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AI LITERACY AND PERCEPTIONS OF AI-POWERED SEARCH ENGINES AMONG UNIVERSITY TEACHERS IN KAZAKHSTAN

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Abstract. In the context of the rapid development of artificial intelligence, its integration into the education system has become increasingly relevant, which requires studying the level of AI literacy of teachers and their attitude toward intelligent AI-powered search engines. Despite the growing interest in the use of AI in education, the teachers' attitudes toward intelligent search engines remain underexplored, particularly in the context of higher education.

This study aims to assess the level of AI literacy among Kazakhstan university teachers, as well as to identify the relationship between the practice of using intelligent search engines and AI literacy.

The research employed a mixed-methods approach integrating quantitative and qualitative data analysis. A total of 112 respondents from six universities in Kazakhstan participated in the survey. A questionnaire consisting of open-ended and closed-ended questions based on a Likert scale was administered to gather data on the characteristics of AI tools usage in educational activities.

The findings indicated that the majority of teachers demonstrate an above-average level of AI literacy and typically maintain a favorable disposition towards the use of AI search engines. A statistically significant moderate positive relationship was established between the level of AI literacy and the frequency of use of AI-powered search engines ($r = 0.42$; $p < 0.01$). In most cases, teachers use artificial intelligence technologies to prepare educational materials and support scientific activities.

The study's findings underscore the necessity for enhanced teacher training programs in the field of AI literacy, the formation of skills for critical assessment of AI-generated information and the development of ethical approaches to the use of artificial intelligence in higher education.

Keywords: artificial intelligence, search engine, AI literacy, teachers, higher education, Kazakhstan, university.

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Introduction

Currently, emerging technologies have become a driving force of global development, particularly in the past two decades have been an era of digital technology. Educational institutions have adopted learning management systems (LMSs) to manage the learning process, multimedia for lectures and classes, MOOCs and various webinars have become an integral part of teaching students around the world. Another challenge was the global pandemic in 2020, where, starting from higher education institutions to schools, they were forced to switch to an online format, where digital learning platforms were practiced.

Artificial intelligence has emerged as a critical element in the transformation of higher education. Previously, digital technologies were mainly used in organizing the educational process; however, contemporary applications of artificial intelligence now encompass the creation of educational materials, information retrieval, and preparation of scientific articles. In this regard, the development of AI literacy among university teachers is essential and constitutes a crucial element in the transformation of education.

In this regard, Kazakhstan is actively adopting AI technologies across various sectors. Many processes have been automated through AI applications, including the development of chatbot assistants in messaging platforms that provide user support and consultation services (Digital Bridge, 2025).

In the international landscape, increasing attention is being paid to the concept of literacy in the field of artificial intelligence. This category covers a set of knowledge and skills that allow a teacher to understand the operating principles and algorithms of artificial intelligence, and critically evaluate the information received. AI literacy is becoming one of the important components of professional competence for teachers.

An analysis of the scientific literature shows that over the past few years, most of the research has been devoted to the introduction of generative artificial intelligence into the educational process and the formation of AI literacy. Special attention is paid to the study of the attitude of teachers and students to generative platforms such as ChatGPT, Gemini, and Perplexity.

However, significantly less research is devoted to the study of teachers' attitudes towards intelligent AI-powered search engines. Despite the active spread of search engines, the issues of their use remain insufficiently studied. The number of empirical studies devoted to AI-powered search engines in the context of Kazakhstan's higher education system remains limited.

The scientific novelty of this study is that it comprehensively examines the level of AI literacy of university teachers in Kazakhstan and their attitude to intelligent search engines. In addition, the study reveals the relationship between AI literacy and the frequency of use of search engines in the professional activities of teachers.

The aim of this study is to examine the level of AI literacy of Kazakh university teachers, their attitude to intelligent search engines, as well as to identify the relationship between AI literacy and the practice of using artificial intelligence-based search engines.

Literature review

In contemporary scientific literature, AI literacy is a fundamental aspect of teacher training in the context of the digital transformation of education. Recent research underscores that the effective use of artificial intelligence requires skills to critically assess obtained information and comprehend ethical considerations in the operation of AI systems. The concept of artificial intelligence has been widely examined by numerous international and national scholars. It has been argued that AI-based technologies contribute to the improvement of educational systems; however, infrastructural limitations remain a significant barrier to their effective implementation (Fadlelmula and Kadhi, 2024). The concept of AI literacy has been increasingly mentioned both in education and in human social activities (Celik, I., 2023). It is important to separate these two concepts from each other, despite the similarity, as 'digital literacy' is more often used in all spheres of life (Chiu, 2024). The concept of AI literacy began to be used relatively recently (Cope and Kalantzis, 2022).

According to some international studies, AI literacy plays a crucial role in the professional development of both pre-service and in-service teachers, making it a mandatory competency and placing it at the center of contemporary educational discourse (Sperling et al., 2024). It was emphasized that artificial intelligence is modernizing

education through the integration of AI algorithms and robotic assistants into digital learning environments (Wang et al., 2024). From this perspective, the concept of AI literacy is closely related to digital literacy and digital competence. Research indicates that AI literacy gained widespread attention during and after the COVID-19 pandemic, when global education systems were forced to adopt digital technologies as a necessity rather than an optional innovation (Williamson et al., 2020).

AI literacy is 'a set of competencies that enables individuals to critically evaluate artificial intelligence technologies, communicate and collaborate effectively with AI, and use AI as a tool in various contexts, including online environments, households, and workplaces' (Long and Magerko, 2020).

In higher education, students increasingly use AI as a tool for information retrieval and text generation, while teachers apply AI more extensively, from developing lesson plans using AI-based platforms to generating research ideas and compiling literature reviews for academic publications (Kong, Cheung, and Zhang, 2021). Another popular AI-powered search engine is Perplexity AI, which assists users in retrieving and citing relevant academic sources (Lewis et al., 2020).

In recent years, artificial intelligence has been methodically incorporated into the pedagogical practices of higher education institutions. Research demonstrates that artificial intelligence technologies are employed to provide educational resources, automate repetitive procedures, and support educators in their research activities. An independent domain of AI advancement is associated with the emergence of intelligent search engines employing semantic and generative search techniques. In contrast to traditional systems, modern search engines can generate answers by analyzing multiple sources through semantic search techniques. As prerequisites, the existing AI-powered search engines in the worldwide arena were examined. The most basic functional search engine is based on ChatGPT Search, which operates by responding to inquiries with GPT (Brown et al., 2020; Bommasani et al., 2021).

AI assistants such as ChatGPT, Gemini, Claude, and Mistral are widely used in academic and professional contexts (Surden, 2014; Ashley, 2017). Google Search incorporates AI functionalities, often without users being aware of the underlying artificial intelligence technologies (Bender et al., 2021).

Kazakhstan is developing local AI infrastructure, such as AlemLLM, that creates favourable conditions for the adoption of AI technologies in higher education.

The research contributes to the scientific comprehension of artificial intelligence applications in higher education in Kazakhstan. This study, in contrast to the majority of existing literature on the use of artificial intelligence and AI literacy, concentrates on intelligent AI-driven search engines and analyzes them in relation to the professional activities of university professors.

Methods

Research design

The research employed a mixed-methods design integrating quantitative and qualitative data analysis techniques. The mixed approach enabled the concurrent evaluation of AI literacy of university teachers and provided deeper insights into the use of AI-powered search engines in the professional activities of teachers.

Participants and sampling

The empirical part of the study was conducted among teachers of six universities in Kazakhstan located in different regions of the country. The purposive sample consisted of English language teachers who were chosen due to frequent use of digital educational resources and AI-powered search tools in their pedagogical and research endeavors.

Data collection instrument

The survey was composed of both open and closed questions on the Likert scale, assessing the AI literacy of teachers and their willingness to use AI-powered search engines. Open-ended questions helped to map teachers' perceptions of artificial intelligence (AI) tools in detail, which helped identify challenges and barriers faced by teachers. During this study, a survey was conducted to examine teachers' understanding of terms such as "AI literacy" and to explore their attitudes towards intelligent search engines. Teachers were asked questions related to AI literacy, how proficient they are, as well as opinions on the use of AI-powered search engines (Table 1).

Table 1. Survey on AI literacy and attitudes towards intelligent AI-powered search engines

Closed-ended questions	I confidently use AI tools in academic practice
	I am confident in my AI literacy
	I can easily tell the difference between AI content and human content.
	I can confidently assess the reliability of AI-generated information.
	I've been trained in AI literacy
Open-ended questions	What AI tools do you use to search for information (such as ChatGPT, Perplexity, Copilot AI, etc.)?
	What search engines do you use in your research activities?
	What challenges do you face when you use artificial intelligence?
Attitude	Artificial intelligence-based search engines help improve the quality of education
	I believe that AI-powered search engines can save educators time.
	I am concerned about plagiarism when scientists and students use AI-powered search engines.
	I believe that, in general, artificial intelligence tools can be used in education.

Note: Likert scale answers correspond to 1 = strongly disagree, 5 = strongly agree.

Demographic information

The work experience of the teachers who participated in the survey was assessed, enabling the characterization of the sample and analysis of the respondents' professional experience (Table 2).

Table 2. Respondents' teaching experience

Teaching experience	Quantity
0-2	17
2-3	19
3-5	21
6-10	15
10-15	18
15-20	22

Ethical considerations

Participation in the study was optional, the survey was conducted anonymously, the study's objective was elucidated to the participants, and the data collected during the survey were utilized solely for research purposes.

Data collection

The experiment was conducted during the fall semester of 2025 at six universities in Kazakhstan, which are in different regions of the country. A total of 112 responses from teachers were received through online questionnaires, which ensured the anonymity of voting. Moreover, fifteen responses containing detailed and complete answers were purposively selected for qualitative analysis. The responses to the open-ended questions were analyzed, from which a small number (n = 15) were selected after data purification. The analysis of the responses of the volunteer participants was conducted in order to deeply explore the understanding of teachers' views on AI-powered search engines. The survey data was analyzed quantitatively, using descriptive statistics in the form of percentages, mean values, as well as Pearson correlation statistics, in order to check whether there is a relationship between variables such as the level of AI literacy and the frequency of use of intelligent search engines.

Data Analysis

The data were analyzed using descriptive and correlation statistics. The responses were presented with frequency distributions, percentages, and averages. AI literacy was evaluated using five indicators such as confidence in using AI tools, self-assessment of AI literacy, the ability to distinguish AI-generated content from human-created content, the ability to assess the reliability of information generated by artificial intelligence, and previous AI literacy training. Pearson's correlation analysis was also used to examine the relationship between AI literacy and the frequency of use of an AI-powered search engine.

Results

The findings were analyzed using descriptive and correlational statistical methods. Descriptive statistics were used to describe and analyze the collected data. The main variables of the study were estimated using frequency distributions, percentages and averages. The analysis enabled the researchers to evaluate the AI literacy of teachers, the frequency of use of AI tools, and the views of respondents towards AI-powered search engines. The evaluation of AI literacy was conducted according to five indicators: confidence in using AI tools, self-assessment of AI literacy, ability to distinguish between content generated by AI and humans, ability to assess the reliability of information obtained from AI services, and previous training in artificial intelligence. The researchers applied a Pearson correlation analysis to find out the relationship between the instructors' AI literacy and the frequency of intelligent search engine use. Results indicated a statistically significant moderate positive correlation between the variables under examination ($r = 0.42$; $p < 0.01$), implying that teachers with high levels of AI literacy tend to use AI-powered search engines more frequently (see figure 1).

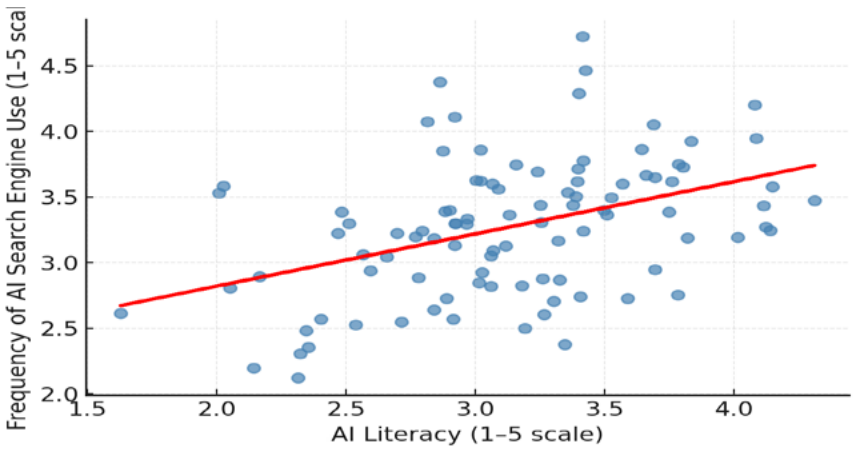

Figure 1. The relationship between AI literacy and the frequency of search engine usage

These findings indicate a moderate positive relationship between AI literacy and the frequency of AI-powered search engine use. Teachers with higher levels of AI literacy tend to use AI-powered search engines more frequently in their teaching practice, as well as in scientific activities. However, it is worth noting that AI literacy does not fully determine the implementation of intelligent search engines. Figure 2 shows the main indicators of AI literacy among teachers of higher education institutions.

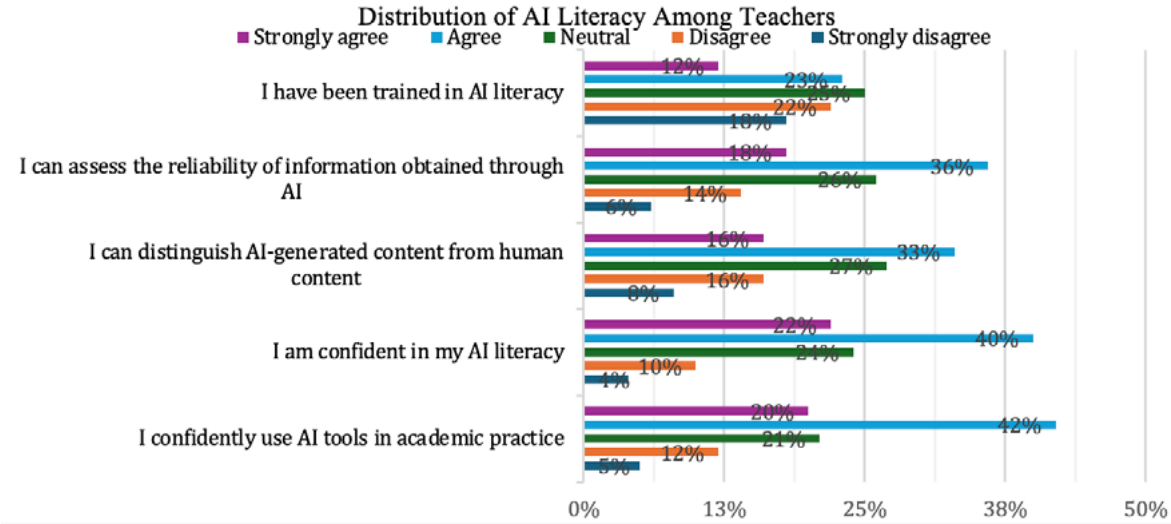

Figure 2. Teachers' self-assessment of AI literacy and their ability to use AI tools in academic practice

The results show that more than half of the respondents who took part in the survey expressed confidence in using AI-powered search engines in academic and scientific activities and in evaluating information obtained using AI. However, a significantly smaller proportion of teachers report that they do not know how to use search engines, although some of them acknowledge occasional use of artificial intelligence tools. A survey of teachers shows that the majority of teachers have a relatively high level of literacy in the field of artificial intelligence. According to the results, the majority of the respondents agreed that they confidently use artificial intelligence tools in scientific and educational practice. However, one third of the respondents stated that they had completed advanced training courses, which indicates a gap between the practical use of artificial intelligence technologies and theoretical awareness of artificial intelligence.

The frequency of AI tool use is shown in Figure 3, where five response options ranging from "rarely" to "very often" were provided.

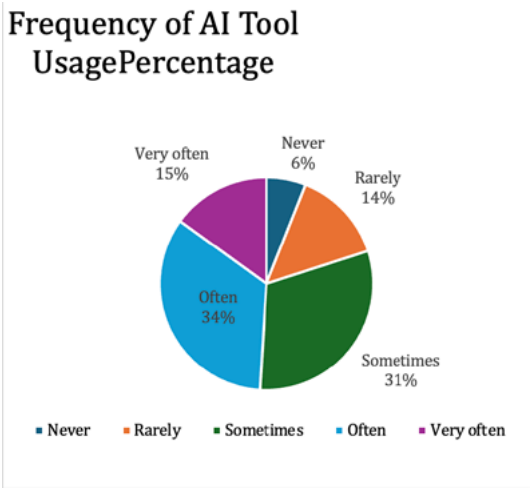

Figure 3. Frequency of AI Tool usage

In this part of the study, the survey revealed that artificial intelligence tools have been increasingly integrated into the teaching activities of teachers in recent years. The survey results show that almost half of the respondents often or very often use search engines based on artificial intelligence. One-fifth of the respondents reported that they rarely or never used them.

In terms of using AI tools and search engines, it is obvious that they can be used for writing scientific papers, preparation of educational materials, text translation, and other purposes. The results are given in Figure 4.

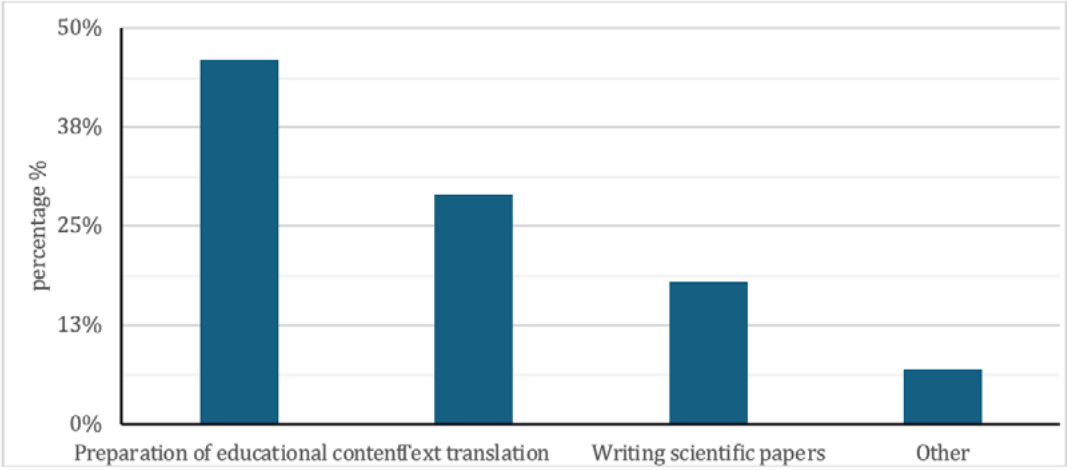

Figure 4. Purposes of using AI

The most common use of AI among teachers is the preparation of educational materials (46%), followed by text translation (29%). A smaller proportion of respondents reported using AI tools for writing scientific papers (18%). Figure 5 presents teachers' attitudes towards AI-powered search engines. At the same time, it gave an opportunity to assess their AI literacy overall.

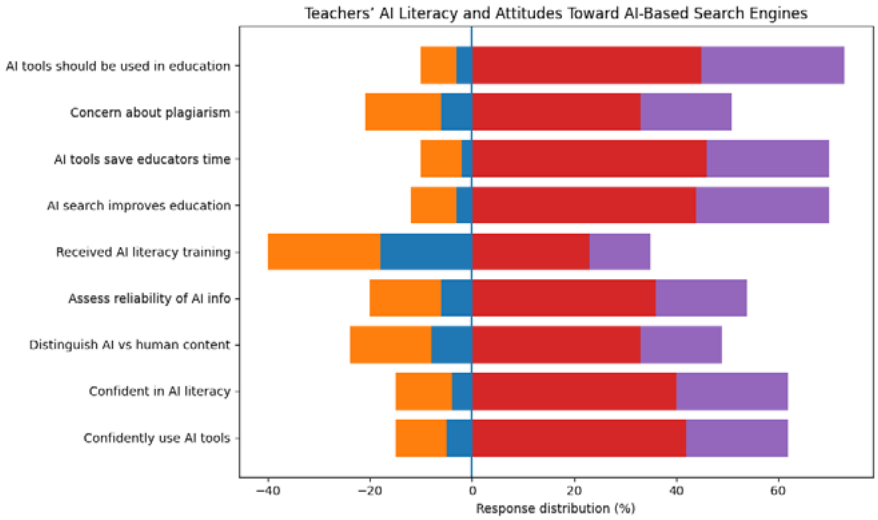

Figure 5. Distribution of teachers' responses to statements related to AI literacy and attitudes toward AI-powered search engines

Discussion

These findings align with those of Kong et al. (2021), who discovered that familiarity with AI tools contributes to greater AI literacy among educators. Similar patterns of AI use have been reported in previous studies, where AI tools were mainly employed for content generation and information retrieval (Wang et al., 2024).

Furthermore, several of the respondents reported that their AI literacy level is low, even despite having received basic training in data analysis. As a result, it can be seen that the distribution of teachers' responses to statements regarding literacy in the field of artificial intelligence and attitudes towards AI-powered search engines,

the majority of respondents are confident in using artificial intelligence tools in academic practice and recognize the potential of artificial intelligence-based search engines to improve the quality of education and save teachers time. In turn, some respondents express concern about plagiarism and the reliability of information generated using artificial intelligence. Furthermore, certain respondents assert that their proficiency in AI literacy is limited, despite having completed introductory training courses in artificial intelligence. Consequently, teachers need more structured professional development programs in this area. This result aligns with the findings of Sperling et al. (2024), who emphasized the imperative for systematic advancement of AI literacy in teacher education.

Overall, teachers reacted positively to the introduction of AI in teaching practice, attributing their positive perceptions to the opportunities provided by AI platforms and their ability to simplify teaching-related tasks. However, there were respondents who were concerned about the reliability of the information, as well as ethical issues in the use of content obtained through AI.

This finding indicates that although many educators actively use artificial intelligence-based search engines, systematic professional development in this area remains limited. A qualitative analysis showed that there were three distinct important aspects that should be addressed in the field of AI literacy. First, there is a need for professional development of teachers in the field of AI. Second, the development of critical evaluation skills related to the use of AI-powered search engines and their limitations. Third, the role of universities in addressing ethical issues associated with the use of intelligent search engines. These aspects should be taken into account when using intelligent search engines based on AI, despite the potential of artificial intelligence in the academic environment and its effectiveness in professional training in general.

Conclusion

This study enabled the assessment of university teachers' AI literacy and the identification of their attitudes towards intelligent AI-powered search engines. The results of the study indicate a positive attitude of teachers towards the use of AI tools in educational activities. The survey findings indicate that numerous teachers use artificial intelligence technologies to prepare educational materials, search for information and support scientific writing. Correlation analysis showed a statistically significant moderate positive relationship between the frequency of use of intelligent search engines and the AI literacy of teachers. This indicates that higher AI literacy correlates with a more engaged and knowledgeable utilization of AI technologies in professional endeavors. The study simultaneously uncovered several issues, including the insufficient level of training of teachers, the necessity for developing a critical evaluation of information reliability, particularly in scientific research. Despite the active use of AI services, a significant part of the respondents did not receive the proper level of training in the form of advanced training courses.

The practical significance of this study lies in the potential application of its findings for teacher training, the development of AI literacy, and the improvement of skills in using AI-powered search engines.

The prospects for further research include investigating the effectiveness of intelligent systems in educational activities, as well as expanding the sample to include teachers from various subject areas.

Contribution of the authors:

Abdrakhmanova S.T. explored the AI-literacy of English teachers and their attitude towards intelligent search engines based on artificial intelligence (AI). Sarzhanova G.B. is the corresponding author, and she contributed to the practical part of the scientific article.

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Грамотность в области искусственного интеллекта и отношение к интеллектуальным поисковым системам среди преподавателей университетов Казахстана

Аннотация. В условиях активного развития искусственного интеллекта его внедрение в систему образования становится особенно актуальным, что требует изучения уровня ИИ-грамотности преподавателей и их отношения к интеллектуальным поисковым системам на основе ИИ. Несмотря на растущий интерес к использованию искусственного интеллекта в образовании, отношение преподавателей к интеллектуальным поисковым системам остается малоизученным, особенно в контексте высшего образования.

Целью данного исследования является оценка уровня ИИ-грамотности преподавателей казахстанских университетов, а также выявление взаимосвязи между практикой использования интеллектуальных поисковых систем и ИИ-грамотностью.

В исследовании использовался смешанный подход, объединяющий количественный и качественный анализ данных. В опросе приняли участие сто двенадцать респондентов из шести университетов Казахстана. Для сбора данных с целью выявления особенностей использования инструментов искусственного интеллекта в образовательной деятельности было проведено анкетирование, включающее открытые и закрытые вопросы с использованием шкалы Лайкера.

Результаты показали, что большинство учителей демонстрируют уровень грамотности в области искусственного интеллекта выше среднего и, как правило, благосклонно относятся к использованию поисковых систем с искусственным интеллектом. Была установлена статистически значимая умеренная положительная взаимосвязь между уровнем ИИ-грамотности и частотой использования поисковых систем, ориентированных на ИИ ($r = 0,42$; $p < 0,01$). В большинстве случаев преподаватели используют технологии искусственного интеллекта для подготовки учебных материалов и поддержки научной деятельности.

Результаты исследования подчеркивают необходимость расширения программ подготовки преподавателей в области ИИ-грамотности, формирования навыков критической оценки информации, генерируемой ИИ, и разработки этических подходов к использованию искусственного интеллекта в высшем образовании.

Ключевые слова: искусственный интеллект, поисковая система, ИИ-грамотность, преподаватели, высшее образование, Казахстан, университет.

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Қазақстан университеттері оқытушыларының жасанды интеллект саласындағы сауаттылығы және зияткерлік іздеу жүйелеріне қатынасы

Аңдатпа. Жасанды интеллекттің белсенді дамуы жағдайында оны білім беру жүйесіне енгізу әсіресе өзекті болып отыр, бұл мұғалімдердің AI-сауаттылық деңгейін және олардың ЖИ негізіндегі интеллектуалды іздеу жүйелеріне қатынасын зерттеуді талап етеді. Білім беруде жасанды интеллектті қолдануға деген қызығушылықтың артуына қарамастан, оқытушылардың интеллектуалды іздеу жүйелеріне деген көзқарасы, әсіресе жоғары білім контекстінде аз зерттелген күйінде қалып отыр.

Бұл зерттеудің мақсаты қазақстандық университеттер оқытушыларының AI-сауаттылық деңгейін бағалау, сондай-ақ зияткерлік іздеу жүйелерін пайдалану тәжірибесі мен AI-сауаттылық арасындағы өзара байланысты анықтау болып табылады.

Зерттеуде сандық және сапалық деректерді талдауды біріктіретін аралас тәсіл қолданылды. Сауалнамаға Қазақстанның алты университетінен жүз он екі респондент қатысты. Білім беру қызметінде жасанды интеллект құралдарын пайдалану ерекшеліктері туралы мәліметтер жинау үшін Likert шкаласын қолдана отырып, ашық және жабық сұрақтарды қамтитын сауалнама жүргізілді.

Нәтижелер көрсеткендей, мұғалімдердің көпшілігі жасанды интеллект бойынша сауаттылық деңгейін орташадан жоғары көрсетеді және жасанды интеллект іздеу жүйелерін пайдалануды қолдайды.

AI-сауаттылық деңгейі мен ЖИ негізінде жұмыс жасайтын іздеу жүйелерін пайдалану жиілігі арасында статистикалық маңызды орташа оң байланыс орнатылды (r = 0,42; p < 0,01). Көп жағдайда оқытушылар оқу материалдарын дайындау және ғылыми қызметті қолдау үшін жасанды интеллект технологияларын пайдаланады.

Зерттеу нәтижелері жасанды интеллект-сауаттылық саласындағы оқытушыларды даярлау бағдарламаларын кеңейту, жасанды интеллект тудыратын ақпаратты сыни бағалау дағдыларын қалыптастыру және жоғары білім беруде жасанды интеллектті пайдаланудың этикалық тәсілдерін әзірлеу қажеттілігін көрсетеді.

Түйін сөздер: жасанды интеллект, іздеу жүйесі, ЖИ-сауаттылық, оқытушылар, жоғары білім, Қазақстан, университет.

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