

Using online courses at an agrotechnological university

Sergii Sharov^{1*}, *Sergey Yekimov*², *Tetiana Sharova*³, *Olga Derkachova*⁴, and *Halyna Kolomoiets*³

¹Dmytro Motornyi Tavria State Agrotechnological University, 66 Zhukovsky street, 69600 Zaporizhzhia, Ukraine

²Czech University of Life Sciences Prague, Faculty of Economics and Management, Department of Trade and Finance, , Kamýčká 129, 165 00 Prague – Suchbát, Czech Republic

³State Scientific Institution “Institute of Education Content Modernization”, 36 Metropolitan Vasyl Lipkovsky street, 03035 Kyiv, Ukraine

⁴Vasyl Stefanyk Precarpathian National University, 57 Shevchenko Street, 76018 Ivano-Frankivsk, Ukraine

Abstract. The purpose of the article is to carry out the quantitative analysis of online courses in various thematic areas, which are located on Ukrainian platforms of massive open online courses (Prometheus, EdEra, OUM). On the basis of the analysis, systematization and generalization of theoretical data, the advantages and weaknesses of the MOOC use in the educational process of higher school and lifelong education are revealed. As of May 2023, they offer 558 online courses on various topics, 80 (14.3%) of which are paid. The authors found out that on Ukrainian online platforms the number of online courses have increased over the past three years compared to the previous six years. Most of the courses are located on Prometheus online platform (376 courses, 67%). All of the Ukrainian online platforms have the same courses such as “IT”, “Civic Education”, “Healthcare”, and “Psychology”. It was found that Ukrainian MOOC can provide advanced training in most disciplines of general training which is outlined in educational programmers of agrarian and food technologies specialties. In further research, we plan to research the possibility of accepting certificates proving the completion of online courses as an element of non-formal education when studying certain academic disciplines.

1 Introduction

The modern information society is characterized by the emergence of new means and technologies for the processing, storage and transmission of information, as well as by introduction of digital gadgets into human life, emergence of new professions, etc. Under these conditions, requirements for future specialists training and their competitiveness in the labour market are radically changing. At the same time, the spread of the Internet, the

* Corresponding author: segsharov@gmail.com

use of mobile and cloud technologies have significantly increased the opportunities for obtaining education in a distance format, including lifelong learning. E-learning and distance learning became especially relevant in the extraordinary circumstances of the Covid-19 pandemic and active military operations when there was no possibility of face-to-face attendance in class.

Massive open online courses (MOOC) are an effective means of distance learning since they implement the principles of open education, provide free access to educational materials on various topics, have powerful means of feedback, etc. Being relevant, MOOC attract researchers' attention. The use of MOOC in the context of the pandemic is reflected in the works by S. Donitsa-Schmidt et al. [1], F. G. Gómez and P. M. Gómez [2]. The teachers' perception of MOOC and their motivation to use them was studied in the work by P. Lowenthal et al. [3]. The satisfaction and motivation of students when using MOOC was researched in the works by D. Sulisworo et al. [4], C. Alario-Hoyos et al. [5]. Among Ukrainian researchers, V. Kukharenko and T. Oleinik [6] studied the issue of distance education; the work by M. Berezytskyi and V. Oleksyuk [7] studied the trends and prospects of developing e-learning and MOOC in particular; S. Sharov et al. [8] studied the thematic areas of online courses located on Ukrainian MOOC; I. Mintii et al. [9] researched the possibilities of MOOC for the development of digital competence; S. Symonenko et al. [10] researched MOOC for training IT specialists, etc.

It should be noted that most of the well-known MOOC have their content in English with the support of multilingual graphical interface. At the same time, for a significant part of users, English is not their native language [11], so they may have difficulties in mastering online courses in English [7]. We see the solution to this problem in the use of domestic MOOC, in particular EdEra, Prometheus, and Open University of Maidan (OUM). They offer high-quality educational content, cooperate with various developers of online courses, including international partners. Considering the MOOC relevance for learning and self-development, the purpose of the article is to carry out the quantitative analysis of online courses which are located on well-known Ukrainian online platforms by thematic areas.

2 Theoretical Background

Today, the use of e-learning and distance learning has become a natural step on the way to improving the quality of the educational process in the conditions of the information society and various challenging situations. According to the requirements technical progress, e-learning and distance learning systems improve their toolkit, thus playing an essential role in modern generation's training, since the latter can use digital technologies, they can form and improve the necessary competences, regardless of their location [12]. According to V. Kukharenko [6], learning through virtual space allows you to get significant advantages, namely: to ensure independent acquisition of the necessary knowledge; to update educational content in a timely manner while taking into account the students' needs; to form new ties between like-minded people; to form new sources of knowledge for further use.

Learning and self-development through distance learning involves the use of open educational resources (Open Educational Resources, OER), which are freely available or published under the Creative Commons license. As stated in the work by D. Sulisworo et al. [4], their use allows us to improve the students' achievements due to the variability of resources in achieving the educational goal. OER are traditionally presented in text, audio, or video format. However, they do not provide feedback to the developer of these educational materials.

At the same time, MOOC have developed the concept of OER [5] and provided equal educational opportunities for a large number of students. According to S. Donitsa-Schmidt et al. [1], MOOC give students the opportunity to learn at convenient time and at a pace that is optimal for them. Provided they are persistently motivated to master the online course, they can develop independence skills and shape their own educational trajectory. The possibility of improving professional competences in accordance with the requirements of the labour market is indicated in the work by S. Symonenko et al. [10]. It can be either a full completion of a course when mastering a specific subject, or a partial completion if you need to learn about individual educational topics. The development of online courses for MOOC is an effective marketing tool for higher education institutions that promote their innovative activities and attract potential students to other courses. On the other hand, the teachers who developed the online course are also interested in promoting their own professional activities among the educational community [2].

Certain limitations should be considered when using online courses. Common disadvantages of MOOC include: limited number of control tools [1]; availability of only those practical tasks that can be formalized and automatically checked; the possibility of creating several accounts to check the test correctness [7]; lack of direct interaction between the course developer and the students; lack of the high-quality Internet; a charge for an online course or certificate.

The main structural elements of online courses are video lectures, self-study materis, tools for evaluating students' learning achievements, presentations. Depending on the topic, an online course may contain additional elements. For example, online programming courses usually contain a theoretical explanation of the software code, practical exercises [5], external modules for testing the software code, etc. If we consider online courses for learning a foreign language, then an authentic video context with subtitles or transcriptions will be useful [13]. In this way, we achieve the students' involvement in the thematic educational environment, as well as a better mastery of the online course.

In Ukraine the most popular online platforms are EdEra, Prometheus, and OUM. EdEra online platform provides courses to support school education, as well as professional, civic and corporate education. Prometheus MOOC has more extensive thematic areas providing the implementation of blended learning and lifelong education. OUM online platform is a platform whose purpose is to provide civic education. All of them have the high-quality educational content, which is in Ukrainian. Most online courses are free. All the analyzed platforms cooperate with ministries and national agencies of Ukraine, international and public organizations, charitable foundations, other online platforms [14]. It proves the support of Ukrainian MOOC at the international and state levels.

3 Research Methods

During the research, we used the analysis of scientific and pedagogical literature on e-learning, distance learning and MOOC, which made it possible to systematize and summarize theoretical data. In the research process, the most well-known Ukrainian MOOC were selected: EdEra, Prometheus, and OUM. The choice was determined by the summarized research data in the leading journals, as well as the practical experience of the authors who use these platforms in their professional activities and take online courses on various topics. To analyze the number of online courses located on Ukrainian MOOC, the authors used direct observation of the number of online courses as of May 2023. The thematic area was chosen as a criterion for grouping online courses and further processing of the obtained statistical data. In the process of research, the obtained data were compared with similar studies, presented in the work by S. Sharov et al. [8].

4 Results and Discussion

Dmytro Motornyi Tavria State Agrotechnological University (TSATU) is a leader of agrarian education in the south of Ukraine and it provides students' training in technical and agrarian specialties. In particular, these are such specialties as 181 “Food technologies”, 193 “Geodesy and Land Management”, 201 “Agronomy”, 203 “Horticulture and Viticulture”, 241 “Hotel and restaurant business”. The analysis of the contents of the educational programmers of the first level of higher education for these specialties demonstrated that they contain a cycle of disciplines of general training, professional training, practical training, elective disciplines, and other components of the educational process. A cycle of disciplines of general training allows forming most of general competencies and certain professional competencies. They include such courses as “Ukrainian for professional purposes”, “Foreign language for professional purposes”, “Philosophy”, “Informatics and Information Technologies”, “Life Safety and Basics of Labour Safety” etc.

Technological progress requires constant self-development and the use of innovative techniques for specialists' training [15]. Ukrainian MOOC provide good opportunities for training in various directions. Online platforms EdEra, Prometheus, OUM allow you to use online courses on various topics, most of them are in Ukrainian. Each of the platforms differs in the educational content and options, as shown in Table 1.

Table 1. General characteristics of the Ukrainian MOOC

Name of the platform	Possibility to get a certificate	Cost	Possibility of filtering	Interface language
Prometheus	+/-	+/-	+	Uk, En
EdEra	+	-	-	Uk
OUM	+	-	+	Uk

As you can see from Table 1, Prometheus has a bilingual user interface (Uk, En) and provides possibilities for automatic course filtering. OUM allows you to find online courses by tags and with the help of a single filter “Current courses” / “New courses”. Users can view the information about the course on all the three platforms. It is usually the number of hours, availability of practical tasks, the number of users enrolled on the course, the number of issued certificates, etc. Also, when choosing a course, you can focus on the presence or absence of a certificate after the successful completion of online training. It should be noted that in recent years, some Ukrainian MOOC have changed the commercialization format of online courses. Before 2021, all courses were offered on the free of charge basis, but now some courses are paid.

In Ukraine, online courses and distance education in general are gradually gaining popularity. The analysis of previous studies [8] revealed that 235 online courses were developed on similar MOOC through 2014–2020. As of May 2020, there were 130 online courses on Prometheus platform, 49 courses on EdEra online platform, and 56 courses on OUM platform, which is 55%, 21% and 24% respectively of the total number of online courses. At the same time, the number of online courses which were developed over the past three years has increased by 88 courses compared to the previous period. The tendency for the online courses increase on Ukrainian online platforms can be seen in Table 2.

Table 2. Number of online courses by years

Name of the platform	2014-2020	2020-2023	Total
Prometheus	130	246	376
EdEra	49	50	99

OUM	56	27	83
Total	235	323	558

As can be seen from Table 2, at the moment users can have access to 558 online courses. Prometheus platform has the largest number of online courses (376 courses), which is 67% of the total number on the three platforms. EdEra platform has 99 courses (18%). OUM online platform provides 83 courses, which is 15% of the total number of courses on the three platforms. The fact that OUM platform has the smallest number of online courses is explained by the specificity of this educational resource, since all the courses are related to civic education. The number of online courses on Ukrainian MOOC by thematic areas is presented in Table 3.

Table 3. Number of online courses by thematic areas

Thematic area	Prometheus		EdEra	OUM	Total
	free	paid	free	paid	
IT	21	12	2	5	40
Data analysis	3	–	–	–	3
English	7	–	3	–	10
Business	28	36	3	–	67
Civic education	49	–	13	24	86
Humanities	13	–	–	–	13
State service	11	–	–	–	11
For educators	27	–	39	–	66
Entrepreneurship	–	–	5	–	5
History	–	–	5	–	5
Economics	–	–	3	7	10
Communication	–	–	1	–	1
Management	–	–	1	4	5
Journalism	10	5	–	8	23
Foreign courses in translation	18	–	–	–	18
Local Government	12	–	–	–	12
Personal development	37	12	–	–	49
Thinking	–	–	–	7	7
Healthcare	16	6	6	3	31
Preparation for External Independent Evaluation	10	5	–	5	20
Law	2	–	14	12	28
Project management	2	2	–	5	9
Psychology	7	1	4	3	15
Social sciences	12	1	–	–	13
Tourism	11	–	–	–	11
	296	80			
<i>Total</i>	376		99	83	558

Compared to previous years, the developers of Prometheus online platform have renamed some thematic areas and added new ones. The new thematic areas are “Foreign courses in translation” (18 courses) and “Tourism” (11 courses). We found out that certain thematic areas were renamed and enlarged at the expense of online courses in related areas. For

example, "History" thematic area was changed into "Humanities" (the total number of courses is 13 courses as of May 2023), and "Healthcare" thematic area was renamed "Basics of Healthcare" (16 courses). Most of all courses on Prometheus online platform correspond to such thematic areas as "Business" (64 courses, 17% of the total number of online courses on the platform), "Civic education" and "Personal development" (49 courses each, 13% of the total number of online courses on the platform). The smallest number of online courses is presented in the thematic area "Law" (2 courses). There are 80 paid courses on Prometheus platform, which is 21% of the total number of courses on Prometheus or 14.3% of the total number of courses on the three platforms.

The distribution of online courses on EdEra platform shows the relevance of thematic areas related to education and training. Today, you can use 39 online courses in the thematic area "For educators", which is 39% of the total number of online courses on the platform. Also, the most popular areas are "Law" (14 online courses, 14%) and "Civic Education" (13 online courses, 13%). The fewest number of courses is presented in the thematic area "Communication" and "Management" (1 course each). It should be added that online courses from the small thematic areas such as "English", "History" can be added to the area "For educators". In our opinion, in case when there are separate thematic areas it is easier for students to find the necessary one, since it is impossible to automatically filter online courses on EdEra platform.

As for OUM platform, it has 83 online courses. It proves that the public sector is also eager to acquire knowledge and learn throughout life. On this platform, most courses are presented in the thematic area "Civic Education" (24 online courses, which is 29% of the total number of courses on the platform) and "Law" (12 online courses, 14%). The least number of courses is in the areas of "Psychology" and "Healthcare" (3 online courses each). It should be noted that on OUM platform the authors analyzed each course separately, instead of using a rubricator. It is explained by the fact that the rubricator contains only 4 general areas of online courses ("Personal efficiency", "Communicative efficiency", "Understanding the global context", "Interaction with authorities"), but it does not contain any specific thematic areas.

Considering the obtained quality indicators (see Table 3), we can conclude that Ukrainian MOOC can provide advanced training in most disciplines of general training. In particular, it concerns online courses in the thematic areas like "Information technologies" (40 courses), "English" (10 courses), "Humanities" (13 courses), "Healthcare" (31 courses), "Social sciences" (13 courses). Also, online courses which deal with personal development (49 courses) and development of thinking will be useful for students of all specialties.

On all the three online platforms, the most popular thematic areas are "Civic education" (86 online courses, which is 15.4% of the total number of courses), "Business" (67 online courses, 12%), "For educators" (66 online courses, 12%). All Ukrainian online platforms contain the same thematic areas such as "IT", "Civic Education", "Healthcare", "Psychology" (Figure 1).

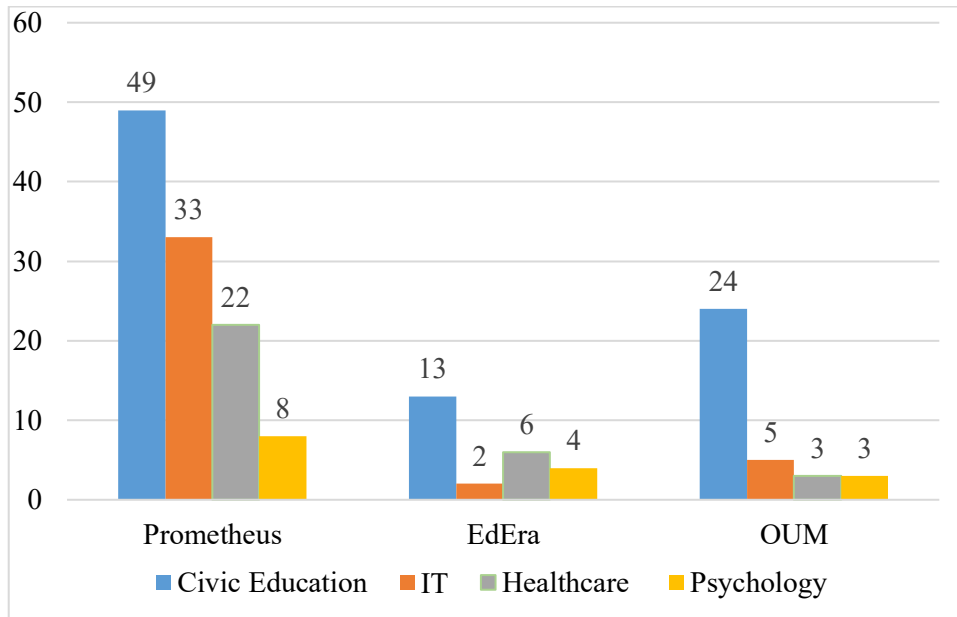


Fig. 1. Number of online courses in the same thematic areas

As we can see from the data in Figure 2, the largest number of online courses is in such thematic areas as “Civic Education” (86 courses, which is 15.4% of the total number of online courses), IT (40 courses, 7%), Healthcare (31 online courses, 5.5 %), “Psychology” (15 courses, 2.6%).

The effectiveness of using MOOC in the educational process depends on a number of factors. According to the researchers [11, 13], developers of online courses should take into account the characteristics of the potential target audience, including cultural, socio-economic features, regional and linguistic contexts. In this case, Ukrainian MOOC meet these recommendations, as they are primarily focused on the education of the Ukrainian community.

We support the researchers’ opinion [1, 2], who consider MOOC to be an effective means of blended learning. In this context, they will become an additional educational resource and provide a balance between face-to-face learning and online education. At the same time, in the conditions of 4th Industrial Revolution the use of artificial intelligence (AI) considerably enhances the possibilities for learning and self-development [16,19]. Hence, MOOC developers ought to implement the elements of AI in the online course.

Since learning in a virtual environment involves a high degree of student independence, researchers emphasize the need to develop innovative approaches to increase their learning motivation [17]. For example, a certificate of online courses completion can be used as an element of non-formal education and it can be counted as one topic within an academic discipline [8, 10].

Teachers can greatly influence the possibility of MOOC implementation in the educational process. According to M. J. V. Salinas and R. Burbat [18], they spend much more time and effort to prepare classes using MOOC. As a result, teachers must also be motivated. The study by P. Lowenthal et al. [3] describes different types of motivation enhancement that can be applied to teachers.

An important factor of the successful use of MOOC and distance learning systems is the developed digital competences among teachers and students [6, 9]. At the same time,

working with online courses will allow you to develop digital skills and navigate the digital space more freely.

5 Conclusions

The quantitative analysis of online courses as of May 2023 demonstrates an increase in courses on Ukrainian online platforms compared to previous years. A total of 558 online courses on various topics, 80 (14.3%) of which are paid, are available to users. The largest number of online courses is presented on Prometheus online platform (376 courses, 67%). The least number of courses is offered by OUM (83 courses, 14.8%), which is explained by the specificity of this online platform.

The largest number of online courses on Prometheus platform corresponds to the thematic area “Business” (64 online courses). On EdEra platform, the largest thematic area “For educators” contains 39 online courses. The largest thematic area on OUM platform concerns civic education and contains 24 online courses. All of the Ukrainian online platforms have the same courses such as “IT”, “Civic Education”, “Healthcare”, and “Psychology”.

The quantitative analysis of the thematic areas of the Ukrainian-language MOOC demonstrated that they can ensure the informational needs of students of the agrotechnological university while studying most disciplines of general training. Students will find available online courses on information technologies, healthcare, English and Ukrainian languages, other social sciences and humanities. In further research, we plan to study the possibility of accepting the certificates of online courses completion as an element of non-formal education when studying certain academic disciplines.

References

1. S. Donitsa-Schmidt, R. Ramot, B. Topaz, Shaping the future of distance learning in teacher education: MOOCs during COVID-19, *Perspectives in Education*, **40**, 250-267 (2022) doi: 10.18820/2519593X/PIE.V40.I1.15
2. F. G. Gómez, P. M. Gómez, Use of moocs in health care training: A descriptive-exploratory case study in the setting of the Covid-19 pandemic, *Sustainability*, **13**, 1-16 (2021). doi: 10.3390/su131910657
3. P. Lowenthal, P. Snelson, C. Perkins, Teaching massive, open, online, courses (MOOCs): Tales from the front line, *International review of research in open and distributed learning*, **19**, 1-18 (2018) doi: 10.19173/irrodl.v19i3.3505
4. D. Sulisworo, Y. Wulandari, M. S. Effendi, M. Alias, Exploring the online learning response to predict students' satisfaction, *Journal of Physics: Conference Series*, **1783** (2021) doi: 10.1088/1742-6596/1783/1/012117
5. C. Alario-Hoyos and et al., Understanding learners' motivation and learning strategies in MOOCs, *International review of research in open and distance learning*, **18**, 119-137 (2017) doi: 10.19173/irrodl.v18i3.2996
6. V. Kukharenko, T. Oleinik, Open distance learning for teachers, *CEUR Workshop Proceedings*, **2393**, 156-169 (2019)
7. M. Berezytskyi, V. Oleksyuk, Massive open online courses as a stage in the development of e-learning, *Information Technologies and Learning Tools*, **56**, 51-63 (2016) doi: 10.33407/itlt.v56i6.1479
8. S. Sharov, A. Zemlianskyi, T. Sharova, H. Viktor, Ukrainian MOOC: Quantitative and Thematic Analysis of Online Courses, *International Journal on Advanced Science*,

- Engineering and Information Technology, **11**, 1143-1149 (2021) doi: 10.18517/ijaseit.11.3.13705
9. I.S. Mintii et al., Current state and prospects of distance learning development in Ukraine, CEUR Workshop Proceedings, **2898**, 41-55 (2021)
 10. S. Symonenko, N. Zaitseva, V. Osadchyi, *Implementation of MOOC platforms into teaching English to IT specialists*, SHS Web of Conferences, **104**, 1-9 (2021) doi: 10.1051/shsconf/202110403007
 11. P. Fidalgo, J. Thormann, O. Kulyk, J. A. Lencastre, Students' perceptions on distance education: A multinational study, International Journal of Educational Technology in Higher Education, **17**, 1-18 (2020) doi: 10.1186/s41239-020-00194-2
 12. A. Salam Lestari et al., The urgency of information and communication technology in MI/SD learning, Journal of Diversity in Learning, **2**, 239-247 (2022)
 13. S. Meri-Yilan, The online interface and social inclusion: A MOOC study in Turkey, Journal of Interactive Media in Education, **1**, 1-10 (2020) doi: 10.5334/jime.558
 14. S. Sharov, A. Pavlenko, T. Sharova, O. Chorna, Analysis of developers of online courses on Ukrainian platforms of MOOC, International Journal of Emerging Technologies in Learning, **16**, 201-213 (2021) doi: 10.3991/ijet.v16i05.18581
 15. S. Yekimov et al., *Using the project method to improve environmental education for law students*, E3S Web of Conferences, **265**, 1-5 (2021) doi: 10.1051/e3sconf/202126507005
 16. Voronkova V. et al., Digital Technology Evolution of the Industrial Revolution From 4G to 5G in the Context of the Challenges of Digital Globalization, TEM Journal, **12**, 732-742 (2023) doi: 10.18421/TEM122-17
 17. O.H. Kolgatin, L.S. Kolgatina, N.S. Ponomareva, E.O. Shmeltser, *Systematicity of students' independent work in cloud learning environment*, CTE Workshop Proceedings, **2433**, 184-196 (2019) doi: 10.55056/cte.379
 18. M. J. V. Salinas, R. Burbat, Foreign language learning with MOOC: Back to the future?, Revista de Linguística y Lenguas Aplicadas, **12**, 151-159 (2017) doi: 10.4995/rlyla.2017.6564
 19. S. Yekimov et al., *Training of teachers for teaching in the conditions of distance education*, E3S Web of Conferences, **420**, 10042 (2023) doi: 10.1051/e3sconf/202342010042