USING MOOCS TO ADDRESS THE SKILLS GAP IN THE 4TH INDUSTRIAL REVOLUTION (4THIR): OPPORTUNITIES AND CHALLENGES

Abstract

With the increased integration and automation of technology, industries, and society, the Fourth Industrial Revolution (4thIR) conceptualizes a transformation in almost every sector, including education. The 4thIR has the potential to elevate global income levels and improve the quality of life for people around the world. Due to this, the education system is set to expand as we provide industries with skilled workers who can support the expansion of existing industries. It is imperative to have highly skilled and knowledgeable human resources in order to compete in today's market. Massive open online courses (MOOCs) are becoming increasingly popular in 4thIR educational environments and have been identified as one of the most effective ways to enhance skills and collaborative learning among youths.MOOCs are the types of innovative academic teaching and learning model based on e-learning have grown tremendously over the years. These are cost effective, less time consuming, easy to access, no attendance required and no limit of enrolment. The present study is carried out with the aim of analytically analysing the use of MOOCs to address the skills gap in 4thIR - opportunities and challenges. MOOCs have been found to benefit the weaker sections of society and people who work at home, ensuring equal access to higher education. MOOCs offer many notable opportunities, including flexibility of learning, access to education wherever you are, equity in education, elimination of geographical barriers, ability to explore global perspectives, digital learning, self-paced learning, global access, enrolment in

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large numbers, and Web-based content for learners. Additionally, MOOCs were also found to have several challenges, including proxy assessments, internet failures, language barriers, and not every learner is tech-savvy. To control proxy assessments, ensure Internet connectivity, and encourage digital literacy from day one, a system needs to be developed.

Keywords: 4th Industrial Revolution, MOOCs, digital technology, e-learning, opportunities in MOOCs.

I. INTRODUCTION

As technology, industries, and society patterns and processes become more connected and automated, the Fourth Industrial Revolution (4thIR), also known as Industry 4.0, conceptualizes the transformation in the 21st century (Katoch, Sehgal, Sharma, et al., 2022; Katoch, Sehgal, Shrikant; et al., 2022; Manda & Dhaou, 2019). The 4thIR has the potential to elevate global income levels and improve the quality of life for people around the world, like previous revolutions (World Economic Forum, 2022).There is a direct impact of 4thIR on a variety of fields, including education, which is critical to the workforce (Junida et al., 2019). This is because the industrial revolution demands new skills. Due to this, the education system is set to expand as we provide industries with skilled workers who can support the expansion of existing industries (López & Ibáñez, 2021).

With the development of digital technology in the 21st century, nearly every industry, including the educational sector, has seen a dramatic shift in the way they design, produce, and work (Hanus et al., 2017). The 4thIR has fundamentally changed how teaching and learning are conducted, thereby introducing a change in attitudes towards education. Technological innovations have become an integral part of education, however there is a dearth of skill development in this sector. In the contemporary era, technology is emphasized in order to boost productivity and employability by enhancing workers' skills (López & Ibáñez, 2021). It is imperative to have highly skilled and knowledgeable human resource in order to compete in today's market. The MOOCs are becoming increasingly popular in 4thIR educational environments and have been identified as one of the best ways to enhance skills and collaborative learning among youths (Umiera Hashim & Md Yunus, 2019).

The era we live in today is the era of technology. Learning and teaching have been reframed and restructured as a result of technological development and e-learning. Innovative approaches to education are needed in order to meet today's educational demands, and all stakeholders in the educational process, including educators, students, and parents, need to invest heavily (Bal et al., 2020). A MOOC is one type of innovative academic teaching and learning model based on e-learning. As the world of digital technologies has developed over the past few years, MOOCs have grown rapidly and received a great deal of attention, especially in higher education (Mazoue, 2013). AMOOC is a free web-based distance learning program that is designed for large numbers of geographically dispersed students (Abeer& Miri, 2014; Billsberry, 2013). Worldwide, MOOCs offer educational and skills training opportunities to the people of all ages and backgrounds (Hone &el Said, 2016). MOOCs are broader platforms than conventional education, providing numerous courses for learners from different backgrounds, regardless of geographical distance. They are cost-effective, time-efficient, easily accessible, require no attendance, and have no enrolment limitations. Over 19,000 MOOCs from prestigious universities (over 950+) are offered to millions of students world-wide. MOOCs have significantly impacted established forms of higher education (van Dijck &Poell, 2015). There's no doubt that MOOCs have transformed education and provided many people with access to previously inaccessible knowledge, which has been the goal of different educational initiatives (Billsberry, 2013).

The MOOC concept really took off when George Siemens and Stephen Downs developed it for teaching a class of 25 students at the University of Manitoba after David Cormier first coined the term. It has the following characteristics:

1. **Moocs are Massive in Nature**: A MOOC is a free web-based distance learning program that is designed for large numbers of geographically dispersed students (Abeer& Miri, 2014). As a first step a) Massive participation refers to the potential for an increase in the number of participants in the course. b) In addition, there is a rise in the number of university students taking part in the curriculum. c) Another aspect of large-scale interaction is that thousands of people participate actively in course discussions from different perspectives. Students' participation and interaction also generate massive learning data (Billsberry, 2013).

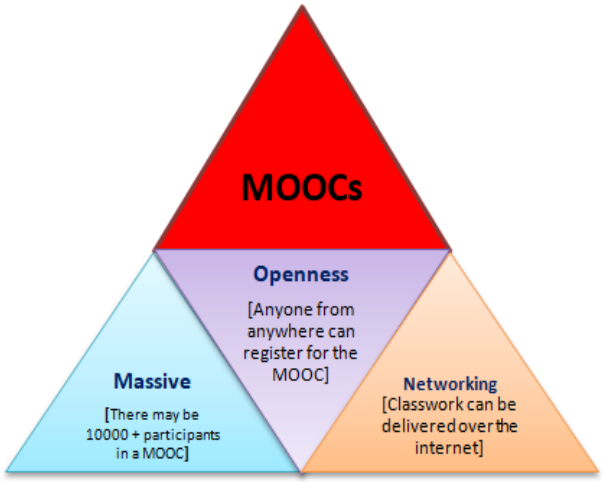

Figure 1: Characteristics of MOOCs

2. **MOOCs are open to all**: One of the prominent features of MOOCs in higher education is their provision of open access, globally free, video-based instructional content, and problem sets. These courses offer various learning materials, including recorded video lectures, online readings, and assessments, to anyone eager to learn, without any restrictions on enrolment or attendance (Baturay, 2015). Higher education is an inherently open process, thanks to the Internet. MOOCs, which provide four levels of openness, extend the openness of the Internet. a) Time and space in curriculum learning are the first aspects of MOOCs. Unlike traditional physical classrooms, MOOCs are not bound by time and space. b) The second advantage is that open information can flow through the curriculum system. The MOOC learning environment lets learners and instructors interact with each other using network learning tools. c) Third, there is a disappearance of authority in curriculum learning. d) Using social networking sites, the learners can freely interact and communicate with their companions and teachers. As such, learners are responsible for constructing their own knowledge in the media context, thereby achieving real academic freedom and free expression (O. R. Katoch, 2012), (Tang, 2017). MOOCs possess an openness that transcends barriers and an apparent structure that takes the form of one of two pedagogical approaches. The connectivist approach connects to connected learning theories such as social constructionism and cognitive-behavioural approaches that target different audiences and employ different teaching methods (Kennedy, 2014).

3. **MOOCs function through networking**: Learning environment networks, individual learning networks, and curriculum knowledge networks are three dimensions of networking incorporated into MOOCs. a) The MOOCs are distributed and managed through the Internet as part of the dimensions of learning environments network (Dagmar El-Hmoudova, 2014). b) It uses a variety of network-based learning support tools to implement teaching and learning functions in the Internet space. c) A MOOC allows participants to build both an internal and external network as part of their individual learning network. Additionally, the social media tool is used to build the individual social network and the ecological knowledge network.

A MOOC is a free, publicly available online learning program available to anyone with access to the internet that includes an open-ended curriculum, open enrolment and is available online to anyone who has a computer (Billsberry, 2013). It connects social networking and education by providing access to online resources (Alexander et al., 2010). Online MOOCs offer free, open-access video instruction, problem sets, and discussion forums to hundreds of thousands of learners (Baturay, 2015). Some MOOCs can be relatively small in scale, while some can be quite large. MOOCs have a direct impact on higher education, as they improve education outcomes that support the advancement of knowledge having positive influence on students' satisfaction (Alhazzani, 2020). Participation, persistence, and continuity in a MOOC may be affected by linguistic competence in English, prior knowledge in the subject matter, broad-mindedness, self-regulation and self-efficacy, and communication skills (Abeer& Miri, 2014; O. Katoch, 2023; Katoch, O, 2022).

MOOCs presented as an alternative to traditional higher education institutions (Feitosa de Moura et al., 2021). An important factor in students' intention to continue using the MOOC was satisfaction with the course (Joo et al., 2018). In another study, it was discovered that perceived usefulness, attitude, task-technology fit, reputation, and social recognition, a significant mediator, are all important to the persistence of intention to utilize MOOCs (Wu & Chen, 2017). The MOOCs which are available online have expanded the landscape of education to include disadvantaged areas and people from distant locations. In addition to social recognition, perceived competence, and perceived relatedness, MOOCs stand to benefit from digital technology, the fit between the courses and the participants, and digital technology itself (Katoch, 2017, 2022; Khan et al., 2018). Due to the popularity and their ability to acquire new knowledge, anyone with an internet connection can participate in a MOOC from anywhere in the world without having to meet any formal entry requirements (Abeer& Miri, 2014).

A MOOC's quality is determined by how well it is intended to be used, the quality of interaction, engagement, motivations, and satisfaction of participants. MOOCs can significantly influence the academic performance of students, as they offer materials and allow the sharing of information that can facilitate the learning process (Al-Rahmi et al., 2019; Katoch, 2021a, 2021b). Education institutions have become more dependent on digital technologies to improve teaching, learning, and collaboration. Learning is an ongoing process that aims to continuously improve quality. Recently, MOOCs have emerged as a new pedagogy that allows education to be delivered anywhere in the world with the click of a button / mouse (Brahimi & Sarirete, 2015; Katoch, 2022b; Katoch et al., 2023; Sharma & Katoch, 2022).

II. OBJECTIVES

Based on the research done in the last few years on MOOCs, we examined following two objectives:

- To investigate the growth of MOOCs over the years.
- To analyse the opportunities and challenges of MOOCs.

III. METHODOLOGY

Our study encompassed an extensive literature review aimed at analysing the current trajectory, potential opportunities, and inherent challenges within the realm of MOOCs. Through this rigorous examination of existing research, we arrived at well-founded conclusions and insights that shed light on the subject

IV. ANALYTICAL DISCUSSION

In 2016, 58 million people around the world took a MOOC (Class Central, 2022). Among the most popular offerings are micro-masters, nanodegrees, certifications, and specializations, which have been developed in collaboration with companies and offer practical, narrowly focused training relevant to specific professions that promise a quicker path to employment once completed (Craig Mak, 2017). In a study, it was found that for MOOCs to be successful, we still need to find evidence-based research on non-mainstream consumers; to reconcile differences in approaches for measuring learner engagement; to develop sophisticated measures of learning outcomes; and to clarify the relationships between many of the key learning and teaching factors (Deng et al., 2019). Although academia and industry have emphasized MOOCs' importance as an innovative/technological educational paradigm, there is still confusion over how learners will be able to grasp and master these technologies (Sun et al., 2020). The quality of instructional design is positively correlated with MOOC rankings (Wang et al., 2021). It is more likely that students will earn a course certificate if they engage in more uninterrupted learning activities over an extended period (Lee, 2018).

Teachers may be able to better understand and provide learning assistance based on a variety of behavioural and affective results from MOOC participants. Additionally, assessment tasks may vary in both difficulty and complexity throughout the course, which may correlate with varied levels of motivation (Wei et al., 2021). While using MOOCs teachers are primarily concerned with the whole educational system and assessment completion is a major concern since it can involve bad behaviour on behalf of students; however, students are more concerned with their personal development, interpersonal relationships, and social development (Ulrich & Nedelcu, 2015).

1. **Growth of MOOCs:** MOOC, which came into being in 2008, has grown tremendously over the years. There were 35 million students enrolled in MOOCs in 2015, across the different platforms for 4200 courses. In 2016, those numbers have increased to 58 million students and 6850 courses. MOOCs saw an increase of more than 400% in the number of students and a 300% growth in the number of courses in 2020 compared to 2015. The figures for 2021 are 520% and 361% respectively (Class Central, 2022) Table 1. Nine

hundred plus universities are offering more than 19000 courses as part of MOOCs to provide higher education via internet/e-learning.

Table 1: Growth of MOOCs in terms of students, courses and universities

Year	No. of Students (in million)	No. of courses	No. of Universities offering MOOCs
2015	35	4200	--
2016	58	6850	--
2017	81	9400	700+
2018	101	11400	800+
2019	120	13500	900+
2020	180	16300	900+
2021	220	19400	950+

Source: (Class Central, 2022) (assessed online from on 21st May, 2022)

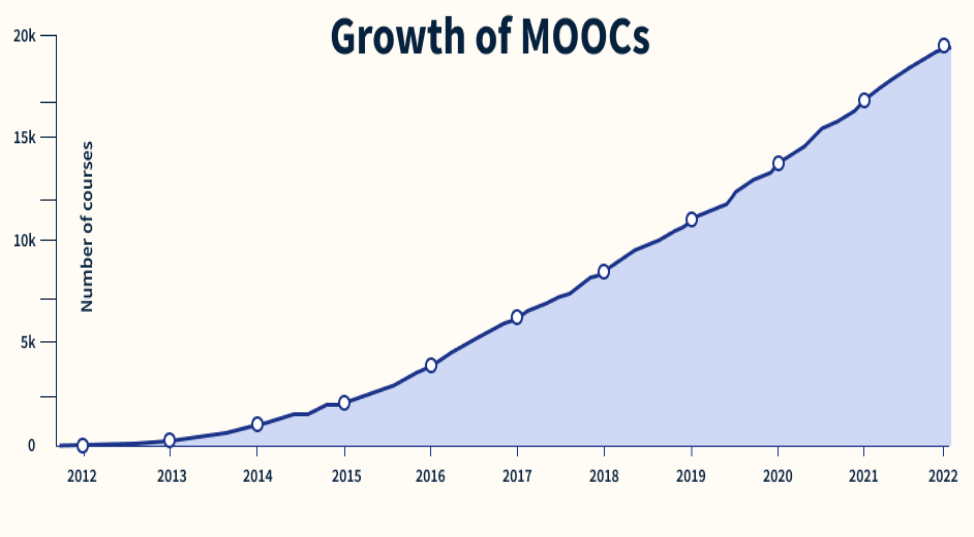

Figure 2: Growth of MOOCs in terms of students, courses and universities

Source: (Class Central, 2022) (assessed online from on 21st May, 2022)

According to its users and offerings, figure3& 4 lists the top MOOC providers in 2020. The study shows *Coursera*[1] provided the highest number of courses (6000) with 97 million enrolments, ranking number one.

[1]**Coursera Inc**. is a Massive Open Online Course provider based in the United States, created in 2012 by computer science academics Andrew Ng and Daphne Koller at Stanford University. Coursera collaborates with universities and other organisations to provide online courses, certificates, and degrees in a wide range of topics. In 2021, Coursera will offer over 6,000 courses from 150 universities.

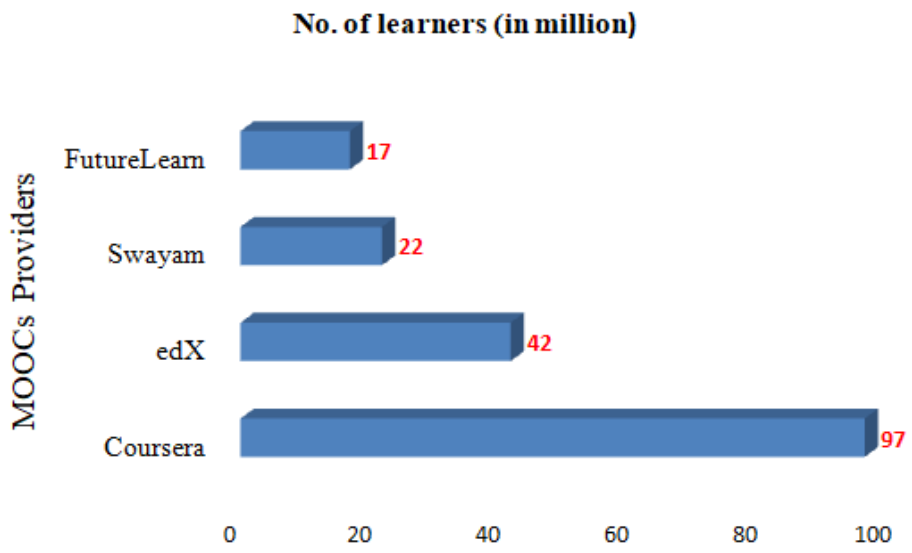

Figure 3: Top MOOC providers in terms of users in 2021

Source: (Class Central, 2022) (assessed online on 18th May, 2022

The edX[2] platform has 42 million registered learners and offers 3550 courses to students. Each Swayam[3] and FutureLearn[4] has 22 million and 17 million students respectively, and offers 1465 and 1400 courses (Class Central, 2022).

[2]**edX** is an American-based massive open online course (MOOC) provider that was established in May 2012 by a team of Harvard and MIT scientists, including Gerry Sussman, Anant Agarwal, Chris Terman, and Piotr Mitros. This platform offers university-level courses in various fields to a diverse global student community, with some courses being available for free. Notably, MIT's first edX course on circuits and electronics attracted enrolment from 155,000 students across 162 countries. In 2013, they expanded their collaboration by partnering with Stanford, reaching a milestone of one million students by June of that year. Additionally, edX conducts learning research to understand how users interact with its platform (edX, 2022a).

[3]**SWAYAM**, short for "Study Webs of Active-Learning for Young Aspiring Minds," is an Indian MOOC platform launched on July 9th, 2017. It was introduced by the Ministry of Human Resource Development (MHRD) Government of India as part of the Digital initiative, aiming to offer centralized and free access to web courses covering all levels of advanced education. Developed through collaboration between MHRD, AICTE, and Microsoft, SWAYAM can host up to 2,000 courses. The platform provides free access to courses ranging from ninth grade to post-graduate levels, allowing academics from esteemed federally supported institutions like IITs, IIMs, and IISERs to teach students. SWAYAM boasts 203 collaborating institutes, an enrolment of 22 million students, and 1465 available courses (Class Central, 2022).

[4]**Future Learn** is a digital education MOOC platform from the United Kingdom, established in December 2012. It was formed in collaboration with 12 university partners, owned jointly by The Open University and SEEK Ltd. The platform has garnered a massive enrolment of 17 million students and offers an impressive selection of 1400 courses. Additionally, it has expanded its reach through partnerships with more than 250 institutions, both within the UK and internationally, including industry and government organizations.

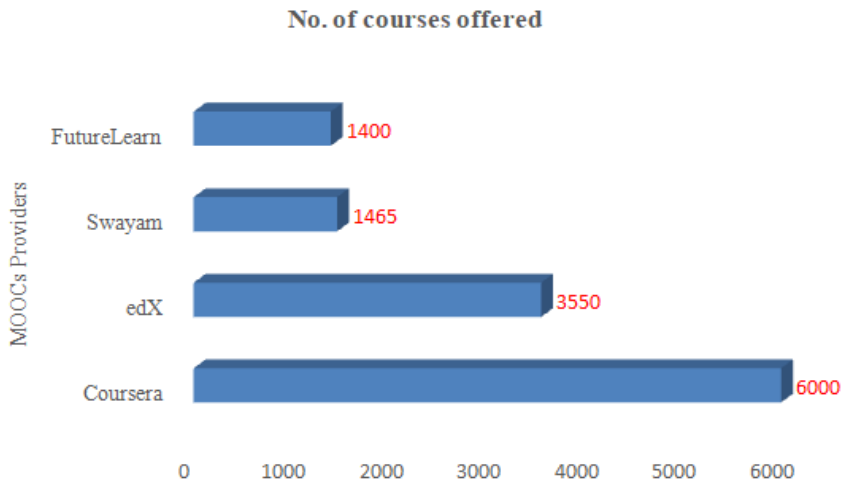

Figure 4: Top MOOC providers in terms of courses offered in 2021
Source: (Class Central, 2022) (assessed online on 18th May, 2022)

2. **Digital verses Conventional Learnings:** Earlier times were renowned for traditional learning. In traditional classroom learning, which has been used since ancient times, students were taught similar things by the same methods by the same teachers. This type of learning requires everyone to be present. Attendance at a lecture is mandatory, otherwise a student may miss the topic taught by the teacher. The number of students a teacher can instruct in a classroom is limited. Regardless of whether it is fruitful or not, all students must learn the same thing. If the students aren't interested in a topic, but they still have to learn about it. Therefore, the traditional education system follows the classroom learning pattern.

   The aim of educational technology is to analyze, design, develop, implement, and evaluate processes and tools that enhance learning experiences. In contemporary society, there is a substantial reliance on modern electronic educational technology. This progress in the field of education encompasses various aspects, such as e-learning, instructional technology, information and communication technologies (ICT), learning technology, multimedia training, computer-based training, flexible learning, web-based training, cyber-learning, virtual learning, and digital education (Jha et al., 2021).

   E-learning can be categorized into two types: synchronous and asynchronous. Synchronous learning involves real-time interactions and communication among one or more participants simultaneously. Examples include face-to-face discussions, online live instructor-led sessions with instant feedback, Skype conversations, and virtual classrooms where all participants are online, collaborating and engaging at the same time(Mayadas, 2019). Because students are engaged in collaborative work, synchronous learning helps them become more open-minded as they actively listen and learn from their peers. Moreover, this approach fosters online engagement and enhances the writing skills of many students (D. Wu et al., 208 C.E.), (Hrastinski, 2007).

Asynchronous learning makes use of various technologies, such as learning management systems, email, blogs, wikis, and discussion boards. Additionally, it involves web-supported textbooks, hypertext files, audio-video materials, and social networking tools (Mayadas, 2019). Asynchronous learning proves beneficial for students facing health issues or having childcare responsibilities. It allows them to complete their coursework in a low-stress environment and within a more flexible timeframe. In asynchronous online courses, students have the freedom to progress at their own pace, which is especially advantageous for non-traditional students as they can manage their daily life alongside their education and maintain social connections.The opportunity for asynchronous collaborations enables students to seek help when needed and provides valuable guidance, regardless of the time it takes for them to complete assignments (Hrastinski, 2007). Various tools employed in these courses include, but are not limited to, videos, class discussions, and group assignments. Students have access to a diverse array of enrichment courses through online learning, all while remaining engaged in regular college courses, internships, extracurricular activities, or work commitments and ultimately graduating with their peers (D. Wu et al., 208 C.E.).The programming exercises, quizzes, and instructional videos, along with the flexibility it offers, were among the most highly valued features of the MOOCs (Dale & Singer, 2019).Digital learning possesses several advantages over conventional learning methods:

- Using digital learning, both students and teachers gain flexibility (Dale & Singer, 2019) and have the opportunity to learn from the best teachers in a particular field. On the other hand, traditional learning involves a teacher teaching 30 to 40 students at a fixed time without concern for students' interest in the topic. Compared with traditional learning, MOOCs provide a great deal of flexibility in the way learning is organized, which is associated with conscientiousness, particularly planning, self-discipline, and organization (Loya et al., 2015). Therefore, the traditional/classroom type of study is not as effective as online studies.

- With the world going digital, every higher educational institution is experiencing a structural change and e-learning is now the dominant form of learning. MOOCs operate over the internet, and the world is moving quickly towards getting connected to the worldwide web, it is expected that assessing courses through MOOCs will become easier and more convenient in the coming years (Dagmar El-Hmoudova, 2014). As a result, the time is right for MOOCs to achieve greater success in the future, which will reinvent the higher education scene in the world.

- The advantages of online learning are that you can choose when to study and how much time you spend on it. It is possible to study at one's own pace (Sonwalkar, 2015). It is not necessary to attend classes in an institution. Unlike traditional education, online courses can be studied and completed at the student's own pace.

- Conventional face-to-face classes allow teachers to establish a more personalized interaction with students. When comparing online classes with traditional classes, it is crucial to take into account your individual learning style and scheduling requirements.

- Traditional education methods tend to be more costly due to the limited number of students teachers can teach at once. Educators receive higher compensation for their work, students need to purchase books and commute to educational institutions, incurring travel expenses, and sometimes even accommodation charges when residing in a hostel or paying guest accommodation. On the other hand, e-learning presents a more favorable option in this regard.

3. **Opportunities in MOOCs:** A well-known fact is that education is the backbone of any nation. In many countries, children have the fundamental right to education, and it is the government's responsibility to ensure that they receive free and compulsory education. Despite this, the target is difficult to attain due to differences in socioeconomicsettings. Using innovative technologies such as MOOCs, which are new and continually evolving, we can achieve these goals. By creating a completely new and large market of educational resources, MOOCs have the potential to create a significant impact particularly on higher education environments across the globe, overtaking the traditional university market share (Dalipi et al., 2017). As a result of 4thIR, MOOCs have provided a range of opportunities:

    - MOOC offers flexibility in the completion of the courses. MOOCS have been designed in such a way that anyone can enrol oneself in them, and complete the course according to one's own convenience. To get a certificate one just needs to pass the written exam at the designated centres. MOOCs have the advantage of letting participants learn at their own pace and at their convenience; they can access the audio-video lectures when and from wherever they like (Sonwalkar, 2015). The course content could be accessed despite limitations caused by power shortages, slow connections, and inadequate computer literacy due to the flexibility of time allowed to participants (Pasha et al., 2016). MOOCs therefore offer flexibility in selecting and completing courses (Hoy, 2014).

    - MOOCs enable the learner to access education from a distant location. Online MOOCs have altered the landscape of education by making it available to people living in disadvantaged and remote areas (Khan et al., 2018).

    - Most studies have found that MOOCs have achieved their goals of either improving student equity or social inclusion (Lambert, 2020). The provision of education for all and especially the most vulnerable and disadvantaged is now possible through MOOCs (Hoy, 2014). MOOCs are beneficial for economically weaker section of the society, women, disabled and ill students thereby promotes equity in higher education. Because MOOCs rely heavily on electronic content, there is no need to spend heavily on books, and to be massive, no fees or free registration are required (Lambert, 2020). It can be beneficial for vulnerable sections of society to have access to MOOCs from a remote location that are available for free or at very low cost (Hoy, 2014).

    - MOOC eradicates the problem of space/ physical infrastructure (Hoy, 2014). Considering their massive nature, MOOCs have the potential to draw many students to take one course at a time. A course by Harvard University on Introduction to Computer Science, taught by three professors - David J. Malan, Doug Lloyd and

Brian Yu - which has already attracted 3,608,205 students, illustrates the use of MOOCs (edX, 2022b). Over the past few years, policymakers in higher education have been discussing MOOCs, which transition the emphasis from mere knowledge acquisition to the acquisition of diverse cognitive and non-cognitive skills. The goal is to provide opportunities for more disadvantaged learners while minimizing costs (Fiona M. Hollands & DevayaniTirthali, 2014).

- As a new tool in higher education, MOOCs serve as an example of how the good contents of education can be democratized through an online course (Atenas, 2015). The participants can access the best experts in the subject matter and various other e-resources from the top universities around the world. MOOCs Cut costs through the use of free materials and textbooks (Kanwar, 2012). In addition to providing access to quality contents, it provides an opportunity for interactive communication. The student can write his/her question into the discussion forum, which is answered by his fellow students and by the course instructor.

- MOOCs provide students with the opportunity to explore global ideas, enabling them to gain more exposure and levelling the playing field. This task may seem impossible due to a lack of expertise and resources. With a bit of creativity and sense of adventure, MOOC organizers demonstrate that they can inculcate a sense of confidence and competence among participants and faculty (Pasha et al., 2016).

- MOOCs makes possible the collaboration among students and teachers across borders and nations.Furthermore, these courses serve as a means for universities to decrease the dropout rate (Brahimi & Sarirete, 2015). The learners share their experiences and problems with each other and the course instructor tests their understanding level at times through quizzes, discussions and assignments.

- MOOCs alleviate rural exodus by eliminating the need of learners to migrate to urban areas, where higher learning institutions are traditionally located. Some learners/students used to give up higher education because of their poor economic backgrounds. Many of the youth stay at home after completing their high school studies. With the tuition, fees increasing every year the number of those who can afford to go to the institutions of higher learning keep on decreasing. This add to the number of the students who are dropping out every year because of the unaffordable fees (cited in (Sigama & Kalema, 2018).

4. **Outcomes of MOOCs:** MOOCs provide open education through online platforms. MOOCs are primarily designed to make higher education accessible to a wider audience. Besides contributing to sustainable development goal (SDG) 4, they also contribute to SDG 5, because they are gender-neutral and allow girls and women to get an education (Masson, 2014). MOOCs are perceived as a promising avenue for offering high-quality education to millions of individuals, particularly those in developing nations, with the ultimate goal of enhancing their quality of life and facilitating the democratization of higher education (Patru & Balaji, 2016). Following are some of the major outcomes of MOOCs:

- **Promotes Digital Learning:** MOOCs have revolutionized conventional learning by ushering in the era of digital learning. Digital learning involves leveraging information and communication technologies to search, evaluate, create, and communicate information, demanding both cognitive and technical competencies. With digital literacy, learners can make productive use of their free time by studying on their smartphones, laptops, and various social media applications to stay updated with knowledge. In the context of MOOCs, learners benefit from a platform that transcends the constraints of time and age. A study abroad suggests that digital literacy fosters lifelong learning, motivating self-development, and raising students' awareness of technology. Embracing technology is essential to enhance their computer skills and ensure they remain adept in the modern digital landscape (Muzafarova, 2014).

- **Promotes Self-Paced Learning:** Traditional learning is centered on formal settings such as schools, classrooms, fixed timetables, teachers, and geographical boundaries. On the other hand, outside learning represents a more contemporary and self-paced approach. MOOCs serve as a platform that encourages learners to venture beyond the confines of the traditional classroom environment by utilizing public networks, e-learning courses, school websites, and private tutoring. Online learning also fosters outside learning opportunities through the use of social media (Brahimi &Sarirete, 2015). No time, space and location constraints can hinder the process of learning in a MOOCS course.

- **Democratization of Education:** The most significant challenges of accessibility and costs facing conventional education are addressed by MOOCs. Making educational access more accessible would not only democratize education, but also help end tuition's unsustainable and exploitative trajectory. Therefore, MOOCs provide a global access to education, thereby reducing the cost of higher education. There are no age, gender, and university constraints in any MOOCS course. MOOCs have earnestly democratised the avenues of higher education. MOOCs differ from traditional distance courses as registration is free and open, they do not insist upon prerequisites for participation, and students do not need to make a clear full- or part-time commitment (Atenas, 2015).

- **Massive Enrolment:** In this competitive era, numerous learners miss out on regular learning opportunities due to limited availability of seats in schools and colleges, often reserved for high-achieving students. However, those who don't have access to traditional education now have the chance to enroll in MOOCs, offering them an alternative path for learning. Educationists had foreseen that by 2020, there would be 120 million learners registered on MOOC platforms. The positive impact of this platform on higher education is becoming increasingly evident (Asoke Nath et al., 2014). E-Learning offers unrestricted learning opportunities, allowing anyone to enroll and obtain certificates by paying a nominal fee to reputable institutions. Web-based MOOCs deliver top-quality materials in the form of videos, documentaries, quizzes, assignments, discussion forums, and e-content.

- **System of Web-Based Learning:** MOOCs offer participants a variety of benefits, including openness, access to audio-visual materials, the possibility of establishing networking among participants, and free audio-visual materials (López Meneses et al., 2020). MOOCs provide free, easily accessible, high-quality content that is readily downloadable and can be conveniently stored for future use. This affordable social online learning platform can be accessed via mobile devices by simply downloading its application.

- **Solution to In-Service Teachers:** Taking courses online in the MOOC may also serve as a solution to the pressing need for in-service teachers with high levels of digital competence. It may also strengthen pedagogical skills and their ability to communicate (Svoboda &Mynaříková, 2021).

5. **Challenges in MOOCs:** There are advantages and disadvantages to both traditional and e-learning. However, the demand for online education is on the rise (North et al., 2014). Virtual learning environments can lose some of the positive aspects of traditional classrooms. According to a study (Kaur et al., 2020), online courses were just as effective as traditional classroom instruction, but they were not superior to it. It can be used to supplement conventional education, but it cannot be a substitute for it. According to the students, MOOCs have the potential to enhance classroom teaching but are unable to substitute it entirely (Sra & Chakraborty, 2018).MOOCs also face some of the following challenges:

   - Using proxy assessments in MOOCs makes it very challenging to regulate bad behaviour such as cheating (North et al., 2014).The institutions offering MOOCs need to develop a mechanism to regulate the bad behaviour in order to overcome this flaw.

   - Designers of MOOCs face a significant challenge in devising meaningful methods for participants to engage with instructors and fellow learners in ways that surpass the conventional discussion forums found in most learning management systems(Dalipi et al., 2017).

   - Since MOOCs rely on Internet a lot, therefore, internet failure is an impediment and can prove detrimental in achieving the desired objectives of a MOOCS. Access to MOOCs requires adequate technology and a high-speed internet connection in order to stream or download video content, complete quizzes, and participate in the student forums (Alcorn et al., 2015).

   - Every learner is not tech savvy to perfection and doesn’t have English language proficiency. Access to internet and computing technology is an obvious hurdle for MOOC access in rural India, along with significantly weaker English language skills that would make it impossible to understand most MOOC courses (Alcorn et al., 2015) . As such, it is a big challenge for realising the desired objectives of MOOCS system of learning.

   - In any learning process, feedback plays a vital role. Due to the large number of enrollments in MOOCs, it may not be feasible for the course instructor to provide

individual assistance and suggestions to each student. Feedback has been recognized as a crucial element directly linked to learners' engagement in the learning process. Nevertheless, the extensive and impersonal nature of MOOCs presents challenges in offering effective and timely feedback to learners who encounter difficulties (Topali et al., 2021).

- Language barriers are a major obstacle for online education done through MOOCs. English is the language of instruction in almost majority of the MOOCs. It is essential that MOOCs be delivered in multiple languages or in their local contexts (Jaganathan, 2018).

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

Today's educational system has undergone a number of changes from the traditional classroom. The convenience of online education provided through MOOC platform allows students and instructors to achieve their academic goals from the comfort of their own homes. Until a few years ago, this was inconceivable. MOOCs, no doubt, is going to be the future of higher education throughout the world. Therefore, governments must infuse adequate budgetary support and trained resource persons to cope up with the changing system of education and the future demands of the time when students will heavily rely on MOOCS courses for their knowledge gaining and employability.

The emergence of MOOCs can be beneficial for weaker sections, disabled, women and the people at distant locations who cannot afford and reach to the best institutions of the world. These can be well-designed for the excluded and less privileged sections of the society. To make MOOCs fully successful the following are the policy recommendations:

- It is very challenging in MOOCs to eradicate the use of proxy assessments. It is imperative that all final examinations be conducted online under camera surveillance to prevent or regulate bad behaviour, such as cheating.

- The technology behind MOOCs completely relies on the internet, so it's imperative that all users have uninterrupted access to the internet at all times. The accessibility of the internet must be ensured.

- When it comes to the success of MOOCs, digital literacy is extremely significant. The government needs to ensure "digital literacy" at the school level, so that once students enter the higher education domain, they can easily adopt MOOCs on their own.

MOOCs have changed the way people think about seeking education. Previously, most faculties had only one lecture hall for delivering the lectures, and students spent only a few minutes looking at things other than their books; however, every institution will now have a smart classroom with a computer for each student, and only one lecture hall for face-to-face classes. The Covid-19 pandemic proved a blessing in disguise. It completely changed the entire system of education. Online education has become the new norm, but it has its own challenges. For instance, lack of proper infrastructure for conduct of digital classes, speed of internet connectivity, and lack of proper digital knowledge to both students as well as the

teachers. In the 4th IR, enormous uses of digital technology are introduced throughout every field, including every educational system within the world due to the introduction of digital technologies within it. The 4th IR has inevitably changed the way education needs to be developed for the future workforce that will be highly computerized and digitized. Due to this fact, nations like India are undergoing transformation from labour-driven economies to knowledge-based economies. The Ministry of Human Resources Development, Government of India, is designing its higher education system under New Education Policy (NEP), 2020 that emphasizes MOOCs as a major feature.

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REFERENCES

[1] Abeer, W., & Miri, B. (2014). Students' Preferences and Views about Learning in a MOOC. Procedia - Social and Behavioral Sciences, 152, 318–323. https://doi.org/10.1016/J.SBSPRO.2014.09.203
[2] Alcorn, B., Christensen, G., &Kapur, D. (2015). Higher Education and MOOCs in India and the Global South. Change: The Magazine of Higher Learning, 47(3), 42–49. https://doi.org/10.1080/00091383.2015.1040710
[3] Alexander, M., Bonnie, S., George, S., & Dave, Cormie. (2010). The MOOC Model for Digital Practice. http://davecormier.com/edblog/wp-content/uploads/MOOC_Final.pdf
[4] Alhazzani, N. (2020). MOOC's impact on higher education. Social Sciences & Humanities Open, 2(1), 100030. https://doi.org/10.1016/J.SSAHO.2020.100030
[5] Al-Rahmi, W., Aldraiweesh, A., Yahaya, N., Bin Kamin, Y., & Zeki, A. M. (2019). Massive Open Online Courses (MOOCs): Data on higher education. Data in Brief, 22, 118–125. https://doi.org/10.1016/J.DIB.2018.11.139
[6] Asoke Nath, Abhijit Karmakar, &TotanKarmakar. (2014). Moocs Impact in Higher Education Institution: A Pilot Study InIndian Context. Journal of Engineering Research and Applications, 4(7), 157–163. https://www.academia.edu/8355152/Moocs_Impact_in_Higher_Education_Institution_A_Pilot_Study_In_Indian_Context
[7] Atenas, J. (2015). Model for democratisation of the contents hosted in MOOCs. International Journal of Educational Technology in Higher Education 2015 12:1, 12(1), 3–14. https://doi.org/10.7238/RUSC.V12I1.2031
[8] Bal, S., Gupta, M., & Gupta, S. B. (2020). Technology and E-Learning in Higher Education Network Security View project MANETS View project Technology and E-Learning in Higher Education. International Journal of Advanced Science and Technology, 29(4), 1320–1325. https://www.researchgate.net/publication/341734948
[9] Baturay, M. H. (2015). An Overview of the World of MOOCs. Procedia - Social and Behavioral Sciences, 174, 427–433. https://doi.org/10.1016/J.SBSPRO.2015.01.685
[10] Billsberry, J. (2013). MOOCs: Fad or Revolution? Http://Dx.Doi.Org/10.1177/1052562913509226, 37(6), 739–746. https://doi.org/10.1177/1052562913509226
[11] Brahimi, T., &Sarirete, A. (2015). Learning outside the classroom through MOOCs. Computers in Human Behavior, 51, 604–609. https://doi.org/10.1016/J.CHB.2015.03.013
[12] Class Central. (2022). By The Numbers: MOOCs in 2021 . https://www.classcentral.com/report/mooc-stats-2021/
[13] Craig Mak, H. (2017). Cell Systems Editorial Harnessing MOOCs for the Practice of Science. 5. https://doi.org/10.1038/s41562-016-0021
[14] Dagmar El-Hmoudova. (2014). MOOCs Motivation and Communication in the Cyber Learning Environment. Procedia - Social and Behavioral Sciences, 131, 29–34.
[15] Dale, V. H. M., & Singer, J. (2019). Learner experiences of a blended course incorporating a MOOC on Haskell functional programming. Research in Learning Technology, 27, 2248. https://doi.org/10.25304/RLT.V27.2248

[16] Dalipi, F., Imran, A. S., Idrizi, F., & Aliu, H. (2017). An Analysis of Learner Experience with MOOCs in Mobile and Desktop Learning Environment. Advances in Intelligent Systems and Computing, 498, 393–402. https://doi.org/10.1007/978-3-319-42070-7_36
[17] Deng, R., Benckendorff, P., &Gannaway, D. (2019). Progress and new directions for teaching and learning in MOOCs. Computers & Education, 129, 48–60. https://doi.org/10.1016/J.COMPEDU.2018.10.019
[18] edX. (2022a). 2022 Impact report: 10 years, 10 mantras. https://impact.edx.org/hubfs/impact-report-2022.pdf?hsCtaTracking=8366bf42-9765-4a38-8d85-2e7a0829016d%7C7fbba536-5150-4ee1-8e51-f11c889f44f2
[19] edX. (2022b). CS50's Introduction to Computer Science | edX. https://www.edx.org/course/introduction-computer-science-harvardx-cs50x
[20] Feitosa de Moura, V., Alexandre de Souza, C., & Noronha Viana, A. B. (2021). The use of Massive Open Online Courses (MOOCs) in blended learning courses and the functional value perceived by students. Computers & Education, 161, 104077. https://doi.org/10.1016/J.COMPEDU.2020.104077
[21] Fiona M. Hollands, &DevayaniTirthali. (2014). MOOCs: Expectations and Reality. https://files.eric.ed.gov/fulltext/ED547237.pdf
[22] Hanus, D., Revel, P., Marulo, F., & Bauer, P. (2017). Aviation and the 4th Industrial Revolution: The Prominent Role of Networks of Excellence. AerotecnicaMissili&Spazio 2017 96:2, 96(2), 86–89. https://doi.org/10.1007/BF03404740
[23] Hone, K. S., &el Said, G. R. (2016). Exploring the factors affecting MOOC retention: A survey study. Computers & Education, 98, 157–168. https://doi.org/10.1016/J.COMPEDU.2016.03.016
[24] Hoy, M. B. (2014). MOOCs 101: An Introduction to Massive Open Online Courses. Https://Doi.Org/10.1080/02763869.2014.866490, 33(1), 85–91. https://doi.org/10.1080/02763869.2014.866490
[25] Hrastinski, S. (2007). The relationship between adopting a synchronous medium and participation in online group work: An explorative study. Http://Dx.Doi.Org/10.1080/10494820600800240, 14(2), 137–152. https://doi.org/10.1080/10494820600800240
[26] Jaganathan, G. S. N. S. and S. (2018). MOOCs : A Comparative analysis between Indian scenario and Global scenario. International Journal of Engineering & Technology, 7(4.39), 854–857. http://www.sciencepubco.com/index.php/IJET
[27] Jha, S., Ahmad, S., Abdeljaber, H. A. M., Hamad, A. A., &Alazzam, M. B. (2021). A post COVID Machine Learning approach in Teaching and Learning methodology to alleviate drawbacks of the e-whiteboards. Journal of Applied Science and Engineering, 25(2), 285–294. https://doi.org/10.6180/JASE.202204_25(2).0014
[28] Joo, Y. J., So, H. J., & Kim, N. H. (2018). Examination of relationships among students' self-determination, technology acceptance, satisfaction, and continuance intention to use K-MOOCs. Computers & Education, 122, 260–272. https://doi.org/10.1016/J.COMPEDU.2018.01.003
[29] Junida, N., Soh, T., Mahmudc, S., &Zanaton, H. (2019). Open Distance and eLearning in the 4th Industrial Revolution. International Journal of Innovation, Creativity and Change, 7(11), 102–119.
[30] Kanwar, A. (2012). Democratising HE through OER : from commitment to action.
[31] Katoch, O. (2023). Is maternal higher education effective in preventing child malnutrition? Evidence from literature. Public Healthcare and Ancient Science, 3(1), 3–13.
[32] Katoch, O. R. (2012). Job satisfaction among college teachers: A study on government colleges in Jammu. Asian Journal of Research in Social Science & Humanities, 2(4), 164–180. http://www.aijsh.org
[33] Katoch, O. R. (2017). Impact of Socio-Economic Factors on Nutritional Status of School Going Children A Study of Primary and Middle Schools in Rural Areas of District Doda in Jammu & Kashmir [University of Jammu]. https://shodhganga.inflibnet.ac.in/handle/10603/219004
[34] Katoch, O. R. (2021a). MATERNAL HEALTH AND NUTRITIONAL STATUS OF CHILDREN: EVIDENCES FROM INDIA'S NATIONAL FAMILY HEALTH SURVEYS. Journal of Hunan University（Natural Sciences）, 48(9), 1–10.
[35] Katoch, O. R. (2021b). Nutritional Assessment Using Composite Index of Anthropometric Failure (CIAF) among school-going Children in J&K, India. Tianjin DaxueXuebao (ZiranKexue Yu GongchengJishu Ban)/ Journal of Tianjin University Science and Technology, 54(08), 404–420. https://doi.org/10.17605/OSF.IO/5XJVW
[36] Katoch, O, R. (2022). Analysis of evidence based interventional programmes for prevention and control of child malnutrition: Evidence from India. In D. Samir, V. Shukla, H. Kaur, M. B. Ghangare, K. Kumari, & W. K. Yadav (Eds.), Multi-Disciplinary Research: Trends and Perspectives (1st ed., p. 432). Notion Press. https://notionpress.com/read/multi-disciplinary-research-trends-and-perspectives

[37] Katoch, O. R. (2022a). Determinants of malnutrition among children: A systematic review. Nutrition, 96, 111565. https://doi.org/10.1016/j.nut.2021.111565
[38] Katoch, O. R. (2022b). Work from Home during COVID-19: Perceptions of Academic Professionals in India. South Asian Journal of Social Studies and Economics, 14(3), 11–27. https://doi.org/10.9734/SAJSSE/2022/V14I330381
[39] Katoch, O. R., Sehgal, S., Sharma, R., & Nawaz, A. (2022). Analysis of the Targets and Progress toward Meeting the 2030 Agenda for SDG 7 on Affordable and Clean Energy: Evidence from India. Journal of Energy Research and Reviews, 92–102. https://doi.org/10.9734/JENRR/2022/V12I4251
[40] Katoch, O. R., Sehgal, S., Shrikant; Nawaz, A., Parihar, S., & Ahmed, A. (2022). Analysis of the effects of child malnutrition on school outcomes, cognitive development, and gross domestic product (GDP): A systematic review. International Journal of Food and Nutritional Sciences, 11(1), 2932–2954.
[41] Katoch, O. R., Sharma, R., Parihar, S., & Nawaz, A. (2023). Energy poverty and its impacts on health and education: a systematic review. International Journal of Energy Sector Management, ahead-of-p(ahead-of-print). https://doi.org/10.1108/IJESM-10-2022-0007/FULL/XML
[42] Kaur, N., Dwivedi, D., Arora, J., & Gandhi, A. (2020). Study of the effectiveness of e-learning to conventional teaching in medical undergraduates amid COVID-19 pandemic. National Journal of Physiology, Pharmacy and Pharmacology, 10(7), 563–563. https://doi.org/10.5455/NJPPP.2020.10.04096202028042020
[43] Kennedy, J. (2014). Characteristics of Massive Open Online Courses (MOOCs): A Research Review, 2009-2012, Journal of Interactive Online Learning, 2014. Journal of Interactive Online Learning, 13(1), 1–16. https://eric.ed.gov/?id=EJ1032981
[44] Khan, I. U., Hameed, Z., Yu, Y., Islam, T., Sheikh, Z., & Khan, S. U. (2018). Predicting the acceptance of MOOCs in a developing country: Application of task-technology fit model, social motivation, and self-determination theory. Telematics and Informatics, 35(4), 964–978. https://doi.org/10.1016/J.TELE.2017.09.009
[45] Lambert, S. R. (2020). Do MOOCs contribute to student equity and social inclusion? A systematic review 2014–18. Computers and Education, 145. https://doi.org/10.1016/J.COMPEDU.2019.103693
[46] Lee, Y. (2018). Effect of uninterrupted time-on-task on students' success in Massive Open Online Courses (MOOCs). Computers in Human Behavior, 86, 174–180. https://doi.org/10.1016/J.CHB.2018.04.043
[47] López, Á., & Ibáñez, E. (2021). Challenges of Education in the 4th Industrial Revolution. 139–150. https://doi.org/10.1007/978-3-030-57020-0_11
[48] López Meneses, E., Vázquez Cano, E., & mac Fadden, I. (2020). MOOC in Higher Education from the Students' Perspective. A Sustainable Model? Studies in Systems, Decision and Control, 208, 207–223. https://doi.org/10.1007/978-3-030-18593-0_17
[49] Loya, A., Gopal, A., Shukla, I., Jermann, P., &Tormey, R. (2015). Conscientious Behaviour, Flexibility and Learning in Massive Open On-Line Courses. Procedia - Social and Behavioral Sciences, 191, 519–525. https://doi.org/10.1016/J.SBSPRO.2015.04.686
[50] Manda, M. I., &Dhaou, S. Ben. (2019). Responding to the challenges and opportunities in the 4th industrial revolution in developing countries. ACM International Conference Proceeding Series, Part F148155, 244–253. https://doi.org/10.1145/3326365.3326398
[51] Masson, M. (2014). Benefits of TED Talks. Canadian Family Physician, 60(12), 1080. /pmc/articles/PMC4264800/
[52] Mayadas, F. (2019). Asynchronous Learning Networks: A Sloan Foundation Perspective. Journal of Asynchronous Learning Networks, 1(1), 1–16. https://doi.org/10.24059/OLJ.V1I1.1941
[53] Mazoue, J. G. (2013). The MOOC Model : Challenging Traditional Education. EDUCAUSE Review, 1–9. http://er.dut.ac.za/bitstream/handle/123456789/71/Mazoue_2013_The_MOOC_Model_Challenging_Traditional_Education.pdf?sequence=1&isAllowed=y%5Cnhttp://er.dut.ac.za/handle/123456789/71%5Cnhttp://er.dut.ac.za/bitstream/handle/123456789/71/Mazoue_2013_The_MOOC_
[54] North, S. M., Richardson, R., & North, M. M. (2014). To Adapt MOOCS, or Not? That is No Longer the Question. Universal Journal of Educational Research, 2(1), 69–72. https://doi.org/10.13189/ujer.2014.020108
[55] Pasha, A., Abidi, S. H., & Ali, S. (2016). Challenges of offering a MOOC from an LMIC. International Review of Research in Open and Distance Learning, 17(6), 221–228. https://doi.org/10.19173/IRRODL.V17I6.2696
[56] Patru, M., & Balaji, V. (2016). Making sense of MOOCS: a guide for policy makers in developing countries. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000245122

[57] Sharma, R., & Katoch, O. R. (2022). Analysis of the Targets and Progress toward Meeting the 2030 Sustainable Development Goal - 6 on Clean Water and Sanitation: Evidence from India. South Asian Journal of Social Studies and Economics, 15(3), 16–26. https://doi.org/10.9734/SAJSSE/2022/V15I330407

[58] Sigama, K., & Kalema, B. M. (2018). Proceedings of the 6th IEEE International Conference on MOOCS Innovation and Technology In Education, MITE 2018. Proceedings of the 6th IEEE International Conference on MOOCS Innovation and Technology In Education, MITE 2018, 14–18.

[59] Sonwalkar, J. (2015). MOOCS: A MASSIVE PLATFORM FOR COLLABORATIVE LEARNING IN GLOBALIZED WAY. Journal of Management Research and Analysis, 2(2), 142–149.

[60] Sra, P., & Chakraborty, P. (2018). Opinion of Computer Science Instructors and Students on MOOCs in an Indian University: Https://Doi.Org/10.1177/0047239518797085, 47(2), 205–212. https://doi.org/10.1177/0047239518797085

[61] Sun, Y., Guo, Y., & Zhao, Y. (2020). Understanding the determinants of learner engagement in MOOCs: An adaptive structuration perspective. Computers & Education, 157, 103963. https://doi.org/10.1016/J.COMPEDU.2020.103963

[62] Svoboda, P., &Mynaříková, L. (2021). MOOC Courses as a Tool for the Development of Digital Competencies of Teachers. Lecture Notes in Networks and Systems, 269, 243–251. https://doi.org/10.1007/978-3-030-80000-0_29

[63] Tang, S. (2017). Learning Mechanism and Function Characteristics of MOOC in the Process of Higher Education. Eurasia Journal of Mathematics, Science and Technology Education, 13(12), 8067–8072. https://doi.org/10.12973/EJMSTE/80769

[64] Topali, P., Ortega-Arranz, A., Martínez-Monés, A., &Villagrá-Sobrino, S. L. (2021). "Houston, we have a problem": Revealing MOOC practitioners' experiences regarding feedback provision to learners facing difficulties. Computer Applications in Engineering Education, 29(4), 769–785. https://doi.org/10.1002/cae.22360

[65] Ulrich, C., & Nedelcu, A. (2015). MOOCs in Our University: Hopes and Worries. Procedia - Social and Behavioral Sciences, 180, 1541–1547. https://doi.org/10.1016/J.SBSPRO.2015.02.304

[66] Umiera Hashim, H., & Md Yunus, M. (2019). Digital Learning with Massive Open Online Courses (Moocs): English for Communication. Modern Journal of Language Teaching Methods (MJLTM) ,3(3), 1–5. https://doi.org/10.26655/mjltm.2019.3.3

[67] van Dijck, J., &Poell, T. (2015). Higher education in a networked world: European responses to U.S. MOOCs. International Journal of Communication, 9(1), 2674–2692.

[68] Wang, X., Lee, Y., Lin, L., Mi, Y., & Yang, T. (2021). Analyzing instructional design quality and students' reviews of 18 courses out of the Class Central Top 20 MOOCs through systematic and sentiment analyses. The Internet and Higher Education, 50, 100810. https://doi.org/10.1016/J.IHEDUC.2021.100810

[69] Wei, X., Saab, N., & Admiraal, W. (2021). Assessment of cognitive, behavioral, and affective learning outcomes in massive open online courses: A systematic literature review. Computers & Education, 163, 104097. https://doi.org/10.1016/J.COMPEDU.2020.104097

[70] World Economic Forum. (2022). The Fourth Industrial Revolution: what it means and how to respond | World Economic Forum. World Economic Forum Annual Meeting. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

[71] Wu, B., & Chen, X. (2017). Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. Computers in Human Behavior, 67, 221–232. https://doi.org/10.1016/J.CHB.2016.10.028

[72] Wu, D., Bieber, M., & Hiltz, S. R. (208 C.E.). Engaging Students with Constructivist Participatory Examinations in Asynchronous Learning Networks. Journal of Information Systems Education, 19(3), 321–330. https://doi.org/10.2/JQUERY.MIN.JS

