatically. But there is one very important and indispensable part of the society that has also been tapped by new innovations and discoveries and that is the concept online education. It is an effective tool for development of educational sector in India.

KEYWORDS: Age, Digital Learning, E-Learning, MOOCs, Online Education

I. INTRODUCTION

The process of imparting education has gone through a sea change if we look at the picture 10-20 years before now. Technology has taken over almost every field of our lives and the onset of online courses came as a path-breaker. No longer did one need to have access to schools, time or a lot of money! All one needed was a good internet connection and a computer. Online education is learning, utilizing electronic technologies to access educational curriculum outside of a traditional classroom. In most cases, it refers to a course, program or degree delivered completely online. Right to Education is the primary right of every citizen of India, whether a child resides in a high profile society or in a faraway not so developed secluded village, according to the Article 45 of Indian Constitution the basic elementary education must be provided to all the children up to the age of fourteen years. Online learning is a combination of learning services and technology to provide high values. Though India is at a nascent stage when it comes to digital education compared to developed nations, none the less it's growing at a substantially rapid rate of 55 per cent. Edutech is certainly ushering the new age of learning in India. It is estimated that the edutech market will double in size from the present USD 20 billion to USD 40 billion by the end of 2017.

Massive Open Online Courses (MOOCs) [3, 7] are free online courses available for anyone to enrol. MOOCs provide an affordable and flexible way to learn new skills, advance your career and deliver quality educational experiences at scale. MOOCs provide one of the best ways of education in the digital age. Millions of people around the world use MOOCs to learn for a variety of reasons, including: career development, college preparations, supplemental learning & training etc. In addition to traditional course materials, such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums to support community interactions among students, professors, and teaching assistants as well as immediate feedback to quick quizzes and assignments.

II. LITERATURE REVIEW

A MOOC is defined as open, participatory, distributed, and as supporting lifelong network learning as stated by Cormier in 2010. The first MOOC, belonging to the first generation, was given by George Siemens and Stephen Downes in 2008. The success of first-generation connectivist MOOCs (cMOOCs) inspired other researchers; Sebastian Thrun and Peter Norvig gave the first extended MOOCs (xMOOCs) in 2011, which belongs to the second generation as quoted by Martin in 2012. To differentiate between these two types of MOOCs, they were then called cMOOCs and xMOOCs respectively as stated by Downes in 2012. cMOOCs focus on knowledge creation and generation, whereas xMOOCs focus on knowledge duplication. The success of the first and second-generation MOOCs raised a lot interest

in the public sphere, in academia, and in higher education institutions. This led to the innovative experimental idea of hybrid MOOCs, first delivered by a group of academics from the University of Edinburgh in 2013. The first-generation cMOOCs embraced a decentralized, learner-centred approach; the second-generation xMOOCs were characterized by teacher-centred teaching and learning; the third-generation hybrid MOOCs took a more pragmatic approach by combining the two previous approaches; to diversify learning opportunities and to reach a broader audience.

There have been some efforts in academia to understand and analyse the MOOC phenomenon; several papers have examined MOOC research in academic journals (Ebben & Murphy, 2014; Gasevic, Kovanovic, Joksimovic, & Siemens, 2014; Kennedy, 2014; Liyanagunawardena et al., 2013; Raffaghelli, Cucchiara, & Persico, 2015; Sa'don, Alias, & Ohshima, 2014; Sangrà, González-Sanmamed, & Anderson, 2015; Veletsianos & Shepherdson, 2015, 2016; Bozkurt, Akgün-Özbek, & Zawacki-Richter, 2017). These papers examined aspects of MOOC research such as methodology, pedagogy, and theory. Furthermore, Bozkurt, Özdamar Keskin, and de Waard (2016) investigated theses and dissertations on MOOCs, focusing on methodological and theoretical issues, and representing MOOCs with a Gartner hype cycle. Other papers have investigated MOOCs in the fields of broadcasting and social media (Bulfin, Pangrazio, & Selwyn, 2014; Deimann, 2015; Kovanovic, Joksimovic, Gasevic, Siemens, & Hatala, 2015; Shen & Kuo, 2015), taking a closer look at the phenomenon by focusing on discourses and sentiments on MOOCs, as well as identifying influencers in broadcasting and social media. Finally, some papers narrowed their scope in analysing MOOC research. For instance, Ossiannilsson, Altinay, and Altinay (2016) reviewed MOOC research with the aim of identifying factors that affect learner experience and quality issues in MOOCs. Similarly, Saadatdoost, Sim, Jafarkarimi, and Mei Hee (2015) examined MOOC studies from the perspective of education and information systems, and Calonge and Shah (2016) analysed MOOC literature in terms of graduate skills gaps and employability. Similar to this research, but with a different scope, Chen (2014) identified 306 blog posts related to MOOCs published from January 2010 to June 2013 and analysed them using a text-mining technique. He noted that MOOCs provide many opportunities for learners, faculty members, universities, and MOOC providers. On the other hand, he also identified some challenges that MOOCs need to overcome, such as questionable course quality, high dropout rates, unavailable course credits, ineffective assessments, complex copyright issues, and the lack of necessary hardware required to join MOOCs.

III. OBJECTIVE OF THE STUDY

Following are the objectives of study:-
- To understand the detailed concept of MOOCs and Online Education.
- To study current state and future of online education in India and abroad.
- To study the various aspects of digital learning.

IV. MOOCS & ONLINE EDUCATION

MOOCs and Online Education collectively makes next generation Digital Learning environment. MOOCs are courses designed for large numbers of participants, that can be accessed by anyone anywhere as long as they have an internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for free. The different dimensions of MOOCs related to this definition are presented below:-

M (Massive)

An online course designed for large number of participants. Number of participants is much larger than can be taught in a 'normal' campus class room / college situation

O (Open)
- Course can be accessed by (almost) anyone anywhere as long as they have an internet connection.
- Open as in freedom of place, pace and time.
- Open to everyone without entry qualifications. No qualifications / diplomas needed to participate in the online course.
- Course can be completed for free i.e. Full course experience without any costs for participants

O *(Online)*
- Complete course is online
- All aspects of course are delivered online

Cs (Courses)

Courses offers a full course experience including
- educational content which may include Video, Audio, Text, Animation etc.

- facilitation of interaction among peers (including some but limited interaction with academic staff)
- activities/tasks, tests, including feedback mechanism
- some kind of (non formal) recognition options i.e. always includes some kind of recognition like badges or a certificate of completion.
- a study guide / syllabus

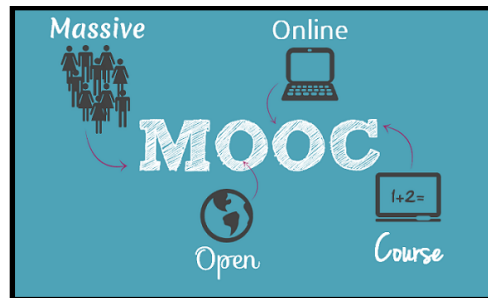Fig. 1 depicts the different dimensions of MOOCs platform.

Fig. 1: MOOCs

Whereas, with a view to providing access to the best quality learning resources across the country, the project 'Study Webs of Active Learning for Young Aspiring Minds' (SWAYAM) has been started. SWAYAM provides an integrated platform and portal for online courses, using Information and Communication Technology (ICT) and covering High School till all higher education subjects and skill sector courses to ensure that every student benefits from learning material through ICT. SWAYAM is:

- One-stop web and mobile based interactive e-content for all courses from High School to University level.
- High quality learning experience using multimedia on anytime, anywhere basis.
- State of the art system that allows easy access, monitoring and certification.
- Peer group interaction and discussion forum to clarify doubts
- Hybrid model of delivery that adds to the quality of classroom teaching.

Basically SWAYAM involves development of Massive Open Online Courses (MOOCs) compliant e-content (video and text) and building a robust IT platform.

Online education is learning, utilizing electronic technologies to access educational curriculum outside of a traditional classroom. In most cases, it refers to a course, program or degree delivered completely online.
Computer-based training, Web-based training, Internet based training, online training, e-learning (electronic learning), m-learning (mobile learning), computer-aided distance education - online education goes by many names and comes in a variety of styles, but at its core: 'Online education is electronically supported learning that relies on the Internet for teacher/student interaction and the distribution of class materials.' The Online Education Programs includes:-

- 100% Online Education - Fully-online degrees are earned from the comfort of your own home with no required visits to your college or university campus.
- Hybrid Education - Hybrid education allows students to pursue a combination of online and on-campus courses.
- Online Courses - While online courses may be part of a degree program, they can also be taken on their own in order to master a certain subject or learn a specific skill.
- MOOCs - Massive Open Online Courses are usually delivered in lecture form to online "classrooms" with as many as 10,000 people.

In the age of internet and MOOCs, do we really need to spend huge amount on getting degrees? One can equally quench his third for knowledge by joining online classes. Online classes are not only cheap but also conveniently arranged for those who are working. What else a student would want if he gets free classes that too online. There are websites that provide free online courses or have resourceful material for students. These websites are bejewelled with informative podcasts, videos and notes, they also take time-to-time assessment tests. Indeed, there should be free flow of knowledge and it is beneficial for the students and teachers both. As reported in India Today, the Top 10 educational websites [8] to teach you for free are given below:-

a) https://www.edx.org/

b) https://academicearth.org/
c) https://archive.org/
d) https://bigthink.com/
e) http://courser.org/
f) https://www.brightstorm.com/
g) http://cosmolearning.com/
h) http://thefutureschannel.com/
i) http://howcast.com/
j) https://www.khanacademy.org/

V. MOOCS IN INDIA AND ABROAD

The University Grants Commission (UGC) along with the HRD (Human Resource Development) Ministry has launched the MOOC program in India for higher secondary, bachelors and masters degrees. This will cover a wide range of subjects that may or may not be taught in regular campus studies. A new portal for MOOCs named 'Study Webs of Active-Learning for Young Aspiring Minds', in short, SWAYAM, is said to present students with an opportunity to study anything from a list of 2000 courses out of which 200 are currently available for registration. Audio-visual medium, illustrations, research and case studies with self-assessment are few of the mediums chosen to approach the study of these courses. The online courses have been developed by a team of senior academicians and are expected to enhance the gross enrolment ratio in higher education without compromising with the quality. These courses will also help in bridging the digital divide in the country. There are various notable institutions, both non-profit and commercial, that offer these courses worldwide with the help of MOOC providers. A few of these are listed below,

− *NPTEL (India):* Indian Institutes of Technology (IITs) and Indian Institute of Science (IISc.) offer online courses through this platform which require no registration and are free of cost.
− *WizIQ (India and USA):* IIT Delhi, India offers this course through this platform which requires registration and fees to study courses offered by them.
− *Open2Study:* The headquarters of this platform for online courses is based out of Australia.
− *Coursera:* The headquarters of this platform for online courses is based out of USA.
− *edX:* The headquarters of this platform for online courses is based out of USA.
− *udemy:* The headquarters of this platform for online courses is based out of USA.

VI. DIGITAL LEARNING ASPECTS

This study is conceptual and Exploratory in nature. It includes various aspects of digital learning and the material has been collected from books, periodicals, journals, websites and published material.

A. The growth of digital learning

Following are the main reasons for the growth of online education in India:

− With nearly a billion people on mobile phones and over 200 million mobiles connected to the internet, there has been a considerable rise in digital learning
− The use of best-in-class content, real-time learning and feedback methods, and personalized instructions has encouraged online learning
− People are stepping towards digital learning as the edutech firms are providing them the comfort of 'live and interactive' anywhere learning in digital format, through its online programmes
− These online courses are affordable and easily accessible
− Digital learning aims to break the numerous barriers that are preventing people from receiving quality education in the physically bound classrooms

B. How is online learning changing education?

− 'Live and interactive' digital learning empowers the learners to receive par excellence, quality education anytime and anywhere. Whether it is career and technical education or project-based learning, it gives learners a more interactive platform for learning and assessment
− Free online courses open up avenues for both education providers and students. People are more confident to take these courses and when they see results, they do not hesitate to pay for more

- Online education gives students an opportunity to plan their future course of action and fast track their careers
- Through live and interactive digital learning, edutech firms are imparting comprehensive and specialized Research knowledge which will enable children and adults to learn with a purpose and instill a sense of belief in them
- Such offerings are changing the way India learns by giving students an edge in learning, along with an opportunity to progress in their career

C. Online education increases the applicability power

The impact of new technologies in educational contexts has been mostly positive as new technologies have given educators the opportunity to enhance their knowledge, skills, and therefore, enhance the standard of education through constructivist learning environment with digital storytelling

- Audio visual aids, interactive, educational simulations help understand concepts and theories enabling better learning
- The students gain knowledge from masters of the subjects from world class institutes which is something they have always desired
- They also benefit by learning from eminent corporate leaders, business academicians as well as the industry connoisseurs. These experts share their valuable insights on the relevant, practical and must know aspects of the corporate world, enabling the students to gain comprehensive and specialized knowledge

D. Social media as a learning tool

- Social media as a tool can be used to enhance e-learning experience and make it more engaging, relevant and culturally diverse
- Students can critique and share feedback on each other's assignments, work in collaboration to create content that can be easily accessed
- This also gives them an opportunity to ask questions and have multiple responses shared on real-time basis
- Social media helps in making the students aware of the current happenings, concerns, issues, social activities and prospective employment
- Thus the relationship between classroom-based learning and social media is significant in the fast pacing modern day world

E. Rural India and digital education

Digital education is breaking the numerous barriers that are preventing students in rural India from receiving quality education in the physically bound classrooms:

- 'Direct to Device' technology will empower these students to get quality education, anytime and anywhere
- It will enable them to save time, by having more freedom to move at their own pace as well as help them save money by avoiding 'hidden costs' of education, like transportation fees etc.
- By not having to be at a certain class at a certain time, it will assist working students to not limit their work schedule, helping them to not lose on wages that they can potentially earn
- With the flexibility of online courses, students can conserve more hours and more money, enabling them to learn with a purpose and instill a sense of self-belief in them

F. Current state of E-learning in India [1, 5]

The education sector in India is no longer bound to just classrooms. Thanks to new start-ups and higher internet and Smartphone penetration, the online learning space in India is growing manifold. The e-learning market in India is estimated to be around $3 billion. The central government's efforts to make digital learning available to students in every corner of the country are also aiding the sector. Currently, online training in India focuses equally on both school and college-based courses as well as mid-level professional courses. For instance, Bengaluru-based Entrance india provides practice papers for all engineering and medical entrance tests in India. The company aims to help students focus on the right subjects and contents rather than swim blindly in an ocean of study materials available across different media. Also, they focus on convenience-based training because online capability enables students to get access to subjects anytime and anywhere. According to studies, India and China will lead the growth in project management roles, generating about 4 million and 8.1 million roles, respectively, by 2020. Hence, the business looks to grow from now on. Another reason why online training will gain momentum is because of the need for re-skilling, For instance, about a decade ago, all that a software professional was required to know were programming languages. Now these professionals need to update themselves on other aspects like big data analytics and cloud computing. Better salary hikes and promotions are also the reasons why people undertake new courses. A lot of start-ups are already

setting their foot in what they think will be the next big thing in India after e-commerce. While some companies like Simplilearn and Intellipaat look to generate content, especially aiming at mid-level professionals, others like Learnsocial plays more of an aggregator role. These companies also offer blended classes, integrating both online and offline experience, along with selftake courses. Bengaluru-based Simplilearn offers more than 200 certification courses in project management, information technology service management, Microsoft certification, quality management and financial management. The company has over 300 courses across 150 countries, with over 600 employees and has trained over 200,000 professionals across the globe. Intellipaat, started in 2011, provides online training to IT professionals including corporate training, and self-paced courses and offers over 80 technological courses across different domains. According to chief executive officer DiwakarChittora, the company is witnessing almost a 1,000% increment in terms of growth. The company caters to corporate like Genpact, Ericsson, Sony, CISCO, TCS, Wipro, and Tata Communications among others. Hyderabad-based Learnsocial is a six-month old company and works on an aggregator model. It aims to cater to both mid-level professionals' and students alike. "We want to become the Amazon of online learning. We want to provide thousands of posts on learnsocial.com, aggregating content from various experts, content houses or universities," says founder Raju Vanapala. Learnsocial has close to 200,000 users and has trained more than 1,100 learners.

G. The Future of Digital Learning

With the Digital India programme's vision to transform India into a digitally empowered society and knowledge economy, the education sector in India is poised to witness major growth in the years to come. Technology-led reach and easy access will bring about a socio-economic difference in the lives of Indian learners.

VII. EMPLOYMENT OPPORTUNITIES

The new world of online education provides inexpensive education of college-level courses in many fields of study. However, it is said that employers are not completely convinced with the level of education and coursework provided by the MOOCs unless the candidate is looking for jobs in the Technology or Computer Science sector. Generally, it is said that MOOCs are focused on providing education that will improve skills in specific fields of study, mostly focused on technology, science and mathematics. Although some of the online courses provide records of completion of the courses, the online education concept is relatively new. It is found that students are ready for this new concept however many employers are still hesitant and sceptical about it. To summarize, MOOCs are a great platform for higher education not just in India but all over the world but it comes with its pros and cons when it comes down to the future prospects of students that have passed out of MOOCs. Since the concept is new and has garnered praise recently, it can turn out to be one of the best concepts off late.

VIII. CHALLENGES

Despite the overwhelming number of advantages to choosing an option in online learning, there are challenges of online learning that are faced by the users. Not that these challenges outweigh the benefits of such distance learning, but one should rightfully be aware of the associated challenges therein. Let's take a look at some, notable challenges in online learning.

- Lack of Infrastructure and hardware facilities which hamper reliability of online learning
- Problem in finding willing skilled manpower to training illiterate rural areas of India.
- Very less computer based courses/skills are taught to the students in primary schools to increase their knowledge about ICT importance in rural development
- Campus distractions
- Self discipline is essential
- Conflicts in learning style
- Social aspects are diminished
- Technological Reliance

IX. E-LEARNING AND DIGITAL EDUCATION – STATISTICS & FACTS

Technology has changed the possibilities within teaching and learning. Classes, which prior to the digital era were restricted to lectures, talks, and physical objects, no longer have to be designed in that manner. Teachers and students now have a digital toolbox – ranging from engaging devices to teach the students to online courses and digital textbooks. Digital education is the term used to refer to all online educational practices. Projections show the e-learning

market worldwide is forecast to surpass 243 billion U.S. dollars by 2022. In 2016, the self-paced e-learning product market amounted to 46.67 billion U.S. dollars and is projected to decrease to 33.5 billion U.S. dollars in 2021. A considerable share of faculty worldwide has shown willingness to support less traditional and digital education models. About 65 percent of faculty supports the use of Open Educational Resources (OERs) in teaching, and 63 percent showed support for the competency-based education system. Back Students have also shown willingness to embrace Digital Learning Technologies (DLT) and practices. About 92 percent of students worldwide are interested in personalized support and information on degree progress. They also showed interest in other academic performance analytics. Students are also interested on the use of different devices in the learning process. As of April 2015, about 56 percent of students worldwide wanted their instructors to enable them to use their laptop more in a learning context. Students already use this type of the device for school related activities. In the United States, about 56 percent of students stated using a laptop or desktop computer in the classroom on a weekly basis. As of 2016, the most common digital learning materials used in weekly in PreK-12 classrooms in the United States were online educational videos, educational apps or software, as well as research websites. Students are turning to online courses as well. In 2015, 49 percent of students stated that they had taken an online course in the last 12 months. This share is slightly higher than 2013 and 2014 figures, when 46 percent and 47 percent of the students stated taking this type of course. Despite this growth, 73 percent of the students in the world are not aware of massive open online courses (MOOC). As of April 2015, the share of students that took a MOOC in the past year was still low – nine percent. From those global students who have interacted with MOOC and CBE, about 11 percent earned a competency-based badge, and about 19 percent said they would use competency-based digital badge on their resume.

X. CONCLUSION & FUTURE SCOPE

As it is being pointed out, MOOC cannot replace the traditional approach of classroom learning but it can be used as an alternative method to bridge the gap between various schools of learning.

- Although digitalization is a must now, there are many nations that are unable to provide the basic necessities to enroll for MOOCs hence the spread of MOOCs are limited.
- It is not always certain that all MOOCs provide degrees, certificates and/or diplomas which limits the number of candidates that enroll for these courses as many companies ask for records of the education levels achieved and candidates are unable to provide them with the same.
- A student's life is confined to one room that has internet access and a laptop or a computer which allows little or no interaction with the outside world.
- Since MOOCs are web-based, there is no monitoring of the candidates/students, which carries a risk of plagiarism or cheating.

REFERENCES

1. A. Gaikwad and V. S. Randhir, 'E- Learning in India: Wheel of Change' International Journal of e-Education, e-Business, e-Management and e-Learning, Volume 6, 2016.
2. A. Tamrakar and Kamal K. Mehta, 'Analysis of Effectiveness of Web based E-Learning through Information Technology', International Journal of Soft Computing and Engineering (IJSCE), Volume 1, Issue 3, 2011.
3. Zawacki Richter, Bozkurt, Alturki and Aldraiweesh, 'What Research Says About MOOCs – An Explorative Content Analysis', International Review of Research in Open and Distributed Learning, Volume 19, Number 1, 2018.
4. https://inc42.com/buzz/indian-online-education-edtechmarket/ (Accessed: 17 December 2020).
5. https://www.indiatoday.in/education-today/featurephilia/story/digital-learning-taking-over-india-343529-2016-09-27 (Accessed: 11 March 2021)
6. https://digitalindia.gov.in/dims/component/e-education (Accessed: 22 December 2020).
7. https://www.mooc.org/ (Accessed: 29 December 2020).
8. https://www.indiatoday.in/education-today/featurephilia/story/free-education-953499-2017-01-06 (Accessed: 29 December 2020).
9. https://www.top10onlinecolleges.org/list/5-challenges-of-online-learning/ (Accessed: 11 January 2021).
10. https://www.indiaeducation.net/online-education/all-about-moocs-massive-open-online-courses-india-abroad.html (Accessed: 17 January 2021).
11. https://www.statista.com/topics/3115/e-learning-and-digital-education/ (Accessed: 11 March 2021).

BIOGRAPHY

Dr. Sunil Taneja is Head & Associate Professor in the Department of Computer Science, Government College, Aharwala (Bilaspur), District Yamuna Nagar, Haryana, India. He has teaching and research experience of 21 years. His educational qualifications include Ph.D, M.Tech, M.Phil, M.Sc, MBA, Certificate Course in French, UGC-JRF, UGC-NET and GATE. He is a member of various Academic and Professional organizations/bodies in India, USA, China, Singapore, Malaysia and Hong Kong etc. He has 67 Research Papers to his credit in reputed National and International Journals/Conferences along with 01 Book. He has presented around 80 research papers in various Conferences/Seminars/Workshops and Chaired sessions as well. He is recipient of number of prestigious awards and appreciation certificates from various Academic & Professional organization/bodies.

INTERNATIONAL JOURNAL
OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING