

Massive Open Online Courses (MOOCs): Practices, Trends, and Challenges for the Higher Education

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ABSTRACT

The purpose of this paper is to provide an insight into the term Massive Online Open Courses (MOOCs), the practices, trends, and challenges for the higher education institutions. MOOCs, although having a short history, literally took off in 2012 when MIT and Harvard created “edX”, former Stanford professors created “Coursera”, a private company created “Udacity”, and UK’s Open University created “Future Learn”. Nowadays, the majority of academic institutions in the US and Europe are offering MOOCs to their students, providing a wide variety of online courses in different subjects with the option, if wanted, to obtain a course certificate. The arrival of MOOCs has greatly affected higher education worldwide, since learners have greater access and more options for their education, they are forcing higher education institutions to reevaluate their educational approaches and comply with the current educational trends. There are many reasons why students decide to participate in a MOOC. Naming a few, to obtain a degree, to get a new job, to get a promotion, to get a post-retirement job, to be admitted to a college, to use it as corporate training. For this reason, both state and private universities begin to reexamine their educational strategy and methods, at a local and international level. The question that arises regards whether MOOCs can be the future of education, or it will be proved that this increasing interest is nothing more than a bubble that will burst in the foreseeable future.

Keywords: Higher Education, Massive Online Open Courses (MOOCs), Online courses

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I. INTRODUCTION

The progress of technology has significantly influenced human life during the last decades. More particular, in the field of education, all these years, courses were taught in a traditional way, meaning a blackboard and a teacher. Then, around the 2000s, this classic way of teaching changed. Internet became a vital tool playing, at the same time, a tremendous role in the spread of education to a great extent of people, of different ages and areas of interest, in both countries of the developed and developing world (Yuan, 2013).

One specific aspect of the aforementioned impact was the launch of the so-called Massive Open Online Courses (MOOCs) which started in 2008 and from that moment gained an increasing influence in both magnitude and scale. Particularly, online courses have been adopted by the greatest universities around the world. MIT, Harvard, Yale, Cambridge and Oxford are among the most prestigious academic institutions that have adopted this type of education (Aguaded-Gomez, 2013).

The economic, technological and professional developments that are taking place nowadays have imposed a new global lifestyle, the main feature of which is the

specialized work. The prerequisite is the acquisition of specialized knowledge and the constant enrichment of knowledge and technology in order to enable citizens to meet the needs of modern society (Yassin, 2013).

Over the last 20 years, the rapid expansion of digital and internet use has greatly improved the educational opportunities offered to citizens, of all ages and ages. Overcoming obstacles due to their social background and financial situation, and linking their needs, depending on the age and the stage of their professional development, to a lifelong learning perspective (Baggaley, 2013).

More and more programs of study, training, and vocational training are offered in a flexible way, with the use of distance learning and the use of technology, and the internet. On the one hand, teachers, training centers, organizations, and businesses need to be informed about developments in technology, the means, and new techniques they can use to continuously improve their programs. On the other hand, citizens are constantly looking for advice and information on new technologies and specifically on the subject they are interested in. Therefore, they choose the corresponding training program, an online course, and even a curriculum, which they wish to follow remotely in order to acquire specialized knowledge in the subject or to improve

their already existing knowledge (Chamberlin & Parish, 2011).

Modern training methods are based on online learning systems and on modern teaching support technologies. The most modern yet effective way of continuous learning is through new powerful e-learning models that provide the ability to properly manage knowledge (Nyberg, 1975).

One striking feature worth mentioning is the reason why online courses are so popular with students from different disciplines around the world. The main and most fundamental reason lies in the fact that students tend to believe that these courses are better in quality in comparison to the ones taught in their academic institutions (Hysten & Schuller, 2007). Consequently, they are eager to learn and obtain the certificate that each online course can offer them. Some of the most famous online educational platforms are edX, Coursera, and Udacity (Fraser & Dean, 1997). The courses provided on these platforms have critically contributed to the amelioration of millions of students' knowledge around the world, as not only they can expand their understanding of different areas and disciplines but also it is a direct way to boost their career prospects. Through this scope of analysis, it is clear that MOOCs' impact can be found on both a theoretical and practical basis. By taking the latter into account, at a future step, students would have the opportunity to obtain an e-portfolio with the chosen online courses which will indicate their area of interest and their eagerness on learning and boost their career prospects (Esichikul, Lamnoi & Bechter, 2011).

The age of the image and the information that the world is experiencing have affected all areas of human life. Technology is changing the technological achievements are great, the companies and the consumers are frankly seeking and praising innovation. Societies have led to globalization and Information and Communication Technologies (ICT) have spread and affected all areas of modern life man (Limongelli, Sciarrone & Vaste, 2011). The terms computer, internet, and electronics systems are everywhere and have marked the emergence and growth of global terms such as social media, e-learning, e-commerce, and digital marketing (Felder & Silverman, 1998).

Businesses most of all sectors were directly affected to modernize, operate online through digital systems, and increase their sales while reducing costs of their operation. The use of ICT is enormous in education as well. The modern man will be trained as much as possible in new technologies to avoid the so-called "digital exclusion" at work (Daniel, 2012). The dominant 21st-century learning skills according to executives of higher education institutions and high-tech companies in the USA are information and communication skills. Literacy in the days we are now ICT literacy, which is the ability to use digital technology and communication networks to operate in a society of knowledge (Cusumano, 2013).

ICT was primarily applied to Greek education at all levels and later in other areas. The computer is the main axis of the integration of new technologies into the educational process due to the capabilities which it offers for multiple representations of information and interconnection communication networks (Bull, 2012). The educational system to meet the needs of modern integration of ICT into

the educational process with the ultimate goal of the most effective and quality upgraded education. More specifically students acquire technological culture and become familiar with new media technology, the information is presented in many forms and activates more than one sensation, and possibilities of immediate feedback are provided (Limongelli, Sciarrone, Tempelini & Vaste, 2009).

In addition to pupils, the integration of ICT into education benefits the state as they are creating technologically informed citizens who can contribute to the modernization of society. The introduction of ICT in the educational process is a fact in Greece with the form of distance learning since the 1990s when it was founded Hellenic Open University (EAP). The face-to-face educational process has largely been replaced by distance learning (e-learning) at all three levels of the Typical Educational System, primary, secondary, and tertiary education. Subsequently the Greek Open and Distance Learning Network.

The remainder of this paper is organized as follows. In Section II a thorough presentation in conjunction with a critical analysis regarding the emergence, the meaning, and the existing types of MOOCs are presented. Section III describes the MOOCs' characteristics. Sections IV and V demonstrated and discussed MOOCs in Europe and Greece respectively. The discussion of MOOCs in Greece focuses on the significance of MOOCs in the education system of Greece, concluding with some critical reflections on further improvements to the current situation. Section VI referred to MOOCs' role in the future. Finally, Section VII concludes this work.

II. MOOCs: MEANING AND MAIN TYPES

A. MOOCs: Meaning under a Critical Reflection

The term Massive Open Online Courses (MOOCs) refers to the online courses aiming at massive participation through an open type of access. Most of these courses are free of charge. However, the more the prestige of the provider of the online course (academic institution, company, business, or NGO) the higher the amount of money the participants need to pay in order to get the specific certificate of attendance.

For someone to attend an online course, all she/he needs is a computer and internet connection. Then, after choosing the course of her/his preference the student (or the professional) needs to enroll in this course, watch the videos with the lectures and the tutorials and then complete the tests and quizzes through the forms of formative assessments. Each course has a specific duration of time (from 6 – 12 weeks) and when is completed a certificate of successful attendance is given to the participant (Cooper & Sahami, 2013).

B. MOOCs: How Did It All Start

1) 2000 – 2002

The appearance of MOOCs can be traced back to 2000 when the universities around the world were providing the course material with the purpose to help students and ameliorate their academic performance. The pioneer academic institution was MIT which, until today, is offering

the most extensive amount of course material. Its website entitled MIT

OpenCourseWare (2002) provides learning material for more than 2340 courses and hosts more than 200 million participants. The main purpose of this platform was to publish on the web the course material and the latter to be accessible to everyone interested in attending it (Hylen & Schuller, 2007).

“The idea behind this online platform is crystal clear: to publish the course material of all of our courses on the web and make it widespread accessible to those interested in learning and improving their knowledge” says Dick K.P. Yue, Professor of Mechanical and Ocean Engineering, at MIT. He was the originator of MIT OpenCourseWare (OCW), a program that has transformed the global higher education landscape. OCW has been accessed by a quarter of a billion educators and learners worldwide, and has inspired and helped launch large international consortia devoted to open educational resources.

2) 2007

In 2007 and by taking into account the existing competition, Yale College decided to follow the steps of MIT. It created an online platform of selected courses by making them accessible and free of charge to everyone. The Open Yale Courses is sponsored by William and Flora Hewlett Foundation and aimed in offering knowledge and educational opportunities to the citizens of the world (Surjono, 2014).

At the same period of time, one of the most famous worldwide organizations, Apple, is launching the iTunes U application. To be more specific, this new brand application was aiming to help users in saving and uploading educational videos, books, journals, and other reading visual materials. Consequently, many universities in the UK, US, Australia, and Canada took advantage of it and helped even more users to come close to ‘knowledge’ by all means.

3) 2008

In 2008, George Siemens and David Cormier, two emeritus professors from Canada, were the pioneers of the term MOOCs. What is more, this was the year when the first organized MOOC, with the form that is known nowadays, was launched by George Siemens and Stephen Downes. Entitled “Connectivism and Connective Knowledge” (CCK08), this course succeeded in ‘attracting’ more than 2200 participants worldwide who attended the lectures and the tutorial through online transmission.

4) 2011

Since 2011, MOOCs have become the most popular way of distance learning. This was the year when Stanford University founded the Udacity platform with the course “Artificial Intelligence” by Sebastian Thrun and Peter Norvig which attracted more than 160,000 users in more than 190 countries. Nowadays, Udacity hosts 1.6 million users.

5) 2012

Andrew Ng and Daphne Koller collaborated with Stanford University, Princeton University, the University of Michigan and the University of Pennsylvania and created

the well-known Coursera platform. The platform, at this moment, provides 1,563 courses in more than 28 countries.

In the same year, EDX was founded too. This platform was established by Harvard University and MIT, offering an online ‘learning destination’ with more than 90 members from distinguished universities and non-profit organizations.

At the end of the same year, the Future Learn platform, supported by Open University, also appeared on the scene. In 2013, it offered its first lesson, and, nowadays, has more than 4.5 million users (Liyanagunawardena *et al.*, 2013).

C. MOOCs: How does it Work?

MOOCs create online communities that include apprentices, teachers, and, often, assistants. Everyone can maintain their own account and profile adjusting it at no cost. From the moment, somebody chooses to enroll in a lesson, the time duration lasts from 6 to 12 weeks. The most common way of transmitting the lesson is by attending a few minutes’ videos of lectures and tutorials. These are open and accessible to all, 24 hours a day and 7 days a week. After the lectures, a quiz or peer-to-peer evaluation is carried out, which leads to obtaining certification with or without a fee (Pange & Lekka, 2012).

D. MOOCs: The 3 Main Types

- i. vMOOCs, task-based: This type of MOOCs uses a series of tasks that need to be completed to acquire skills, so it is job-based. The community can provide help and examples but this is not a primary goal. The letter “v” comes from the word “Vocational” because vMOOCs are used for professional training and are based on simulations and related technologies for competence assessment and skills (Tuomi, 2006).
- ii. xMOOCs, content-based: This term was used by Stephen Downs to separate them from cMOOCs. xMOOCs are content-based, have the most records, and are more popular. They use the principles of objectivity as an educational model and aim at acquiring skills through the content.
- iii. cMOOCs, network-based: this type of MOOCs is network-based. The letter “c” refers to the word “Connectivism” as this kind uses the principles of concretization as an educational model. Their main goal is communication, collectively structured knowledge, and exposure to a participant environment, leaving content and skills (Sandeem, 2013).

III. MOOCs: CHARACTERISTICS

A. MOOCs: Pros and Cons

1) MOOCs’ Positive Aspects

- **Massive:** MOOCs host a large number of participants, who may otherwise have been excluded because of the space, time, and financial problems they face. The type of organization that MOOCs use, makes them more accessible to users. Every participant can enroll on any platform without being a member of the university host institution, which may involve high tuition fees. What is more, many countries have benefited from

this action as they obtain access to higher education (Sabine & Beate, 2005).

- **Openness:** In order for someone to attend a MOOC lesson all she/he needs is a computer and internet connection. Most platforms are open and free of charge unless a certain amount of money is required for certification. In addition, all course material needed by the user, curriculum, lectures, information sources, etc., is provided by the platform providers (Tsolis *et al.*, 2011).
- **The Concept of Contemplation:** Most MOOCs follow the principles of concretization such as openness, diversity, autonomy, and interaction. More specifically, users interact and share information, goals, abilities, skills, and interests (Skiba, 2013).
- **The Variety of Courses:** MOOCs facilitate lifelong learning and help users to broaden their knowledge or improve the existing ones. There is a huge range of courses, from art to computer science. Some specializations are those that follow: Humanities, Science, Technology, Health, Business Administration, Education, etc. The graph below illustrates some of these specialties and their appeal to the public.



- Humanities 20%
- Computers / Programming 16%
- Business Administration 15%
- Sciences 11%
- Health Sciences 11%
- Education/ Mathematics/Social Sciences 5%

Fig. 1. MOOC's Specialities and Appeal to the Public.

2) *MOOCs' Disadvantages*

- **Data copying:** The fact that all the course material (video lectures, PowerPoint presentations, links, e-books, etc.) is open and accessible to everyone poses a risk to authors' copyrights. Consequently, each of the aforementioned online platforms should create a mechanism that ensures authors' copyright and that the material available to users is legitimate.
- **Certification:** Two factors are problematic with certification. One is that although most MOOCs are initially free, then an amount of money may be required by the user in order to receive the corresponding certification. The other factor is whether the certification provided by MOOCs is valid and recognizable by other organizations (Schrire & Levy, 2012).
- **The role of the professor:** The autonomy provided by MOOCs can lead to a downgrading of the role

of the professor as the learning process can evolve uncontrollably from the participant. The trainee is responsible for his / her learning, paying particular attention to his / her teaching skills and not to the transmission of knowledge. The learner is unable to manage the classroom and shape the personality of the users.

- **Lack of guidance:** The difficulty of directness and communication between the teacher and the student creates chaos and most of the participants resort to abandonment. Specifically, the percentage of students dropping out before completing their studies is extremely high, reaching 90%.

The following Fig. 2 summarises all the questions that arise from the characteristics, negative and positive, presented above.

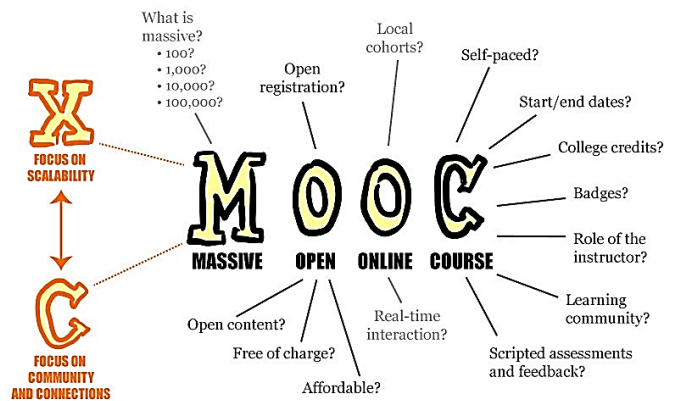


Fig. 2. MOOC, every letter is negotiable.

B. 2.5 *MOOCs: Programming and Logistics*

MOOCs are based on the concept of *Open Educational Resource (OER)*. Open Educational Resources is educational digital material given free to teachers and students for use and reuse for educational purposes (learning and teaching). Open-source software includes the following:

- Software server and client system.
- Server software.
- Learning management software.
- Software for creating educational material.
- Internet Browser.
- Information support software that uses management systems learning.

In addition, in order to create properly and effectively a distance and online lesson this requires some tools, which are used with open-source software. These means are:

- The moving picture.
- PDAs.
- E-Portfolio (hardware collections)
- Audio players.
- Websites and communities.
- Email.
- Games.
- Simulators.
- Educational animation.
- Blogs.
- Assisted assessment.
- Forum.

- CD-ROM.
- Voting system etc.

As the most basic way of transmitting the lesson is through an online video, this requires a large number of people who will work together in order to achieve this result' from educational designers to digital platform specialists, filmmakers, and technology experts. Beyond the people who work for a platform, reliable and high-speed internet connectivity and a media/content sharing browser are also required (Vardi, 2012).

Last but not least, regarding the form of evaluation, there are two ways of conducting it; either by questionnaires and quizzes or by an evaluation by the other classmates.

C. MOOCs: Examples

Below is a list of MOOCs indicative platforms (the order is random).

- Stanford Online: Stanford University initiative, offers a wide variety of professional education, 2006, USA.

<http://online.stanford.edu/>

- National Program on Technology Enhanced Learning (NPTEL), funded by the Ministry of Human Resource Development (MHRD), 2006, India.

<http://nptel.ac.in/>

- Coursera, through various universities, 2012, USA.

<https://www.coursera.org/>

- Open2Study, based on seven Australian universities, 2013, Australia.

<https://www.open2study.com/>

- EDX, Massachusetts and Harvard Technology Foundation, 2012, USA.

<https://www.edx.org/>

- Iversity, courses and lectures of higher education, 2013, Europe.

<https://iversity.org>

- One Month, technology-based courses, 2013, USA.

<https://onemonth.com/>

- NovoEd, founded by Stanford, 2013, USA.

<https://novoed.com/>

- Pacific Open Learning Health Net (POLHN), focusing on Pacific health practitioners, 2005, Western Pacific Region.

<http://courses.polhncourses.org/>

- Udacity, 2012, USA.

<https://www.udacity.com/>

- Academic Earth, video lectures from various institutions such as UC Berkeley, UCLA, University of Michigan, Harvard, MIT, etc. 2009, USA.

<http://academicearth.org/>

- FutureLearn, lucrative and owned by Open University, 2012, United Kingdom.

<https://www.futurelearn.com/>

- Kadenze, offering courses related to art, music, and creative technology, 2015, USA.

<https://www.kadenze.com/>

IV. MOOCs IN EUROPE

The European Association of Distance Teaching Universities, EADTU, was created to provide online open and flexible tertiary education and its members cover 200

universities and approximately three million students. In April 2013, EADTU Erasmus+ creates the OpenupEd platform to increase access to and participation in education. It consists of eleven member countries, eight within the European Union, and three outside the EU. These are France, Italy, Lithuania, the Netherlands, Portugal, Slovakia, Spain, and the United Kingdom as well as Russia, Turkey, and Israel. Among the partners in the Hellenic Open University (EAP), which offers MOOCs as well as the University of Cyprus, which of course does not give this possibility. This platform is a nonprofit collaboration that offers MOOCs with high-quality courses that can be distinguished either in scheduled MOOCs or in self-paced MOOCs. It initially started with 40 lessons and has now reached more than 200 MOOCs through partner platforms in 13 languages plus Arabic.

The following figure shows the emergence of MOOCs in Europe, as observed in 2015. What can be seen is that in 2015 no effort has been made by Greece to create such courses.

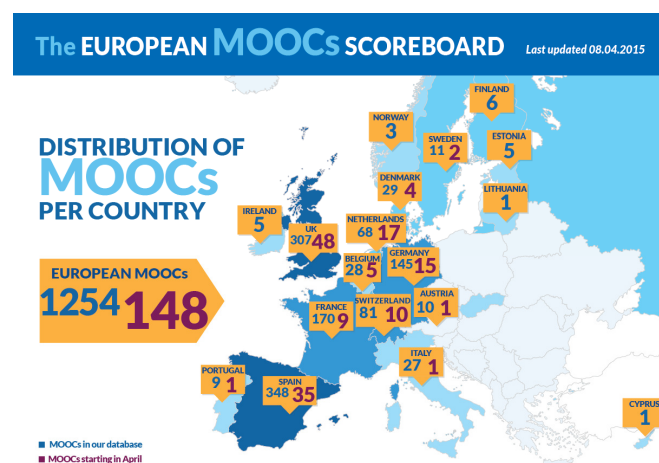


Fig. 3. MOOCs in Europe in 2015.

V. MOOCs IN GREECE

In recent years there has been a desire for Greek universities to join MOOCs by offering them free online lessons through the internet. Below are some of the Greek universities that have gone to this area with their own courses and the corresponding platforms that serve them as well as an action from Academic Courses that are a step toward them (Zutshi, O'Hare & Rodafinos, 2013).

1) MeaeX - Hellenic Open University

The Hellenic Open University, EAP offers online courses-training seminars through MeaeX. This platform was created by the Internal Evaluation and Training Unit (IAEA) and is supported by OpenEdx. Two online courses are being conducted until now. The lessons to be conducted on the platform are announced by the EAP and the IAEA page. Upon completion of the course and the successful course of the interested person through evaluations and questionnaires, certification is given.

2) Mathesis - University of Crete

Another interesting action for creating MOOC is that of the University Publications of Crete that created in 2015 the Mathesis Open Internet Courses Mathesis in order to

provide the public with online courses of an international level. They seek to work not only with professors from the University of Crete but with professors from all the Greek Universities. Mathesis has set up its first courses on the Edx platform and aspires to: "Ensure - choosing the right 'writers' - that the quality of his 'books' will not be inferior to the 'environment' that hosts them". Eleven courses have been created as a whole and the subjects are Physics and History.

3) Ionian University

The Ionian University, in collaboration with members of the Interactive Arts Research Lab and the students of the same department, designed MOOC courses. The first course is titled "Interactive Multimedia" and access to the course is provided through the Udey platform. The site where one can attend is as follows: <https://www.udemy.com>.

In addition to the actions of the universities mentioned (University of Crete and Ionian University) and the EAP, there have been two very important actions that tend to approach the term MOOC through the lessons they offer. The reason is for Open Courses and the University of Patras in cooperation with the Vocational Training Center.

4) Open Courses

Higher Education Institutions (AEI) and former (now are AEI) Technological Educational Institutions (TEI), in Greece meet on the Open Courses platform and offer online lessons for free. Open Courses were designed and implemented by the Academic Internet (GUnet) to support Open Digital Courses (AWMs) provided. They are Open Academic Courses and differ from MOOCs, but they are a good endeavor.

Characterized as the National Open-Source Portal and beyond open digital lessons, it combines the Open e-class and Open Delos platforms. The first platform concerns a modern e-course creation and management system, while Open Delos is a platform of polymorphic educational content.

5) University of Patras

Also, the University of Patras and the Vocational Training Center of the University 2014 implemented projects to develop new flexible training programs following the exploitation of technology. They also offer online courses with the ability to acquire certification. Information is available at <http://kek.upatras.gr/> of the Vocational Training Center.

Of course, to obtain a certificate, even for attending courses, it is necessary to pay a bank sum. In case someone wishes to attend a course he/she should first submit an online application to the University of Patras.

VI. MOOCs: THEIR ROLE IN THE FUTURE

Undoubtedly, nowadays, MOOCs are a new and popular way of acquiring knowledge and this will certainly have an impact on higher education. What makes them different from other lessons provided online is that they involve large institutions and universities that provide their lectures free of charge around the world at no cost. The question that

arises is whether MOOCs are a temporary trend or whether they have come to stay and how they will affect education.

On the one hand, there are several reasons for critics to think that MOOCs are a trend that will not have an impact on higher education because it is transient. The high abandonment rate by trainees (around 90%), the exclusion of interested parties without internet access, and the plagiarism that may exist are the reasons for this theory. What is more, many aspects of the traditional class such as small group discussions, conversation, and time with the teacher do not work properly in MOOCs. Indeed, Stanford University professor Susan Holmes in her interview states: "I do not think you can give Stanford an online education in the same way as I do not think Facebook gives you a social life".

On the other hand, there is a fear of lowering tertiary education due to the continuous increase of MOOCs. In addition, the quality of education will decrease as universities use MOOCs to reduce the cost of their teachers and assistants. Chris Dellaroca, a Greek professor at the University of Boston, presents the future of education and says that in the future students will choose for themselves courses that are of interest to them, thus creating their own program that will not aim both at the degree but in the continuous lifelong learning. Most lessons indicate that they will be done through the internet and now the role of the teacher will be demoted and will become a mentor, who will not teach but guide the apprentice.

Without a doubt, the above concern is not unfounded and the numbers on the rapid development of MOOCs confirm it. In the figure below we can see that the figures for MOOCs in 2016 are vertiginous and constantly growing. According to <https://www.class-central.com>, in 2016 there were 23 million new registrations globally, easing the total to 58 million, and 2,600 new courses were announced, reaching 6,850 courses in over 700 universities.

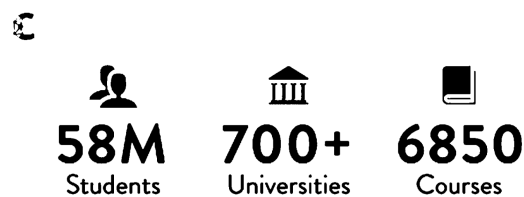


Fig. 4. MOOCs in 2016.

The following figure illustrates the evolution of MOOCs in recent years, but also their expected evolution until 2017.

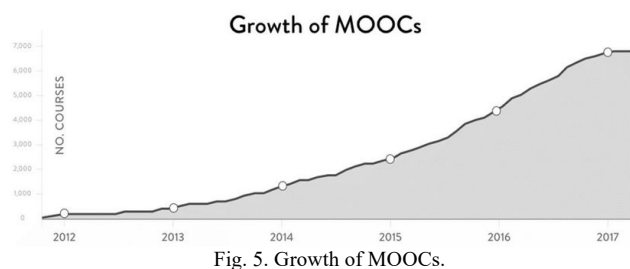


Fig. 5. Growth of MOOCs.

Below is a list of indicative websites (the order is random):

- <https://ocw.mit.edu/index.htm>
- <https://ocw.mit.edu/about/>
- <http://europestartsmooc.weebly.com/iotasigmatauo-micronrhoiotakappaalphasigmatauomicroniotachepsiloniotaalpha>
- <https://www.udacity.com/>
- <https://www.coursera.org/>
- <https://www.edx.org/>
- <https://www.futurelearn.com/>
- <http://elearninginfographics.com>
- <http://mooc.eap.gr>
- <http://mathesis.cup.gr/platforma>
- <https://www.class-central.com>

VII. CONCLUSION

The rapid development of technology contributes to the rapid development of all the sectors affected by it. Consequently, a person must constantly expand her/his knowledge, acquire new, and evolve. Obligations of course and the fast pace of life are sometimes an obstacle. That's what MOOC tends to break down. Anyone can access an enormous amount of learning material, easily, quickly, and sometimes free of charge, without having to leave her/his home (Billsberry, 2013). Too many platforms around the world provide such courses and enable the user, as mentioned before, not only to expand her/his knowledge but also to use them in professional training through specialized programs (Bissell, 2009).

What is more, questions such as whether MOOCs are a temporary trend or whether they will continue to grow to arise? The second possibility is truer. However, the rapid evolution of MOOCs poses risks to the quality of education and, in particular, to the degradation of Higher Education. Additionally, the following issues are addressed: the lack of guidance, the role of the teacher, and the copying of the data (Anderson & Dron, 2010). It is therefore expected to know in the future whether the change that MOOCs will bring will be the best. Nevertheless, we should always have in mind that obtaining knowledge from different sources is always something positive (Voudoukis, 2018). Students can ameliorate their academic performance and obtain a wide knowledge about different sectors and areas that interests them. In addition, students obtain a thorough and deeper understanding of their field of studies, while at the same time they are able to see something different that is provided by other academic international institutions (Anderson, 2011; 2003).

Below are some suggestions for possible future research and work to help improve and upgrade the personalized and adaptive e-learning system.

An evolution of the system could be to create a questionnaire that identifies learners' learning styles, based on a suitable and accurate set of questions and answers. Questionnaires on the style, personality, and behavior of the learner's study can draw important information from their answers about their learning style and preferences (Audsley et al., 2013). This information, when accurate, is crucial for the design and development of personalized e-learning systems with resilience features. Therefore, a proposal for a

future study and work is to create an appropriate questionnaire for identifying the learning style (Yuan & Powell, 2013).

In addition, future research includes the exploration of technical and functional requirements as well as the development of relevant services to be the proposed system of personalized and adaptive e-learning available on mobile devices (Vagale, 2012).

Finally, it is important to investigate whether MOOCs can be supported by Moodle LMS, as MOOCs are the new modern trend in distance learning. Because MOOCs are targeted and delivered to a very large number of users, it is helpful to look at technical requirements to support thousands of users in a system like Moodle (Bodea, Dascalu & Lytras, 2012).

Another improvement of the system is the extraction of information from the logs and reports of the system, and the appropriate processing of it to draw conclusions about the actions of the users in the e-learning system. Some of these findings are useful to include in the user profile to enhance his / her 'personalization'. In addition, it is useful in the user's profile to include his / her overall performance in the course and possibly his / her participation in the course's activities (Antonelou et al., 2012).

On the other hand, young professionals and non-students are able to attend courses from different fields that may interest them and were not able to attend them when they were younger either for financial reasons or because they did not have time. No matter the reason for someone picking to attend a MOOC the benefit is the same. Knowledge is powerful and MOOCs can be a perfect tool in this direction. Last but not least, we should always have in mind that the role of the professor is irreplaceable and that human interaction is something that cannot be substituted by fancy lectures and tutorials (Pagiatakis & Voudoukis, 2022). Undoubtedly, online education is the future. We just need to be open and welcome it.

CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

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