

ПЕДАГОГІЧНІ АСПЕКТИ

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A STUDY OF THE EFFECTIVENESS OF DISTANCE LEARNING AT A MEDICAL UNIVERSITY IN UKRAINE

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У статті проаналізовано досвід запровадження дистанційного навчання в Україні, досліджено ефективність онлайн навчання в порівнянні з аудиторною формою, розглянуто роль мотивації в процесі дистанційного навчання та фактори, що впливають на ефективність онлайн навчання. Метою дослідження є визначення, теоретичне обґрунтування та експериментальна перевірка ефективності дистанційного навчання в медичному університеті. Авторами проаналізовано результати анкетування 315 здобувачів медичного та стоматологічного факультетів Полтавського державного медичного університету другого (магістерського) і третього (освітньо-наукового) рівнів вищої освіти. Показано, що онлайн навчання впливає не лише на рівень мотивації здобувачів освіти до продовження навчання, а й на ставлення до майбутньої професії. Дистанційне навчання спрямоване на індивідуалізацію процесу отримання знань на відстані з використанням сучасних інформаційно-комунікаційних технологій. Водночас необхідно відстежувати результати навчання та досліджувати їх залежність від зростання популярності онлайн навчання у світі. Авторами розроблено анкету на основі моделі Дональда Кіркпатріка та застосовано методику вивчення факторів привабливості професії. 85,49 % респондентів відзначили своє загальне враження від організації дистанційного навчання позитивним (271 респондент), задоволені організацією дистанційного навчання у ЗВО – 74,13 % опитуваних, на питання «Наскільки ясно Ви розумієте, що роботи з отриманими дистанційно знаннями?» за шкалою від 1 до 5 (1 – не ясно взагалі, 5 – дуже ясно) респонденти розподілили свої голоси наступним чином – 1,58%, 7,26 %, 29,97 %, 43,53 % та 17,66 % відповідно. Результати опитування за даним питанням не корелюють з результатами тестового контролю, проведеного в межах опитування ($r=-0,06010$, $p=0,2892$). Експериментальна перевірка показала розбіжності між загальним враженням від організації дистанційного навчання здобувачів та рівнем знань, які вони засвоїли під час дистанційного навчання. Рівень, за яким здобувачі визначали складність роботи під час дистанційного навчання, не корелював з результатами тестового контролю респондентів ($r=0,04745$, $p=0,4028$), та віком респондентів ($r=0,1379$, $p=0,0242$). При цьому рівень володіння технічними навичками роботи з програмним забезпеченням, веб-ресурсами залежав від віку опитуваних ($r=0,2432$, $p<0,0001$), але не корелював з рівнем, за яким здобувачі визначали складність роботи під час дистанційного навчання ($r=0,0818$, $p=0,1826$), та рівнем загального враження від вивчення дисципліни ($r=-0,0972$, $p=0,1130$). Наявність попереднього досвіду дистанційного навчання не корелювала з показником результативності вивчення дисципліни ($r=0,003982$, $p=0,9441$), що свідчить про те, що попередній досвід дистанційного навчання не впливає на ефективність дистанційного навчання в цілому. Результати проведеного опитування дають змогу стверджувати, що на ефективність дистанційного навчання не впливають стать і рівень освіти. Натомість є підстави стверджувати, що на ефективність процесу значним чином можуть впливати комунікативні і технічні навички. Дослідження не претендує на остаточне розв'язання проблеми підвищення ефективності дистанційного навчання у середовищі медичного закладу вищої освіти. Подальшого вивчення потребують теоретико-методологічні аспекти зарубіжного досвіду використання спеціального програмного забезпечення (систем управління навчанням, баз даних, програмних оболонок) для оптимізації процесу дистанційного навчання.

Ключові слова: дистанційне навчання, мотивація до навчання, заклади вищої медичної освіти, модель Дональда Кіркпатріка

This paper analyzes the experience of introduction of distance learning in Ukraine, explores the efficiency of online learning in comparison with the classroom form of education, and identifies the role of motivation in the process of distance learning and the factors influencing the effectiveness of online learning. The aim of this research is to determine, theoretically substantiate and experimentally test the effectiveness of distance learning at a medical university. The authors

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analyzed the results of a survey of 315 medical and dental students of Poltava State Medical University at the second (Master's) and third (PhD) levels of higher education. Our research relies on the assertion that online learning influences not only the level of students' motivation to continue their studies, but also the attitude toward their future profession. Therefore, upon receiving online training, students' learning motives and perception of the attractiveness of the profession were used to measure the effectiveness of online mode of education. Distance learning aims to individualize the process of acquiring knowledge remotely using modern information and communication technologies. At the same time, it is necessary to monitor the learning outcomes and examine their dependence on the growing popularity of online learning in the world. We developed a questionnaire based on Donald Kirkpatrick's model and applied the method of studying the attractiveness factors of the profession. 85.49% of respondents demonstrated their general impression of the organization of distance learning as positive (271 respondents). 74.13% of respondents were satisfied with the organization of distance learning at the university. To the question "How clearly do you understand how to apply the knowledge acquired through distance learning?" according to the scale from 1 to 5 (1 – not clear at all, 5 – very clear) respondents distributed their votes as follows – 1.58%, 7.26%, 29.97%, 43.53% and 17.66% respectively. The results of the survey on this issue correlate with the results of the test control conducted within the survey ($r = 0.31$). Experimental testing showed differences between the general impression of the organization of distance learning among students and the level of knowledge they acquired during distance learning. The level at which students determined the complexity of work during distance learning did not correlate with the results of test control of respondents ($r = -0.04745$, $p = 0.4028$), and the age of respondents ($r = 0.1379$, $p = 0.0242$). The level of technical skills in working with software and web resources depended on the age of respondents ($r = 0.2432$, $p < 0.0001$) and did not correlate with the level at which students determined the complexity of work during distance learning ($r = 0.0818$, $p = 0.1826$), and the level general impression of studying the discipline ($r = -0.0972$, $p = 0.1130$). The presence of previous experience of distance learning did not correlate with the performance in the discipline ($r = 0.003982$, $p = 0.9441$), which indicates that previous experience of distance learning does not affect the effectiveness of this mode of training in general. The results of the survey allow us to state that the effectiveness of distance learning is not affected by sex and level of education. Instead, there is reason to believe that communication and technical skills can have a significant impact on the efficiency of this process. The theoretical and methodological aspects of foreign experience in the use of special software (learning management systems, databases, software shells) require further research to optimize the process of distance learning.

Keywords: distance learning, motivation to study, medical educational institutions, Donald Kirkpatrick's model

Introduction

Online learning has been a popular mode of higher education around the world for decades. However, the outbreak of COVID-19 necessitated an accelerated shift to online teaching in the educational settings that previously had not practiced it very widely, including, but not limited to, the areas of medicine and healthcare. In 2022, the Russian full-scale military invasion of Ukraine urged higher education to switch to online mode once again. Hence, there is an urgent need for adequate comprehension and appropriate assessment of the effectiveness of this mode of learning in different academic contexts. The aim of this research is to determine, theoretically substantiate and experimentally test the effectiveness of distance learning at a medical university in Ukraine.

This aim will be achieved by targeting the following tasks:

- 1) to determine and experimentally test the effectiveness of distance learning in terms of studying foreign languages;
- 2) to find out the factors influencing the effectiveness of distance learning;
- 3) to detect the level and factors of motivation to study at a higher educational institution.

Literature review

In medical education, in particular, the use of online learning was propagated long before the COVID-19 pandemic, for instance, in *e-Learning in Medical Education* by Rachel Ellaway and Ken Masters, which was published in 2008 under the auspices of the Association for Medical Education in Europe (AMEE). We strongly agree with Ellaway's and Masters' assertion that online learning largely relies on "the educational uses of technology" [10, p. 3]. Back et al. (2016) studied the Blackboard online learning platform in the context of medical student learning [5]. The authors concluded that in order to create an effective e-learning environment, maximum efforts should be made to develop meaningful learning material. Moon

and Hyun (2019) analyzed the effectiveness of distance learning for medical students (nurses) while learning cardiopulmonary resuscitation, and found an increased level of knowledge and the state of emotional attitude, as well as improvement in the behavioral and cognitive attitude, and self-efficacy [17].

During COVID-19 lockdown, researchers have explored this issue in different countries and various teaching contexts. For example, Al-Balas et al. (2020) found a higher satisfaction rate among students and instructors in clinical medical education in Jordan as compared to their pre-COVID experience [2]. AlQhtani et al. (2021) studied the effectiveness and satisfaction with online versus classroom teaching in medical students from Saudi Arabia by measuring several parameters [3]. In particular, the scholars detected a positive dynamic in assignment submission and meeting individual needs, but a lower satisfaction with building skills and knowledge and interaction level. Stoeher et al. (2021) conclude that the COVID-19 lockdown might be a long-anticipated catalyst that brings about a new epoch in online medical education [20]. Meanwhile, Tayem et al. (2022) argue that online learning may be quite effective in terms of delivering the theoretical components of the curriculum, but cannot ensure mastering the clinical skills, which should be offered in the classroom as soon as the lockdown is over [21]. Ahmady et al. (2021) insist that technology-enhanced and simulation-based learning can significantly improve medical students' academic achievements, and therefore they must be integrated into such online learning resources as Massive Open Online Courses and virtual clinical cases [1].

Distance learning aims to individualize the process of acquiring knowledge remotely using modern information and communication technologies. Hyun (2017) argues that a reasonable combination of online and classroom teaching (i.e., a blended approach) can promote self-directed learning of medical students, thus facilitating their independence and responsibility in acquiring knowledge in a flexible and self-paced manner [17]. In order to

develop self-learning skills among medical students in the bachelor's and PhD curricula, educators actively implement the principles of evidence-based medicine, both during distance learning or self-directed study, and as a combination of e-learning and practical training [4; 8; 11; 14; 15].

Our study of the experience of implementing distance learning has several directions: we analyzed the effectiveness of this process in comparison with the traditional classroom methods; we examined factors influencing its efficiency; the paper also focused on students' motivation in the process of distance learning. In terms of the latter, we believe that motivation to study at a medical university is determined by a number of specific factors. In our previous research (2020), we concluded that the formation of future doctors' interest in professional activities depends most on the implementation of the following conditions: the consistency of content, forms and methods of teaching, the openness of educational material to innovations, engagement of students in research activities, cooperation of students with teachers, unity of theory and practice [18]. Motivation may be a key factor in academic success in distance learning [18]. The use of modern multimedia tools, as well as organizing students' self-directed research were also identified as positive factors in fostering motivation for learning and future professional activity in general [9; 19]. The scientists from the Iran University of Medical Sciences (2010) suggested a method for increasing the motivation to study professional English at a medical university based on group research projects. According to the researchers, the change in students' behavior was influenced by the application of Kemmis and McTaggart's cyclical research model and the problem method [9]. Similar techniques have been developed by other researchers [6; 16].

Hence, researchers, in general, evaluate online medical education as a positive tendency in modern education and as an effective component in a blended learning approach. However, it is essential to select and refine a teacher's technological toolkit in order to benefit from online education as much as possible, as well as to increase students' motivation for studies. At the same time, it is necessary to monitor the learning outcomes and examine their dependence on the growing popularity of online learning in the world.

Materials and methods

We analyzed the results of a survey of 315 undergraduate and PhD students at Poltava State Medical University while studying foreign languages: English for Academic Communication (the PhD programme) and English for Professional Purposes (undergraduate students). The questionnaire was developed on the basis of Donald Kirkpatrick's model for evaluating the effectiveness of education [7]. At the beginning of the survey, we studied the reaction of students to the introduction of distance learning at the appropriate training levels. Next, we determined how well students had acquired the knowledge during distance learning and how they used it in further training. Learning outcomes were assessed using tests in English for Academic Communication and English for Professional Purposes.

In the course of the research, respondents were offered a questionnaire of 50 statements, where they indicated their agreement or disagreement by appropriate

marks. Respondents noted factors that are attractive and unattractive for them in the chosen profession. Our research relies on the assertion that online learning influences not only the level of students' motivation to continue their studies, but also the attitude toward their future profession. Therefore, upon receiving online training, students' learning motives and perception of the attractiveness of the profession were used to measure the effectiveness of online mode of education. Differentiation of answers in a questionnaire was carried out according to the three scales: 1. "Acquisition of knowledge", 2. "Mastering the profession" (motives to acquire professional knowledge and develop professionally important skills), 3. "Obtaining a diploma" (formal acquisition of knowledge and skills to obtain a diploma, attempts to use detours when passing exams and tests). The attractiveness of the profession was determined by 11 factors placed in columns A and B by the method of studying the attractiveness factors of the profession. We used the Google Forms service <https://docs.google.com/forms> to conduct the survey. The survey results were processed using the Google Tables service and MS Office 2010.

The statistical processing of the obtained data was conducted using the software packages «Excel» and «GraphPad Prism 5.0». The D'Agostino-Pearson test (K2 test) was used to assess the normality of the distribution. We applied Spearman's rank correlation test (Spearman r) to assess intergroup differences. Differences were considered statistically significant at $p < 0.05$.

Results

The distribution of respondents by sex was as follows – men accounted for 39.2%, women – for 60.8% of respondents; the age of the respondents ranged from 20.2 ± 2.97 years. By level of education, undergraduates accounted for 84.2% of respondents (255 people), PhD students – 15.8% (60 people). The first-year students accounted for 39.05% of respondents, and students in the 2nd, 3rd, and 4th years of study – 21.59%, 35.87%, and 3.49%, respectively. 50.16% of respondents (159 respondents) had previous experience of distance learning. At the same time, 2.52% of respondents acquired previous experience of distance learning in professional educational institutions (colleges), 6.29% – when taking Internet courses, webinars, advanced training courses, attending online conferences, etc., 3.77% – when preparing for state certification before admission and when learning a foreign language at private institutions, the rest – when studying in senior classes of school and in previous years of study at the university.

85.49% of respondents demonstrated their general impression of the organization of distance learning as positive (271 respondents); 74.13% of respondents were satisfied with the organization of distance learning at the university, to the question "How clearly do you understand how to apply the knowledge acquired through distance learning?" according to the scale from 1 to 5 (1 – not clear at all, 5 – very clear) respondents distributed their votes as follows – 1.58%, 7.26%, 29.97%, 43.53% and 17.66% respectively. The results of the survey on this issue do not correlate with the results of the test control conducted within the survey ($r = -0.06010$, $p = 0.2892$).

In preparation for classes, students often used Internet resources and materials from the university's website (Fig. 1).

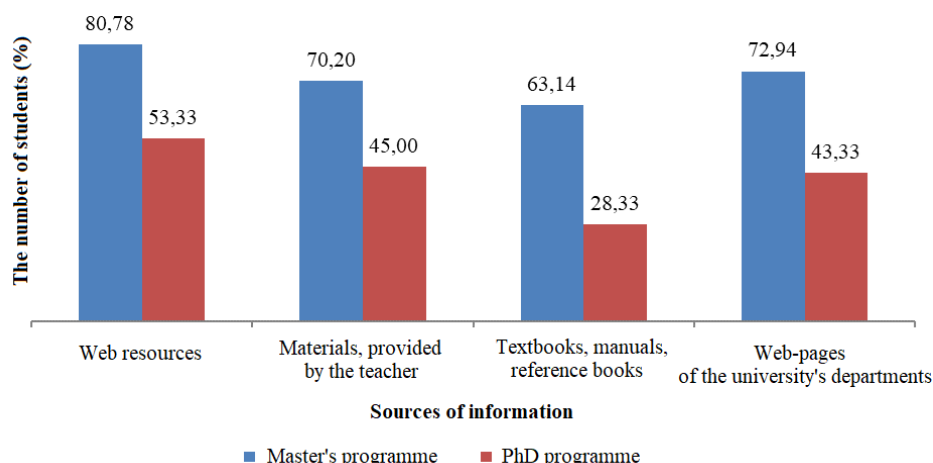


Fig. 1. Distribution of resources used by university students in preparation for classes
The results of query analysis are represented in Figure 2:

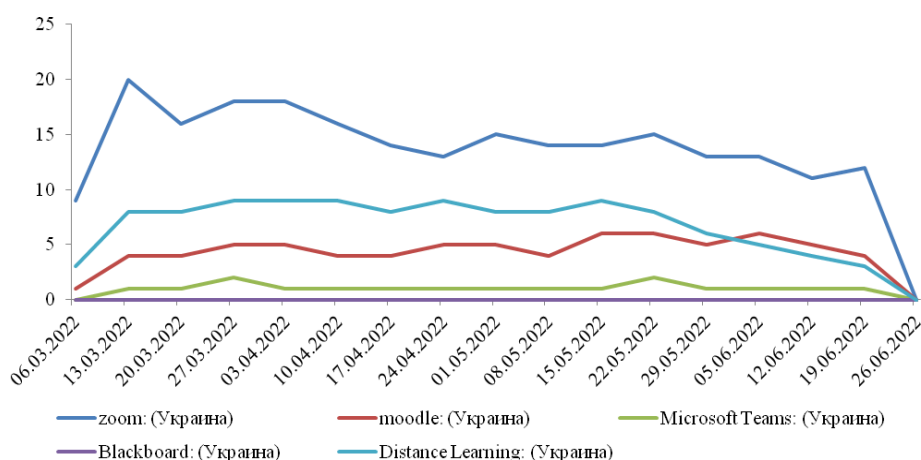


Fig. 2. Distribution of queries "distance learning" (in Cyrillic), «Zoom», «Moodle», «Microsoft Teams» and «Blackboard» in Google Trends

According to the five-point scale, the easiness in working with learning material during distance learning in all disciplines was rated by students at an average of 4.34 points, and the understanding of material learned remotely – at 3.92.

According to the questionnaire for research on motivation to study at a university, with a maximum value of

12.6 points according to the scale № 1, the average score in the group of respondents was 5.35 points, according to the scale № 2 – 5.64 points, and according to the scale № 3 – 4.29 points (with a maximum of 10 points for both scales). (Fig. 3).

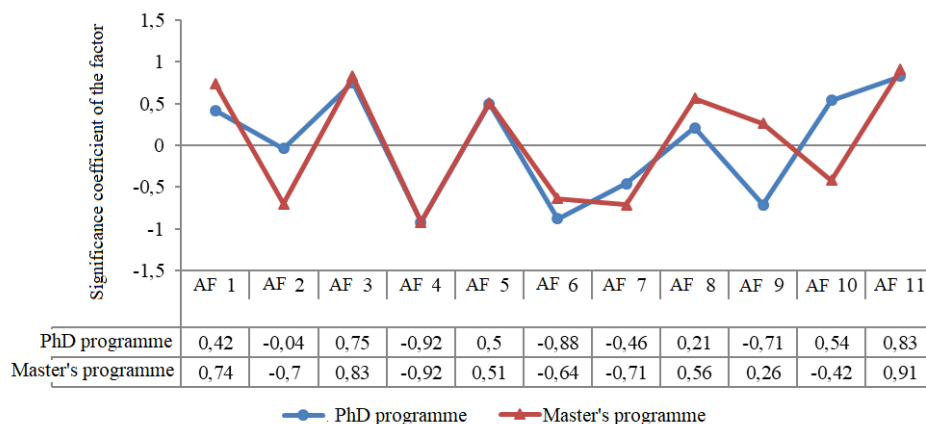


Fig. 3. The maturity level of professional orientation

AF 1 – This profession is one of the most important in the society;
 AF 2 – This occupation involves working with people; AF 3 – This occupation requires constant creativity;
 AF 4 – This occupation that does not cause excessive fatigue; AF 5 – Substantial salary; AF 6 – The possibility of self-improvement;
 AF 7 – This occupation corresponds to my abilities; AF 8 – This occupation corresponds to my character; AF 9 – Short working day;
 AF 10 – The lack of frequent contact with people; AF 11 – The opportunity to achieve social recognition

Using the questionnaire to determine the motives for studying at a medical university, we found that 96.53% of respondents express a desire to become a highly qualified specialist, ensuring successful future professional activity is a priority motive for 81.39% of respondents, the list of the most important motives also included the desire to gain deep knowledge (76.66%), the desire to successfully continue their studies (52.05), the desire to obtain a diploma (44.8).

Processing the results of the questionnaire by the method of studying the attractiveness factors (AF) of the profession involves the calculation of the significance coefficient (C_s) for each factor.

Discussion

The level at which students determined the complexity of work during distance learning did not correlate with the results of test control of respondents ($r=-0.04745$, $p=0.4028$), and the age of respondents ($r=0.1379$, $p=0.0242$).

The level of technical skills in working with software and web resources depended on the age of respondents ($r=0.2432$, $p<0.0001$) but did not correlate with the level at which students determined the complexity of work during distance learning ($r=0.0818$, $p=0.1826$), and the level general impression of studying the discipline ($r=-0.0972$, $p=0.1130$). At the same time, 142 respondents associate difficulties in the process of distance learning with insufficient technical skills in working with software and web resources, 49 – with insufficient efficiency of working with the teacher. Oral situational tasks were the most difficult for 48.11% of respondents, written practical tasks – for 37.12%, and test tasks – for 14.77%.

The presence of previous experience of distance learning did not correlate with the performance in the discipline ($r=0.003982$, $p=0.9441$), which indicates that previous experience of distance learning does not affect the effectiveness of this mode of training in general.

Based on the generalization of data in Fig. 1, it is possible to define several regularities. For AF 1, the significance coefficient is significantly reduced in PhD students, in contrast to undergraduates, which may indicate that the attractiveness factor does not depend on professionalism, and respondents made their choice based on personal preference. The result for AF 2 shows a negative attitude of both undergraduates and PhD students toward the need to work with people, which indicates that students are aware of problems that may arise in the process of professional communication.

Factors that were not significant for students were AF2, AF4, AF6, and AF7. AF 3 – "This occupation requires constant creativity" – shows a positive level of professional orientation in both groups, which indicates a desire for self-improvement. Among all the factors of attractiveness for the profession, AF3 and AF11 were the most significant for students at both levels, which indicates a high level of internal motivation to master the profession.

Conclusions

The results of the study served as a basis for formulating a number of conceptual conclusions. We did not observe significant fluctuations in the scores of the coefficient indicators according to the three scales. The predominance according to the scales "Acquisition of knowledge" and "Mastering the profession" is insignificant in relation to the scale "Obtaining a diploma", which does

not allow to trace the dominant motivation among students. The great importance of the "Diploma" scale can be explained by the crisis of transition from adolescence to early adulthood, which leads to complications in the interpersonal and professional spheres.

Experimental testing showed differences between the general impression from the organization of distance learning among students and the level of knowledge they acquired during distance learning. The results of the survey allow us to state that the effectiveness of distance learning is not affected by sex and level of education. Instead, there is reason to believe that communication and technical skills can have a significant impact on the efficiency of this process.

Motivation to study, especially in the context of distance learning, reflects the attitude of students to professional activities. The development students' motivation for professional activity under conditions of distance learning becomes possible with the creation of an effective electronic educational environment, which, in turn, should provide quality content, interactivity, and the ability to individualize the learning process.

The study does not claim to be a definitive solution to the problem of improving the effectiveness of distance learning at medical universities. The theoretical and methodological aspects of foreign experience in the use of special software (learning management systems, databases, software shells) require further research to optimize the process of distance learning.

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