JOURNAL OF E-LEARNING AND KNOWLEDGE SOCIETY
Vol. 21, No. 3 (2025), pp.47-56

Attitude of Russian pre-service teachers in different training fields towards Artificial Intelligence

Albina Drozdikova-Zaripova[a], Gulnara Gutorova[b,1], Mars Khabibullin[c]

[a]*Kazan (Volga Region) Federal University, Pedagogy Department at the Institute of Psychology and Education – Kazan (Russia)*

[b]*All-Russian State University of Justice, Sochi Branch, – Sochi (Russia)*

[c]*Tatarstan Academy of Sciences, Institute of Tatar Encyclopedia and Regional Studies – Kazan (Russia)*

(submitted: 31/8/2024; accepted: 1/2/2026; published: 4/4/2026)

Abstract

In recent years, artificial intelligence (AI) has been rapidly developing, and the issues concerning the use and implementation of AI in education and science are becoming increasingly relevant. Meanwhile, the effectiveness of introduction of digital technologies, including AI, into education largely depends on digital competence, the level of knowledge in this area, as well as the attitude of educators towards these technologies. In this regard the aim of the study was to identify the peculiarities of the attitude of students–pre-service teachers in different training fields towards artificial intelligence and their experience of its use in education. The study involved 249 bachelor students in Teacher education of Kazan (Volga Region) Federal University. The study showed that, in general, students show interest in the use of digital tools for both educational and personal purposes. In teaching practice, about 40% of students have experience in using AI at the stage of planning and constructing lessons. Students from different training fields identify the benefits of using AI in different areas of education and set different goals for the use of AI in lessons design. At the same time, pre-service teachers critically assess the possibilities of AI and more than 80% of them point out possible risks in the use of AI in education. About 60% of the respondents agree on the need to adapt to changes brought on by AI. The results of the study can be used in designing the students' curricula and planning their learning process using digital tools, including AI.

KEYWORDS: Artificial Intelligence (AI), Digital Tools, Digital Technologies, Students, Pre-Service Teachers, Higher Education.

DOI
https://doi.org/10.20368/1971-8829/1136036

CITE AS
Drozdikova-Zaripova, A., Gutorova, G., & Khabibullin, M. (2026). Attitude of Russian students: pre-service teachers in different training fields towards Artificial Intelligence. *Journal of e-Learning and Knowledge Society*, *21*(3), 47-56. https://doi.org/10.20368/1971-8829/1136036

1. Introduction

Due to the rapid development of artificial intelligence technology and its active implementation in all spheres of human life, issues related to the use of AI in teaching, learning and research are becoming more and more relevant. Society needs highly qualified specialists who are able to meet the challenges of the modern world and effectively apply various high-tech solutions, including AI-based tools, in their activities. Consequently, the task of higher education is to train such kind of specialists, and this is no exception for higher education institutions engaged in training future teachers.

The integration of AI technologies has had a significant impact on the education system in recent years. Applications and services based on AI are actively used in teaching and learning processes due to a number of advantages they provide. For example, these technologies can be used by educators as an assistant for preparing teaching materials and learning simulators that can help students better understand and remember new material; as virtual assistant counsellors that can

[1] corresponding author - email: gulnara_shaes@mail.ru – address: 18 Kremlin Street, Kazan (Russia)

provide answers to typical student questions (Shirobokova, 2024). AI is used to personalize the learning process, adaptive testing and increase student engagement (Kumar et al, 2023). AI-powered tools have been shown to improve student engagement and academic performance, with some studies reporting a 15% increase in average test scores (Cerón Silva et al., 2025). In addition, AI technologies can help to increase manageability of educational processes and reduce the workload of teachers by reducing routine tasks (Liu & Baucham, 2023; Karan & Angadi, 2023). AI-based digital resources and tools also greatly facilitate research work by increasing efficiency and accuracy, simplifying various tasks, providing deeper analyses, and facilitating interdisciplinary collaboration (Lund et al, 2023; Alaa, 2024; Landis, 2023). Such technologies not only save time but also improve the quality of research results.

However, many serious concerns arise related to intellectual property, data privacy, ethical considerations, plagiarism, transparency, factual accuracy, potential bias, and equal access to resources (Li et al., 2022; Rudolph et al., 2023; Kasneci et al., 2023). The use of generative AI in education raises pressing questions about learning paradigms, pedagogy, authorship, and more (Williamson et al., 2023; Zembylas, 2023). Many scientists emphasize the importance of investigation of the issues related to AI technology implementation in education, possible risks of using AI and chatbots in learning, teaching and research (Alexeeva & Pronichkina, 2023; Dempere et al., 2023; Sarin & Kimkong, 2023; Delello et al., 2025). Regardless, it should be admitted that AI has become an integral part of education and teachers need to learn how to interact with it. Meanwhile, research works show that the successful introduction of new technologies into the teaching process depends largely on teachers' own attitudes towards these technologies (Kim & Kim, 2022; Sasota et al., 2021). Teachers should be well-prepared for the changes in the education caused by the introduction of AI into it, therefore it's quite important to assess future teachers' experience and attitudes towards AI. There is also a need for a better understanding of the factors that shape pre-service teachers' attitudes towards AI, their perceptions of its usefulness and the difficulties they face in using it (Strzelecki, 2024).

Despite the fact that recently there have been many studies devoted to the topic of AI in education, which indicates the growing interest in this problem, the issues of how it is perceived and used by students – pre-service teachers remain understudied. There is also a gap in studying and comparing the experiences and attitudes of education students depending on the direction of their training. This topic is important and relevant because understanding how students interact with AI tools is crucial for their effective use in educational contexts. In this regard, the purpose of our study was to identify the peculiarities of the attitude of students – pre-service teachers of different training fields to AI and their experience of its use in education.

In this respect, we formulated the following research questions: 1) What are the main opportunities of AI that students – pre-service teachers use for personal and professional purposes? 2) What difficulties they face when using AI? 3) What aspects most of all affect the use of AI-based tools by students of different training fields for further effective implementation in the educational process and application in the professional sphere (teaching and research practice).

2. Materials and methods

2.1 Research Methods and Techniques

A set of complementary methods was used in the implemented research: analysis of psychological and pedagogical literature, generalization; a confirmatory experiment, questionnaire method and methods of statistical data processing.

The questionnaire was developed by the research group in the ISATT online study "Exploring the Impact of Artificial Intelligence on Teacher Education" using the online service Google forms. The questionnaire consisted of 5 sections including questions of socio-demographic nature (gender, age, training profile, year of study), assessing the attitude of students – pre-service teachers to AI and the experience of its use during teaching practice or in teaching activities, as well as in everyday use for personal purposes, opportunities and risks of using AI in education. The questionnaire used closed, semi-open and open-ended questions, evaluation scales.

2.2 Experimental base of the study

The study was conducted on the basis of Kazan (Volga Region) Federal University in April-July 2024. The sample of the experiment involved 249 bachelor students in Teacher education studying at the Institute of Psychology and Education, the N.I. Lobachevsky Institute of Mathematics and Mechanics and the Institute of Philology and Intercultural Communication.

Participation in this survey was free and voluntary, the survey was conducted during the educational process.

Basic statistics (mean and standard deviation, percentages) were calculated for all subgroups of respondents participating in the survey. For the studied indicators, the acceptable level of significance was set at the level of $P \leq 0.05$ when identifying differences in the responses of students studying in different training fields using the Kruskal-Wallis test and χ^2 - criterion. Statistical processing was carried out using IBM SPSS Statistics version 23.

3. Results

3.1 Sample Characteristics

249 bachelor students took part in the online survey, among them 106 people (42.6%) were pre-service primary school teachers (training field: Primary education), 55 people (22.1%) were pre-service teachers of Russian language and literature (training field: Russian language and literature), 46 people (18.5%) were pre-service teachers of English language (training field: Supplementary education and English language) and 42 respondents (16.8%) were future teachers of mathematics and computer science (training field: Mathematics, computer science and information technology). Generalized socio-demographic indicators are presented in Table 1.

Based on Table 1, it can be identified that the majority of respondents are female between 19 and 23 years old, they are mainly in their 3rd year of study.

3.2 Attitudes and experiences of using digital tools in education

The study revealed that the students have received digital technology training/courses for teachers of various lengths, both in their free time and at university (Table 2).

As it can be seen from Table 2, students – pre-service teachers of primary school and English language (more than half of the numerical composition of these training fields) most often attend the longest training courses in digital technologies. More than 2/3 of them are getting the second specialty in IT and digital competences at the university within the framework of the project 'Digital Departments' with receiving a professional retraining diploma with the qualification 'Programmer'. Less than a third part of students in Russian language and literature, Mathematics, computer science and information technologies take courses in digital technologies, about 60% of which choose courses on their own.

Table 1 - Generalized socio-demographic characteristics of respondents.

Training field of students	Gender		Age			Year of study	
	female	male	mean	standard deviation	2	3	4
Russian language and literature	53 (96,4%)	2 (3,6%)	21,3	1,26	0 (0%)	31 (56,4%)	24 (43,6%)
Mathematics, computer science and information technologies	38 (90,5%)	4 (9,5%)	20,4	0,67	4 (9,5%)	38 (90,5%)	0 (0%)
Primary education	106 (100%)	0 (0%)	19,9	0,88	46 (43,4%)	60 (56,6%)	0 (0%)
Supplementary education and English language	46 (100%)	0 (0%)	20,4	1,3	12 (26,1%)	19 (41,3%)	15 (32,6%)

Table 2 - Completion of digital technology teacher training/courses by students (in %).

Training field of students	Course attendance*	Course duration	Course delivery mode		Confirmation documents			
			in free time	at university	Attestation	Certificate	Diploma	Not available
Russian language and literature	12,7	from 1 to 2 weeks	58,2	41,8	5,5	12,7	3,6	78,2
Mathematics, computer science and information technologies	28,6	from 1 week to 1 year	66,7	33,3	9,5	4,8	4,8	80,9
Primary education	57,5	from 9 weeks to 9 months	20,8	79,2	9,4	15,1	42,5	33
Supplementary education and English language	50	from 5 weeks to 9 months	30,4	69,6	8,7	2,2	30,4	58,7

Note: *differences at a high level of statistical significance (χ^2=32.330, at p<0.0001).

It was found that pre-service teachers are interested in using digital tools both for educational and personal purposes (Table 3). At the same time, the most expressed interest on a 5-point scale is shown for educational purposes, pre-service teachers of primary school and Russian language and literature have it to the greatest extent.

Table 3 - Assessment of students' interest in digital tools.

Training field of students	Interest in digital tools			
	personal purposes		educational purposes	
	mean	standard deviation	mean	standard deviation
Russian language and literature	3,87	1,03	4,21	0,89
Mathematics, computer science and information technologies	3,85	1,03	3,95	0,94
Primary education	4,0	0,88	4,2	0,88
Supplementary education and English language	3,8	0,91	4,0	0,82

Among the main digital tools used in personal life and education future teachers identified various text and graphics programs, including Microsoft products, AI-based services and neural network tools (ChatGpt, chatbots, Pinterest, Quizizz AI etc.), social networks, educational platforms, services for creating and editing educational and scientific material. AI and neural network tools are most often used by students – mathematicians (61.9%) and pre-service teachers of English language (56.5%), the least often they are used by students receiving philological (38.2%) and primary school teacher (14.2%) education. It is important to note that in addition to traditional AI services, students use tools related to their specialization. The most frequent use of social media in everyday life is by future teachers of English and primary education (39.1% and 31.1% respectively).

3.3 Everyday use of AI in personal life

According to the survey results we received the largest number of "no" answers to the question "Do you know what generative AI is?" from students studying in Russian language and literature and Primary education training fields (41.8% and 40.6% respectively), "yes" answers were more often noted by pre-service teachers of Mathematics and computer science (38.1%) and English language (39.1%). The highest percentage of unsure answers was demonstrated by students in Russian language and literature (40%).

According to the students' opinion, the following keywords are associated with AI, based on the dominant positions for each group of respondents: quickness and speed, technology, future, science, development and progress (training field: Primary education); quickness and speed, modern digital technologies, algorithm and program (training field: Russian language and literature); intelligence, future, development and progress, neural network (training field: Supplementary education and English language); neural network, intelligence, assistant (training field: Mathematics, computer science and information technologies).

Over the last 6 months, more than 70% of students expressed interest and desire to deepen their knowledge in this area, for this purpose, about 20% of respondents preferred to learn AI technologies on their own and only about 5% took a training course at the educational organization.

The majority of pre-service teachers positively assess the expediency of using AI both in everyday life and in education. According to the students, such expediency is especially significant in the sphere of education for the implementation of the educational process including research work of teachers and students. Interestingly, the largest number of students who expressed this judgment was found among mathematicians (71.4%), and the lowest number of votes among future teachers of Russian language (47.3%) (Table 4).

Table 4 - Students' assessment of the expediency of using AI (in %).

Training field of students	Using of AI in all spheres of life*	Using of AI in education**
Russian language and literature	40	47,3
Mathematics, computer science and information technologies	61,9	71,4
Primary education	61,3	53,8
Supplementary education and English language	47,8	50

Note: *differences ($\chi 2$=20,331, at p=0,016);
** differences ($\chi 2$=21,743, at p=0,01).

Despite the experience of using AI, the frequency of using the technology among students is rather low. For example, about 40% of respondents practiced AI only 'sometimes' when translating foreign texts, creating presentations, videos and images. Students also have experience in generating texts, searching for educational and scientific information when preparing reports, projects and writing term papers. In everyday life, students use AI to maintain a personal blog, find ideas

for cooking dinner, for entertainment and leisure activities, and find answers to questions.

It was found that more than a half of the students are aware of AI capabilities and use it more often as a work tool (as we see in Table 5).

Table 5 - Areas in which students use AI (in %).

	Areas of students' use of AI			
Training field of students	**As a work tool**	**For leisure activities**	**As a game, leisure and work tool**	**Don't use**
Russian language and literature	54,5	7,3	25,5	12,7
Mathematics, computer science and information technologies	66,7	9,5	19	4,8
Primary education	66,9	5,8	16,9	10,4
Supplementary education and English language	60,8	0	19,6	19,6

Among the main advantages of using AI technologies in pedagogical activity, the majority of respondents (about 70%) unanimously noted: high speed of work performance, time saving, convenience, simplicity and accessibility in use, multifunctionality. Among other things, students – mathematicians also highlighted the possibility of generating tasks of different levels of complexity, students – Russian philologists emphasized the possibilities of high-quality visualization of educational material and improving the quality of learning, increasing free time for teachers; students – future teachers of English emphasized the uniqueness of generated texts and reducing the burden on the teacher (data collection, verification and control); primary education students identified opportunities for generating creative ideas and original tasks, structuring large amounts of information, and increasing children's interest to the learning process.

3.4 AI and teaching

Based on the pedagogical experience, obtained primarily during the pedagogical practice, in lesson design about 40% of students – pre-service teachers of primary school, Russian and English languages sometimes use AI in the planning and in the strictly instructive phases, while only about 13% of students demonstrate the use of AI in the evaluation phase. A distinctive picture is observed in terms of the frequency of AI use in the strictly instructive phase among the Mathematics, computer science and information technologies students. Thus, 66.7% of them in their primary experience of pedagogical activity often apply AI in all stages of lesson design, including the evaluation stage (Table 6).

In pedagogical practice, students in lesson planning had trial experience of using AI mainly for preparing teaching materials (34.8% – Supplementary education and English language, 37.7% – Primary education), for lesson design (30.9% – Russian language and literature) and frequent use to deepen their knowledge (23.8% – Mathematics, computer science and information technologies).

According to pre-service teachers, in the course of designing a lesson with the help of AI, special attention should be paid to the searching ideas for developing a lesson scenario, to the stage of motivating students to activeness at the lesson, generation of the learning content (preparing educational texts, didactic material, tasks and games with the help of image, video and sound generation), to the stage of control and evaluation of learning achievements.

Table 6 - Evaluation of the frequency of students' use of AI for lesson design (in %).

Training field of students	**Use of AI for lesson design**					
	in the planning phase*		**in the strictly instructive phase****		**in the evaluation phase*****	
	sometimes	**frequently**	**sometimes**	**frequently**	**sometimes**	**frequently**
Russian language and literature	12,7	12,7	21,8	12,7	10,9	9,1
Mathematics, computer science and information technologies	19	23,8	14,3	23,8	4,8	19
Primary education	27,4	9,4	20,8	23,6	17,9	7,5
Supplementary education and English language	28,3	6,5	26,1	10,9	10,9	6,5

Note: *differences (χ^2=26,082, at p=0,002); **differences (χ^2=28,844, at p=0,001); ***differences (χ^2=21,450, at p=0,011).

About 40% of Russian language and primary education students believe that the possible advantage of using AI is achieved in teaching science disciplines, 34.8% of future teachers of English language are confident in the potential advantage of humanities disciplines. Among mathematics and computer science students, the opinions were equally divided between humanities, natural sciences and other scientific disciplines.

In addition, students of different training fields identified different most likely benefits from AI also in administration (52.4% – Mathematics, computer science and information technologies and 60% – Russian language and literature), schooling management (44.3% – Primary education and 38.2% – Russian language and literature) and in housekeeping for ancillary tasks (47.8% – Supplementary education and English language and 45.3% - Primary education). The obtained differences were confirmed at a high level of statistical significance ($\chi2=34.116$, at $p=0.001$; $\chi2=29.669$, at $p=0.003$; $\chi2=26.316$, at $p=0.010$ in the corresponding areas).

The wide opportunities for the use of AI in different areas of education are related, according to respondents, to the simplification of reporting, automation of control over educational processes, and the possibilities for analyzing of big data.

3.5 Critical analysis

Students unanimously consider it necessary to develop the use of AI in education (average score 3.9 on a 5-point scale) in connection with time saving, convenience and simplification of solving multifunctional educational tasks, increasing students' interest in learning activities and involvement of students and teachers into the educational process, improving the quality of learning material, automatization of routine tasks and reducing the load on teachers and students. In general, according to the respondents' perceptions, AI acts as an assistant for teachers and students. In addition, future English language and primary school teachers emphasize the prospect of effective educational development thanks to AI.

However, in terms of students' confidence in AI, the results are lower and are unanimously on average only 2.96 points on average with a standard deviation equal to 0.97 on a 5-point scale. Future pedagogues critically assess the possibilities of AI and note possible risks in the use of AI in education (Table 7).

As can be seen from Table 7, the greatest number of agreements in assessing the presence of risks in the use of AI was given by students in Supplementary education and English language (91.3%), and the least by students in Mathematics, computer science and information technologies (76.2%).

Among these risks, future educators identified the following hierarchy: unreliability of information and the need to double-check it, plagiarism, access to personal data, lack of human interaction, decrease in intellectual abilities and critical thinking of learners, degradation of human society and the sense of insecurity and fear that things may be out of human control.

Nevertheless, about 60% of the respondents agree with the need to adapt to AI (Table 8) due to the digitalization of society (84.5% of the total number of respondents) and modern educational requirements (60.2% of students).

Table 7 - Assessment of risks from using AI (in %).

Training field of students	Risks of using AI		
	Yes	Maybe	No
Russian language and literature	16,4	65,5	18,1
Mathematics, computer science and information technologies	38,1	38,1	23,8
Primary education	29,2	56,6	14,2
Supplementary education and English language	30,4	60,9	8,7

Table 8 - Assessment of students' need to adapt to AI (in %).

Training field of students	Need to adapt to AI		
	Yes	Maybe	No
Russian language and literature	14,5	49,1	36,4
Mathematics, computer science and information technologies	4,8	52,4	42,8
Primary education	13,2	42,5	44,3
Supplementary education and English language	17,4	34,8	47,8

4. Discussion and Conclusions

Students' attitudes towards artificial intelligence vary across different educational fields and countries. Studies show that in different countries the attitude towards AI among students varies significantly depending on such factors as gender (Samreen & Hasan, 2023; Kim & Lee, 2023), level of education (Khater et al., 2023; Hajam & Gahir, 2024), specialty (Almaraz-López et al., 2023; Lavidas et al., 2024) and time spent on its study (Alzahrani, 2023). For example, Spanish students in economics and business management are willing to enhance their AI education but lack sufficient training (Almaraz-López et al., 2023). Medical students in Egypt and Kazakhstan demonstrate from moderate to good knowledge and positive attitudes towards AI, emphasizing the need for AI integration in medical

curricula (Khater et al., 2023; Cruz et al., 2023). Dental students also show optimism towards AI advancements in dentistry, with a majority agreeing on its potential benefits and the importance of AI education in their studies (Karan-Romero et al., 2023). Overall, students across different disciplines recognize the significance of AI in their future professions and express a willingness to learn more about its applications. Our study also showed that pre-service teachers are interested in the use of digital tools in general; this is the most typical for students studying in the fields of Primary education and Russian language and literature.

Students' attitudes toward AI are determined, among other things, by the level of training and expected effectiveness of artificial intelligence for professional activities (Przybyła-Kasperek et al., 2023; Kim & Lee, 2023; Hajam & Gahir, 2024; Strzelecki, 2024). Understanding these elements is crucial to develop a positive attitude towards artificial intelligence in students.

According to our study, in the conditions of digitalization of education, about 40% of students – pre-service teachers are interested in acquiring additional digital competencies. The key motivator of students' learning is the administration of the institutes, which contributes to the creation of favorable conditions for taking courses in digital technologies at the university.

In their personal and professional lives, students use various digital resources, including both traditional AI-based services and neural network tools, so as related to their specialization. It is important to note that, despite the interest in use of digital technologies for the organization and implementation of the educational process and research work, pre-service teachers of primary school and Russian language use AI tools in their practice less often (about a quarter of respondents) compared to future teachers of mathematics and computer science and English language (about 60%). Moreover, the level of knowledge in the field of generative AI is lower among the Primary education and Russian language and literature students than among the Mathematics and computer science and English language students. Przybyła-Kasperek et al. (2023) in their study obtained similar results, finding that computer science students are more aware of the possibilities and applications that AI brings than education students.

At the same time, students' attitudes towards AI tools and their assessment of their feasibility in education differ from their previous assessments regarding the use of other digital technologies, with Mathematics and computer science students being among the most interested ones. Although according to the study of Kim & Lee (2023) students with high interest toward AI or experience with block- and text-based programming languages showed significantly positive attitudes toward AI. Meanwhile, a study by Lavidas et al. (2024) shows that the key factors influencing humanities and social science students' intentions to use these technologies for academic purposes are performance expectancy, habit and enjoyment of using AI applications. In our view, this may be due to the fact that despite the strong breakthrough of AI-based digital assistants in recent years, AI technologies are adopting in education much slower than in other fields, and the digital skills of unrelated educators are not sufficiently developed yet.

In this regard, over the last 6 months, more than 70% of pre-service teachers expressed interest in deepening their knowledge in this area, emphasizing the importance of effective and responsible use of AI technology in their future careers. At the same time, less than 20% of respondents tried to realize their intentions by learning new technology independently or in an educational organization. We believe that the situation of difficulty in realizing the students' intention to study AI applied in education is due to the insufficient number of developed special courses.

The results of the survey showed that students are aware of the possibilities of AI and use it sometimes as a work tool to create presentations, videos and images, generate texts, translate foreign texts, search for educational or scientific information in preparation for classes or research work. Students have an intention to use various functions of AI in pedagogical practice and further professional activity for effective implementation of educational process, namely: generation of visuals and educational material of various content, educational videos, tests, quizzes, text tasks of different levels of complexity, interactive tasks and games for lessons, lessons design, preparation of lesson plans and notes, scenarios of educational events, automation of routine tasks (checking homework, creating and checking tests), etc.

Among the main possibilities of AI in pedagogical activity were named: high speed of work performance, time saving, convenience, simplicity and accessibility in use, multifunctionality. Special emphasis was also made by students of different training fields on such advantages as generation of tasks of different complexity level, creative ideas and original assignments, improvement of the quality of learning process and involvement of students and teachers into the educational process, reduction of the workload on the teacher and student. The obtained results of our study partially confirm the previously published data on the benefits of using AI (Shirobokova, 2024; Kumar et al, 2023; Liu & Baucham, 2023; Karan & Angadi, 2023).

However, new interesting facts were also revealed. During the teaching practicum, students gained experience in using AI in the planning and development of lesson content, while mathematics and computer science students also practiced it in the evaluation phase. It was found that students of different training fields identify the advantages of using AI in different areas of education, for different academic disciplines and set different goals for the use of AI in lesson planning.

For future teachers, AI tools act primarily as assistants for effective organization of the educational process. Unfortunately, future teachers are not focused on using AI services in research activities. In our opinion, a cardinal change of the situation is possible with the increase of digital competencies of faculty and students, expansion of the arsenal of digital tools based on AI for the implementation of research work by students and adjustment of the content of practice for obtaining primary skills of research work taking into account the identified risks.

According to a study by Hajam & Gahir (2024) science students tend to have more positive attitudes toward artificial intelligence than their peers in the arts and commerce. According to the results of our study, AI and neural network tools are most often used by math and computer science students and least often by philology students, which also indicates a more positive attitude of the former. The data obtained by Kim & Lee (2023) indicating a direct correlation between interest toward AI and positive attitudes toward AI was partially confirmed in this study.

The work also revealed an interesting pattern: the higher the interest of students in the application of AI technology in education and the more experience in using it in practice, the lower the risk assessment of AI application. These results correlate with the data obtained by Przybyła-Kasperek et al. (2023), according to which the more experience and knowledge students have regarding AI, the less concerns and fears they have about AI development. In general, students – pre-service teachers unanimously consider it necessary to develop the use of AI in education and, if necessary, to adapt to AI in connection with the digitalization of society and modern educational requirements.

The findings can become the basis for further research and discussions on the role of AI in education and research work, as well as for the development of strategies for effective integration of these technologies into the educational process, taking into account the changing needs and expectations of students and teachers, as well as the specifics of the pre-service teachers' training fields.

Nevertheless, our study has a number of limitations. The limited number of participants does not allow us to generalize the results to a broader context, but our study can be a basis for future research. The study has opened interesting perspectives on approaches to educational content management in the training of future educators of different training fields using AI-based digital technologies. However, this study is only the beginning and future in-depth studies are needed, especially regarding different factors influencing the effectiveness of teacher training, especially in the direction of research work in the context of digitalization of education. Of particular interest is a comparative analysis of attitudes towards the use of AI and successful experiences of its use among pre-service and in-service teachers. Finally, it would be useful to conduct international studies to find out whether pre-service and in-service teachers from different cultures have different views on the use of digital technologies and AI services in education.

Acknowledgements

This paper has been supported by the Kazan Federal University Strategic Academic Leadership Program (PRIORITY-2030).

References

Alaa, A. (2024). Harnessing Artificial Intelligence for Enhanced Efficiency in Academic Writing and Research. Fusion: Practice and Applications, 16(2), 126-146. DOI: https://doi.org/10.54216/FPA.160209

Alexeeva, D.A., Pronichkina I.S. (2023). Artificial intelligence in foreign language teaching: post-editing as an indicator of language proficiency level. Language and Cultural Contacts, 12, 137-141.

Almaraz-López, C., Almaraz-Menéndez, F., López-Esteban, C. (2023). Comparative Study of the Attitudes and Perceptions of University Students in Business Administration and Management and in Education toward Artificial Intelligence. Education Sciences, 13(6):609-609. doi: 10.3390/educsci13060609

Alzahrani, L. (2023). Analyzing Students' Attitudes and Behavior Toward Artificial Intelligence Technologies in Higher Education. International journal of recent technology and engineering, 11(6):65-73. doi: 10.35940/ijrte.f7475.0311623

Cerón Silva, S. A., Ballesteros Lara, M. C., Salama Muhammad, I. M., Cerón Silva, D. J., Cerón Silva, A. D., & Salazar Rodríguez, R. R. (2025). Artificial Intelligence as a Co-Teacher: The Future of Personalized Teaching. LATAMRevista LatinoamericanaDeCiencias SocialesYHumanidades, 5(6), Unidad Educativa Mocache. https://doi.org/10.56712/latam.v5i6.3283

Cruz, J., Sembekova, A., Omirzakova, D., Bolla, S., Balay-odao, E. (2023). General Attitudes Towards and Readiness for Medical Artificial Intelligence among Medical and Health Sciences Students in Kazakhstan (Preprint). doi:10.2196/preprints.49536

Delello, J. A., Sung, W., Mokhtari, K., Hebert, J., Bronson, A., & De Giuseppe, T. (2025). AI in the Classroom: Insights from Educators on Usage, Challenges, and Mental Health. Education Sciences, 15(2), 113. https://doi.org/10.3390/educsci15020113

Dempere, J., Modugu, K., Hesham, A. and Ramasamy, L.K. (2023) The impact of ChatGPT on higher education. Front. Educ. 8:1206936. doi: 10.3389/feduc.2023.1206936

Hajam, K.B., Gahir, S. (2024). Unveiling the Attitudes of University Students Toward Artificial Intelligence. Journal of Educational Technology Systems, 52(9). 10.1177/00472395231225920

Karan, B., Angadi, G.R. (2023). Artificial Intelligence Integration into School Education: A Review of Indian and Foreign Perspectives. Millennial Asia. doi: 10.1177/09763996231158229

Karan-Romero, M., Salazar Gamarra, R.,Leon Rios, X. (2023). Evaluation of Attitudes and Perceptions in Students about the Use of Artificial Intelligence in Dentistry. Dentistry Journal, 11(5), 125. doi:10.3390/dj11050125

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfefer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., … Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences, 103, 102274. https://doi.org/10.1016/j.lindif.2023.102274

Khater, A., Zaaqoq, A., Wahdan, M., Ashry, S. (2023). Knowledge and Attitude of Ain Shams University Medical Students towards Artificial Intelligence and its Application in Medical Education and Practice. Educational Research and Innovation Journal, 3(10), 29-42. 10.21608/erji.2023.306718

Kim, N.J., Kim, M.K. (2022) Teacher's Perceptions of Using an Artificial Intelligence-Based Educational Tool for Scientific Writing. Front. Educ. 7:755914. doi: 10.3389/feduc.2022.755914

Kim, S.-W., Lee, Y. (2023). Investigation into the Influence of Socio-Cultural Factors on Attitudes toward Artificial Intelligence. Education and Information Technologies, 29(8), 1-29. 10.1007/s10639-023-12172-y

Kumar, P., Nithiya, S., Suguna, A., Kavitha, K.B. (2023). Implementation of Artificial Intelligence in Education. International research journal of computer science, 10(05):104-108. doi: 10.26562/irjcs.2023.v1005.01

Landis, E. (2023). AI Tools for the Researcher: Streamlining the Scholarly Communications Process. EON. Retrieved July 25th 2024 from https://eon.pubpub.org/pub/dtxegde0

Lavidas, K., Voulgari, I., Papadakis, S., Athanassopoulos, S., Anastasiou, A., Filippidi, A., Komis, V., Karacapilidis, N. (2024). Determinants of Humanities and Social Sciences Students' Intentions to Use Artificial Intelligence Applications for Academic Purposes. doi: 10.20944/preprints202404.0750.v1

Li, C., Xing, W., & Leite, W. (2022). Building socially responsible conversational agents using big data to support online learning: A case with Algebra Nation. British Journal of Educational Technology, 53(4), 776–803. https://doi.org/10.1111/bjet.13227

Liu, Y. & Baucham, M. (2023). AI Technology: Key to Successful Assessment. In E. Meletiadou (Ed.), Handbook of Research on Redesigning Teaching, Learning, and Assessment in the Digital Era (pp. 304-325). IGI Global. https://doi.org/10.4018/978-1-6684-8292-6.ch016

Lund, B. D., Wang, T., Mannuru, N. R., Nie, B., Shimray, S., & Wang, Z. (2023). ChatGPT and a new academic reality: Artifcial Intelligence-written research papers and the ethics of the large language models in scholarly publishing. Journal of the Association for Information Science and Technology, 74(5), 570–581. https://doi.org/10.1002/asi.24750

Przybyła–Kasperek, M., Smyrnova-Trybulska, E., Kommers, P. (2023). Factors Enhancing Students' Views on Artificial Intelligence. International Journal of Research in E-learning, 9 (2), 1–42. doi: 10.31261/ijrel.2023.9.2.03

Samreen, B., Hasan, Q.S. (2023). Assessing Students' Attitude Towards Artificial Intelligence with Respect to Gender and Use of Computer and Mobile Devices. International Journal For Multidisciplinary Research, 5(3). doi: 10.36948/ijfmr.2023.v05i03.4130

Sasota, R.S., Cristobal, R.R., Sario I.S., Biyo, J.T., Magadia, J.C. (2021). Will–skill–tool (WST) model of technology integration in teaching science and mathematics in the Philippines. Journal of Computers in Education, 8(3), 443–464. https://doi.org/10.1007/s40692-021-00185-w

Shirokolobova, A.G. (2024). Artificial intelligence as a tool to optimize the work of a higher school teacher // Pedagogy. Voprosy teorii i praktiki, 9(2), 138-145.

Sok, S., Heng, K. (2023). ChatGPT for Education and Research: A Review of Benefits and Risks. Cambodian Journal of Educational Research, 3(1), 110–121. doi.org/10.2139/ssrn.4378735

Strzelecki, A. (2024). Students' Acceptance of ChatGPT in Higher Education: An Extended Unifed Theory of Acceptance and Use of Technology. Innovative Higher Education. 49:223–245. https://doi.org/10.1007/s10755-023-09686-1

Rudolph, J., Tan, S., & Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education? Journal of Applied Learning & Teaching, 6(1), 1–22

Williamson, B., Macgilchrist, F., & Potter, J. (2023). Re-examining AI, automation and datafcation in education. Learning, Media and Technology, 48(1), 1–5. https://doi.org/10.1080/17439884.2023.2167830

Zembylas, M. (2023). A decolonial approach to AI in higher education teaching and learning: Strategies for undoing the ethics of digital neocolonialism. Learning, Media and Technology, 48(1), 25–37. https://doi.org/10.1080/17439884.2021.2010094