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COMPREHENSIVE ANALYSIS OF THE STUDENTS’ MOTIVATION CONNECTION TO THE MASSIVE OPEN ONLINE COURSES COMPLETION RATE

Abstract: The article provides the analysis for the learning outcome at massive open online courses to identify students’ motivational needs. Motivational techniques for improving the learning process quality and increasing the correlation between mastering the theoretical material and passing practical exercises are proposed.

Keywords: correlation, learning outcome, massive open online course, motivational technique, motivational needs.

Introduction

The online learning further development and popularity, the continued blended learning implementation into the educational process in Ukrainian higher education institutions, requires high-quality new online courses in various fields of knowledge [1], adaptations and translations of existing courses from leading professors of the best educational institutions in the world for the further leading teaching methodologies used in the educational process. As noted in earlier studies, the online education development will be the driving force behind changes in the world’s educational trends [2; 3]. Further massive open online courses use with open source software will increase the education’s accessibility for all, provide access for people with disabilities to the desired profession [4; 5; 6].

Problem statement

The proposed article provides the analysis for the learning outcome at massive open online courses "Learning How to Learn" [7] and "Educational Tools for Critical Thinking" [8] to identify students’ motivational needs. "Learning How to Learn" course is adapted in Ukrainian, and the course “Educational Tools for Critical Thinking" are developed by Ukrainian author Serhiy Terno. Courses are distributed on the Prometheus platform during 2018, they are created for different target audiences and include different motivational components for students.

The article aims to solve such problems: analysis and research the testing results at the courses "Learning How to Learn" and "Educational Tools for Critical Thinking" to motivate students [9; 10; 11] and further guidelines for the motivational techniques’ development for online course students.

The "Learning How to Learn: Powerful mental tools to help you master tough subjects" on the Prometheus platform is the Ukrainian adaptation for the course created in 2014 by Barbara Oakley and Terrence Sejnowski. This online course is the most popular in the world and now has over 2.6 million enrolled students. For 4

weeks at 7 hours, the course`s authors help to master the main methods of the educational process in a light and understandable scientific popular form. At the time of the research, the subscription to the Ukrainian version of the course on Prometheus platform was 15053 people. Successfully completed course 1108 people (7.36%), which is an average percentage for MOOC’s successful passing rate [14; 15; 17].

This course is a typical representative of open online learning. It includes short videos collections (maximum 8 minutes, minimum 2 minutes each), notes, additional reading materials, test tasks for self-examination and video interviews with well-known specialists from various fields on the learning process peculiarities [14; 15]. In early September 2018, the Ukrainian platform for massive open online courses Prometheus received permission for translation and the course’s materials free placement for Ukrainian viewers. The Coursera platform feature (the original course is hosted on this online learning platform) text matches and subtitles availability for adapting in different languages, which greatly simplifies the work for the translator and editor.

The online course "Educational Tools for Critical Thinking" was created in 2018 by the doctor of pedagogical sciences, professor of Zaporizhzhya National University Serhiy Terno to improve educators’ qualifications. This online course is the author’s second experience, with this course he proposed a new methodological approach improving the learning outcomes. Under this methodological approach, after each video lecture, the author developed a short test for self-examination. As a result, 45 video lectures (average duration 5-8 minutes) and 45 questions were created, and the final test for the acquired knowledge perception analysis. This methodological approach was used on the platform for the first time, therefore it is interesting for analysis. The course has 6468 enrolled students, 35.2% (2277) have successfully completed their training and received a certificate.

Learning outcomes analysis

The student's motivation for an online course is among the key issues in the online learning successful implementation and its further development.

Among the analyzed courses, only "Educational Tools for Critical Thinking" has a high success rate, which indicates the students’ motivation to complete their studies.

At the same time, the "Learning How to Learn" course is a typical indicator of success for the world’s online learning practice [17]. This indicates a rather low students’ motivation to complete the course, even though they have already registered for the course of their own choice or at the request of the management / teacher, that is, from the beginning, they had a certain intention, desire or purpose to learn. The introductory test took 4082 people, and this is 27,12% of the total number of registered, only 27,14% scored a sufficient points number to obtain a certificate. The introductory test includes 20 different questions, which has 2 answer variants each: right and wrong. The question can be divided into the following groups: on general erudition, on logical thinking, on wit, on attentiveness.

Students responses distribution (right-wrong) to the introductory test questions of the online course "Learning How to Learn" is shown in Fig.1. It shows the most difficult for the listeners are questions 1, 3 and 19. Questions 3 and 19 are issues of attentiveness and question 1 - on the general erudition. This suggests there is a need to further implement techniques to improve the attentiveness, namely: the additional tests of attentiveness creation to affect the certification, the learning elements to improve cognitive skills’ development and implementation, possible to take children's tests for attentiveness.

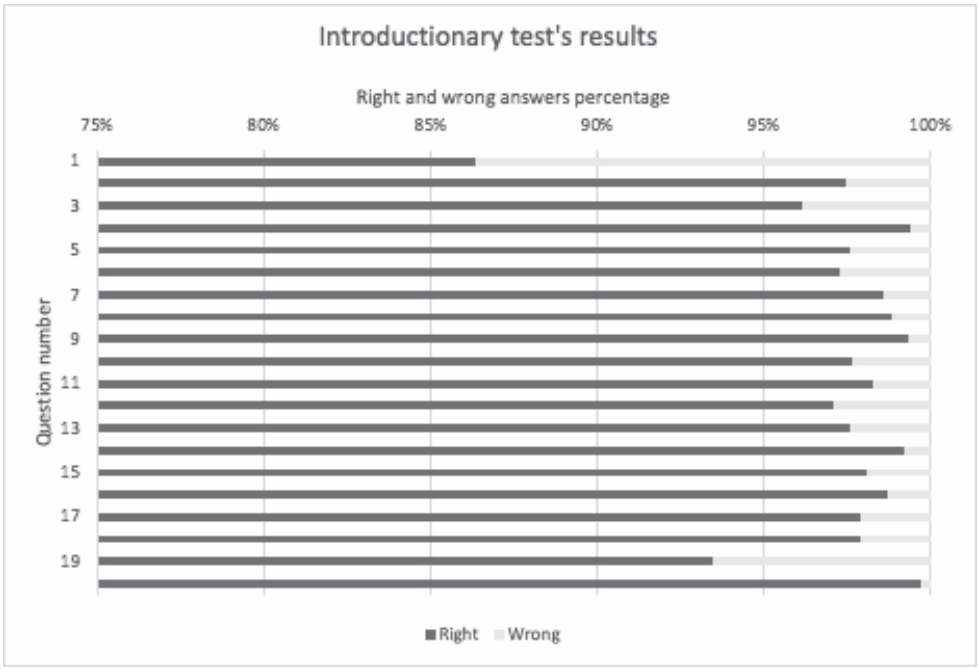

Fig. 1. Students responses distribution (right-wrong) to the introductory test questions of the online course "Learning How to Learn"

During the introductory test’s adaptation, the Prometheus platform technical features were taken into account (lack of opportunity to advance the course without completing the video review, the other classification and division issues availability, the features of the Code of Honor of the platform, etc.), and language units’ perception feature by Ukrainian-speaking listeners. For example, among this course’s features is the presence of a significant number of translations in other languages, which are immediately available on the Coursera platform as subtitles, technically connecting subtitles different for users at Prometheus platform. Similarly, mobile applications and settings for the user are technically different. Part of the course’s terminology is in the neurobiology and information systems of brain activity research fields, which caused problems in translation since the Ukrainian language does not have a well-established terminology base from these fieldsof knowledge. Logical transference, transcription, and transliteration were usedto provide accurate matches that were understood by users without further clarification.

It should be noted that the course "Educational Tools for Critical Thinking" is

aimed at a narrow target audience: secondary schools’ teachers and higher education institutions lecturers, among which a significant number of students who have successfully completed education are women (76.58%), and senior ones over 50 years (20.39%). The main motivation for this category is the certificate availability stating hours number that allows qualifying as an advancement course, which is the main component for contracts renewals for teachers and increase of wages. Thus, a question of classical students’ material motivation with free access to educational materials. The age and sex distribution of certified students of the course "Educational Tools for Critical Thinking" are shown in Fig. 2.

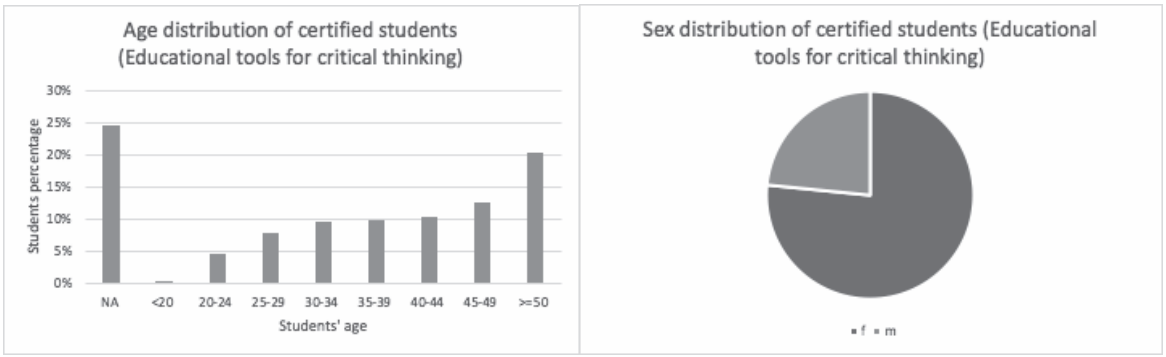

Fig. 2. Age and sex distribution of certified students of the course "Educational Tools for Critical Thinking"

During the data analysis for “Learning How to Learn”, no such sharp differences in gender and age of the students were detected. All students, as they successfully completed the course, were divided according to age, gender, and level of education in proportion to their lack of clearly defined narrow target audience, so is much more difficult to name the components of motivation for this course. The age and sex distribution of the certified students of the course "Learning How to Learn" are shown in Fig. 3.

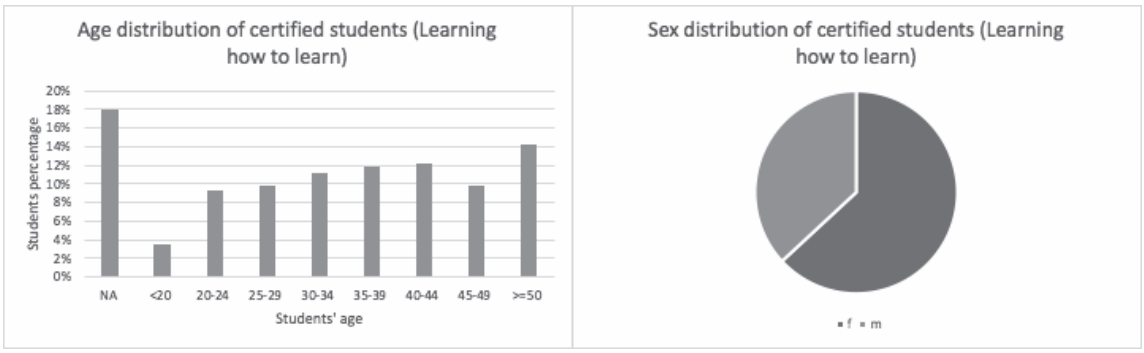

Fig. 3. Age and sex distribution of certified students of the course "Learning How to Learn"

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Students motivation needs

According to the preliminary assumptions [9], motivational factors in the learning process may include a personal feedback from the teacher, constant feedback, increase or decrease the tasks’ complexity under the potential student’s level, etc., and bonus points, the access possibility to new levels of courses professional orientation.

To determine the relationship between the mastering of theoretical material in the video lectures form and the performance with tests to consolidate the acquired theoretical part of knowledge by the same students, statistical analysis was performed on the indicated online courses, and the Pearson criterion r_{xy} by formula (1) was calculated for the correlation between percentage of viewed video materials and percentage of success in related tasks.

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2 \sum_{i=1}^{n}(y_i-\bar{y})^2}}, \quad (1)$$

where x_i is the percentage of user-viewed videos on a specific topic; y_i is a percentage of the user’s success, in the subject corresponding to the test task; $\bar{x}$ is the average value of video views on this topic; $\bar{y}$ is an average success rate of the test on this topic; n is the number of students in the sample group.

The results of the Pearson criteria’s calculation for two online courses, and the average percentage of video material reviewed and the success for the two online courses are presented in Table 1.

Table 1.

Statistics and correlation coefficient between a percentage of viewed videos and success rate in two online courses

Online course (topic)	Average percentage of viewed videos, %	Average test success by topic, %	Correlation coefficient (by Pearson criterion)
Learning How to Learn (introductory test)	54.5393536	97.3388085	0.055236917
Educational Tools for Critical Thinking (video lecture 2.1)	26.2267436	89.7560976	0.058745102

Fig. 4 shows a graph of an online test success for “Learning How to Learn” from video views before the test.

Figure 5 shows the dependence graph of the chapter 2.1 test success of the online course “Educational Tools for Critical Thinking” from the video lectures views of this chapter.

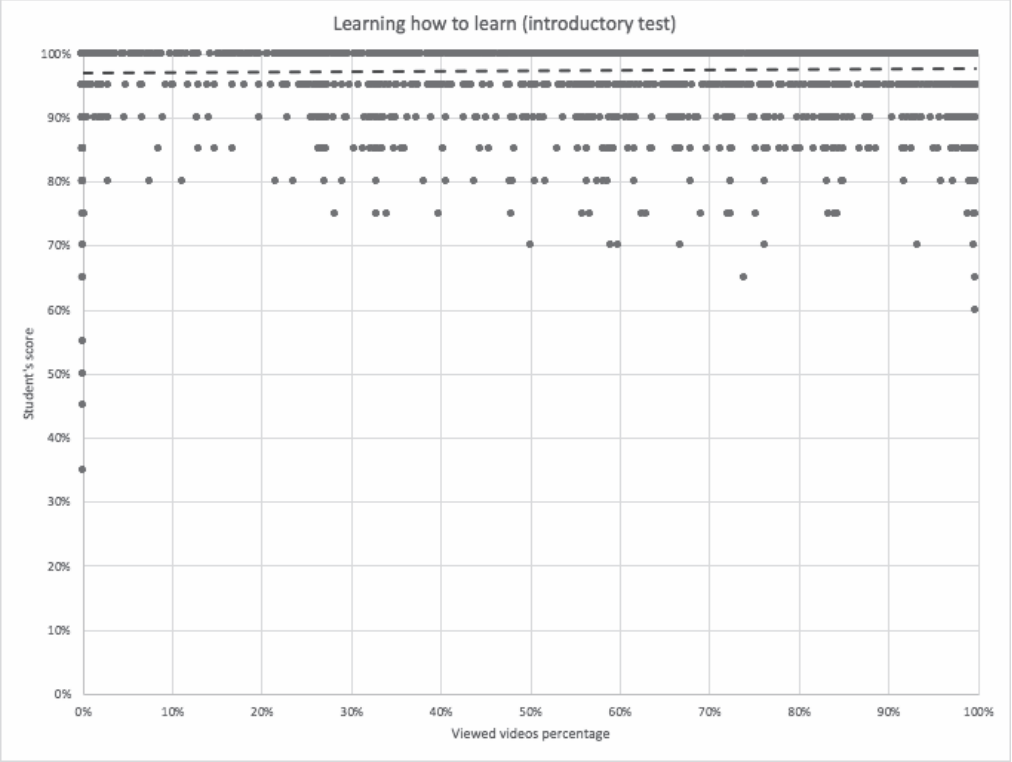

Fig. 4. The success graph of online test for “Learning How to Learn” from video views before the test, the dashed line indicates the regression line

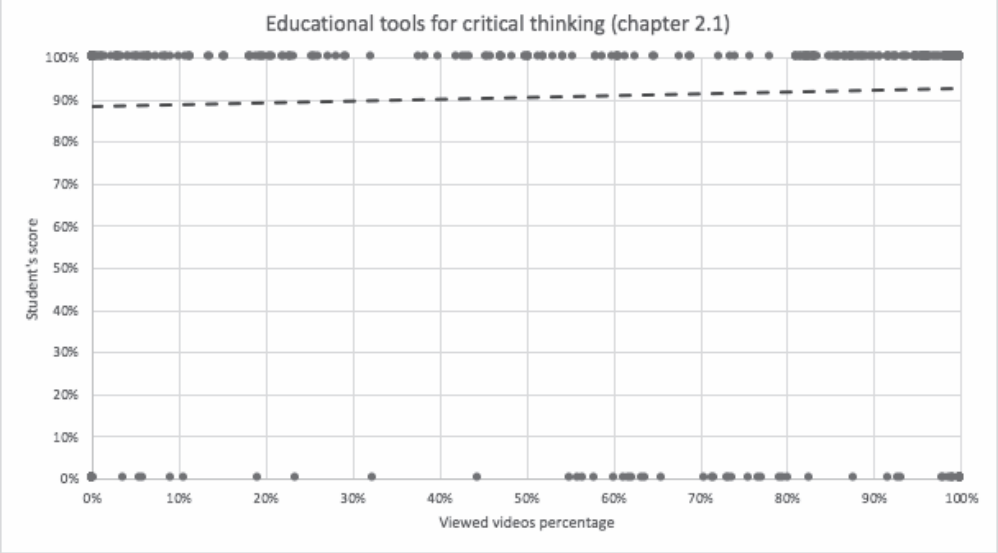

Fig. 5. The test's success graph for the chapter 2.1 of the online course “Educational Tools for Critical Thinking” from the video lectures views of this chapter, the dashed line is indicated by the regression line

Conclusions

The analysis showed a very weak correlation between the video viewed percentage and the assessments of the relevant tests, which indicates that part of the stu-

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dents master the theoretical material only, and the part without the mastery of the theory immediately passes to testing. It should be noted that we considered video lectures views only on the platform, without taking into account possible views directly on the YouTube channel. However, two analyzed courses belongto different areas of knowledge and created for different purposes and for different target audiences and have different performance indicators (from average to very high). In our opinion, we can conclude that such a low correlation will be observed in all other online courses. Therefore, the following motivation techniques are on the development stage to increase the correlation. We propose to use the following motivational techniques for improving the learning process quality and increasing the correlation between mastering the theoretical material and passing practical exercises:

- Encouraging course students through e-mail messages or in their own dashboards (for example, when the user did not complete the course but passed a large part, he or she receives a letter "You have two steps left to the goal, continue your studies today!");
- Motivational elements integrated into the platform (color markers and iconography of theoretical and practical materials passed, the percentage exclusion for mastered material and percent of what is left to learn, progress in learning);
- Comparative motivation against other listeners (the message output about how many listeners with the same results as the given listener completed the course and received a certificate);
- Introduction of different certificates levels for all courses (if a person has gained over 90%, he or she receives a certificate of honors);
- Introducing requirements for the relevant video lectures mandatory viewing prior to the practical tests’ compilation (for example, the ability to go to the next section of the online course after viewing 80% of the video);
- Possibility to share the online course’s successful completion in social media (the opportunity to send a certificate of completion from a personal dashboard or a specially prepared phrase "I have passed such a course on the platform Prometheus");
- Personal cabinet personification (the certain number of graphic elements appearance, symbolizing certain achievements, for example, the receipt of 3 certificates, 5, 10, etc.).

The proposed techniques’ implementation can be the subject of further scientific research using artificial intelligence systems for students’ individual motivation purpose.

REFERENCES

1. Пархоменко А.В. Перспективи розвитку систем дистанційної освітиу вищій школі // IX Міжнародна науково-технічна конференція студентів і аспірантів «Друкарство молоде». Київ, 2009. С.110-112.

2. Пархоменко А.В. Місце дистанційної освіти у вищій школі // VIII Міжнародна науково-технічна конференція студентів і аспірантів «Друкарство молоде». Київ, 2008. С.121-122.

3. Parkhomenko A. The Future of Modern Distance Education Systems // Innovations in Science and Technology. Kyiv, 2009. С.193-194.

4. Parkhomenko A. Free and Open Source Software in Online Education Systems // Innovations in Science and Technology. Kyiv, 2010. С.162-163.

5. Пархоменко А.В. Перспективи використання вільного програмного забезпечення у створенні віртуальних лекційних класів систем дистанційної освіти // Мультимедійні технології в освіті. Київ, 2010. С.79.

6. History and Trends of Learning Management System // Oxigile infographics, 2016. Режим доступу: https://www.oxagile.com/company/blog/history-and-trends-of- learning-management-system-infographics/. Access date: 28.02.2019 р.

7. Онлайн-курс «Навчаймось вчитись: Потужні розумові інструменти для опанування складних предметів» [Електронний ресурс] // Prometheus. 2018. URL: https://courses.prometheus.org.ua/courses/course-v1:Prometheus+ +LHTL101+2018_ T3/about. Access date: 26.02.2019.

8. Онлайн-курс «Освітні інструменти критичного мислення» [Електронний ресурс] // Prometheus. 2018. URL: https://courses.prometheus.org.ua/ /courses/course-v1:Prometheus+CTFT102+2018_T3/about. Access date: 26.02.2019/

9. Пархоменко А.В., Сегол Р.І., Лісовиченко О.І. Вивчення мотивації слухачів онлайн-курсів // Адаптивні системи автоматичного управління. 2018. № 1 (32). С.137-145.

10. Сегол Р.І., Лісовиченко О.І., Пархоменко А.В. Автоматизована система профорієнтаційного тестування // XIII Міжнародна наукова конференція для молодих вчених «Сучасні проблеми математики та її застосування в природничих науках та інформаційних технологіях». Харків, 2018. С.21-23.

11. Gregory R. Psychological Testing: History, Principles, and Applications (Sixth ed.). Boston: Allyn & Bacon, 2011. 672 p.

12. Сегол Р.И., Пархоменко А.В. Использование МООС в учебном процессе // Проблемы современного образования в техническом вузе: материалы V Междунар. науч.-метод. конф. / ГГТУ им. П. О. Сухого. Гомель, 2017. С.143-145.

13. Segol R., Parkhomenko A. Massive open online courses' implementation in blended format as a new approach in Ukrainian higher education // Сучасні проблеми моделювання: зб. наук. праць. 2018. № 11. С.140-146.

14. Segol R., Parkhomenko A. Learning management systems in modern educational process for interdisciplinary students // II Всеукраїнська науково-практична конференція «Теоретико-практичні проблеми використання математичних методів і комп’ютерно-орієнтованих технологій в освіті та науці». Київ, 2018. С.71-75.

15. Parr C. Mooc completion rates ‘below 7%’ // Times Higher Education. Режим доступу : https://www.timeshighereducation.com/news/mooc-completion-rates-below- 7/2003710. article#. – Access date: 07.03.2019.

16. Segol R., Parkhomenko A. The massive open online courses implementation as the main rethinking in Ukrainian educational process (based on massive open online courses platform Prometheus) // Technics. Technology. Education. Safety. '18. Sofia, Bulgaria, 2018. С.287-289.

17. Сегол Р.І., Пархоменко А.В. Змішана форма навчання у вищій освіті в Україні // 20 міжнародна науково-практична конференція «Сучасні проблеми геометричного моделювання». Мелітополь, 2018. С.140-146.