An Overview on Massive Open Online Courses (MOOCs) as an E-learning Platform: A Review

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Abstract— Massive Online Open Courses (MOOCs) have peaked in popularity with the vast improvement in technology with minimum infrastructure to connect to the Internet, thereby allowing learners to access the massive number of courses available through accredited universities and academic institutes. Coursera, edX, Udacity are some of the platforms in MOOCs that enable learners to get certified and gain knowledge in relevant fields. This paper focuses on signifying the importance of assessing the ideal effectiveness of the MOOCs platform, while conducting a review and identifying motives to enrol, pros and cons, and factors to drop out of MOOCs. The authors have identified four research questions in relation to the above facts in concern regarding the MOOCs platform, and a literature review has been carried out in this study by addressing the said research questions. The results of this review suggest that there exist multiple motives for the learners to enrol in MOOCs, and there is also a considerable attrition rate of the MOOCs learners from those courses. The reasons to drop out of MOOCs is therefore a significant area that must be discussed, and there are both pros and cons of this e-learning platform. Further, there is no proper method to assess the effectiveness of MOOCs and therefore, such an assessing procedure is a timely need, due to the fact that it is an online education platform, where individuals can gain access to plenty of courses available, irrespective of geographical boundaries and time constraints.

Keywords: MOOCs, online education, self-learning, affective education

I. INTRODUCTION

As the name implies, MOOCs are an online open-source educational platform that enables learners worldwide who have a desperate need to gain knowledge through online platforms to get certified and enhance knowledge on the field they are interested. MOOCs have been rating at the top since its introduction in 2008 while now it's been recognized as one of the most popular and easiest ways of getting certified from world-renowned and competitive universities and educational organizations instead of wasting time and money in attending the real-time classrooms and lectures needed for the relevant courses.

Therefore, the trend now is to get hands-on experience and knowledge on the interested fields through online video lessons, tests, interactive questions while and after the video lectures and peer- reviews provided by the MOOCs platform, which may vary according to the courses to be accessed. Nevertheless, through MOOCs, university students are also able to gain credit by participating in some of the courses available on the platform. The main pillars in the MOOC platform include the providers such as Coursera, edX, Udacity, and Udemy.

Generally, there are two types of MOOCs namely, Connectivist MOOC (C-MOOC) and Extended MOOC (X-MOOC). In C-MOOC, the learners are treated both as a teacher and a student whereas in X-MOOC each learner is treated either as a teacher or a student. Moreover, C-MOOCs are the original MOOCs that consist of less content and structure and rely on social learning, self-governance, and chaos for knowledge formation whereas, X-MOOCs have been outlined for mass teaching and mainly associated with more conventional pedagogical perspectives (Iqbal, et al., 2015).

Figure 1 depicts how the number of courses provided through the MOOCs platform has evolved since 2012 (Shah, 2020).

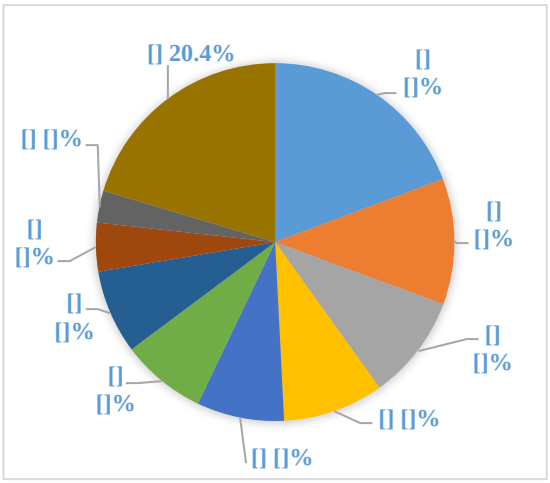

Figure 1. The User Growth in MOOCs
Source: Class Central Data 2020

Therefore, from the above statistics, it is clear that the number of courses provided through MOOC web-based platform has rapidly risen throughout the past few years, and this proves the fact that online learning through MOOCs has provided an extraordinary learning option to learners around the world which are still being embraced by individuals all around the world.

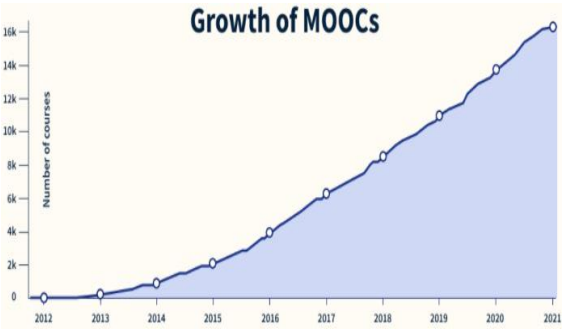

Figure 2. Course Distribution by Subject
Source: Class Central Data

As shown in Figure 2 (Shah, 2020), MOOCs can be classified according to 10 subject areas that are being provided to learners around the world. Therefore, through the above diagram, it is clear that Business has been the highest offered subject area in MOOCs whereas Mathematics being the least while Technology is the second-highest offered subject area out of the overall number of subject areas.

This paper focuses on addressing the driving factors to enrol in MOOCs, reasons to drop out of MOOCs and signifies the effectiveness, pros, and cons of MOOCs platform, and makes use of a literature review section to identify key considerations on the MOOCs portal.

II. RELATED WORK

Distance learning has fostered several technologies to enhance education, such as teleconferences, webinars, podcasts, and online courses. However, the limitations of those technologies also have increased the dropout rate of e-learners (Kalansooriya L P, 2016).

Within the e-learning platform, MOOCs have become very popular, and the very first MOOC was established in the year 2008, and afterward, the number of MOOCs has been expanding. An initial summit could be identified in the year 2012, which was named the Year of MOOCs. Furthermore, it initiated a discussion interrogating the standard of MOOCs and their educational quality as learning encounter and learning mechanism which has resumed to date (Stracke, et al., 2018).

MOOCs have impacted the traditional education system in a beneficial way that has improved the flow of knowledge in serving learners, educators, professionals, and even researchers through digitalization which improved in the last few decades (Sachdeva, et al., 2015).

Research (Reda & Kerr, 2018) has proposed a MOOC policy framework that augments three educational factors namely, achieving a complete MOOC degree from a recognized academic institution, expandable international assembly and freemium payment formula for open accessibility. After analysing the above framework, four prospective MOOC BAs have been presented for the bachelor's degree at the University of Naples Federico II with a focus on dominant expository aspects.

A study (Hew & Cheung, 2014) has explored the main motivational drivers which pursue to enhance the use of MOOCs and has reviewed challenges in MOOCs platform and also to spot issues that need to be solved. The findings from the above-stated research suggest four motives

for students to enrol for MOOCs namely, the desire to master about a contemporary concern or to widen current knowledge, curiosity on MOOCs, for personal provocation, and the desire to accumulate as many completion certificates as possible.

Another research (Stracke, et al., 2018) conducted with a focus to determine the perspectives of MOOCs learners and designers on the interaction and experiences in MOOCs and to achieve this objective, this study has made use of the initial discoveries from the Global MOOC Quality Survey while comparing the learners' and designers' perspective on interaction in learning with MOOCs. Moreover, the study has spotted the fact that the designers have underestimated their design effort, whereas the MOOC learners have provided higher ratings for their learning experience. Nevertheless, it has also been identified that there is a gap in understanding the demands of the MOOC learners by the MOOC designers.

MOOCs have been the most in-demand theme in recent years when the e-learning concept is taken into consideration. Since 2012, MOOCs have enticed universities around the world. Moreover, the process of MOOCs is moderately growing. Among MOOC platforms, the most famous portals are Coursera, edX, and Udacity.

Coursera is a profit organization founded by Andrew Ng and Daphne Koller at Stanford in 2012 and currently top rating in popularity among the MOOC portals. Coursera collaborates with educational institutions all over the world to provide a few of their courses in the domains such as mathematics, humanities, machine learning, engineering, social science, biology, physics, and computer science to the online crowd.

EdX is a non-profit MOOCs portal founded jointly by Harvard University and Massachusetts Institute of Technology (MIT) and has reached a higher number of learners. EdX collects much data from research to get better knowledge in user experience, such as what times the learners prefer to learn.

Udacity MOOC platform is built by Sebastian Thrun, David Stavens, and Mike Sokolsky in 2011 which initially began with providing university courses whereas now providing courses for professionals as well. Udacity deviates a little from the Coursera and EdX due to the hallmarks such as putting more emphasis on skill training for professional requirements and non-cooperating with universities while breaking the contemporary educational model in universities. Furthermore, Udacity is considered to be more influential since it offers more impactful certificates than the other two popular platforms (Chen, et al., 2014).
The researchers (Chen, et al., 2014) have built a distributed data warehouse and analysed the course log data in Coursera platform. Further, it evaluates the quality of online course education in terms of country distribution, grading policy, homework completion, and peer review assessments. Finally, the authors propose a new grading policy and peer assessment procedure where a data warehouse of grading history and the weight is calculated according to the learners' grading history.

Therefore, from the above review, it can be identified that there has been great work towards the MOOC platform since its invention in 2008, and to date, there is rapid development and suggestions to improve the quality of the services provided through this.

III. METHODOLOGY

E-learning has received significant recognition in the last few years. MOOCs allow individuals to enrol in courses and get certified without any constraints on time and geographic locations. Nevertheless, with the vast progress of online education, many people concentrate on the expansion of their network rather than having the focus on the quality of learning gained through MOOCs.

Therefore, it can be concluded that there should be much concern about this aspect and must be discussed broader in order to enhance the quality and value of the education provided through this online portal.
Hence, identifying research questions would be supportive to determine the scope of the study on MOOCs.

A. Research Questions

Research Questions are predominant when pinpointing the scope of this study. Following are the research questions which are the motives to perform this study and would be discussed further in the next section.

RQ1: What are the main driving factors to enrol in a MOOC?
RQ2: What are the pros and cons of MOOCs?
RQ3: What are the factors that underlie to drop out of the enrolled courses?
RQ4: Are MOOCs effective in gaining knowledge?

B. Data Collection

For the literature review and in addressing the research questions mentioned in section A, the collection of research papers was done from the IEEE Xplore and the Google Scholar and the papers that are published after the year 2012 were selected for the literature review.

IV. DISCUSSION

A. Driving factors to enrol in MOOCs

Research undertaken by (Guo, et al., 2019) has categorized the factors which drive to enrol in MOOCs belong to the dimensions: Cognitive interest, Career development, Interpersonal relationship, Get-rid-of the routine, External influence, and Social service. The cognitive dimension's motives include personal interest and desire of learning, intention to be more intelligent, interest in the course content, and a sense of achievement. The career development dimension comprises motives such as seeking career progress, enhancing the curriculum vitae, preparing for a career switch, and improving the salary. The desire to be accepted by others and create a network with instructors in the courses is a motive that belongs to the Interpersonal relationship dimension. Relieving job burnout and reducing the stress of life is connected with the Get-rid-of routine dimension. External dimension motives include an undertaking assigned by a senior, meeting the expectations of an expert. The social service dimension focuses on serving the society by enrolling in the course such as contributing to the workplace and intending to do civic duty.

From this study (Guo, et al., 2019), it has been identified that learners who participate in MOOC learning have the strongest motivation in Cognitive interest and Social service, whereas Getting-rid-of the routine dimension is with the lowest score. Moreover, the well-experienced course instructors in relevant subject areas, experience the courses provided by a prestigious institution, limited access to other educational resources affordable costs for the courses are some other motives that influence learners to enrol in MOOCs.

According to (Li & Wan, 2016), learners with the intention of self-improvement have a greater possibility of completing the courses that they have enrolled in through the MOOCs platform. Further, the course completers were found to have previous learning experience in learning through MOOCs portal and found only a little difficulty in following the courses. In addition, internal motivation was found to be influencing the learner most than to obtain the certification.

Another study has spotted the fact that knowledge construction and information exchange are the most vital considerations in learner's perception of online interaction, whereas equipping tech help in numerous ways and briefing the online discussions after each discussion are the significant facts when the instructor's perception of online interaction is considered (Khalil & Ebner, 2015).

Research done by (Sooryanarayan & Gupta, 2015) has considered that the motives for the MOOCs enrolment as the desire for learning, experience the courses provided by a prestigious institution, limited access to other academic resources, quality education free of cost, network with interesting people, supplement learning at work/school/university and enhance the resume. The results found that all the above-stated factors could be identified as the primary motives where limited access to other academic resources was rated the highest.

B. Pros and Cons

MOOCs as an online education platform consists of both pros and cons related to Information Technology for Self Education. Some of the pros of self-education based on the Internet are cost and time efficiency, easing of the evaluation

procedure, and expanding of involved learners. However, according to (Chen, et al., 2014), the improper grading policy that involves the learners in grading is a con of this MOOCs portal when the assessment to be graded is more professional.

Research done by (Kruchinin, et al., 2018) exposes the fact that some points such as unlimited education, up to today knowledge, information Studying vs. information consumption, and information search cannot be precisely categorized under pros and cons due to the fact that the assessing those criteria may vary with the definition. Moreover, owing to the reason that transaction cost is much expensive, self-education in rural areas has obtained much benefit from the information technology implementation. Therefore, it is much evident that e-learning has provided significant benefits for the MOOC platform as well.

Also, MOOCs have provided computer simulations for expensive laboratory practices in engineering education, and that is incredibly vital since engineering education deals with applying engineering discipline in the practical scenario with the use of theoretical aspects (Iqbal, et al., 2015).

Active learning, quick feedback, self-engagement, and peer learning are the building blocks of MOOCs. When learners engage in learning, a higher engagement is obtained, and in massive online platforms, learners participate in courses referring to the learning material, prevent persistent misunderstandings and self-learning (Mitros, et al., 2013). Therefore, compared with a traditional learning environment, MOOCs provide numerous benefits when the above facts are considered.

A drawback found in MOOCs is that although the grading system is much easier to deal with since the computer-generated or peer review assessments are mainly used, the structure of the assignments and exams provided through MOOCs might differ when compared with the traditional system. Also, student reviews differ obviously from instructor reviews (Kulkarni, et al., 2013).

In addition, MOOCs have also been introduced for university degrees rather than providing certificates for general courses. The critics also point out that the MOOCs scarce sufficient learner-instructor interaction and university life, that are the fundamental concerns of university education, and the exposure to the educational material doesn't impact personal growth (Iqbal, et al., 2015).

Nevertheless, the original concept of MOOCs was to provide free and open education for all but not for credit, but with the further developments in this portal, the MOOC providers concerned on establishing a fee for certification and even a fee for sitting the examination although the tuition is free (Brown, 2013). Therefore, for the learners who are in need of financial helps, this aspect has been a great con.

Actually, the language also might be a barrier when referring to the resources and accessing the exams, and individual attention is also not prevalent in MOOC learning. Increased number of course dropouts, difficulty in measuring learner involvement, and inability to access the courses with insufficient network bandwidth are some other cons of MOOCs.

C. Reasons for dropping out of MOOCs

A study (Sachdeva, et al., 2015) has found an increased dropout rate from online courses since learners find offline courses more engaging. Therefore, it is proposed that in order to make those courses more fascinating, the process of gamification should be introduced. Also, to achieve gamification, a credit-based system where the learners receive some incentives based on their performance can be cited.
Furthermore, in another research (Mamgain, et al., 2014) conducted to identify the effect on video viewing features with the feedback from learners, it has been determined that edX provides more complementing subtitle features than Coursera since those subtitles block the course slides and the learners' preference was to short videos as those ensure the non-distracted concentration to the video lesson.

Research done by (Hew, 2015) has identified the main reasons for the dissatisfaction of the learners who drop out of MOOCs as peer review activities, forum management, unhappiness about the claims, perceived biases, topics in teaching, reading academic papers, and assignment-related issues. Further, the authors of this research (Hew, 2015) suggest to minimize the reading of academic papers as a part of the course completion and to enhance the

distribution of handouts that summarize the significant findings in the academic papers.

According to (Xie, 2020), diverse expectations and motivations, and satisfied or done with the part of the course content that the learner expected to obtain knowledge are some other reasons that make the learners to drop out of the MOOCs.

Researchers (Palvia, et al., 2018) have identified that high bandwidth connectivity of telecommunication infrastructures, improving the online course deliverance as equal to the contemporary face to face in class education, and blending the online and offline education there by maintaining a healthy balance between online and traditional education as significant concerns that must be focused when the online education system is to be upheaved. Further to summarize the challenges that are pinpointed in this research, the authors have listed the country-level factors that influence the quality of online education and the factors include, ICT capacity, internet/mobile technology diffusion, income, country laws, and digital divide as the factors that hinder the use of online education. Since MOOC is also an e-learning platform, the above discussed factors apply to the MOOC platform as well.

D. Effectiveness of MOOCs

There are many studies and researches that have been undertaken to evaluate the effectiveness of the MOOCs portal and still it is being discussed due to the fact that the criteria for evaluating the effectiveness cannot be interpreted exactly.

A study (Iqbal, et al., 2015) has been conducted with the use of the findings from the Global MOOC quality survey, which was distributed among learners, designers, and facilitators of MOOCs with the motive of recognizing the gap between MOOC designers and learners on the interaction and experience in MOOCs. From the above study, it has been identified that the MOOC designers do not seem to understand the needs and demands of MOOC learners.

Furthermore, teaching methods and grading policy have not met the real targets in the MOOC platform, owing to the reasons that the instructors do not have individual attention on the learners involved in the courses, and cheating has also become a real concern on the online platform. Although many MOOC providers employ some mechanisms to prevent cheating, most of them have not been successful (Pappano, 2012).

A study conducted by (Gamage, et al., 2015) has identified ten dimensions that affect to an effective MOOC from the learners' perspective using the Grounded Theory methodology and the dimensions include, interactivity, collaboration, pedagogy, motivation, network of opportunities/future directions, assessment, learner support, technology, usability, and content. According to the authors, the 'network of opportunities/future directions' dimension is a unique dimension that they have found out which suggests that the learners should have the opportunity to practice the course content they have learned in MOOCs.

According to (Reda & Kerr, 2018), when providing university degrees through the MOOC platform, the MOOC providers grant full degrees in terms of quality, scalability, and accessibility. The term quality here refers to the standards that must be adhered in providing the certifications and courses through the MOOCs portal and scalability is broadening the MOOC network to a huge amount of learners in multiple cultures, while accessibility is allowing the learners to access the course content before enrolling themselves in degrees.

Actually, low completion rate has also become a significant issue since abandoning the courses occurs at the very beginning, soon after the course enrolment in MOOCs. Also, it has been found that if educational institutions provide degrees via MOOC, the completion rate for each course will be lower than 10% because once the needed credits are obtained, the learners tend to leave the course. Further, the authors bring out the fact that MOOCs are not filling gaps in the undergraduate education and its preliminary contribution is to professional development. (Brown, 2013). However, certificates offered through the MOOC platform are not valuable and quality like the certificates provided by traditional universities (Parr, 2013).

A research (Moreno-Marcos, et al., 2020) has analysed the factors such as previous grades, forum and exercise variables, course duration, clickstream data, exam question layout, etc. to identify the influencing factors that predict the performance of the MOOC learners and it is found out that exercise variables are the best predictors for the student performance while the forum variables are found to be useless.

Learner engagement is another factor that must be considered when assessing the effectiveness of MOOCs. The research done by (Guo, et al., 2019) has questioned on the learner intention of engaging in learning materials namely, videos, discussions, assignments, and homework. According to the results obtained, majority of the learners were willing to engage in homework, assignments, and videos while participating in discussions was with less rating. Nevertheless, a limitation identified is that, although the participants to the survey have rated in this manner, there is the need of monitoring the learners in terms of their log data since this results in obtaining the actual engagement of the MOOC learners.

V. CONCLUSION

Through the conduct of this study, it has been identified that with the rapid development of the Internet, the popularity and concern for MOOCs have risen and with that, it has attracted millions of individuals who are keen on involving in courses online and gain knowledge. Nevertheless, there exist both pros and cons of the MOOCs portal, that should be concerned while assessing the effectiveness of MOOCs. Therefore, this study has aimed to minimize the gap between the unexposed facet of the MOOCs thereby establishing the fact that MOOCs as an online educational platform cannot replace the traditional education system when the effectiveness of the grading and teaching system in MOOCs is considered. Furthermore, when gaining knowledge on the relevant courses, it is in the hands of the learner to decide whether the course is carried out to gain the knowledge in core subject matters or to just earn a certificate for the betterment in their resume. On this basis, it is evident that the need to overview on MOOCs is strenuous in order to identify the real aspect of this online learning portal. In fact, the MOOC providers should also be much vigilant and must focus on minimizing the issues and dissatisfactions of the learners around the world.

VI. FURTHER WORKS

Further works of this research include applying the outcomes of this research to identify the driving factors to enrol, reasons to drop out, and assessing the effectiveness concerning the MOOCs platform when compared with the traditional in class courses, through the conduct of a survey.

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