

The role of massive open online courses during the COVID-19 era: Challenges and perspective

Aayat Amin Aljarrah*, Department of Computer Information Systems, Near East University, Nicosia, Cyprus
Mustafa Abdel-Karim Ababneh, Department of Computer Information Systems, Near East University, Nicosia,
Cyprus
Nadire Cavus, Computer Information Systems Research and Technology Centre, Near East University, Nicosia,
Cyprus <https://orcid.org/0000-0001-7470-7752>

Suggested Citation:

Aljarrah, A. A., Ababneh, M. A. & Cavus, N. (2020). The role of massive open online courses during the COVID-19 era: Challenges and perspective. *New Trends and Issues Proceedings on Humanities and Social Sciences*. 7(3), pp 142–152. Available from: www.prosoc.eu

Received from June 20, 2020; revised from September 19, 2020; accepted from November 12, 2020.
Selection and peer review under responsibility of Prof. Dr. Huseyin Uzunboyulu, Higher Education Planning,
Supervision, Accreditation and Coordination Board, Cyprus.
©2020 Birlesik Dunya Yenilik Arastirma ve Yayincilik Merkezi. All rights reserved.

Abstract

The process of developing education is a vital and important issue around the world as it is an issue that is inherited through time, and it is one of the most important challenges facing the world. Distance education is one of the means of developing education through which knowledge can be spread and which can help people to overcome obstacles of time and space. Recently, teaching and learning systems have become completely dependent on e-learning, especially during the corona virus disease (COVID-19) pandemic since the world has turned to electronic transactions in all areas, especially in education, and the most used technology includes the use of online training courses such as massive open online courses (MOOCs). It provides great support to the distance learning process as it can facilitate the learning process by diversifying its contents via media, such as text and video. In addition, MOOCs are the most popular and effective online courses. The aim of this paper is to provide an in-depth analysis of the definition, characteristics and patterns of MOOCs. Also, this paper discusses the specific advantages and disadvantages of taking up MOOCs along with the different challenges that MOOCs are facing. In addition, various suggestions will be given to make improvements that can help in making process enhancements to MOOCs. Finally, this paper presents the importance of MOOCs in the COVID-19 era. We hope this paper will help instructors to understand how MOOCs can be made more efficient, enable learners to become more organised and increase their understanding of MOOCs, and will help education development system specialists to find suitable solutions for problems that MOOCs are facing.

Keywords: Massive open online courses, e-learning, online courses, distance education, COVID-19.

* ADDRESS FOR CORRESPONDENCE: Mustafa Abdel-Karim Ababneh, Department of Computer Information Systems, Near East University, Nicosia, Cyprus
E-mail address: 20194017@std.neu.edu.tr

1. Introduction

In conformity with the huge improvement in education, nowadays, many new methods have appeared to present various groups of techniques that are helpful for teachers in developing the learning process. The learning technology has opened many chances and new standards to improve the teaching sectors and to deliver meaningful ideas and knowledge. In addition, increasing creativity in such a process is needed to obtain a suitable environment. In recent times, massive open online courses (MOOCs) have become very useful, especially for online learning. It is a very common way since teachers and students are very far from the real classrooms. However, these standards are well known, precisely when it comes to higher studies. Thus, many students prefer this kind of learning, and they participate in MOOCs to have their courses online. The number of participants is increasing through time because of its pros like having a wide range of learners (Sadhasivam & Babu, 2017). However, MOOC is considered to be a new experiment that needs some time to prove its efficiency. These courses are also provided for self-study, especially for students who prefer to study by themselves. In fact, students can read and answer any homework by getting help from any sector or person, such as having a group discussion, websites, blogs or any other platform. The role of MOOC is presented through making a connection between the basic abilities of learning and the practices of them in a widespread online society (Conole, 2013).

Learning online gives its learners a big amount of independence in their learning; a process compared to the traditional ways on the campus. This can be applied especially to the huge courses through MOOCs. It is a shape of learning where learners have their own choices to make quick decisions about the time and the place for their education. This kind of method provides its learners a choice to try the self-regulation process of learning (SRL) (Jenny, Lin, Wei-Chieh & Emily, 2013; Littlejohn, Hood, Milligan & Mustain, 2016). Students strive to make their learning in a successful construction (Bol & Garner, 2011; Dunlosky & Lipko, 2007). It is also very significant to provide learners with an SRL (Jansen, van Leeuwen, Janssen, Conijn & Kester, 2020).

MOOC is considered to be the abbreviation for massive open online course. It was given by the Financial Times Dictionary to be a web that is based on lectures where these lectures contain a huge number of learners (Stuchlikova & Kosa, 2013). Thus, it is designed for the goal of learning. Learners in MOOCs are assigned to do a lot of activities, such as watching videos. These videos are divided into clips with 10–15 minutes for each. Also, students interact with their teachers online, besides they have to answer quizzes and exams. These tests are done with multiple-choice questions to get the grades easily. The process of correcting the answers is carried out automatically. In addition, students have to take much of homework to evaluate their performances where the MOOC contains a specific group for evaluation. There are a lot of examples on MOOCs, such as Harvard Open Courses, where the Harvard Extension School relies on distance education classes using videos recorded online or through the coordination of direct web conferences. In addition, the Harvard Extension School provides weekend lectures on campus. Online courses contain scheduled assignments and exams and also extend for a full semester. This is due to the nature of interactive web-conferencing lessons, which is also not free (Coetzee, Schmulian & Coetzee, 2018). The variety of ideas and thoughts has led MOOCs to have two main kinds: the connective and the content-based ones. To illustrate, the first type was created relying on making a connection with the other improved networks informally. On the contrary, the other one follows and sticks to many styles of attitudes and behaviours (Yuan & Powell, 2013).

The pandemic of corona virus disease (COVID-19) has participated in affecting the educational system all over the world, which has led to closing the whole educational institution, such as schools and universities (Burgess & Sievertsen, 2020). In this case, these institutions are forced to find an alternative way like distance education. For instance, a lot of courses specialised in Urology Science in Canada used distance education instead of the traditional one, such as the urology school, journal clubs and urology grand. In McMaster (Uyeki, Bundesmann & Alhazzani, 2020), the surgical programme has changed all its classes and courses to Zoom, to make use of the chatting for question–answer (Q&A) and attendance goals. This has led to the importance of online materials in addition to

the absence of traditional education, which has participated in enabling resident-led initiatives. Also, residents have the ability to access the VoIP, similar to any other administrators or workers. In McMaster, the urology school sessions and chief, use Zoom every week. This online education was very rapid and smooth for teachers and residents. Using any platform, such as Zoom, many advantages can be achieved, such as reducing the time of travelling, besides increasing the benefits of these educational initiatives. In addition, the RPC meetings can be held where learners can easily participate because of moving between platforms where moving from a hospital to another is not a big issue (Andone et al., 2015).

Thus, the research aims to provide a clear definition of the MOOCs by supporting its properties and shapes. Also, it clarifies the pros and cons of MOOCs usage. Also, it shows the role of MOOCs during the pandemic COVID-19. In addition, it shows the difficulties in this kind of learning for both teachers and learners. As a result, many suggestions and recommendations are provided to make some development in the MOOCs. We wish that our paper will be very helpful for the efficiency of MOOC, besides giving a full understanding and organising for it. Also, we hope that it will be very useful for the educational improvement, especially in presenting appropriate solutions for the faced challenges.

2. Related research

It is undeniable that many research studies were carried out to show how the MOOCs have extremely participated in developing different fields; also, a lot of studies were carried out to present the models of MOOCs. In addition, we show the challenges, advantages and disadvantages of MOOCs in education; the related works are shown in Table 1.

Table 1. Related research studies

References	Objective	Fields
Ding, Wang, Braga and Matsumoto(2020)	The aim of this study was to present how MOOCs contributed to Urology education in the time of COVID-19	Urology education in the COVID-19 era
Andone et al. (2015)	This research paper was conducted to show how the MOOCs have extremely participated in developing the education in colleges by presenting a different learning model	Education
AlboandHernandez-Leo (2017)	This paper presented Innovations in blended learning (BL) with MOOCs in the campus summer course for high-school students	Education
Kloos, Munoz-Merino, Alario-Hoyos, Ayres and Fernandez-Panadero (2015)	This study presented how the face-to-face course type in colleges produces a recent shape of BL kind of learning.	Education
Perez-Sanagustin, Hilliger, Alario-Hoyos, Kloos and Rayyan (2017)	This study showed various shapes and combinations of MOOCs–BL and MOOC framework.	Education
Cole and Timmerman (2015)	This research referred to how the MOOC gives learners a chance to interact with their colleagues using different backgrounds in education for the goal of exchanging opinions and ideas.	Education
Adzhar, Khalid and Karim (2017)	This study showed the elements of MOOC, and it is a property, such as flexibility, online education and interactive courses.	Education
Bucovetchi, Stanciu and Simion (2016)	This study was carried out to figure out that MOOC is very applicable to all learners to develop their educational skills and to be more knowledgeable.	Procedia Social and Behavioural Sciences

Daud, Zulkifli, Rahman and Khalid (2017)	According to this study, MOOC's usage is related to unifying the use of technology in order to make sure that learners can get the perfect online courses. This is conducted by making a connection between both learners and lecturers.	Education
Anderson et al. (2011)	This study presented a lot of indications, which reveal that MOOC participates in improving the communication skills of learners, developing their success and helping in developing the societies as well.	Healthcare and Medicine
Hashim, Rusli, Yunus and Hashim (2019)	This is a recent study that proves the capability and ability of learners using MOOCs.	Education
Sadhasivam (2014)	This study proved that the e-learning way of education is not enjoyable anymore for many institutions which present that learners face a lot of problems related to technical issues and communication skills or linguistic ones. Also, it presents some of the problems faced by participates when using MOOCs.	Technology and Education
Atiaja and Proenza (2016)	This research clarifies the problems and challenges faced by higher education when using MOOCs. Moreover, studies reveal that learners become demotivated in using MOOCs because of its limited applicability for only specific courses.	Education
Ain and Liza (2018)	This research showed the use of MOOC within a community, college, business opportunity certificate and students.	Industrial
Pickering and Swinnerton (2017)	This research aims to provide a great benefit to healthcare professionals by creating an anatomy of MOOCs.	Healthcare
Karnouskos (2017)	This study aims to develop the industrial field by increasing the efficiency of workers. To achieve these goals, important MOOCs are offered in the field of workers.	Industrial
Ebner, Schon and Braun (2020)	This study aims to clarify the importance of MOOCs in the field of learning, education and higher education.	Education
Liyanagunawardena and Williams (2014)	This study provides a summary of a group of MOOCs that are used in health and medicine.	Healthcare and Medicine

3. MOOCs' characteristics

Generally, the construction of the MOOC is predicted to have independent learning containing some resources, such as folders, videos and links. This provides easy arguments and connection that is called as a Forum. The MOOC has a lot of proprieties, such as being online open and massive. To illustrate, online means that this method is used remotely by only using the Internet without any need to go to the lectures physically. Also, by open, we mean that the MOOC does not need any request or permission because it is open for every learner. Finally, it is massive by being a container for a large number of learners, which is way bigger than the real classes (Haron, Hussin, Yusof & Yusof, 2019).

3.1. MOOC model

The MOOC is divided into two main forms: CMOOC and XMOOC. The first one was once defined as 'Connectivism and connective knowledge' at the University of Manitoba in 2008. In this study, more than 2,000 persons participated from all over the universe (Altinpulluk & Kesim, 2016). The first model

of MOOC was not linear, and it was disorganised; besides, learners were led and controlled. However, students extremely needed to learn all things by themselves to be called an individualised learning. On the contrary, the second generation of MOOCs was very wide with an online copy of normal educational methods. To illustrate, it was a tool to transform the knowledge using records, videos or any mini-lecture (Kocdar, Okur & Bozkurt, 2017). In this case, the tool becomes linear and simple wherein video classes, followed by tests and discussions, ensure their efficiency (Haron et al., 2019).

In addition, the sample was very common in discussing the MOOC method. The lecturers' role is to give the materials and the nature of notes, homework and tests. The MOOC presents a chance to get free lectures in a global shape. In particular, the classes in the MOOC provided to the higher learning are mostly taken from XMOOC (Haron et al., 2019). Therefore, providing free courses is a very important propriety that contributes to spreading the MOOC widely. Having less costs is not only limited to students, but also to teachers, which makes it a free costing method. Also, this introduces the MOOC to be an appropriate method for students to help them choose the knowledge that they need with no restrictions to specific materials or settings (Abu-Shanab & Musleh, 2018).

3.2. Pedagogical model and infrastructure

Although the MOOC is an open tool and a huge one, it does not mean that we all can get this type of technology as it is provided. Many obstacles can be seen in this regard, such as content's relevance, instructional languages, variety in needs for learning, besides the different cultures in the pedagogy (Castillo, Lee, Zahra & Wagner, 2015). These pedagogical concerns must be highlighted, especially when dealing with huge audiences since the MOOC has a very high dropout percentage. This justifies why about 15% of the learners complete their classes on average. It is also undeniable that many researchers have included in their studies the logistical aspects in both designing and managing these courses, such as the pedagogical sample and the MOOCs' quality. The late improvements of MOOCs have been taken for commercial purposes instead of pedagogical problems (Buhl & Andreasen, 2018). Also, the supporters and the providers of the MOOC are working to build modern samples for business by associating the teaching activities of the MOOC with different levels of payments. Some studies gave a summary of the various samples of business for four huge players on the marking of MOOC (Shah, 2017). By carrying out this exam, many sides were tested, such as the edX courses, future learn and Udacity accordingly. In their test, they show that the MOOC mainly works based on the mechanisms of marketing through replacing the educational views for everyone by the various payment systems. A rank of four providers proves that edX resembles the most opening provider who gives its users free accessibility. However, Udacity resembles the first one to provide a new sample of certification.

4. Advantages and disadvantages of MOOCs in education

Like any other educational system, the MOOC system that aims to improve the process of education has its pros and cons. Here are some of them to make our point crystal clear.

4.1. Advantages of MOOCs

MOOC has many advantages where only by pressing a button, any person who has a computer and an Internet connection anywhere can apply and register for educational courses. They have high-quality providence presented by universities and unique institutions around the world in any wanted field, starting from astronomy, to general health, to human nutrition, going to literature, history, philosophy, artificial intelligence, designing computer games and to programming. Moreover, the field of education has become common in social media, such as Twitter, Facebook, etc. (Ababneh, Al-Jarrah & Cavus, 2020; Cavus & Mohammed, 2017). The most significant thing is that it is free and available for all its users with high positivity in all aspects and for all teachers (Lawal & Cavus, 2019), students and materials. All this will be mentioned and explained briefly in the following points:

1. Teachers obtain the use of MOOCs by exchanging main designed representations and the accessibility of other designs in order to get lessons from both effective and ineffective teaching practices, in their society (Albo & Hernandez-Leo, 2020). In addition, learners are not limited by a specific time or place, even students who do not have accessibility to formal high teaching courses can easily engage in such a process. They can make an expansion for their learning atmosphere and their private networks, besides developing their own skills and interests.
2. The content and the course are also included in this. The content is created and exchanged within the course's advancement. Also, it is considered as a software agnostic that can apply any kind of online methods if they are relevant (Miller, 2015). When it comes to the courses, they are informal ones that can be arranged and organised easily. Although some kind of learning was carefully planned, the majority was carried out by assuming that most learners have the capability to learn by themselves. Registering is open and available for any learner, everywhere, without any cost or any acceptance papers, whereby it extremely supports preparing for jobs and developing its users' performances and skills.
3. It has also many pros of teaching and peer grading as well. It helps very much in both the improvement of teaching and its importing too. In other words, it works to make teaching a global one by reaching global topics and universal trainers (Farmer, 2013). Moreover, it helps learners by getting feedback about their personal achievements and by providing a chance for applying transferable skills, which are very useful for processing and their life. Thus, this helps them in increasing their quality of learning the process. Finally, it is very helpful in encouraging institutions, innovating universities and helping communities. To illustrate, it helps in improving the unique missions for institutions (incentivising pedagogical change) (Farmer, 2013).
4. Moreover, when it comes to universities, the MOOC helps in increasing the creativity and the innovation in them, since the use of technology allows learners to adjust their learning relying on the style with no bad effects on the traditional structures or the mortar schools (Boyatt et al., 2014). In addition, it is very useful in creating helpful societies. To clarify, learners will be able to meet universal contacts using online sources. Thus, they can exchange their experiences and knowledge. Also, they can help each other to pass, regardless of their distant places. This universal way of learning is a positive fingerprint for learners and for instructors that societies can get used from, and where relationships can last ever after completing the course.

4.2. Disadvantages of using MOOCs

Despite the various unique points that the idea of open courses online provides to spread knowledge and science for all its users anytime, besides using the suitable ways, this method has faced criticism. One of its cons was the lack of communication between teachers and students because of the huge number of learners (Guo, 2017). This led to the weakness of students' performance compared to the traditional ways of education either in the campuses or the uncomplimentary ones online. Some researchers and statistics carried out in the Cours era website prove that less than 10% only completed the open courses till the end (Ferguson & Clow, 2015). Also, many criticisms have been directed towards the MOOCs for the lack of accuracy in the used way-peer evaluation, especially in the humanities sciences, which depends on the qualified students to evaluate their assignments and exams (Ben-Shahar, 2017).

5. Importance of MOOCs in the COVID-19 era

Nowadays, we live in a surpassing time with the appearance of the COVID-19 pandemic with a very fast spread that leads the medical staff around the world to use all their efforts and energy. Despite the main concern, which is to stop this disease, it is undeniable that the pandemic has affected badly

the educational system for all students in schools and universities. Although teaching was conducted based on groups or teams, especially for post-graduate students of any major, this kind of education needs a physical meeting where students and teachers get together face to face. Nevertheless, during the time of COVID-19, social distancing is used as a good method, as a protection strategy, until a suitable vaccine found (Del Rio & Malani, 2020). Because meetings in classrooms are prevented, a lot of institutions have depended on technology to continue their works via the Internet (Ding et al., 2020).

Similarly, it was also notable that this pandemic as led to an increase in the significance of online learning by re-using MOOCs. In addition, Class Central has already increased its onrush as well. It creates an ecosystem that helps learners reaching their purposes with a very attic moderator for many class reviews. This led MOOC developers to make many initiatives. For students, it is considered as a new chance. At the end of March, Coursera (Lund & Zukerfeld, 2020), the most powerful MOOC provider, presented that they are providing more than 100 free courses via the Internet to be useful in this time until May (Coursera, 2020). Lately, it has increased the total number of courses to 140 in July (Galimullina, Korshunova & Feoktistova, 2020). The modern courses are taken from Coursera's partners in the Latin American college. It has provided more than 19 million learners the opportunity to choose their classes (Chen & Oakley, 2020). In addition, there are many free classes as well, such as free online learning due to coronavirus (Harvard: Mechanical Ventilation for COVID-19 course and Stanford: CS472 Data Science and AI for COVID-19 course), free courses to teach about COVID-19 (e.g., Fighting COVID-19 with Epidemiology course and Managing Your Mental Health During COVID-19 course) and the List of Digital Learning Conferences Going Virtual Due to Coronavirus (Coursera Virtual Conference and EADTU Webinar on Joining Online Education). In addition to Coursera, the edX was also created by the MIT and Harvard University to be a non-profitable creation that provides a catalogue of the provided courses and gives free certificates to the university students via the remote access programme (edX, 2020).

This pandemic has changed the whole educational system in all cities by forcing companies and institutions to use the online method, whether for learning or working. Technology plays a very significant role in allowing the spread of the curricula via the internet. Technology may help in finding solutions to the weak points in education. It does not build a high-quality education that is available to any person with a trustful internet, and it is also a method for international conversations and cooperation. Thus, the value of MOOCs after this pandemic must not be forgotten.

6. MOOCs challenges and suggested solutions

Relying on some study, the less skilful user in technology will mainly face a problem while using the MOOC (Ramirez, Rivera & Garcia, 2014). In addition, another study suggested that other problems may appear, such as the incorruptibility of discussing, the responsiveness to queries, designing tasks for cooperated activities, cultural differences, and awareness of sensitivity and problems of retentively (Motzo & Proudfoot, 2017). In addition, two basic problems appear very clearly in MOOC: the high percentage of non-complete courses (dropout) and forcing institutions to have less costs (Chiam, 2016). These obstacles need the efforts of teachers to be more qualified and capable in the technical areas and digital ones. However, since the institutions face the issue of preserving classes provided by MOOCs, lectures must highlight the significant factors to develop the platform. As a result, making it an efficient tool with a high-quality process will also increase the effectiveness of teaching and learning. In the scale of Likert, it is clearly seen that eight cons or obstacles are mentioned: Internet/WiFi, comprehension of MOOCs' use, MOOCs' tools, students' discipline, students' encouragement, MOOCs' materials, grades' division and providing courses in the MOOC (Atiaja & Proenza, 2016).

However, the MOOC faces challenges with quality where the problem of quality is considered as a very significant issue in colleges. Since MOOC mainly relies on a self-direction way of education, it contains a new way of formal education, including various experiences. Also, the educational

environment of MOOCs is open in nature, which makes it contain self-selection to participate in these learning processes. Thus, developing an educational environment that satisfies the user's expectations will be a suitable solution for such a problem. Thus, students' satisfaction with these courses will lead them to complete the courses totally till the end without dropping out. Not only quality and completion rates resemble obstacles in MOOCs' applying but also the students themselves. To illustrate, they must have their own responsibilities while learning, besides having the capability of self-regulation and having a specific purpose to achieve. Since this kind of learning is artificial, time and effort must be provided to finish the courses (Zulkifli, Hamzah & Bashah, 2020).

Furthermore, encouragements and self-regulation are considered as the basic terms to succeed in this process. Moreover, grading may reflect as an issue since it is automatic and peer-based, besides having teaching assistance, which means that all of them are mandatory. Accreditation is also an obstacle because academic learning needs dedication to reach the educational goals with high accuracy. In addition, when it comes to the standards and the grading issues, the materials must be arranged and organised to help and guide learners, especially when taking up the included courses. For instance, a section that guides students can be very helpful by naming it the 'Getting Started Section', by showing them how to understand the content, how to hand in the homework, how to participate in some group discussions or even how to finish assessments. On the other hand, the high quantity of materials will badly affect the information included in the courses which will affect the grades. To further elucidate, the large amounts of assignments will prevent MOOCs from grading them, which will present a serious problem (Zulkifli et al., 2020).

Similarly, the dropout rate is another problem where less than 10% of the learners finish their courses. Thus, to solve this problem, the reasons behind it must be known (Farmer, 2013). Also, to solve this issue, the payment costs must be reduced and cut, which will motivate them to finish their classes completely. Moreover, cheating in these courses is very predictable wherein authenticity depends on student's morality and identity. As a result, plagiarism has a strong rate to be found where the only factor to stop it or prevent it totally is the learners' manners. Also, this type of education does not need acceptance papers, but it must give certificates and signed papers to prove that learners have completed their courses. This is something unproven which makes MOOCs' users doubt whether they will get a certificate or not. In this case, this doubt contributes to reducing its authenticity. Finally, improving the revenue samples to make the term of self-sustaining also plays a role in this area. This aims to balance between the on going and the start-up costs.

7. Conclusion

Using MOOCs in education leads to a positive effect on the learning system, precisely in higher studies. Having a quick growth in the virtual environment and the technological methods contributed to creating a huge difference in sharing knowledge in a very acceptable way by both learners and lecturers, despite difficulties and obstacles faced through it. Therefore, in this paper, we aimed to clarify and discuss the most popular difficulties that face MOOCs in the learning process for the purposes of finding some solutions to develop it. We wish that this study will be helpful for lecturers through increasing the efficiency of MOOCs, besides the help of teachers themselves. They must choose the best technique for maximising the rate of MOOCs' use. Nevertheless, institutions must always develop the WiFi and services in order to satisfy and to fulfil the students' needs. For example, they must not face any problem like connecting to the Internet. Thus, teachers must give serious attention to find significant methods in order to develop MOOCs' platforms to reach a kind of learning process. This is because of the importance of MOOCs now in the time of COVID-19 as it is very popular in all levels and departments of education.

References

- Ababneh, M., Al-Jarrah, A. & Cavus, N. (2020). *Social media usage in education: big data perspective*. In Proceedings of the 14th International Technology, Education and Development Conference (pp. 3689–3698). IATED Publications.
- Abu-Shanab, E. A. & Musleh, S. (2018). The adoption of massive open online courses: challenges and benefits. *International Journal of Web-Based Learning and Teaching Technologies*, 13(4), 62–76.
- Adzhar, H., Khalid, F. & Karim, A. A. (2017). Penggunaan massive open online course (MOOC) sebagai kaedah pembelajaran baharu. *Pembelajaran Abad ke-21: Trend Integrasi Teknologi*, 179–188.
- Ain, N. & Liza, R. (2018). Kesiediaan penggunaan massive open online course (MOOC) dalam kalangan pelajar sijil pengoperasian perniagaan kolej komuniti ledang. In *Proceedings of the International Prosiding Conference on Global Education* (pp. 1932–1942). Pulau Pinang: Politeknik Seberang Perai.
- Albo, L. & Hernandez Leo, D. (2017). *Breaking the walls of a campus summer course for high school students with two MOOCs*. Paper presented at: Hybrid Ed Workshop. Innovations in blended learning with MOOCs, 24 May 2017, Leganes, Spain. Retrieved October 02, 2020, from https://repositori.upf.edu/bitstream/handle/10230/32157/Albo_HybridEdWorkshop_brea.pdf?sequence=1&isAllowed=y
- Albo, L. & Hernandez-Leo, D. (2020). Conceptualising a visual representation model for MOOC-based blended learning designs. *Australasian Journal of Educational Technology*, 36(4), 1–26.
- Altinpulluk, H. & Kesim, M. (2016). *The evolution of MOOCs and a clarification of terminology through literature review*. In Proceedings of the EDEN European Distance and E-Learning Network Annual Conference (pp. 220–231). Budapest, Hungary: European Distance and E-Learning Network.
- Anderson, E. W., Potter, K. C., Matzen, L. E., Shepherd, J. F., Preston, G. A. & Silva, C. T. (2011). A user study of visualization effectiveness using EEG and cognitive load. *Computer Graphics Forum*, 30(3), 791–800.
- Andone, D., Mihaescu, V., Ternauciu, A. & Vasiiu, R. (2015). *Integrating MOOCs in traditional higher education*. In *Proceedings of the Third European MOOCs Stakeholder Summit* (pp. 71–75). Retrieved October 02, 2020, from https://www.researchgate.net/publication/289991756_Integrating_MOOCs_in_Traditional_Higher_Education
- Atiaja, L. A. & Proenza, R. (2016). The MOOCs: origin, characterization, principal problems and challenges in Higher Education. *Journal of e-Learning and Knowledge Society*, 12(1), 65–76.
- Ben-Shahar, T. H. (2017). Big data and educational justice. Retrieved October 02, 2020, from <https://law.haifa.ac.il/images/SSRN-id2990065.pdf>
- Bol, L. & Garner, J. K. (2011). Challenges in supporting self-regulation in distance education environments. *Journal of Computing in Higher Education*, 23(2–3), 104–123.
- Boyatt, R., Joy, M., Rocks, C. & Sinclair, J. (2014). *What (Use) is a MOOC?* In Proceedings of the 2nd International Workshop on Learning Technology for Education in Cloud (pp.133–145). Berlin, Germany: Springer.
- Bucovetchi, O., Stanciu, R. D. & Simion, C. P. (2016). Study on designing a curriculum suitable for MOOC platforms starting out the Romanian students' expectations. *Procedia Technology*, 22, 1135–1141.
- Buhl, M. & Andreasen, L. B. (2018). Learning potentials and educational challenges of massive open online courses (MOOCs) in lifelong learning. *International Review of Education*, 64, 151–160.
- Burgess, S. & Sievertsen, H. H. (2020). Schools, skills, and learning: the impact of COVID-19 on education. Retrieved October 02, 2020, from <https://voxeu.org/article/impact-covid-19-education>
- Castillo, N. M., Lee, J., Zahra, F. T. & Wagner, D. A. (2015). MOOCs for development: trends, challenges, and opportunities. *International Technologies and International Development*, 11(2), 35.
- Cavus, N. & Mohammed, A. K. (2017). Investigating faculty members' awareness on social media usage in teaching and learning. *New Trends and Issues Proceedings on Humanities and Social Sciences*, 3(3), 221–226.
- Chen, K. Z. & Oakley, B. (2020). Redeveloping a global MOOC to be more locally relevant: design-based research. *International Journal of Educational Technology in Higher Education*, 17(1), 1–22.
- Chiam, C. C. (2016). Benefits and challenges of massive open online courses. *ASEAN Journal of Open and Distance Learning*, 8(1), 16–23.

- Coetzee, S. A., Schmulian, A. & Coetzee, R. (2018). Web conferencing-based tutorials: student perceptions thereof and the effect on academic performance in accounting education. *Accounting Education*, 27(5), 531–546.
- Cole, A. W. & Timmerman, C. E. (2015). What do current college students think about MOOCs. *MERLOT Journal of Online Learning and Teaching*, 11(2), 188–201.
- Conole, G. G. (2013). MOOCs as disruptive technologies: strategies for enhancing the learner experience and quality of MOOCs. *Revista de Educacion a Distancia*, 39, 1–17.
- Coursera. (2020). Coursera coronavirus response initiative. Retrieved May 16, 2020, from <https://www.coursera.org/coronavirus>
- Daud, M. Y., Zulkifli, F. N., Rahman, M. J. A. & Khalid, F. (2017). Kesediaan pelajar siswazah menggunakan mooc dalam pengajaran dan pembelajaran. *In Proceedings of the Seminar Pendidikan Serantau ke-VIII*. (pp. 636–650). Retrieved October 02, 2020, from <https://seminarserantau2017.files.wordpress.com/2017/09/75-md-yusoff-daud.pdf>
- Del Rio, C. & Malani, P. N. (2020). 2019 Novel corona virus-important information for clinicians. *JAMA*, 323(11), 1039–1040.
- Ding, M., Wang, Y., Braga, L. H. & Matsumoto, E. D. (2020). Urology education in the time of COVID-19. *Canadian Urological Association Journal*, 14(6), E231–E232.
- Dunlosky, J. & Lipko, A. R. (2007). Meta comprehension: a brief history and how to improve its accuracy. *Current Directions in Psychological Science*, 16(4), 228–232.
- Ebner, M., Schon, S. & Braun, C. (2020). *More than a MOOC - seven learning and teaching scenarios to use MOOCs in higher education and beyond*. In *Proceedings of the Emerging Technologies and Pedagogies in the Curriculum* (pp. 75–87). Berlin, Germany: Springer.
- edX. (2020). edX Online Campus. Retrieved October 02, 2020, from <https://campus.edx.org/>
- Farmer, L. S. (2013). Technology use and research approaches for community education and professional development. In V. C. Bryan & V. C. X. Wang (Eds.), *Technology use and its changing role in community education* (pp. 134–149). Hershey, PA: IGI Global.
- Ferguson, R. & Clow, D. (2015). *Examining engagement: analysing learner subpopulations in massive open online courses (MOOCs)*. In *Proceedings of the Fifth International Conference on Learning Analytics and Knowledge* (pp. 51–58). New York, NY: ACM Press.
- Galimullina, N. M., Korshunova, O. N. & Feoktistova, I. R. (2020). *The role of MOOC courses in the development of Polytechnic Education*. In *Proceedings of the International Scientific Conference 'Far East Con'* (pp. 1731–1740). Atlantis Press.
- Guo, P. (2017). MOOC and SPOC, which one is better. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(8), 5961–5967.
- Haron, H., Hussin, S., Yusof, A. R. M. & Yusof, H., (2019a). MOOC initiative: a technology enhanced learning in 21 century at higher learning institution. *Journal of Information System and Technology Management*, 4(14), 26–33.
- Haron, H., Yusof, A. R. M., Samad, H., Ismail, N., Juanita, A. & Yusof, H. (2019b). The platform of MOOC (Massive Open Online Course) on open learning: issues and challenges. *International Journal of Modern Education*, 1(3), 1–9.
- Hashim, H. U., Rusli, R., Yunus, M. M. & Hashim, H. (2019). Are Malaysian university students 'MOOCs-ready'? *Creative Education*, 10(12), 2540–2547.
- Jansen, R. S., van Leeuwen, A., Janssen, J., Conijn, R. & Kester, L. (2020). Supporting learners' self-regulated learning in massive open online courses. *Computers and Education*, 146, 103771.
- Jenny, W. A. N. G., Lin, C. F. C., Wei-Chieh, W. Y. & Emily, W. U. (2013). Meaningful engagement in facebook learning environments: merging social and academic lives. *Turkish Online Journal of Distance Education*, 14(1), 302–322.
- Karnouskos, S. (2017). Massive open online courses (MOOCs) as an enabler for competent employees and innovation in industry. *Computers in Industry*, 91, 1–10.

- Aljarrah, A. A., Ababneh, M. A. & Cavus, N. (2020). The role of massive open online courses during the COVID-19 era: Challenges and perspective. *New Trends and Issues Proceedings on Humanities and Social Sciences*. 7(3), pp 142–152. Available from: www.prosoc.eu
- Kloos, C. D., Munoz-Merino, P. J., Alario-Hoyos, C., Ayres, I. E. & Fernandez-Panadero, C. (2015). *Mixing and blending MOOC technologies with face-to-face pedagogies*. In Proceedings of the Global Engineering Education Conference (pp. 967–971). Piscataway, NJ: IEEE.
- Kocdar, S., Okur, M. & Bozkurt, A. (2017). An examination of xMOOCs: an embedded single case study based on Conole's 12 dimensions. *Turkish Online Journal of Distance Education*, 18(4), 52–65.
- Lawal, A. & Cavus, N. (2019). *Detection and prevention of social media cybercrime among students*. In the Proceedings of the 11th Annual International Conference on Education and New Learning Technologies (pp.3773–3779). IATED Publications.
- Littlejohn, A., Hood, N., Milligan, C. & Mustain, P. (2016). Learning in MOOCs: motivations and self-regulated learning in MOOCs. *The Internet and Higher Education*, 29, 40–48.
- Liyanagunawardena, T. R. & Williams, S. A. (2014). Massive open online courses on health and medicine. *Journal of Medical Internet Research*, 16(8), e191.
- Lund A. & Zukerfeld M. (2020a). Corporate capitalism's use of openness. In A. Lund & M. Zukerfeld (Eds.), *Profiting from massive open online courses* (pp. 241–272). Cham, Switzerland: Palgrave Macmillan.
- Lund, A. & Zukerfeld, M. (2020b). Profiting from massive open online courses. In M. Zukerfeld, A. Lund (Ed.), *Corporate capitalism's use of openness*(pp. 241–272). Cham, Switzerland: Palgrave Macmillan.
- Miller, S. L. (2015). Teaching an online pedagogy MOOC. *Journal of Online Learning and Teaching*, 11(1), 87–102.
- Motzo, A. & Proudfoot, A. (2017). MOOCs for language learning—opportunities and challenges: the case of the Open University Italian Beginners' MOOCs. In K. Qian and B. Stephen (Eds.), *Beyond the language classroom: researching MOOCs and other innovations* (pp. 85–98).Research Publishing.
- Perez-Sanagustin, M., Hilliger, I., Alario-Hoyos, C., Kloos, C. D. & Rayyan, S. (2017). H-MOOC framework: reusing MOOCs for hybrid education. *Journal of Computing in Higher Education*, 29(1), 47–64.
- Pickering, J. D. & Swinnerton, B. J. (2017). An anatomy massive open online course as a continuing professional development tool for healthcare professionals. *Medical Science Educator*, 27(2), 243–252.
- Ramirez, M. S., Rivera, N. & Garcia, A. (2014). *MOOC learning: challenges and opportunities of using team teaching*. In Proceedings of 7th International Conference of Education, Research and Innovation (pp. 5751–5756). Barcelona, Spain: IATED Publications.
- Sadhasivam, J. (2014). Educational paradigm shift: are we ready to adopt MOOC? *International Journal of Emerging Technologies in Learning*, 9(4), 50–55.
- Sadhasivam, J. & Babu, R. (2017). MOOC: a framework for learners using learning style. *International Education and Research Journal*, 3(2), 21–24.
- Shah, D. (2017). *MOOCs started out completely free. Where are they now*. Retrieved October 02, 2020, from <https://www.class-central.com/report/moocs-started-completely-free-now/>
- Stuchlikova, L. & Kosa, A. (2013). *Massive open online courses-challenges and solutions in engineering education*. In Proceedings of the 11th International Conference on Emerging eLearning Technologies and Applications (pp. 359–364). Piscataway, NJ: IEEE.
- Uyeki, T. M., Bundesmann, M. & Alhazzani, W. (2020). Clinical management of critically ill adults with Corona virus disease 2019 (COVID-19). Retrieved October 2, 2020, from https://emergency.cdc.gov/coca/calls/2020/callinfo_040220.asp
- Yuan, L. & Powell, S. J. (2013). *MOOCs and open education: implications for higher education*. Retrieved October 2, 2020, from <http://hdl.voced.edu.au/10707/284805>
- Zulkifli, N., Hamzah, M. I. & Bashah, N. H. (2020). Challenges to teaching and learning using MOOC. *Creative Education*, 11(3), 197–205.