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MASSIVE ONLINE COURSES (MOOCS) AND THEIR ROLE IN THE DIGITALIZED ERA

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Abstract:-
In recent years, Massive Open Online Courses (MOOCs) have gained considerable attention as a new and flexible form of learning in the digitalized educational landscape. Emerging from earlier traditions of distance and self-directed education, MOOCs are designed to provide open and large-scale access to learning opportunities through the use of modern information and communication technologies. This article traces the development of MOOCs and examines their key features, including openness, scalability, and learner autonomy. It also discusses the two main MOOC models—cMOOCs and xMOOCs—highlighting their pedagogical foundations and instructional approaches. The study reviews leading MOOC platforms such as Coursera, edX, Udemy, and FutureLearn, with particular emphasis on Coursera's organizational structure, teaching methodology, technological design, and learner participation. Furthermore, the paper addresses several challenges associated with MOOCs, including low course completion rates, limited mechanisms for evaluating independent learning, and the need to respond to learners with diverse abilities and motivations. To address these concerns, the article explores blended learning strategies and proposes the use of mixed diagnostic tests as an effective tool for improving assessment and personalizing learning paths. Overall, the study suggests that while MOOCs present challenges to traditional higher education, they also encourage innovation and contribute to the development of more accessible, flexible, and learner-centred educational models.

Keywords: *Massive Open Online Courses (MOOCs); Digital Education; Online Learning Platforms; Blended Learning; Connectivism; Learning Assessment; Higher Education*

Brief history

MOOC, "Massive Open Online Course" is a term coined in 2008 by George Siemens and Stephen Downes after carrying out the online course CCK08 (Fini, 2009) that succeeded a number of previously successful OOCs (Fini et al., 2008). They have emerged, challenging existing methods and approaches and were developed from the traditions of distance and self-access learning. Their structure was inspired by the philosophy of connectivism, and the implementation requires conceptual changes in perspective from both "facilitators" (tutors) and learners.

MOOCs have become an integral part of current teaching and learning processes. This change in education is due to the increase in access to technology and from a will to increase access to education (Manning, C., Morrison, B. R., & McIlroy, T., 2014).

McAuley, et al. (2010), refer the c-MOOCs characteristics as "An online phenomenon gathering momentum over the past two years or so, a MOOC integrates the connectivity of social networking, the facilitation of an acknowledged expert in a field of study, and a collection of freely accessible online resources. Perhaps most importantly, however, a MOOC builds on the active engagement of several hundred to several thousand "students" who self-organize their participation according to learning goals, prior knowledge and skills, and common interests."

MOOCs are not recent phenomena. They have been developing successfully since 2008, and provide not only more learning opportunities but also improve the learning experience (Gaebel, 2013). As it has been said before, MOOCs have been developed from previously existing forms of learning. However, they have acquired their particular characteristics, which distinguish them from other ways of learning and can be characterised as follows (Gaebel, 2013):

- they are online courses
- with no formal entry requirement
- no participation limit
- are free of charge
- and do not earn credits.

MOOCs are mainly free, massive and international, which implies that they are formed for not only any student but also to attract the right tutors from various nations. MOOCs are not removed, once they are finished, they stay online and can be used by the participants.

According to Siemens, Hill, Downes and Daniel (2012), there are two different models of MOOCs:

- cMOOC model
- xMOOC model

cMOOC model (c for connectivity) "emphasises creation, creativity, autonomy and social networking learning" and "focus on knowledge creation and generation" and xMOOC model – "emphasises a more traditional learning **approach through video presentations and short quizzes and testing" and "focus** on knowledge duplication". (Siemens, 2012).

How are MOOCs provided?

Nowadays, MOOCs mainly involve non-profit private companies and are partnered with universities.

Here is the list of the most popular companies that provide online learning:

Coursera – a for-profit "social entrepreneurship company that partners with the top universities in the world" (Coursera Website). Website: https://www.coursera.org **edX** – not-for-profit venture established and governed by Harvard and MIT. Website: https://www.edx.org

Udemy – is a portal that facilitates online courses, mainly targeted to of entrepreneurship, IT, software use, design, arts and sports.

Website: http://www.udemy.com/about Futurelearn was established in 2012. According to the website, it "will bring together a range of free, open, online courses from leading UK universities, in the same place and under the same brand." Website: http://futurelearn.com/

Coursera is the leader in the area of MOOCs, and holds more than 5 million students, coming from around 195 countries. Presently, there are different types of online courses, due to the different pedagogical methods in distance education (Liyanagunawardena, Williams and Adams 2013).

Anant Agarwal, who manages edX, has also mentioned in his speech that, although 2013 was the hype year for MOOCs, still there are high aspirations, which are adopted by individual disappointing outcomes. He had also mentioned different ways related to supplement traditional classroom. The author believes that current education system should be reorganised, with the aim to satisfy the requirements of modern students. He mentioned to reimagine the system of education and move from lecture halls towards online space. However, Agarwal believes that distance learning courses should also be complemented along with the traditional type of learning and teaching (Agarwal 2014).

Coursera. A brief review

Coursera is most widely represented in MOOCs spectrum. It positions itself as an educational company offering free online courses for everyone (Koller, 2012) Coursera's partners are more than 100 leading universities and organisations of the world, which, thanks to a special technology, were able to teach not hundreds but millions of students.

Coursera as a start-up was founded in 2012 by two employees of Stanford University: Daphne Koller (Daphne Koller) - Professor of the Department of Computer Science and Andrew Ng (Andrew Ng) - Associate Professor of the Department of Computer Science and the Department of Electro-Director of the Laboratory of Artificial Intelligence.

The Coursera team consists of 55 employees. Their functions are distributed as follows:
the founders of Coursera, general directors - 2; President - 1; software development - 25 people; designers - 2; organization of courses - 15; business development - 5; Office employees - 2; selection of personnel - 1; team's partners - 2.

As a software platform, Coursera uses its own development. In particular, this allows to keep all statistical information about students and their activities in a single database and then use it to analyse and improve the educational process (Nihalani, 2013).
The student's workplace is any computer with a web browser. In December 2013 Coursera introduced its mobile application for the iPhone (Coursera blog). To maximise the audience's reach, the company organises equipment-equipped educational centres in those countries where a certain deficit of funds is experienced (Coursesa educational programs).
Coursera's pedagogical approach is based on several principles (Coursera sight):

1. Online education is as effective as full-time education. Mixed training, including both of these approaches, is more effective than each of them separately.
2. The widespread use of interactive exercises contributes to the maintenance of students' interest and ensures the possibility of constant repetition and testing of the acquired knowledge.
3. The possibility to repeatedly complete the assignments until a sufficient level of mastering of a separate part of the training material is acquired, allows to proceed to the study of the following parts of the course.
4. Interpreting the students' reports when they become acquainted with the methods of evaluating independent work contributes to a deeper understanding of the educational material.

Coursera offers a full course, which includes video lectures with subtitles, textual abstracts of lectures, homework, tests and final exams. A feature of the presentation of the lecture material is the division of it into small parts with a duration of no more than 20 minutes. After each such part, it is necessary to check the assimilation in various forms. Access to courses is limited in time. Each homework or test should be performed only in a certain period with an accuracy of up to a week. This allows you to plan interaction between listeners on forums and in social networks during the course. Upon completion of the course, subject to the successful completion of the assignments and the final examination, the trainee may be sent a paid certificate of completion of studies.
The cost of developing digital materials for one course is estimated at $ 15-30 thousand. The platform is capable of providing simultaneous training of up to 50 thousand people in each course.
At the time of writing, the total number of registered students reached 6,266,870.

Who enrols?
A survey carried out among the participants of a Coursera course called “machine learning” revealed that half of the students were working professionals. Smaller groups were school pupils and the unemployed. Around 40% of students took up a course because they were curious about the topic. Close to 30% wanted to master their skills, and less than 18% were enrolled because they would like to improve their job opportunities. According to Coursera and UDACITY, most of their students live outside the US (Kolwich, 2012).

Michael Gaebel (2013) states that MOOCs offer real courses since:

- they are not video-taped, but are taught courses with a variety of lectures (which are taped), textbooks and exercises;
- they have a concrete starting and end point, but within these limits allow students to study at their own pace;
- they may involve interaction between teacher and student, and among students. In most Coursera courses peer assessment is considered.

MOOC as a basis for a new form of training requires a multifaceted analysis. For example, the authors of MOOCs note (Lewin,2013) that of all enrolled in the courses more than half do the training, but not all of them completely pass the entire course. The number of students who are given certificates of completion of the course is 5-10% of the number of enrolled students. What causes this situation? Some people are enrolled in the course out of curiosity, out of a desire to see the content of lectures and to evaluate the forms of presenting the teaching material. This part of the audience does not plan to complete the course in advance. It is logical to assume that students who are interested in acquiring new knowledge face insurmountable problems during their studies.

One of such problems, which is observed in traditionally organised training, is connected with the complexity or even the impossibility of independently mastering the fundamentals of the theory or the independent application of the theory's provisions to solve practical problems. These are situations in which the teacher's help is required. The concept of blended education and traditional education (Garrison, 2008; Allen E., Seaman J., Garrett R., 2007) suggests solving this problem by organically combining electronic and human resources. But when it comes to thousands of students, no human resource is enough. The idea of automation of the educational process in these circumstances seems reasonable. It should be noted that automated training systems have existed before.

It has been observed that the system for evaluating the autonomous work of the student is weak in MOOCs . Authors of most MOOCs offer students tests that automatically evaluate only the final result and projects. It is worth mentioningthat this method of verification was proposed in the 70's. XX century by a Russian mathematician V.F. Shatalov (Shatalov,1987). In Shatalov's organizational and methodological system, this approach is called peer control. It is the use of the mutual control that makes it possible at present to resolve the problem of checking the detailed answers of a very large number of students.
A large number of studies have been devoted to discussion, analysis, and experience with the use of MOOCs.
Much can be argued about MOOCs. However, they represent a definite challenge to traditional forms of education. Each university has to think about how widely it will use the Internet in its activities.

MOOCs platforms

A large number of software platforms have been developed for the implementation of open education projects; 155 systems are listed on the site of the Catalogue of the program platforms[1]. The most popular, based on the number of organizations and countries that use them, can be considered Moodle, WebCT, Docebo, Claroline, Desire2Learn.
A full-featured software platform usually provides the following tools to the MOOCs developers:

1. Support SCORM standard for distance learning.
2. Content management mechanisms, content filters.
3. Interface for teachers and students.
4. Creating tests with different types of test tasks.
5. The possibility of expert evaluation.
6. Support for a variety of resources.
7. Use of tasks of different types.
8. Using databases, a set of types of database fields. 9. Means of organising interviews.
9. Use of graphic tools.
10. Glossaries.
11. Forums, blogs, chats.
12. Wiki - a website created by users together.
13. Support for different languages.
14. Methods of registration and authorization.

A distinctive feature of most such platforms is the availability of open source code, which allows developers to add new functionality elements to these software systems. Thus, the results of new studies aimed at improving the learning process can be translated into software implementation within the framework of functioning systems.

Mixed diagnostic tests - a new paradigm in the field of blended education

The emergence of MOOCs provides an extensive field for analysis and research related to online learning. The most debatable are the questions connected with autonomous work and evaluation of the results of the educational activity. These are types and formats of homework assignments, testing methods, evaluation of answers in forms of essays and abstracts.

However, even at the current stage of the development of the field of education with the application of MOOCs technologies, a number of problems occur. One such problem is the fact that students with different abilities have different preferences in learning and achieving their goals, which is not taken into account in the systems presented to the respondents (pupils).

Another problem is that one set of proposed assignments, oriented to the average level of the respondents, can create difficulties in passing the training course for weaker respondents and do not allow to reveal all the abilities of stronger respondents, especially creative ones. Also, testing the solution for the final result (answer), especially for menu-based testing and using traditional testing, is not always possible, but always primitive.
Solving the problems listed above makes it possible to form an approach to the creation of intellectual training and testing subsystems in the MOOC system. The following measures are proposed:

1. Use of questionnaires to assess the respondents' ability to learn, as well as the accumulated skills, experience and purpose of training, allowing at the initial stage to orient the learning process to take into account the abilities and preferences of the respondent. Orientation to the specific abilities and preferences of the respondent will make the learning process more effective and practical.
2. Use for teaching and testing the original paradigm of mixed diagnostic tests (MDTs) (Yankovskaya, 1996) which represent the optimal combination of unconditional and conditional components. A distinctive feature of MDTs is that they allow you to make a decision simultaneously while building them. MDTs are one of the most appropriate and useful tools that can be applied in mixed education and training.
3. Use MDTs not only to determine the quality of the student's training but also to design the trajectory of the educational process. The presence of variability in the educational process (the possibility of choice) is particularly appreciated by respondents in the context of mixed education and training.

To effectively implement the proposed approach, it is necessary to solve the following tasks:
1. offer students a tool for developing their own learning paths;
2. provide interactive interaction between the teacher and the student;
3. increase the level of accessibility of information for all stakeholders of the educational process.

As a result of the proposed approach, training will become more effective and practically applicable.

Conclusion

Massive open online courses, which enable a broad range of people to study various subjects for free and remotely, constitute a powerful global trend of modern higher education. They are focused on the active use of all services of network and mobile interaction, i.e. The widest use of the technical and programmatic capabilities of modern information technologies. At the same time, they are a challenge to traditional education, motivating it towards innovative development, one of the directions of which is the research and implementation of mixed diagnostic tests.

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