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Digital technologies in the system of teaching students at the university

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Abstract

The study aims at identifying the role of the digital technologies in the system of teaching students at the university. The following methods were used in the study: testing, questioning, analysis of performance results, mathematical methods of data processing, etc. Methods for diagnosing learning motivation and emotional attitude to learning, studying the levels of formation of students' cognitive interests (author's method), a questionnaire for assessing students' knowledge in the field of research activities were applied as well. The data of the students' final progress in subjects were also analysed. An analysis of the main results of the study allows us to conclude: students who were asked to use digital technologies in teaching showed significant differences before and after the experiment on all scales of the study (the learning motivation level, the cognitive interest level, the knowledge level in the research activities field, assessment of the final performance in subjects). The analysis of the results also showed that according to all the data obtained at the stage of the control experiment, the reliability of the differences in the conclusions of the experimental and control groups on all scales of the study is confirmed.

Keywords

Digital technologies, education, students, motivation, cognitive interest, research activity

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Цифровые технологии в системе обучения студентов в университете

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Аннотация

Целью исследования является изучение цифровых технологий в системе обучения студентов в вузе. В исследовании были использованы следующие методы: тестирование; анкетирование; анализ результатов деятельности; математические методы обработки данных и т.д. Применялись методики диагностики мотивации учения и эмоционального отношения к учению, исследования уровней сформированности познавательных интересов студентов (авторская методика), анкета для оценки знаний в области научно-исследовательской деятельности у студентов. Авторами проанализированы данные итоговой успеваемости студентов по предметам. Анализ основных результатов исследования позволил сделать следующие выводы: студенты, которым было предложено применять в обучении цифровые технологии, показали достоверные значимые отличия до и после эксперимента по всем шкалам исследования: уровню мотивации учения, уровню познавательного интереса, уровню знаний в области научно-исследовательской деятельности, оценке итоговой успеваемости по предметам. Данные, полученные на этапе контрольного эксперимента, подтверждают достоверность отличий в результатах экспериментальной и контрольной групп по всем шкалам исследования.

Ключевые слова

Цифровые технологии, обучение, студенты, мотивация, познавательный интерес, научно-исследовательская деятельность

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INTRODUCTION

Digitalisation and innovations have become an integral part of any modern professional, including educational, activity. Digitalisation of education is the result of scientific research, the search for new forms, methods, and ways of implementing pedagogical activity. Today, digitalisation of higher education is carried out in the fields of educational digital infrastructure development (digital space establishment); digital teaching materials, services, and tools; educational work organisation's new models development and dissemination.

Digital technologies are understood as "a discrete system based on the methods of encoding and transmitting information, which allows performing a variety of diverse tasks in the shortest time intervals" [6]. Various digital projects "Datahab"; "Architecture of Digital Yransformation"; "Digital University"; "Unified Service Platform of Science"; "Marketplace of Software and Equipment"; "Digital Education"; "Service Hub" are proposed for implementation in the "Strategy of the Branch of Science and Higher Education Digital Transformation" [1].

Depending on the model of setting the educational process, digital technologies can be used:

– in the system of mixed learning (chatbots in the activities of university libraries and as virtual consultants, tutors for students and teachers; the use of interactive Web 2.0 tools on Internet resources (Wikia, Babylon, Wikidot, etc.) [2; 3]);

– in the development of online education (development of online courses that allow the entire educational process to be transferred online, for example, Intuit, Coursera, Open Education, the introduction of interactive materials exchange systems in the Socrative, Kahoot, Edmodo, and Nearpad systems [3; 4]);

– in creating a digital, virtual environment (creating a personal digital environment for a student based on the use of web blogs, Wikis website, social networks (YouTube, Facebook, LinkedIn, VKontakte, etc.), and bookmark sites (Reddit, Stumble Upon and Digg). This approach allows us to create new learning models (for example, E-learning 2.0, Pedagogy 2.0, Faculty 2.0 [4], etc.).

In general, it can be noted, that the introduction of digital technologies in the education of university students is in great demand, especially during the remote educational format associated with the spread of the COVID-19 pandemic. Nevertheless, there is a question of the quality and effectiveness of such training, which determines the relevance of our research.

MATERIALS AND METHODS

The study involved university students (in the number of 65 people). The experimental group of students consisted of 34 people, whose training was conducted with the use of digital educational technologies. The control group consisted of 31 students – students who receive education traditionally, offline. The experimental group of students was trained according to a mixed learning model (full-time and remotely using various digital technologies (chatbots, interactive Web 2.0 tools, online courses, etc.)).

The purpose of the study is to examine digital technologies in the system of teaching students at the university.

Research hypothesis: the use of digital educational technologies allows to increase the educational motivation level, cognitive interest, and knowledge in the field of research activities among students of higher educational institutions.

Research methods: testing; questionnaires; analysis of performance results; mathematical methods of data processing, etc.

Research methods: 1. Methodology for diagnosing the motivation of teaching and emotional attitude towards learning (A.D. Andreeva, adapted for interviewing students at the university). 2. Methodology "The students' cognitive interests formation levels diagnostics" (author's manual). 3. Questionnaire for assessing students' knowledge in the field of research activities. 4. Final assessment of students' academic performance in the subjects.

RESULTS

In the experimental group, according to the methodology of diagnostics of learning motivation and emotional attitude to learning at the initial stage of testing, five levels were revealed. Namely, the following: the first (productive cognitive motivation) and second (productive social normative motivation) levels of motivation are in 4 (11.8 %) and 5 (14.7 %) students, and the fourth (reduced motivation, negative attitude to learning) and fifth (highly negative attitude to learning) – in 7 (20.6 %) and 4 (11.8 %) respondents, respectively. Repeated testing showed that the first and second levels were detected in 10 (29.4 %) and 12 (35.3 %) students.

In the control group, at the first stage of the experiment, the first and second levels were detected in 2 (6.4 %) and 5 (16.1 %) people. According to repeated testing, the results have not changed much (Fig. 1).

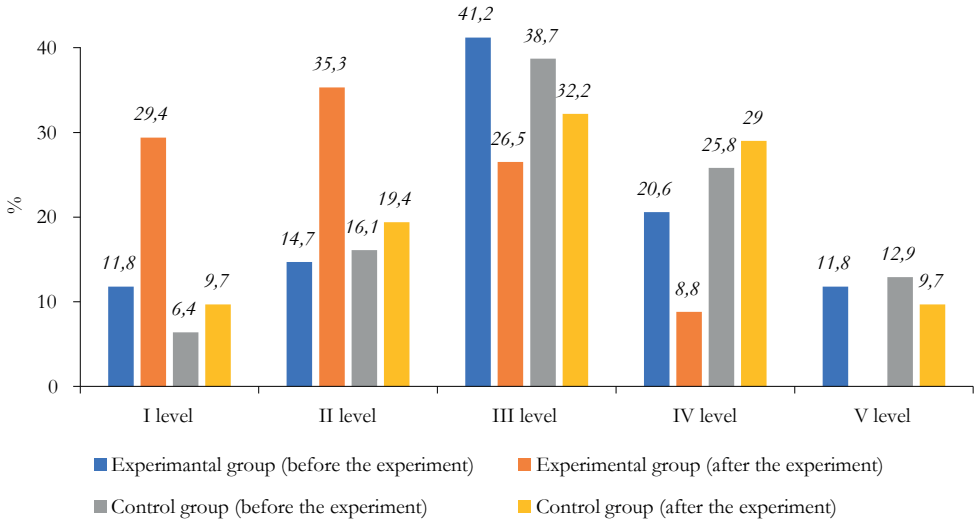

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Fig. 1. Results of diagnostics of educational motivation and emotional attitude to learning

A comparative analysis of the results of the study showed that according to the method "The students' cognitive interests formation levels diagnostics" in the experimental group before and after the use of digital technologies, the number of students with a high level of formation of cognitive interests of students increased (from 4 people (11.8 %) to 16 (47.1 %)).

In the control group, a high level of formation of cognitive interests was revealed in 5 (16.1 %) and 8 (25.8 %) students at the ascertaining and control stage of the experiment (Fig. 2).

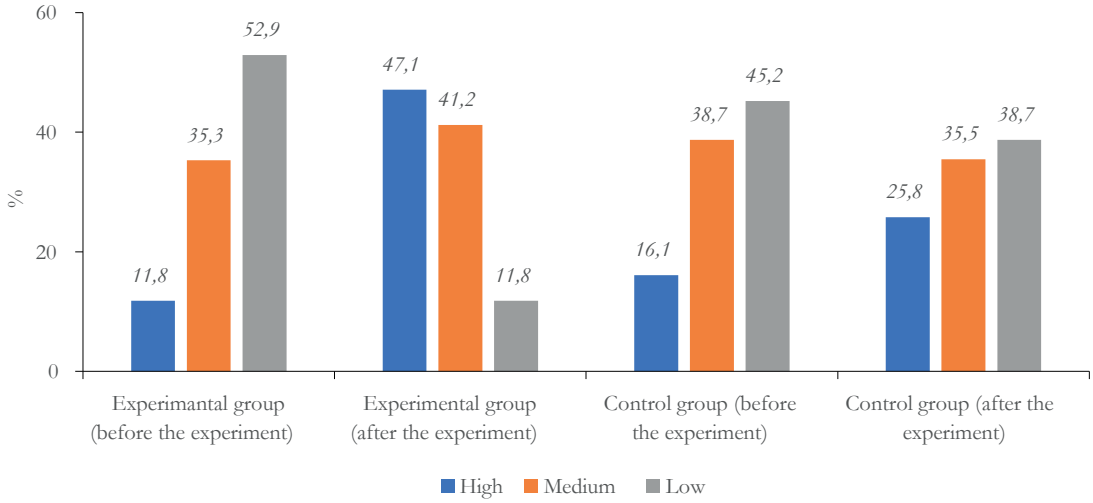

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Fig. 2. Methodology "The students' cognitive interests formation levels diagnostics"

Comparative indicators of the results according to the methodology "Questionnaire for assessing students' knowledge in the research activities field" showed that in the experimental group of students, the level of knowledge in the research activities field before participating in the pedagogical experiment was low for most students (20 people – 58.8 %) and average (11 people – 32.4 %). Only 3 people (8.8 %) had a high level of knowledge in this field.

Repeated testing revealed a high level of knowledge in the research activities field in 18 people (52.9 %).

In the control group of respondents, the initial level of knowledge in the research activities field was also low (15 people – 48.4 %) and average (11 people – 35.5 %). High scores were revealed in the responses of only 5 students (16.1 %).

Repeated questioning did not reveal any significant differences in this indicator (Fig. 3).

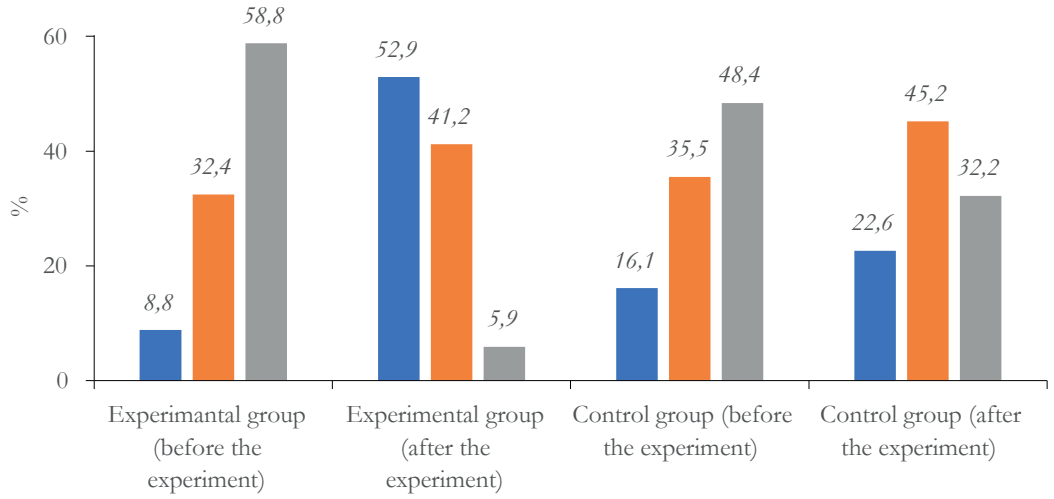

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Fig. 3. Comparative indicators of results according to the methodology "Questionnaire for assessing students' knowledge in the field of research activities"

The results of the final assessment of students' academic performance in subjects showed that in the experimental group, according to the primary data, the grades "good" and "excellent" were revealed in 18 (52.9 %) and 4 (11.8 %) subjects. According to the control experiment, an excellent score was found in 19 subjects (55.9 %).

In the control group, 12 students (35.3 %) had satisfactory and good scores on this indicator. Excellent grades were expressed only in 6 respondents (19.3 %). According to the repeated analysis of academic performance, a fairly large part of students remained satisfactory (7 people – 22.6 %) and good (16 people – 51.6 %) grades (Fig. 4).

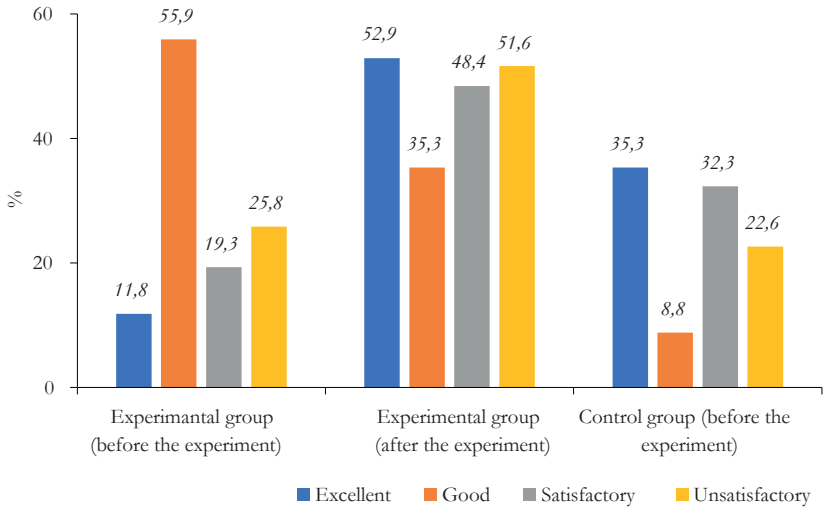

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Fig. 4. The results of the final assessment of students' academic performance in the subjects

As the calculation of indicators by the Wilcoxon *T*-criterion for the experimental group shows, the reliability of the differences was confirmed on all scales of the study: the motivation level for learning (0.634), the cognitive interest level (0.497), the knowledge level in the research activities field (0.333), the assessment of final academic performance in subjects (0.841).

In the control group of subjects, the reliability of differences before and after the experiment was not revealed on any scale.

The analysis of data on the Mann–Whitney U-criterion showed that for all indicators obtained at the stage of the control experiment, the reliability of differences in the results of the experimental and control groups

is confirmed: the level of motivation for learning (0.000); the cognitive interest level (0.015); the knowledge level in the research activities field (0.002); the final academic performance assessment (0.000) (Table 1).

Table 1

Calculation of the Mann–Whitney U-test

Scales	U Mann–Whitney statistics	W Wilcoxon statistics	Z	Asymptotic knowledge (two-sided)
The level of motivation for learning (up to)	464.500	992.500	–0.476	0.634
The level of motivation for learning (after)	275.500	803.500	–3.481	–
The cognitive interest level (up to)	480.000	1 075.000	–0.678	0.497
The cognitive interest level (after)	353.000	849.000	–2.439	0.015
The level of research field's knowledge (up to)	461.000	1 056.000	–0.967	0.333
The level of research field's knowledge (after)	311.000	807.000	–3.064	0.002
Final academic performance (up to)	483.000	1 011.000	–0.201	0.841
Final academic performance (after)	249.000	745.000	–3.867	–

Source: [2]

Thus, we can talk about the confirmation of our hypothesis that the use of digital educational technologies makes it possible to increase the level of educational motivation, cognitive interest, and knowledge in the field of research activities among students of higher educational institutions.

DISCUSSION

The data of our study generally confirms the theoretical conclusions and the results of practical research published in other works, which emphasizes that the use of digital technologies can increase students' interest and motivation to learning [for example, 6; 7]. The data also confirmed the results of a survey of students of Plekhanov Russian University of Economics in January – February 2021 that blended learning (face-to-face and remotely using digital technologies) is the most effective for them [8].

CONCLUSION

The results obtained allow us to conclude that the use of digital educational technologies can improve not only the academic performance of students at the university, but also the educational motivation level, cognitive interest, and knowledge in the research activities field. The problem we are investigating requires further theoretical and practical study, first of all, with regard to the impact of digital technologies on the success and effectiveness of teaching students at different stages of study at the university.

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