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ORGANIZATION OF NON-FORMAL EDUCATION FOR FUTURE PHYSICAL EDUCATION TEACHERS

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Organization of non-formal education for future physical education teachers

Abstract. The organization of massive open online courses on the Coursera platform to enhance academic competence of future physical education teachers is the subject of this study. In the work massive open online courses are presented as a resource for students' non-formal education. The goal of the study is to identify the effectiveness of massive open online courses in increasing students' academic performance and developing academic competence. The authors used the following theoretical and empirical methods: literature review and analysis, content analysis of non-formal education courses and pedagogical experiment. Mathematical statistics methods as SPSS Statistics 27.0 program and the non-parametric Mann-Whitney U-test to compare the control and experimental groups were utilized in this research. 70 students of 3-4 years of study of the educational program "Physical Education and Sport" of Pavlodar Pedagogical University named after Alkey Margulan took part in the pedagogical experiment. Empirical data were collected based on the results of organizing 5 massive open online courses for students. As a result of the study, the authors found out that the presented courses increased the academic performance of the experimental group by 11.4%. This fact allows future physical education teachers to apply the acquired skills to develop their academic competence.

Key words: non-formal education, academic competence, physical education, massive open online course, pedagogical experiment.

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Болашақ дене шынықтыру мұғалімдеріне бейресми білім беруді ұйымдастыру

Аңдатпа. Бұл мақалада болашақ дене шынықтыру мұғалімдерінің академиялық құзыреттілігін дамыту үшін Coursera платформасында жаппай ашық онлайн курстарды ұйымдастыру талқыланады. Бұл жұмыста студенттерінің бейресми білім беру ресурсы ретінде жаппай ашық онлайн курстары ұсынылған.Зерттеудіңмақсаты–студенттердіңоқуүлгерімінарттыружәнеакадемиялыққұзыреттілігін дамытудағы жаппай ашық онлайн курстардың тиімділігін анықтау. Авторлар әдебиеттерге шолу және талдау, бейресми білім беру курстарының мазмұнын талдау және педагогикалық эксперимент деген теориялық және эмпирикалық әдістерді пайдаланды. Мақалада бақылау және эксперимент топтарын салыстыру үшін SPSS Statistics 27.0 бағдарламасы және параметрлік емес Mann-Whitney U-тесті сияқты математикалық статистика әдістері қолданылды. Педагогикалық экспериментке Әлкей Марғұлан атындағы Павлодар педагогикалық университетінің «Дене шынықтыру және спорт» білім беру бағдарламасының 3-4 курсында оқитын 70 студент қатысты. Эмпирикалық деректер Coursera платформасында студенттерге арналған 5 жаппай ашық онлайн курстарды ұйымдастыру нәтижелері бойынша жиналды. Зерттеу нәтижесінде авторлар Coursera платформасында ұсынылған жаппай ашық онлайн курстар эксперименталды топтың оқу үлгерімін 11,4%-ға арттырғанын анықтады. Бұл факт болашақ дене шынықтыру мұғалімдеріне өздерінің академиялық құзыреттілігін дамыту үшін алған дағдыларын қолдануға мүмкіндік береді.

Түйін сөздер: бейресми білім, академиялық құзыреттілік, дене тәрбиесі, жаппай ашық онлайн курс, педагогикалық эксперимент.

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Организация неформального образования для будущих учителей физической культуры

Аннотация. В данной статье рассматривается организация массовых открытых онлайн-курсов на платформе Coursera для развития академической компетенции будущих учителей физической культуры. Массовые открытые онлайн-курсы представлены авторами в качестве ресурса для неформального образования студентов. Цель исследования – выявление эффективности массовых открытых онлайн-курсов в повышении академической успеваемости студентов и развитии академической компетенции. Авторами применялись следующие теоретические и эмпирические методы: обзор литературы и ее анализ, контент-анализ курсов неформального образования и педагогический эксперимент. В работе также использовались методы математической статистики, такие как программа SPSS Statistics 27.0 и непараметрический критерий U-критерий Манна-Уитни, для сравнения контрольной и экспериментальной групп. В педагогическом эксперименте приняли участие 70 студентов 3-4 курсов обучения образовательной программы «Физическая культура и

спорт» Павлодарского педагогического университета имени Әлкей Марғұлан. Эмпирические данные были собраны по результатам организованных для студентов 5 массовых открытых онлайн-курсов на платформе Coursera. Результаты исследования показали, что представленные онлайн-курсы повысили академическую успеваемость экспериментальной группы на 11,4%. Данный факт позволяет будущим учителям физической культуры применять полученные навыки для развития своей академической компетенции.

Ключевые слова: неформальное образование, академическая компетенция, физическая культура, массовый открытый онлайн-курс, педагогический эксперимент.

Basic provisions. Non-formal education contributes to reach the potential in terms of social, motivational, cognitive and creative abilities, to increase the competitiveness and to make the skills more marketable. Increasing the effectiveness of the key competencies of students who are mastering the relevant areas of training will allow turning to the possibilities of non-formal education. The main feature of non-formal education is the lack of universal standardized requirements for learning outcomes. This kind of education focuses on the specific needs and interests of students and has educational systems that are flexible in organization and form. It is able to respond to educational processes in a timely manner and obtain broaden opportunities for systematizing and monitoring educational activities. The mobility and flexibility of the non-formal education system are the advantages in the context of continuous global changes in the education sector. Teaching methods are innovative and objectives are practical and tailored to individual learning needs.

Introduction. Non-formal education is positioned as a supplement or a substitute to the main one. It is carried out outside the formal educational system and is unrestricted by the place, duration and form of training received. An analysis of recent studies and publications on non-formal education indicates the great importance of this type of education in modern society. B. Brennan views non-formal education as a complement or alternative to the formal education system. The researcher attempts to introduce a new concept of non-formal education [1]. Other researchers in their work write about the advantages of organizational forms of non-formal education and an inevitable transformation from formal to non-formal learning in the future [2]. Some academics note that the needs of students are better met by non-formal education, as it responds openly and flexibly to the interests of students [3]. M. Souto-Otero notes the necessity to validate the results of non-formal education. This allows educational institutions to take responsibility for learning that occurs outside their campuses, provided that non-formal education is consistent with established curricula [4]. S.E. Novikova supports the verification and recognition of competencies within non-formal education in order to include them in the formal education system [5].

Non-formal education uses great freedom in choosing content, methods, and forms of teaching. Massive open online courses (MOOCs) are one of the main forms of non-formal education. MOOCs imply the ability to simultaneously train a large number of students and use software that has an open-source access code for registration for everyone. Such online courses are becoming a significant resource for non-formal education of certain social groups [6]. MOOCs are just online courses for educational purposes, they are distinguished by having accessibility and scalability in the terms that anyone can apply to them [7]. MOOCs are aimed at broadening horizons and deepening knowledge in various fields, they range from several modules to a series of courses. According to foreign studies, they involve increasing academic performance level and developing the academic competence of students [8]. MOOCs impact on participants' learning performance that are evidenced by facilitating the process of learning through providing materials and encouraging information sharing [9]. The development of academic competence means the ability of students to acquire new knowledge in the field of study, to enable to apply these skills in professional activities, to understand and utilize teaching methods of specialized disciplines, to be open to learning new things, to be flexible and mobile, and also show a high interest in knowledge of the organization of educational activities, and to be ready for self-education.

The goal of the study is to identify the effectiveness of massive open online courses in increasing students' academic performance and developing academic competence.

Methods and organization of research. During the research process, the following theoretical and empirical methods were utilized in this research: literature review and analysis, content analysis of non-formal education courses and pedagogical experiment. In addition, the methods of mathematical statistics such as the non-parametric

Mann-Whitney U-test [10] and SPSS Statistics 27.0 program to compare the control and experimental groups were used. The research involved 70 students of 3-4 year of study of the educational program "Physical Education and Sport". The pedagogical experiment was conducted during the first semester of the 2023-2024 academic year.

In this work the authors formulated three research questions:

RQ1 – Is there any difference in academic competence between the students from the experimental group and the control group before the experiment?

RQ2 – Is there any difference in academic competence between the students from the experimental group and the control group after the experiment?

RQ3 – Does non-formal education influence on students' academic competence of the specialty "Physical Education and Sport"?

Research results and their discussion. In the third cohort of massive open online courses on the Coursera platform, 35 grants were distributed among 3-4 year students of the educational program "Physical Education and Sport". Thus, 70 students of 3rd and 4th year of study participated in the ascertaining stage of the pedagogical experiment. The experiment participants were split up into 35 students each into control and experimental groups. Both groups were determined based on the rating control indicators of such disciplines: "Gymnastics with teaching methods", "Methods of teaching physical education" and "Sport games with teaching methods", which were studied by the 3rd year students in the mentioned semester. The following disciplines: "Inclusive education", "Theory and methodology of children's and youth sports", "Fundamentals of sport medicine and rehabilitation", "Theory and methodology of health-improving and recreational physical culture", "Swimming with teaching methods" were observed for the 4th year students.

The results of diagnosing the academic competence of the control group (CG) at the ascertaining stage of the pedagogical experiment are presented in Table 1.

Table 1 – Results of diagnosing the academic competence of the control group at the ascertaining stage of the pedagogical experiment (n=35)

Stage	Academic competence of the control group					
	high level		average level		low level	
	student number	%	student number	%	student number	%
Ascertaining stage	2	5,7%	21	60%	12	34,3%

The indicators demonstrate that students of the control group at the ascertaining stage of pedagogical experiment gain academic competence in a high level – 5.7% (2 students), in an average level – 60% (21 students) and in a low level – 34.3% (12 students). The results of diagnosing the academic competence of the experimental group (EG) at the ascertaining stage of the pedagogical experiment are presented in Table 2.

Table 2 – Results of diagnosing the academic competence of the experimental group at the ascertaining stage of the pedagogical experiment (n=35)

Stage	Academic competence of the experimental group					
	high level		average level		low level	
	student number	%	student number	%	student number	%
Ascertaining stage	1	2,9%	16	45,7%	18	51,4%

Results of diagnosing the academic competence of the experimental group at the ascertaining stage show that students obtain this competence in a high level – 2.9% (1 student), in an average level – 45.7%

(16 students) and in a low level – 51.4% (18 students). The usage of statistical significance testing with the help of mathematical statistics method of the non-parametric Mann-Whitney U-test verified the results of control and experimental groups. This criterion illustrates the nonappearance of differences at the ascertaining stage of the pedagogical experiment in the levels of important characteristics between the experimental and the control groups.

The criterion statistics are presented as follows:

$$U = n_1 \cdot n_2 + \frac{n_x \cdot (n_x + 1)}{2} - T_x$$

The sum of ranks for the experimental group is 1233, for the control group – 1252. Let us signify the largest sum by $T_x = 1252$.

The criterion statistics allows to formulate hypotheses:

H0: the experimental group does not exceed the control group in terms of academic competence.

H1: The experimental group outperforms the control group in academic competence.

Defining the value U_{emp} utilizing the proposed formula we receive:

$$U_{emp} = 603$$

Thus, U_{crit} = p≤0.01 – 413, p≤0.05 – 471, as the result, the statistics shows the samples of unimportant differences and the H0 (null hypothesis) that proves the experimental group and the control group are homogeneous at the ascertaining stage. So, at the ascertaining stage, the EG does not exceed the CG in terms of academic competence.

Pavlodar Pedagogical University named after Alkey Margulan on behalf of the Ministry of Science and Higher Education organized free massive open online courses on the Coursera platform for the future teachers of physical education. The students of experimental group (n=35) completed 5 massive open online courses on different topics on the platform during the forming stage of pedagogical experiment: “Business Analysis and Process Management”, “Effective Problem-Solving and Decision Making”, “AI for Everyone”, “Excel Skills for Data Analytics and Visualization Specialization” and “Introduction to Basic Game Development Using Scratch”. The courses were selected and studied by the experimental group students in a wide range of languages as Russian, Kazakh and English, or in the English language with subtitles (Table 3):

Table 3 – The selection of courses on the Coursera platform by students of the experimental group (n=35)

#	Course title	Number of students enrolled
1	Business Analysis and Process Management	11
2	Effective Problem-Solving and Decision Making	9
3	AI for Everyone	8
4	Excel Skills for Data Analytics and Visualization Specialization	4
5	Introduction to Basic Game Development Using Scratch	3

The presented courses on the Coursera platform contain from 3 to 4 modules. The course “Business Analysis and Process Management” from Coursera Project Network was chosen by 31.4% of learners (11 students). In this course students learn to analyze business procedures and processes and find solutions to current issues. Students describe their business goals and operate within the organizational context; assess current business from a process perspective and identify appropriate business way outs. The second most preferred course among future teachers of physical education of the experimental group is “Effective Problem-Solving and Decision Making” from the University of California, which offers 4 modules. This course was studied by 25.7% of students (9 students). The ability to solve problems is an essential skill nowadays. The course teaches the students to utilize decision-making methods, generate potential solutions, analyze and evaluate them. The learning outcomes of the course are to build subject matter expertise, acquire fundamental understanding of a topic and tools, and get experienced to enhance employability. The course “AI for Everyone” from Deep Learning AI, consisting of 4 modules takes the third place among learners. 22.9% of leaners (8 students) selected it. The course provides the information and tips to become better user of AI technology. The course teaches AI terminology, the

basics of data science, some opportunities to apply AI technologies, build machine learning projects, create AI strategies, and manage ethical norms and societal debates about AI. The fourth place among the courses on the Coursera platform takes the course from Macquarie University "Excel Skills for Data Analytics and Visualization Specialization". It contains 3 module series. Only 4 students or 11.4 % applied to this course. The course helps to develop the ability of analyzing and visualizing information to improve work performance and increase employment opportunities. Students learn to use Excel functions, tables to automate analysis, create visualizations, utilize the tolls such as transformation, linking and categorizing data. The last place is occupied by the course "Introduction to Basic Game Development Using Scratch" from the Coursera Project Network, which was studied by only 3 students (8.6%). The course teaches how to utilize some features in Scratch, create basic game with block-based codes, build confidence in creating algorithms for games with block-based programming.

The mentioned courses include an overview of the course, reading materials, contextual modules, videos, quizzes, assignments graded by other participants and discussion forums. Computer examinations or tests and written assessment are required in each Coursera course. 35 experimental group students were rewarded certificates of achievement upon completion of their online courses.

The table data demonstrates some variations in academic competence and academic performance of students in the experimental group mainly at an average level after they finished courses on Coursera platform. The control group also practiced little changes, just only +2,9% on the rating control indicators of the studied disciplines. The usage of the non-parametric Mann-Whitney U-test illustrated that academic competence and academic performance in the experimental group underwent quantitative transformations.

A comparative table for diagnosing the academic competence of the control and experimental groups at the final stage of the pedagogical experiment is presented in Table 4.

Table 4 – Comparative table for diagnosing the academic competence of the CG and EG at the ascertaining and final stages of the experiment

Stage	Control group			Experimental group		
	levels in %					
	high	average	low	high	average	low
Ascertaining stage	5.7%	60%	34.3%	2.9%	45.7%	51.4%
Final stage	8.6%	62.9%	28.5%	5.8%	57.1%	37.1%
Comparison in %	+2.9%	+ 2.9%	- 5.8%	+2.9%	+ 11.4%	- 14.3%

At the end of pedagogical experiment, the control group did not reveal statistically significant changes in academic competence according the statistical process which was applied to these students. Conversely, the experimental group presented an increase in average level of academic competence. The data are demonstrated in Figure 1.

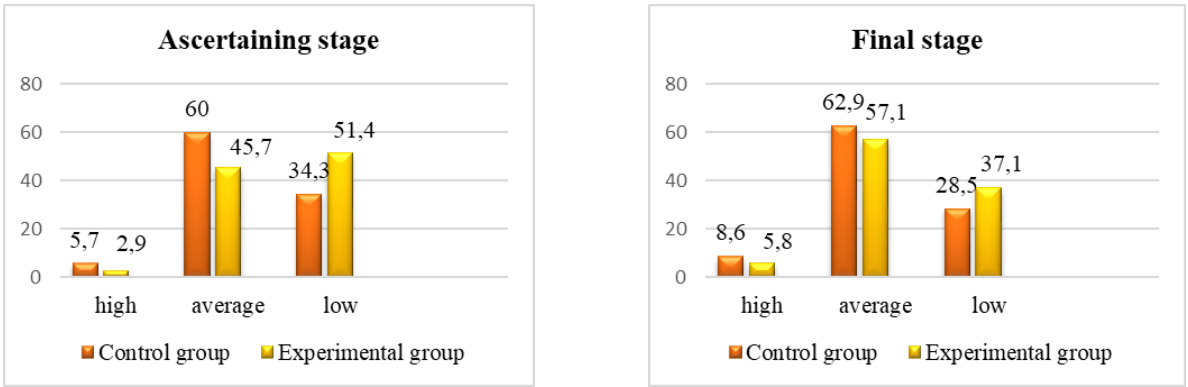

Figure 1 – Comparative figure of diagnostics of academic competence of the CG and EG at the ascertaining and final stages of the experiment

Answering to the first research question: "Is there any difference in academic competence between the students from the experimental group and the control group before the experiment?", we conclude that in terms of academic competence and academic performance the experimental group is not greater than the control group. We take the hypothesis H0 according to the results of mathematical statistics of the nonparametric Mann-Whitney U-test. This fact demonstrates that the students in the control and experimental groups were practically identical at the ascertaining stage of the experiment. In response to the second research question: "Is there any difference in academic competence between the students from the experimental group and the control group after the experiment?", the students of EG finished 5 massive open online courses on the official Coursera platform: "Business Analysis and Process Management", "Effective Problem-Solving and Decision Making", "AI for Everyone", "Excel Skills for Data Analytics and Visualization Specialization" and "Introduction to Basic Game Development Using Scratch". The control group's academic competence in a high level improved from 5.7% to 8.6%%, which means +2.9%, whereas in an average level from 60% to 62.9%, i.e. +2.9%. The level of high academic competence of the experimental group increased by 2.9%, from 2.9% to 5.8% and an average level of academic competence grew from 45.7% up to 57.1%, which means +11.4%. The third research question was inquired as "Does non-formal education influence on students' academic competence of the specialty "Physical Education and Sport"? Our findings after these research outcomes show that enrolling to non-formal education of massive open online courses is beneficial to students of specialty "Physical Education and Sport". It not only on terms of the level of academic competence and academic performance, but also for developing metacognitive skills. The experimental group students demonstrated increased independence, the ability to filter secondary knowledge information in addition to current materials and data, showed perseverance in completing challenging assignments in classroom, and began to provide more feedback. The results of the study proved that students' academic performance positively impacted by massive open online courses on the Coursera platform.

Conclusions. The content and methodological tools of non-formal education forms are an important factor in the development of students' academic competence. In-depth analysis of the domestic and foreign literature on non-formal education specifies the active development of the practice of this issue.

Our research revealed the impact and the effectiveness of massive open online courses on the Coursera platform on increasing students' academic competence in the educational program "Physical Education and Sport". The students of the experimental group completed 5 massive open online courses on the Coursera platform with successful completion certificates: "Business Analysis and Process Management", "Effective Problem-Solving and Decision Making", "AI for Everyone", "Excel Skills for Data Analytics and Visualization Specialization" and "Introduction to Basic Game Development Using Scratch". After finishing online courses, the students of the experimental group demonstrated gained skills in the next mid-term period in such theoretical disciplines as "Methods of teaching physical education", "Sport games with teaching methods", "Theory and methodology of children's and youth sports", "Fundamentals of sport medicine and rehabilitation" and "Theory and methodology of health-improving and recreational physical culture". Students of educational program "Physical Education and Sport" became more open to learning new things, became flexible and mobile, and also showed a high interest in knowledge of the organization of educational activities. After pedagogical experiment academic performance of the control group improved by 2.9%, and the experimental group increased by 11.4%.

Our recommendations to the students of educational program "Physical Education and Sport" next time to choose the online courses not only to develop their key competences but professional as well. The number of online courses and topics for regional universities expand gradually. The consultations should be given by advisers because the Coursera platform provides courses for future physical education teachers: "The Science of Training Young Athletes", "Sport Marketing" and "Sport and Society". After completion of more professional-oriented courses students will receive practical sport science information, comprehend nature of coaching and utilize the skills of physical activities.

Thus, the development of non-formal education should make up for the shortcomings of formal education. In the future, it is necessary to create new conditions for the training of future teachers to implement the processes of integration, validation of non-formal education and recognition of obtained skills and competences.

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