The Digital Revolution in Education: The Role of AI from the Perspective of Future Teachers

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Abstract: We are currently witnessing rapid technological advancement and modernisation of society, with digital technology, particularly artificial intelligence (AI), increasingly asserting its dominance. This study focuses on understanding the attitudes and expectations of future teachers towards AI, which has an impact on all areas of society, especially on the education and preparation of future teachers. Through a questionnaire survey, the study seeks to gain a more detailed insight into how future educators perceive AI and their attitudes towards it. The questionnaire, which was specifically designed for this research, focuses on different aspects of perceptions of AI in education. Respondents from both primary and secondary school teacher education programmes expressed their views on the use of AI in the pedagogical process, its impact on teacher-student interaction and indicated possible implications for the future of education. The main objectives of the research were to determine the views of prospective teachers on the use of AI in teaching, to identify positive, negative or neutral attitudes towards the integration of AI into the educational process, to identify the future role of AI in education, to determine how prospective teachers envision the use of AI in the pedagogical environment in the long term, to identify areas where teaching with AI could be most effectively integrated, and to identify areas where AI could be most appropriately used to improve educational outcomes and processes. The data presented through this paper is part of the "Perceptions of AI by current and future teachers" project. The results of this study could provide valuable information for educational institutions, policy makers of educational strategies and frameworks, and AI developers to better understand the needs and expectations of future teachers in the context of the increasing digitalisation of education. Our intention is to fill the knowledge gap on the perception of AI in educational contexts and thus provide important information for the future development of pedagogical strategies and technologies in education.

Keywords: Video games, Academic performance, Projective testing, High school, Addiction

1. Introduction

Traditionally conceived education is currently facing many challenges, and not only in the Czech Republic. Pressure is currently exerted on current and future teachers from several directions, forcing them to constantly adapt teaching methods, forms, activities and educational content to the current times. The catalyst for these changes is ever-accelerating technological developments led by artificial intelligence (AI). According to a study conducted by the European Commission (2018), AI is one of the main drivers behind the transformation of the education system, both in the teaching process and in the creation of new pedagogical methods and tools. It can be assumed that the integration of AI into education at all levels will be gradual. One of the hurdles that teachers in many countries face in coping with this new technology is their heavy workload as expressed by the student (pupil)-teacher ratio. However, digital technologies (including AI) can be an effective solution to some of the current problems in education (excessive teacher workloads, increased personalisation of learning and working with gifted pupils and pupils with special needs or from disadvantaged backgrounds, etc.). Related to this is the need to scientifically validate different solutions for the use of AI in education across different target groups. From the perspective of learners, AI tools have a demonstrable positive impact on skills development in the form of improved written expression and step-by-step problem solving according to some authors. There were also positive impacts in learning fixation, with students using ChatGPT to create quizzes on different subjects. Chatbots enable access to educational content according to their learning preferences and subsequently improve learning outcomes and promote the integration of old and new knowledge. Beyond the direct interaction of AI with the student, pedagogical research also talks about the effect of AI on the teacher's work. Here, saving time in a teacher's routine tasks (planning, assessment, question generation, etc.) and in the extension and improvement of the quality of teaching seems to be a significant benefit. The promising scientific results and findings will therefore have to be transferred to pedagogical practice. We believe that one of the potential barriers may be the fears, prejudices or negative attitudes of current and future teachers towards the use of AI in teaching practice, which may stem from a very narrow awareness of this technology and its potential

benefits for the educational process. We therefore think it is essential to map positive and negative opinions, attitudes and concerns to understand how current and future teachers perceive the advent of AI.

Therefore, we focus on this issue in one of the parts of our research and present partial research findings on the relationship of future teachers to AI in the text of the paper. We must bear in mind that this generation of future teachers is in most cases still not systematically prepared for the use of AI in education, but it cannot be ruled out that they will avoid this technology in their future work. A questionnaire was used to determine the opinions, attitudes and potential concerns of trainee teachers towards the use of AI in education. This survey will allow us to answer the following research questions:

RQ1: How are trainee teachers familiar with applications and tools of artificial intelligence and their possible use in future teaching work?

RQ2: What is the attitude of future teachers towards the use of AI tools in teaching?

RQ3: How do future teachers perceive the use of AI tools in their future work?

RQ4: What are the perceived potential risks of using AI for trainee teachers in relation to their future professional work?

2. Methods

We chose a quantitative strategy for our research and used a questionnaire as a research tool to analyse the issue of AI in education through the eyes of future teachers. Our research looked at several factors, such as views on the use of AI in the teaching process; AI as an 'enhancer' of learning outcomes; possible challenges for the future and, conversely, the risks associated with it. The questionnaire entitled 'Artificial Intelligence and Future Teachers' contained a total of 22 questions and was specifically designed for the purpose of this research. The nature of the questions included a combination of closed-ended multiple-choice, open-ended and scaled questions. The first seven questions were used to obtain information about the respondents, i.e., their gender, the focus of the study programme, its forms, type of school and year, study approbation and parent college. The following questions offered them an opportunity to express their own views and attitudes towards AI in the context of teaching such as student motivation, improved learning outcomes, change in language and communication skills, and critical assessment of generative tools. Respondents also commented on the use of AI in their future professional work as teachers, reflecting on possible future use, but also related limitations. The questionnaire itself was distributed by email using Google Forms, a platform chosen for its user-friendliness, ease of distribution and the possibility of efficient data collection. The main target group of the questionnaire survey was students of teacher-oriented study programmes, specifically Pedagogy for Lower and Upper Primary School and Pedagogy for Secondary School, Social and Special Education. The selection of these groups was motivated by the desire to understand and analyse how the current young generation, who will be working in the department in a few years, views AI from the other side. The data was collected in April 2024. We managed to collect responses from 222 respondents.

3. Results

The survey asked several key questions regarding familiarity with AI applications and tools, attitudes towards their use in teaching and potential risks associated with their implementation. The results of the study can be used to discuss the modernisation of the educational process, to innovate/revise the courses of the given study programmes and to adapt to new technological trends in the field of pedagogy. In the research part we focused on the overall view of the students as well as on subgroups, which were divided according to the following criteria.

Table 1: Distribution of the research sample by gender, field of study and type of study

Gender		
Female	167	75%
Male	54	24%
Do not want to answer	1	1%
Field of study		
Teaching for lower primary school	45	20%
Teaching for upper primary school	59	27%

Teaching for secondary school	78	35%
Social pedagogy	17	8%
Special education	22	10%
Type of study		
Full-time	160	72%
Part-time	62	28%

If you have already encountered AI tools, what specific tools have you come across?

The results of the questionnaire show that out of 222 respondents, 35 have never had experience with AI tools. Among those who had experience, tools such as ChatGPT and OpenAI predominate (167 respondents). Others mention applications like Geminy, Deepl and other tools for generating text, images and music. This data suggests that experience with AI tools is quite widespread among trainee teachers, with ChatGPT tools being used most frequently. If we look at the distribution by the type of study, it shows that out of the 35 respondents who have no experience of using AI, 10 are from part-time studies and 25 are from full-time studies. Although in absolute numbers the number of respondents who have never had experience with AI was lower in part-time study than in full-time study, if we look at the percentages of the total, the result is very similar in both forms (16.1% in part-time and 15.6% in full-time). Similar results are obtained for respondents who have some experience, and it turns out that the use of AI is not related to the type of study.

Different results are obtained if we divide the respondents according to their study programmes (social pedagogy, special education, lower primary school, upper primary school and secondary school). Our data analysis shows that there are differences in the experience of using AI between different groups of students according to the type of study. The highest percentage of students with no experience with AI is recorded in special education and lower primary school, at 19% of the total. On the contrary, upper primary and secondary school students show lower percentages (6% and 4% respectively). This data may indicate differences in the integration of modern technologies in the educational process between different disciplines.

The gender breakdown also shows that there is some correlation among our respondents. As many as 91% of men have some experience with AI tools, while the figure for women is lower at around 82%.

How many teachers have introduced you to AI applications and tools and how can they be used in future teaching work?

Respondents chose from 1 (all) to 5 (none). The data obtained from our quantitative research showed that the mean response was 3.59, indicating that most respondents stated a medium level of familiarity with these technologies, with a standard deviation of 1.42 indicating a dispersion of values around the mean. The median response of 4 then suggests that half of the respondents were rarely or not at all familiar with AI from their teachers, indicating a certain lack of awareness in the teaching environment regarding technological trends dealing with AI. If we look at gender, women answered on average 3.57, men 3.69. The dispersion for women was higher. Both groups are around a medium level of familiarity. The differences between part-time and full-time students are not significant either. Similar results are obtained if we divide the respondents into part-time and full-time students (part-time 3.44 and standard deviation = 1.70; full-time 3.65 and standard deviation = 1.29). However, a certain difference can be traced if we look at the student's individual study programmes (lower and upper primary school, secondary school, special education and social pedagogy). The results show that the mean score is low, indicating that students generally feel a lack of familiarity with these topics. The group of social pedagogy students received the best rating (closest to 1) with an average rating of 3.06, indicating that familiarity with AI applications was most prevalent in this group. Conversely, the worst rating (closest to 5) was obtained by the group of trainee teachers for upper primary school level with an average rating of 4.01, indicating that these students perceive their familiarity with AI applications as least sufficient, see Figure 1.

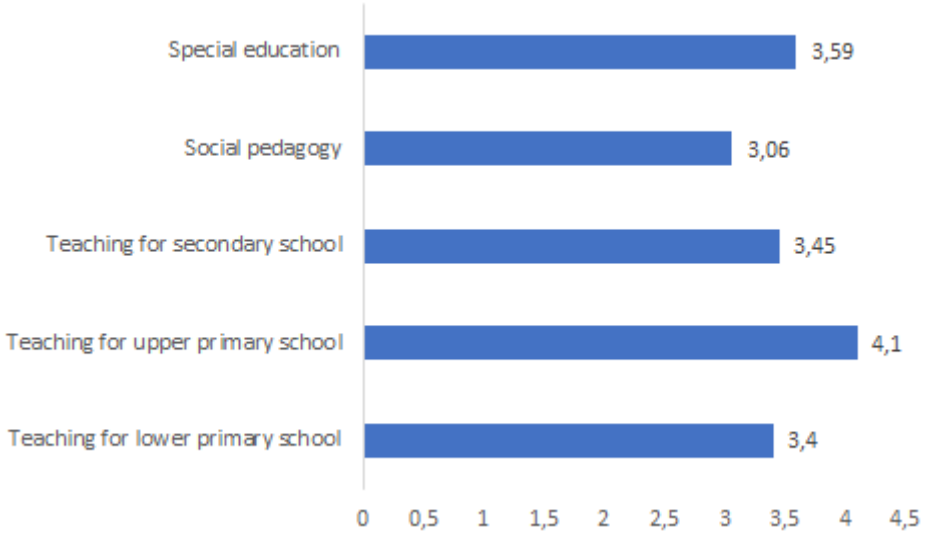

Figure 1: Average number of teachers who introduced students to AI applications and tools and their potential use in educational work. Divided according to the field of study. (1 – all; 5 – none)

What is your attitude towards the use of AI tools in education?

For this question, students again chose from 1 (positive) to 5 (negative). The graph shows the frequency of responses.

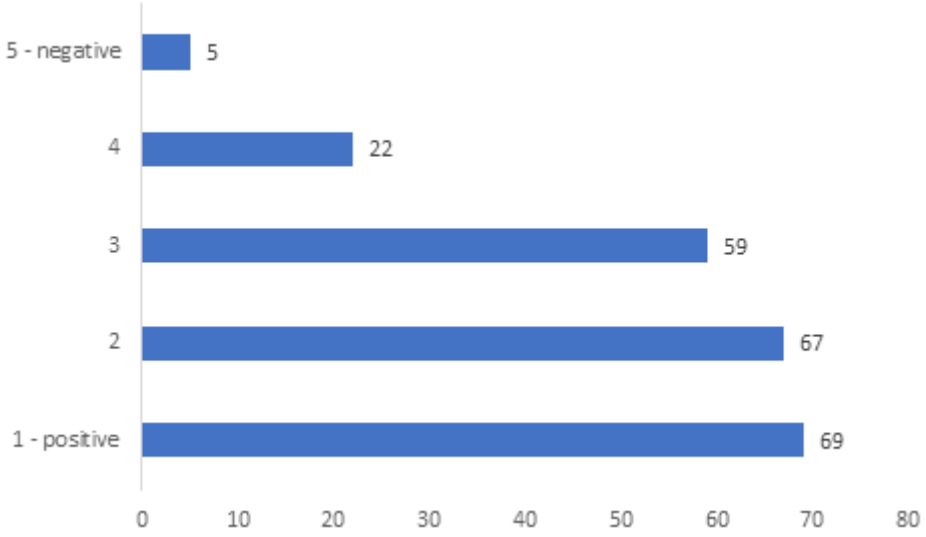

Figure 2: Distribution of students' attitudes towards the use of AI in teaching

The average attitude of respondents towards this issue was 2.22, indicating a rather positive attitude towards the use of AI in teaching. The standard deviation of 1.07 shows some variability in the responses, yet together with the median value of 2, it confirms that the majority of respondents have a rather positive attitude towards this issue. This suggests that trainee teachers are interested and open-minded about the use of AI tools in teaching, although there is some diversity in their views.

The gender breakdown of the respondents yielded the following findings on their attitudes towards the use of AI tools in teaching. For male respondents the average response was 1.83, indicating an even more positive attitude towards this issue than the overall average. A standard deviation of 0.96 indicates less variability in responses among men, which may indicate greater agreement in their views. The median value of 2 suggests that, here too, most men have a rather positive attitude towards the use of AI in teaching.

On the other hand female respondents had a higher average response, specifically 2.34, indicating a slightly higher level of scepticism or reserve compared to males. The standard deviation of 1.07 indicates a greater variability in women's responses, suggesting that opinions among women may be more diverse. The median value of 2 indicates that most women still have a rather positive attitude towards this issue, although slightly lower than men. From these results, it can be concluded that men generally show more positive attitudes towards the use of AI tools in education than women, although both groups show similar trends in the direction of their attitudes.

It can be observed that, similarly to the previous question, it does not matter much whether our respondents are from part-time or full-time studies. This similarity is interesting. Part-time students have on average a higher age, which would suggest a lower interest in new technologies. On the other hand students studying part-time might have different attitudes because of the greater involvement of technology and distance learning. However, the fact that their attitudinal responses were not significantly different from those of full-time students suggests that the use of technology in teaching may be perceived similarly regardless of the particular form of study, and this would certainly be worthy of more detailed research.

Table 2: Attitude towards the use of AI in teaching by type of study (1 – positive, 5 – negative)

	Type of study	N	Mean	Median	SD
Attitudes towards the use of AI tools in education	Full-time	159	2.23	2	1.04
	Part-time	62	2.18	2	1.14

Interesting findings are the results of the distribution of students according to their future focus into lower primary school teachers, upper primary school teachers, secondary school teachers, social pedagogy teachers and special education teachers. Despite the different expectations in attitudes towards the use of AI tools in education by focus, the results proved to be very similar. The average attitude of students across the range of focuses was around 2.2, indicating a rather positive attitude towards the use of AI in teaching. A standard deviation of around 1.1 indicates some variability in responses, suggesting that despite similar means there may be differences in attitudes between groups. The most positive attitudes in this respect were from prospective upper primary school teachers, who had a mean value of 2.02 and a lower dispersion in responses (0.86). This result may indicate that these students have a more positive attitude towards the use of AI in teaching than students with a focus in other areas. On the other hand students with a focus on special education had the worst results in this respect, with the highest mean value (2.55) and median response (3), indicating a slightly more negative attitude towards the use of AI in teaching. This group may have special needs or concerns about the use of technology in special education. These results suggest that despite the expected differences in attitudes by focus, students generally have similar attitudes towards the use of AI tools in education.

Table 3: Attitude towards the use of AI in teaching by type of study (1 – positive, 5 – negative)

	Study	N	Mean	Median	SD
Attitudes towards the use of AI tools in education	Lower primary school	45	2.27	2	1.176
	Upper primary school	59	2.02	2	0.861
	Secondary school	78	2.24	2	1.119
	Social pedagogy	17	2.24	2	1.147
	Special education	22	2.55	3	1.057

Would you use AI tools in your future professional work as a teacher?

The average response to the question "Would you use AI tools in your future work?" was 1.98, indicating that students showed a rather positive attitude towards using AI tools in their future teaching work. A standard deviation of 1.15 indicates some variability in responses, suggesting that some students may be more sceptical than others. The median response of 2 indicates that the majority of respondents have a rather positive attitude

towards this issue. A comparison with responses to the question "What is your attitude towards the use of AI tools in education?" shows that students have generally similar attitudinal responses to the use of AI in teaching, but slightly prefer the possibility of using these technologies in their future work than in teaching in general. These results show that trainee teachers have a positive attitude towards the use of AI tools both in education in general and in their future teaching work. This indicates students' openness and readiness to use modern technology to support teaching and learning. If we compare both results with the first question "How many teachers have introduced you to AI applications and tools and their potential use in future teaching work?", the average answer to this question indicates that most students are not fully familiar with AI applications and tools and their potential use in future teaching work. A comparison with the previous two questions suggests that although students have a rather positive attitude towards the use of AI tools in teaching and in their future work, most of them were not sufficiently familiar with these technologies. This may impact their ability to use these tools effectively in future teaching work.

We also observed that for men, the average response to the question "Would you use AI tools in your future professional work as a teacher?" was lower than the overall average, specifically 1.67. This suggests that male respondents showed an even more positive attitude towards the use of AI in their future teaching work. The dispersion of responses for men was 0.99, indicating less variability in their attitudes. The median response for males was 1, indicating that the majority of male respondents clearly expressed their willingness to use AI in future work. On the other hand the average answer for women was higher, specifically 2.08. This suggests that female respondents were less inclined to use AI in their future teaching work than males. The dispersion of responses for women was 1.19, indicating greater variability in attitudes among women. The median response for women was 2, indicating that the majority of female respondents shared a moderately positive attitude towards the use of AI in future work. If we look at whether students study full-time or part-time, again both groups show almost identical results.

Table 4: Use of AI tools in future teaching work by type of study (1 – definitely yes, 5 – definitely no)

	Type of study	N	Mean	Median	SD
Use of AI tools in future work	Full-time	159	1.99	2	1.13
	Part-time	62	1.95	1	1.22

Quite visible differences can again be seen if we look at the respondents according to their future focus. Prospective upper primary school teachers had the most positive result with an average of 1.66 and a deviation of 0.99. Furthermore, a median of 1 indicates a positive perception of the use of AI in their future work. The lowest results in the notional rankings were from students focusing on special education. Their mean was 2.55 with a deviation of 1.30 and a median of 2.50.

Table 5: Use of AI tools in future teaching work according to the focus of study (1 – definitely yes, 5 – definitely no)

	Study	N	Mean	Median	SD
Use of AI tools in future work	Lower primary school	45	2.02	2	1.215
	Upper primary school	59	1.66	1	0.993
	Secondary school	78	2.05	2	1.115
	Social pedagogy	17	1.94	1	1.249
	Special education	22	2.55	2.5	1.299

What do you perceive as possible risks of using AI in your future career as a teacher?

Students were given several options to choose from. The results of the quantitative research conducted at the University of Ostrava indicate that out of 222 respondents, 125 perceived the substitution of human interaction as a possible risk of using AI in teaching work, while 60 respondents expressed concerns about technical difficulties. Furthermore, 110 respondents cited the unpreparedness of educators to integrate these technologies as a potential problem, and the majority of respondents, specifically 172, see the possibility of cheating as a risk. Only 3 respondents do not consider any of these risks to be significant.

Let's look at the interpretation of the results of your quantitative research:

- Replacement of human interaction (125 responses)
- *This result suggests that the majority of respondents perceive the possibility that AI may replace human interaction in the teaching process, which could lead to less personal contact between teacher and pupils.*
- Technical difficulties (60 responses)
- *About a quarter of the students surveyed see technical difficulties as a possible risk. This may include technology issues such as equipment failure, internet connectivity issues or the difficulty of using technological tools.*
- Unpreparedness of teachers (110 responses)
- *The majority of respondents perceived that educators may be unprepared for the integration of AI into the classroom. More preparation and training for teachers and curriculum adjustments in teacher-centred programmes are needed to enable them to use modern technology effectively in teaching.*
- Cheating (172 responses)
- *This result shows that many respondents consider the possibility of cheating to be a risk associated with the use of AI in educational settings.*
- No concerns (3 responses):
- *Only a small number of respondents see no potential risks associated with the use of AI in their future professional work.*

Students also had the opportunity to write their own opinion on possible concerns. This option was used by 19 respondents. In this part, three main areas were repeated. As an example, we always present a few answers from the students themselves

- Problems with critical thinking
- *"It is possible that students' critical thinking will decline and that they will rely more on AI."*
- *"Lack of critical thinking when AI does it for you."*
- *"A confluence of true and false information that we will not be able to critically distinguish."*
- Work with errors
- *"Use of unverified, erroneous information; loss of ability to search on the internet."*
- *"Incomplete or incorrect answers."*
- Cyberbullying
- *"Bullying using pupils' faces. Spreading false information about teachers that may jeopardise their credibility or job position."*
- *"Deep fakes, cyberbullying."*

This part of the study highlights the importance of taking the concerns and preparation of educators into account when implementing AI in the learning environment.

4. Discussion

In our research we investigated key aspects related to familiarity with AI applications and tools, attitudes towards their use in teaching and potential risks associated with their implementation among the target group of future teachers. The research findings reveal important factors and potential consequences associated with the integration of AI tools into the education process, especially in the preparation of future teachers. The results of the study provide a basis for discussion on the modernisation and innovation of study programmes and their adaptation to new technological trends. The discussion focuses on three main areas: students' awareness of and experience with AI, their attitudes towards the use of AI in teaching and the potential risks associated with the implementation of these technologies.

Awareness and experience with AI tools

The results show that the majority of trainee teachers already have experience with AI tools, with ChatGPT and OpenAI being the most frequently cited applications. This trend is evident across different study programmes and types of study, indicating a relatively high level of technological awareness among prospective teachers. However, there is still a minority of students who have no experience with AI, suggesting the need for a greater focus on integrating these technologies into the curriculum.

Attitudes towards the use of AI in education

The results show that student teachers have a generally positive attitude towards the use of AI tools in teaching. This positive approach to AI in teaching indicates the willingness of trainee teachers to embrace and use modern technology to support the learning process. At the same time our respondents show a higher willingness to use AI in their future teaching work, with average responses again indicating a more positive attitude. This positive attitude is key to the successful integration of AI into the classroom, as it reflects students' openness and willingness to experiment with new technologies.

Risks associated with the implementation of AI

Identified risks associated with the use of AI in education include the replacement of human interaction, technical difficulties, unpreparedness of educators and the potential for cheating. The most significant risk, according to respondents, is the possibility of cheating, cited by 172 respondents. These concerns need to be taken seriously and addressed through targeted and thorough teacher training. Furthermore, effective integration of AI tools into teaching, which may minimise risks, is necessary.

Based on these findings it is clear that integrating AI into the education process requires a comprehensive approach. This can be achieved, for example, through:

- *An increase of awareness and training:* Providing more training seminars and courses on the use of AI in education to increase the competences of educators. Providing practical workshops and training for teachers.
- *Innovation of study programmes:* Revising and modernising study programmes to integrate AI technologies and tools into the curriculum in order to equip students with practical skills and knowledge. Incorporating specific AI-focused courses into study programmes.
- *An individual approach:* Adapting education programmes and training to the specific needs of each group of students, taking into account differences in attitudes towards AI.
- *Support of critical thinking:* Focusing on the development of critical thinking and information handling skills so that students are able to use AI effectively while recognising potential risks and errors.
- *Ethical aspects and safety:* It is imperative to develop clear rules and ethical guidelines for the use of AI in the education of future teachers to ensure safe and ethical use of these technologies.

5. Conclusion

The results of our research provide insight into the current state of awareness, experiences and attitudes of trainee teachers towards AI tools. We analysed the responses of 222 respondents studying in various teacher training programmes and identified several trends that can contribute to the modernisation of the education process. Although there are differences between respondents depending on their field of study and gender, they generally have a positive attitude towards the integration of AI in the classroom. The results suggest that there is a need for more awareness and training of educators in AI, as trainee teachers are willing to use AI in their future professional work. Although the majority of students expressed a positive attitude towards the use of AI in their future teaching work, a significant number of respondents pointed out the risks associated with the implementation of these technologies. The main concerns included the possibility of replacing human interaction, technical problems, a lack of teacher training and the risk of cheating.

In conclusion, students are willing and ready to embrace modern technologies, including AI, as part of their teaching work. However, our research has also highlighted the need for more familiarity and hands-on experience with AI. The key to successful implementation is ensuring that all stakeholders are sufficiently informed and prepared for the challenges that these technologies bring. This will ensure that future teachers are prepared to use AI effectively in their work, which could significantly contribute to the modernisation and improvement of the educational process.

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