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ARTIFICIAL INTELLIGENCE IN HISTORY TEACHING: THE RESULTS OF A PEDAGOGICAL EXPERIMENT

Abstract. The article examines the effectiveness of using artificial intelligence tools in teaching regional history. The relevance of the research topic is due to the need to increase the educational motivation and activity of students by introducing artificial intelligence tools into the educational process. The purpose of the research is to identify the impact of the use of artificial intelligence tools on the learning outcomes of students.

102 first-year students participated in the study. The study was conducted in an experimental group using artificial intelligence tools and in a control group where instruction was carried out using traditional methods. During the research, students were offered interactive tasks: virtual historical data, analytical exercises, and creative work. The experiment consisted of the stages of preliminary testing, implementation of the methodology, and subsequent testing. The methods of quantitative and comparative analysis were used in the course of the study. Compared with the control group, the experimental group showed a higher level of learning, critical thinking, and learning activities. The results of the experimental group's work are clearly reflected in the article. There were fewer positive changes in the control group.

In addition, the article notes a number of difficulties that arise when using artificial intelligence. The results of the research can serve as a basis for improving educational programs, for broad application in the practice of teaching historical and humanitarian disciplines, and for future research in digital pedagogy.

Keywords: artificial intelligence, digital technologies, humanities, history of Kazakhstan, methods of teaching history.

Introduction

The world is entering the digital age, and new technologies are developing rapidly. Today, artificial intelligence is one of the most widely used technologies across various spheres of society, and the education sector is no exception. Artificial intelligence is becoming a crucial tool in organizing the educational process, opening up new opportunities in the educational system.

In the digital economy era, the importance of artificial intelligence is also underscored by strategic state development priorities. Artificial intelligence is considered one of the key tools for the development of the state and the advancement of human potential. In this context, the concept of

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digital transformation (2023–2029), approved by the Government of the Republic of Kazakhstan, emphasizes the introduction of modern technologies into the learning process [1; 2]. The concept of digital transformation (2023-2029), approved by the government of the Republic of Kazakhstan, also emphasizes the introduction of modern technologies into the learning process [3].

One of the ways to implement artificial intelligence is with AI tools based on a neural network. Today, the use of AI tools based on neural networks enables teachers to significantly simplify their work and improve the quality of student learning [4, p. 63].

One unusual way to use AI tools in education, particularly in history lessons, is to visualize historical events using neural network technologies. A number of researchers have noted that the visual representation of information in history teaching not only makes reading more visually appealing, but also contributes to a deeper understanding of historical events and contexts compared to traditional teaching methods [5, p. 43; 6, p. 91].

The researcher T.M. Shamsutdinova emphasizes several important advantages, including faster and more effective assimilation of historical events compared to information presented in a simple text style. First, artificial intelligence enables students to engage their cognitive processes, thereby accelerating the perception and memorization of information. Secondly, the visualization of historical events helps establish an emotional connection with students, and this, in turn, is one of the basic principles of the assimilation of historical information [7, p. 52].

Thus, although in modern research artificial intelligence is considered a universal tool for improving the quality of learning and students' learning motivation, in the study of specific historical and pedagogical topics, sufficient attention has not been paid to the methodological features of its use.

At the same time, the work of Kazakh researchers Zh.S. Begimbayeva, A.R. Saitgaliyeva is of particular interest. In their pedagogical experiment article, the authors show that the use of intellectual tools in history lessons enhances learning motivation, improves the quality of material assimilation, and increases students' cognitive activity [8, p. 245].

In foreign studies, a similar problem is considered in the work of S. Raimov. It has been experimentally demonstrated that integrating AI into history lessons leads to a significant increase in student academic performance and learning activity [9, p. 2252]. Similar results are presented in a study by L.F. Roshaanatun. It is statistically proven that using the “AI-Enhanced History Learning App” in the classroom promotes students' deeper understanding of historical material, the development of analytical thinking, and increased interest in the subject [10, p. 189].

Thus, both domestic and foreign studies agree that the introduction of artificial intelligence tools into history teaching has a positive impact on academic achievement and student engagement. As we can see, these works focus on the general course of history and do not focus on regional aspects.

In this regard, there is a need to develop and test pedagogical approaches to the use of artificial intelligence tools for the study of the research topic “The development of the education system and enlightenment in the Semipalatinsk region in the 1920s” in a narrower, more meaningful context.

This study differs from other studies in that it considers artificial intelligence not only as a technological tool but also as a means of organizing students' educational and cognitive activities in the study of regional educational history. The novelty of the research lies in the development and testing of methods for applying artificial intelligence tools to the study of educational development in the Semipalatinsk region in the 1920s.

At this stage, our proposed research will focus on empirically demonstrating the effectiveness of various AI tools in historical education, particularly MyLens AI, Haliluo AI, Mapify AI, and Vesmi AI. The primary objective of this research is to evaluate the effectiveness of AI devices for teaching history compared with traditional teaching methods. In this study, AI tools are considered not as independent teachers but as auxiliary tools in the learning process.

Visualization of historical processes with AI tools not only revives the past but also deepens students' immersion in history lessons and fosters emotional connections. Therefore, given the

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diversity of neural networks and their effectiveness in the educational process, the full realization of the pedagogical potential of neural network representations of historical material underscores the relevance of our research.

The research hypothesis is based on the concept that the integration of AI tools into the process of teaching historical materials creates conditions for students to delve deeper into the topic and increase their motivation to learn, while the usual traditional method strengthens basic knowledge, but can interfere with a more complete understanding of historical events with a visual eye.

Research methods and materials

To assess the effectiveness of integrating AI tools into the learning process, the study organized participants into experimental and traditional groups. The experiment was attended by 102 students from the I-year groups of the MSOE "Higher College of IT and new technologies", studying in the field of "software" within secondary vocational education. The topic of the study was "The development of the education system and enlightenment in the Semipalatinsk region in the 1920s".

The reason for selecting this contingent was that students who voluntarily chose this profession primarily sought to master digital and informational instruction. However, because the students are first-year students, they have not yet gained substantial experience; this allows you to track how artificial intelligence contributes to knowledge acquisition within the scope of this research topic. Although the teaching methods differed, each group performed similar tasks: in one group, mastering the research topic was supported by videos, digital images, and infographics, whereas the second group used traditional methods, including oral discussion and whatman drawings.

The empirical basis of the study was archival documents from the State Archive of the Abai region, which reflect the state and development of the public education system in the 1920s. The materials of Fund No.415 (Semipalatinsk Provincial Department of Public Education, 1920-1928) and Fund No.185 (Semipalatinsk District Department of Public Education, 1917-1928) were used in the work [11; 12].

The archival materials include reports on the state of the school network, statistical information, meeting minutes, official correspondence, and regulatory documents, which enabled a comprehensive analysis of the processes of institutional formation of the education system in the region. These documents were used not only as a source base for research, but also as practical material for organizing students' academic work. The students were provided with fragments of archival files to analyze, interpret, and structure information using artificial intelligence tools.

In addition, the study used a collection of archival materials and photographic documents, "The development of public education in East Kazakhstan in the XIX - early XX centuries," which allowed for the expansion of the source base through published documents and visual materials reflecting the dynamics and features of the development of public education in the region [13].

Before the lesson, both groups completed a pre-test that assessed their ability to think critically, their proficiency with tools, and their initial understanding of basic concepts. After all obligations were fulfilled, the students passed the final post-test and completed a questionnaire assessing mastery of the educational material, analytical skills, and motivation for learning. In this way, consistency was maintained within each group, thereby enabling cross-group data analysis.

In addition, the effectiveness of AI tools during the lesson, their impact on learning motivation, student attendance, and learning outcomes were differentiated through comparative and pedagogical analyses.

Results and discussion

In the study, the experimental group (EG, n=54 students) was trained using AI tools, whereas the control group (CG, n=48 students) studied the subject using traditional instructional methods. During the pedagogical experiment, teaching was organized as an academic course during the first semester. The organization of the pedagogical experiment was carried out in accordance with the generally accepted structure, including the ascertaining, forming, and control stages, which

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corresponds to the logic of pedagogical research described in the work of L.F. Roshaanatun [10, pp. 177-190].

At the initial stage, an entrance test was conducted to identify the level of knowledge on the topic "The history of the development of education system and enlightenment in the Semipalatinsk region in the 1920s." The test included 20 closed-type tasks testing knowledge of factual material, understanding of chronology, and the ability to establish cause-and-effect relationships. The need for a preliminary diagnosis of students' level of knowledge is justified by the research of S. Raimov who emphasizes that organizing a pedagogical experiment is impossible without determining students' initial level of readiness [9, p. 2253].

To summarize the test results, a point system was used, and students' mastery of the research topic was classified as high, medium, basic, or average.

Table 1- Comparative results of Pre-Testing in experimental (EG) and control (CG) groups

Indicator	EG Pre-Test	CG Pre-test
Average Test score (%)	62	60
High level (%)	11 (20%)	8 (17%)
Intermediate level (%)	34 (63%)	32 (67%)
Basic level (%)	9 (17%)	8 (16%)

As shown in Table 1, the pre-test results indicated the comparative level of training between the two student groups. The average entrance test scores ranged from 1.0 to 1.5, and the average task completion rate was 60-62%, indicating comparable levels of preparation between the experimental and control groups. There were no statistically significant differences between the groups, allowing us to consider the initial training data equivalent and meeting the requirements for organizing a comparative pedagogical experiment.

The formative stage of the experiment aimed to test the methodology for visual modeling of historical material using AI tools. The theoretical basis of the implemented methodology was the principle of clarity developed by M.M. Alameddine, who emphasized that learning should be based on perception and specific images that ensure a more solid and meaningful assimilation of knowledge [14, pp. 8-9]. In addition, the methodology aligns with the concept of active learning, which involves taking part in students' independent cognitive activity [15, pp. 12-20]. The formative stage in the experimental group was implemented in stages and involved the consistent completion of a set of training tasks.

At the first stage, students were offered visual reconstructions of historical situations depicting the activities of educational institutions in the Semipalatinsk region in the 1920s (the organization of adult schools, the construction of rural schools, the opening of national schools, etc.). Photo documents from the collection "Development of public education in East Kazakhstan in the 19th – early 20th centuries" were used as the basis [13]. Based on them, historical scenes were recreated using digital tools (Hailuo AI, PixVerse AI). The students analyzed the presented materials, determined the historical context and features of the educational policy of the period under review. The use of visual sources in teaching is considered an effective way to develop students' historical thinking, as noted by L.F. Roshaanatun [10, p. 178].

At the second stage, students compiled a chronology of the region's education system, highlighting its main events and reforms. Archival documents served as an empirical basis – reports on the work of schools, regulations, and minutes of meetings of the foundation No.415 (Semipalatinsk Provincial Department of Public Education, 1920-1928) – containing information on the state of the educational system [11]. Based on these materials, students built a sequence of historical events and identified key changes in the education system. The MyLens AI digital instrument was used for

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visualization. The use of timelines in teaching is considered an effective way to understand the historical process and the interrelation of events [10, p. 176].

At the third stage, an intelligence map was created that reflected the main directions of educational development in the region: the creation of labor schools, the fight against illiteracy, and the expansion of the network of educational institutions. Materials from the Foundation No.185 (Semipalatinsk District Department of Public Education, 1917-1928), 1920-1928) were used to complete the task, enabling identification of key areas of the region's educational policy [12]. The Mappify AI tool was used to create the intelligence map. As X. Sheng notes, the presentation of information in a structured form contributes to a better understanding of the topic and to the systematization of historical data [16, pp. 45-47].

The final stage of the formative work was reflexive and analytical. The students summarized the results in a visualized form (using Visme AI) and formulated conclusions about the dynamics of the region's educational system in the 1920s. This stage contributed to consolidating the material and developing skills for independent analysis of historical processes.

In the control group, training was conducted using traditional methods: lecture presentations of the material, work with text sources, oral responses, and written assignments. This approach corresponds to the explanatory and illustrative model of teaching, in which the teacher plays the leading role [17, p. 572]. Although the students performed tasks to consolidate the material, structured visual modeling of historical processes was not used.

After completing the formative stage, a final test was conducted, similar in structure to the entrance one. The results showed that in the experimental group, the average task completion rate increased to 78%, while in the control group it increased to 67%.

Table 2 - Comparative results of post-testing in experimental (EG) and control (CG) groups

Indicator	EG Post-test	CG Post-test
High level (%)	38 (70%)	14 (29%)
Intermediate level (%)	13 (24%)	26 (54%)
Basic level (%)	3 (6%)	8 (17%)

Table 3 - Average achievement test score (Experimental group – AI instruction; Control group – traditional instruction)

Group	Pre-Test Score (%)	Post-test Score (%)	Improvement (%)
EG	62	78	16
CG	60	67	7

As shown in Table 2 and Table 3, there were no significant changes in the control group (CG) after the completion of the formative stage of the experiment. The average test score increased from 60% to 67%, a 7% increase. The proportion of students with a high level of knowledge increased from 17% to 29%, while the proportion with a basic level remained virtually unchanged (from 16% to 17%). The majority of students still remain at the average level (a decrease from 67% to 54%), indicating that, in the context of traditional education, the positive dynamics are moderate and do not provide a significant redistribution of results towards a high level of achievement. Nevertheless, the average academic performance in the control group remains stable and confirms the assimilation of basic educational material at a satisfactory level.

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The increase in post-test results showed improvement in students' ability to analyze historical data, identify causal relationships, and draw conclusions. These changes indicate that the tasks used during training contributed to increased cognitive activity.

In the experimental group (EG), the changes were more pronounced and sustained. The average test score increased from 62% to 78%, a 16% increase, indicating a significant improvement in academic results. The distribution by level is particularly noticeable: the proportion of students with a high level of knowledge has increased from 20% to 70%, more than three times. At the same time, the proportion of students at the basic level has significantly decreased - from 17% to 6% - indicating fewer students experiencing difficulties mastering the material. Thus, the increase in the experimental group was 16%, while in the control group it was 7%.

These results confirm the position that the use of AI tools in the classroom contributes to a deeper assimilation of knowledge compared to traditional methods [8, p. 248]. An important conclusion is that, in both groups, results were not below baseline, indicating that the learning goals were fully achieved.

The final element of the study consisted of a survey. The survey was conducted using five main evaluation criteria: the ability to work with AI tools, the depth of material assimilation, the ability to think critically, the ability to visualize the material, and the quality of reflection. It should be noted that although the diagram presents indicators indicating “visualization abilities” and “use of AI tools”, in the control group trained in the traditional format, these parameters were not evaluated. The assessment of these indicators was carried out only in the experimental group.

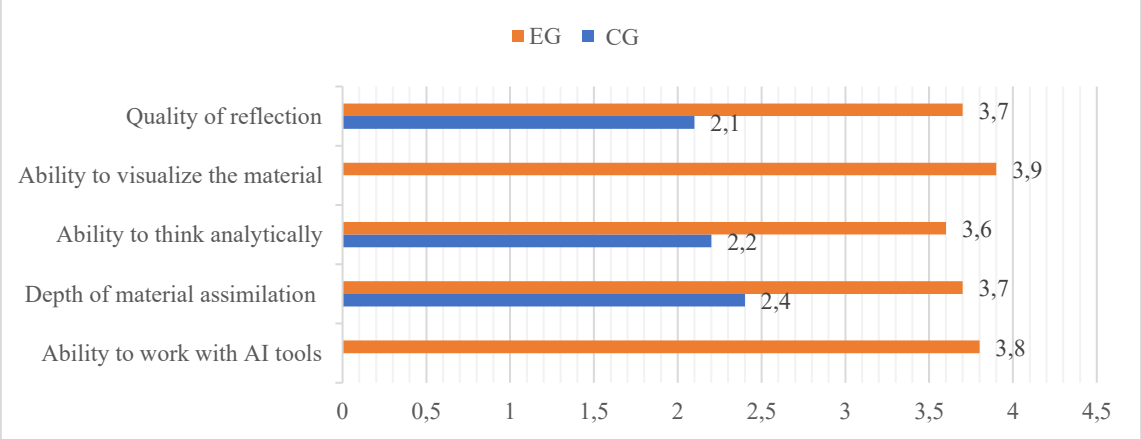

Diagram 1 - The results of the questionnaire according to the five criteria

The survey results showed higher scores across all assessment criteria for the experimental group (EG) using visual AI tools than for the control group (CG) using traditional methods. Especially clearly, the difference between “critical thinking ability” (3.6 in EG, 2.2 in CG) and “ability to master a topic in depth” (3.7 in EG, 2.4 in CG) was noticeable. These quantitative indicators indicate that integrating AI tools into the educational process contributed to the development of analytical and critical thinking skills among students in the experimental group (EG), the assimilation of material through various interactive methods, and improved reflection skills.

Turning to the ethical aspects of the study, the control approach was implemented solely within the research context. The students attended at their own discretion, and no personal information was collected. When using artificial intelligence tools, safety and age-related considerations were fully accounted for, and ethical requirements were not violated.

The Post-test and survey responses showed that the use of AI tools in the educational process not only increased students' subject knowledge but also influenced their thinking. In using AI tools, the automation of some stages of the educational process played an important role. For example, visual modeling, the ability to draw timelines and mental maps, and the ability to quickly create

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infographic posters allowed students not only to mechanically complete the task but also to develop a deeper understanding of the study's content.

However, it is also worth noting the advantages of traditional learning approaches in the control group (CG). Oral collective discussion of the research topic, and working with written materials, developed students' communication skills and consolidated basic knowledge. But in the context of working with visual and complex historical materials, the traditional method was weak in fostering systemic and critical thinking. Students often focused on the technical aspects of task design or on memorizing historical facts, and oral discussion of the research topic limited opportunities for visual and structural analysis.

According to X. Sheng in traditional history lessons, students spend much of their time memorizing historical dates and events, while critical thinking skills are neglected [16, p. 241]. A similar position is occupied by J. Santamaría-Velasco et al., the author notes that using textbooks in class does not always increase modern students' interest in the educational process, leading traditional approaches to be perceived as boring and ineffective for learning motivation [17, p. 568].

This problem was clearly traced to the organization of the control group's educational activities. Students in the control group (CG) who completed the assigned tasks did not cite historical facts or examine their relationships in depth, which, in turn, did not affect their critical thinking ability.

A number of authors note that such standard approaches allow you to hone motor and communication skills, but the efficiency of comprehensive work with visual data is lower than that of digital data [9, p. 2254; 10, p. 188].

In turn, our study's results show a positive effect of integrating visual AI tools into the educational process. When pre-test and post-test data were combined with survey results, the experimental group outperformed the control group. The use of automatically generated images, videos, and visual schemes enabled a deeper understanding of the research subject. In particular, the students in the experimental group, who used AI tools to visually represent chronological events, emphasized the analysis of the logic of historical development rather than the technical aspects of the design.

In the scientific literature, it is often noted that images generated automatically undergo artistic processing or contain errors [5, p. 42; 7, p. 54.]. Therefore, the teacher should not immediately accept the generated material for use; instead, they should critically analyze it and teach students to verify its accuracy. The main reason is that AI tools can sometimes introduce errors and inaccuracies.

Overall, the study's results indicate that tasks performed with AI tools have a positive effect on students' critical thinking and academic performance. However, the effectiveness of such tasks depends directly on the methodological organization of the educational process and the teacher's role. The teacher must effectively guide students and teach them to critically evaluate AI-generated results. It is also important to correctly correlate visual materials with historical sources.

Thus, the use of AI and visual tools cannot replace traditional teaching methods but complements them, opening new opportunities for analyzing and understanding educational material.

Conclusion

The study found that integrating artificial intelligence tools into history lessons had a positive effect on learning. In the experimental group (EG), where artificial intelligence tools were used, learning activity increased: students with average academic performance showed greater initiative and made steady progress, whereas students with initially high results quickly engaged in analytical work and mastered the material more deeply. In the control group (CG), which was trained using traditional methods, students also mastered the core material and demonstrated discipline. However, due to the lack of visualization and interactivity in the lesson, the ability to master the research topic in depth was limited.

The use of AI tools during the lesson enabled a deeper study of historical events and their effects. The integrated use of control and comparative methods clearly demonstrated differences in students' activity and success.

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Adherence to ethical standards for the use of new technologies, in combination with digital and traditional teaching approaches, remains the main condition for their successful implementation in the educational process.

The study found that artificial intelligence technologies provide teachers with new pedagogical opportunities, increase students' motivation to learn, and contribute to the development of critical thinking. Therefore, we consider it appropriate to use AI tools effectively in history lessons.

These conclusions can inform the preparation of programs and methodological manuals in history, as well as the design of a digital educational space. The integration of artificial intelligence tools should be considered a means to increase their learning potential, not a replacement for existing learning paths.

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Тарихты оқытудағы жасанды интеллект: педагогикалық эксперимент нәтижелері

Аңдатпа. Мақалада жасанды интеллект құралдарын өңірлік тарихты оқытуда қолданудың тиімділігі қарастырылады. Зерттеу тақырыбының өзектілігі жасанды интеллект құралдарын оқу үдерісіне енгізу арқылы білім алушылардың оқу ынтасы мен белсенділігін арттыру қажеттілігімен негізделеді. Зерттеу жұмысының мақсаты жасанды интеллект құралдарын қолданудың білім алушылардың оқу нәтижелеріне әсерін анықтау болып табылады.

Зерттеуге бірінші курс студенттерінен 102 адам қатысты. Зерттеу эксперименттік топта жасанды интеллект құралдарын қолдану арқылы және оқыту дәстүрлі әдістермен жүзеге асырылған бақылау тобында жүргізілді. Зерттеу барысында білім алушыларға интерактивті тапсырмалар: виртуалды тарихи деректер, аналитикалық жаттығулар, шығармашылық жұмыстар ұсынылды. Эксперимент алдын-ала тестілеу, әдістемені енгізу және тестілеуден кейінгі кезеңдерінен тұрды. Зерттеу барысында сандық және салыстырмалы талдау әдістері қолданылды. Бақылау тобымен салыстырғанда эксперименттік топ оқу материалдарын меңгерудің, сыни тұрғыдан ойлаудың, оқу іс-әрекетінің жоғары деңгейлерін көрсетті. Эксперименттік топтың жұмыс нәтижелері мақалада көрнекі түрде көрсетіледі. Бақылау тобында оңды өзгерістер аз байқалды.

Сонымен қатар, мақалада жасанды интеллектті қолдану барысында туындайтын бірқатар қиындықтары да аталып өтіледі. Зерттеу нәтижелері білім беру бағдарламаларын жаңғыртуға, тарих және гуманитарлық пәндерді оқыту тәжірибесінде кеңінен қолдануға, цифрлық педагогика саласындағы болашақ зерттеулерге негіз бола алады.

Кілт сөздер: жасанды интеллект, цифрлық технологиялар, гуманитарлық ғылымдар, Қазақстан тарихы, тарихты оқыту әдістемесі.

Искусственный интеллект в преподавании истории:
результаты педагогического эксперимента

Аннотация. В статье рассматривается эффективность использования средств искусственного интеллекта в преподавании региональной истории. Актуальность темы исследования обусловлена необходимостью повышения учебной мотивации и активности обучающихся путем внедрения в учебный процесс средств искусственного интеллекта. Целью исследовательской работы является

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выявление влияния применения средств искусственного интеллекта на результаты обучения обучающихся.

В исследовании приняли участие 102 человек первокурсникове. Исследование проводилось в экспериментальной группе с использованием средств искусственного интеллекта и в контрольной группе, где обучение осуществлялось традиционными методами. В ходе исследования обучающимся были предложены интерактивные задания: виртуальные исторические данные, аналитические упражнения, творческие работы. Эксперимент состоял из этапов предварительного тестирования, внедрения методологии и последующего тестирования. В ходе исследования были использованы методы количественного и сравнительного анализа. По сравнению с контрольной группой экспериментальная группа показала более высокий уровень усвоения учебного материала, критического мышления, учебной деятельности. Результаты работы экспериментальной группы наглядно отражаются в статье. В контрольной группе положительных изменений было меньше.

Кроме того, в статье отмечается ряд трудностей, возникающих при использовании искусственного интеллекта. Результаты исследования могут стать основой при совершенствовании образовательных программ, широкого применения в практике преподавания исторических и гуманитарных дисциплин, будущих исследований в области цифровой педагогики.

Ключевые слова: искусственный интеллект, цифровые технологии, гуманитарные науки, История Казахстана, методика преподавания истории.

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