



## The Role of Artificial Intelligence in Teaching: Perspectives from Primary School Teachers

*Research article*

Veli Kryeziu<sup>1</sup>, Flamur Maloku<sup>2</sup>, Shqipe Avdiu-Kryeziu<sup>3</sup>, Gresa Mehmeti<sup>4</sup>

<sup>2,3,4</sup>Faculty of Education, Public University “Kadri Zeka”, Gjilan, Kosovo

<sup>1</sup>Faculty of Education, University of Prishtina, “Hasan Prishtina”, Kosovo

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### Abstract

*This qualitative study explores the attitudes of primary education teachers toward the role of artificial intelligence (AI) in the teaching and learning process. Through semi-structured interviews, 20 primary school teachers from Kosovo were interviewed. This research aims to capture teachers' perspectives on the role of AI in education, focusing on their experiences, perceived benefits and challenges, student motivation, ethical considerations, privacy issues, as well as expectations for the future. The primary challenges identified include the lack of adequate training and infrastructure, alongside ethical concerns and the protection of personal data. The findings highlight the need for an integrated approach that encompasses the development of clear policies, investment in technology, and pedagogical training for teachers to ensure responsible use of AI in primary education. This study contributes to a deeper understanding of how educators incorporate emerging technologies in the educational environment and guides the development of future educational practices.*

**Keywords:** *artificial intelligence, infrastructure, primary education, students, teachers*

In the last decade, digital transformation has brought profound changes to all areas of life, including education, which is facing extraordinary new challenges and opportunities. Artificial intelligence (AI) has emerged as one of the most promising technologies in the learning process,

influencing the way students learn and how teachers organize and convey knowledge (Luckin & Holmes, 2016; Vinay, 2023). According to Xu (2024), AI has the potential to personalize the learning experience, automate administrative tasks, and create more interactive environments, making the

learning process more engaging and tailored to the individual needs of students (Xu, 2024).

Contemporary literature emphasizes that integrating AI into education can increase student motivation, engagement, and academic achievement through advanced data analytics and the provision of personalized feedback (Pertiwi et al., 2024). Furthermore, the use of adaptive applications, chatbots and virtual assistants has begun to change the traditional way of teaching, making it more flexible and student-oriented (Thomas et al., 2024). However, the benefits of AI are not indisputable; numerous challenges arise in practice, including the lack of technological infrastructure, resistance to change, lack of specialized training for teachers, and ethical issues related to data privacy and security (Mendoza & Ureña, 2024).

In the context of developing countries, such as Kosovo, these challenges are even more pronounced. Primary education in Kosovo faces numerous infrastructural and financial constraints, while teachers often do not have sufficient access to advanced training in the use of new technologies (MASHTI, 2022). The lack of clear institutional strategies and sustainable investments in technology could lead to significant inequalities in the quality of education, risking that the benefits of AI will remain limited to a few schools or regions (Kaur et al., 2020; Bergdahl & Sjoberg, 2025).

In addition to technical and organizational challenges, ethical issues are increasingly important in the contemporary discourse of digital education. The use of students' personal data, the transparency of algorithms, and the preservation of privacy are topics that require special attention from policymakers and the educational community (European Union, 2022). This is particularly important in primary education, where we are dealing with minors, where these ethical aspects are not addressed, highlighting the need for clear guidelines and laws that protect privacy and data security (Mendoza & Ureña, 2024).

In this context, it is essential to understand the attitudes, experiences and challenges that primary education teachers experience in relation to the use of artificial intelligence. Previous studies have shown that the success of integrating AI in education

depends not only on the availability of technology, but also on the pedagogical preparation of teachers, institutional support and the development of clear ethical policies (Bergdahl & Sjoberg, 2025; European Union, 2022). Furthermore, the involvement of students in this process is equally important, with AI helping them achieve their competencies gradually (Southgate et al., 2018).

### Literature Review

Nowadays, technological developments have brought about a significant transformation in the way education is organized and implemented, making artificial intelligence an essential component in modern educational structures (Chassignol et al., 2018; Bergdahl & Sjoberg, 2025)

The definition of AI includes computer systems capable of performing complex tasks that require skills similar to those of human thought, thus making it a revolutionary tool for personalizing learning (Eltahir & Babiker, 2024). In this context, the use of AI-based methods has had a significant impact on increasing student motivation, autonomy and engagement, transforming the traditional teaching process into an interactive and individually tailored approach (Xu, 2024). Recent technological developments have allowed the creation of platforms that not only transmit information, but also continuously analyze student behavior and needs to provide immediate and personalized instruction (Southgate et al., 2018).

The use of artificial intelligence in modern education has gone through several phases, reflecting technological developments and changes in the way these tools are implemented. Historically, the use of AI began with simple computer models that aimed to reproduce human mental processes, but over time it has evolved to include more advanced methodologies such as neural networks and machine learning (Chen et al., 2020).

The development of artificial intelligence in education has followed a progressive path since 2010. Initially, it focused on adaptive systems and automated assessments for higher education. From 2016 to 2018, it expanded to language learning and virtual environments, with support from technology corporations. In 2019–2020,

the emphasis was on the personalization of teaching and the use of virtual assistants. Since 2021, the focus is on AI ethics, inclusion, and safety through technologies such as speech recognition and natural language processing (Vinay, 2023). This technological transformation has positively impacted the way teaching methods are organized, transforming them into an integrated experience where each student receives specific instructions according to their own learning pace and style (Baker et al., 2019).

Globally, artificial intelligence has transformed teaching and learning, increasing student motivation and deepening understanding through technologically advanced instruction. Its integration into modern education has brought about more interactive and efficient environments, where adaptive methods help students acquire knowledge in a more active and personalized way (Pertiwi et al., 2024).

Interdisciplinary collaborations, involving technology experts, teachers, and policymakers, are essential to harness the transformative power of AI fully, creating learning environments that respect ethical standards and promote justice (European Union, 2022). The integration of artificial intelligence in education not only improves teaching but also administrative efficiency and knowledge organization, making education more global and responsive to digital challenges. Studies show that AI-based learning platforms increase student motivation, analyzing their behavior and providing immediate feedback that strengthens self-confidence and autonomy (Pertiwi et al., 2024; Southgate et al., 2018). These applications enable students to create immersive environments that make the learning process more engaging, identify those who may have difficulties in the social-emotional aspect, and provide targeted interventions for their well-being, so that they are active participants in the learning process and solve problems, resulting in significant improvements in academic achievement (Vinay, 2023). Also, the interaction of technology with traditional teaching practices creates an environment where learning becomes more interactive and focused on the individual needs of students, thus increasing the effectiveness of the learning process (Southgate et al., 2018).

This integration process transforms education into an inclusive experience that helps increase student engagement and motivation in a sustainable way. Collaborations between technology experts, teachers, administrators, and policymakers are essential for developing innovative approaches to using AI in contemporary education (Bergdahl & Sjoberg, 2025). However, the use of AI requires ethical caution, as surveillance and collection of personal data can violate the privacy, autonomy, and active participation of students and teachers. (Xue & Wang, 2022). These reforms and interdisciplinary collaborations are essential to fully harness the transformative potential of artificial intelligence in modern education (Pertiwi et al., 2024).

Recent developments in AI have changed the way education is organized and delivered, using advanced analytics and adaptive systems that adapt to the needs of students in real time. Intelligent systems, digital assistants, and online environments have made learning more interactive, personalized, and focused on academic outcomes. This includes the use of virtual platforms, self-assessments, and interactive tools for personalized learning. (Kaur et al., 2020).

Despite the benefits of AI in education, its use in primary education remains limited due to a lack of knowledge about the impact on student motivation and performance. However, AI is being used in language learning, where digital assistants help with pronunciation, grammar, and vocabulary. Virtual and augmented reality create more interactive environments, while chatbots provide instant support and help organize groups, increasing collaboration and interaction (Baker et al., 2019).

According to Luckin and Holmes (2016), integrating AI into education helps students develop critical, creative, and digital skills, essential for the 21st century. For successful implementation, teacher training should be tailored based on their experience, with basic courses for beginners and advanced programs for experienced teachers, to improve teaching and pedagogical effectiveness (Bergdahl & Sjoberg, 2025). The integration of AI technologies into school education is making learning more personal, dynamic, and interactive, improving the student experience,

easing administrative tasks, and promoting the comprehensive development of 21st century skills (Baker M. J., 2000; Vinay, 2023; Luckin & Holmes, 2016; Bergdahl & Sjoberg, 2025; European Union, 2022). AI-based learning platforms in primary education are designed to create a learning environment where each child receives personalized instruction, based on analyses of their individual data (Pertiwi et al., 2024).

Virtual reality (VR) and augmented reality (AR) are transforming primary education by providing engaging and interactive learning experiences that help students better understand complex concepts through simulations and 3D visual content. These technologies allow for the personalization of teaching according to student needs and increase engagement in the educational process (Southgate et al., 2018). These technologies create simulation environments where children explore safely and interactively, improving knowledge acquisition and fostering creativity and collaboration (Vinay, 2023).

Artificial intelligence technologies support all students to achieve their academic excellence (MASHT, 2020). The four main parts of the educational process that artificial intelligence affects are: content, teaching methods, assessment, and communication. Content includes the knowledge that teachers transmit to students, including personalizing it according to their needs (Instituti Pedagogjik i Kosovës, 2016).

Analytical reports generated by these systems provide valuable information to administrators, enabling them to make informed decisions to improve educational policies and strategies. (Bergdahl & Sjoberg, 2025). These advantages contribute to the creation of an educational environment where the efficiency and quality of teaching are significantly improved, making the education process more adaptable and inclusive (Chen et al., 2020).

However, every innovation also brings significant challenges and risks. Despite the numerous benefits, the integration of AI also faces significant challenges, such as the lack of advanced technological infrastructure, issues of privacy and data security, and the need for specialized training for teachers (Mendoza & Ureña, 2024; Bergdahl & Sjoberg, 2025). These challenges create gaps between institutions

with different resources, jeopardizing equity in the benefits of AI in education. In addition, ethical concerns about the use of personal data and the transparency of algorithms require clear standards and regulations for the responsible use of technologies (European Union, 2022). These organizational and technological challenges require a joint approach between all stakeholders to achieve a successful and sustainable integration of artificial intelligence in modern education (Pedro et al., 2019). Furthermore, it is argued that the risks of deep information manipulation through AI technology, as well as gender, ethnic, class, and linguistic biases, could harm students' academic development and social skills. Only with a strong focus on mitigating these ethical challenges can schools successfully incorporate AI innovation into teaching (Karan & Angadi, 2024).

Another critical aspect is that integrating AI into modern education helps reduce administrative burdens and improve information literacy, supporting the professional development of teachers, but even here, the use of AI raises concerns about how it may impact the traditional way of teaching and the critical role of the teacher (Xue & Wang, 2022). AI technologies, by offering new opportunities for managing tasks such as assessment, note-taking, and creating digital student profiles, have transformed into time-saving tools for teachers, but also create challenges regarding the integration of technology into the curriculum and the adaptation of traditional learning environments (Chassignol et al., 2018; Luckin & Holmes, 2016).

To realize the full potential of artificial intelligence in modern education, it is essential that institutions invest in technological infrastructure, including modern equipment and high-speed networks, to ensure equitable access to the benefits of AI (Pedro et al., 2019). Also, continuous and specialized training for teachers is necessary to improve their digital skills and enable them to use these tools effectively (Kaur et al., 2020). These technological investments and training programs contribute to creating an educational environment that is ready to face the challenges of the digital age and use artificial intelligence to improve academic outcomes. In this way, a strong infrastructural base and continuous training are fundamental

to the transformation of modern education (Bergdahl & Sjoberg, 2025).

For a responsible and equitable use of AI in education, policies and ethical standards must be created that protect privacy, security and transparency in the use of data. These should clearly define how personal data is collected, processed and stored, building trust and avoiding abuse. (Bergdahl & Sjoberg, 2025; Pedro et al., 2019).

Future strategies for integrating AI should include investments in infrastructure, equipping teachers with new digital skills, and interdisciplinary collaborations, so that modern education is transformed into an innovative, personalized, and effective environment that prepares students for the challenges of the 21st century (Kaur et al., 2020; Xu, 2024). In this way, the ethical and responsible use of artificial intelligence brings numerous benefits to contemporary education, revolutionizing learning processes and creating an inclusive educational environment that strengthens students' critical thinking skills, social interaction, and creativity (Bergdahl & Sjoberg, 2025).

### **Purpose of the Study**

The study aims to obtain the views of primary education teachers on the role of artificial intelligence (AI) in the learning process, focusing on teachers' experiences, benefits and challenges, student motivation, ethical issues and privacy, as well as expectations for the future.

### **Methodology**

This study was developed using a qualitative approach, which focuses on in-depth analysis and interpretation of individuals' experiences, thoughts, and perceptions (Johnson et al., 2007; Creswell, 2009). The qualitative approach was chosen to provide an in-depth understanding of the phenomenon studied, emphasizing the context and subjective experience of teachers and students in the use of artificial

intelligence in primary education (Creswell & Plano Clark, 2018). This approach enables a detailed analysis of the narratives, perspectives and dynamics that occur in the classroom, providing insight into how technology impacts teaching and learning (Tashakkori & Teddlie, 2010).

### **Research Questions**

- What are teachers' attitudes about the impact of artificial intelligence on the learning process in primary schools?
- How do teachers see the benefits of artificial intelligence in the learning process?
- What are the challenges of developing the learning process?

### **Sample**

This research used a random sample to ensure fair representation of the population of primary school teachers and students in Kosovo. The random sample was chosen to minimize bias and increase the external validity of the results, giving each individual an equal chance to be part of the study (Creswell, 2012).

### **Participants**

The research was conducted with 29 primary school teachers and 100 primary school students from different schools in Kosovo. The selection of teachers and students was done randomly from the list of staff and classes of participating schools in the municipalities of Štrpce and Ferizaj, to ensure diversity in experience, gender and school environment (Cohen et al., 2018). Selecting participants from levels 1-5 ensures that different perspectives are captured, allowing the research to uncover the nuances and daily challenges of teachers in a broader context, such as those related to technological tools, data handling, and interaction with students. Table 1 presents the data of the research participants: gender, work experience, and the code used to maintain confidentiality.

**Table 1.***Structure of Interview Participants*

| No.   | Gender | Work experience | Code |
|-------|--------|-----------------|------|
| 1     | F      | 2               | M1   |
| 2     | F      | 8               | M2   |
| 3     | F      | 15              | M3   |
| 4     | F      | 24              | M4   |
| 5     | F      | 6               | M5   |
| 6     | F      | 13              | M6   |
| 7     | M      | 19              | M7   |
| 8     | F      | 22              | M8   |
| 9     | M      | 30              | M9   |
| 10    | M      | 17              | M10  |
| 11    | F      | 9               | M11  |
| 12    | F      | 16              | M12  |
| 13    | F      | 28              | M13  |
| 14    | M      | 33              | M14  |
| 15    | F      | 11              | M15  |
| 16    | F      | 7               | M16  |
| 17    | F      | 1               | M17  |
| 18    | F      | 20              | M18  |
| 19    | F      | 5               | M19  |
| 20    | F      | 22              | M20  |
| Total | 20     |                 |      |

### Data Collection Instruments

To collect research data, we used semi-structured interviews, which allow for in-depth exploration of teachers' attitudes, experiences, and challenges in relation to the use of artificial intelligence (Smith & Sparkes, 2016). This instrument is designed to combine the structure of preliminary questions with the flexibility of follow-up questions, allowing the interviewer to follow the flow of the conversation and discover new, important aspects that arise in the discussion (Creswell & Poth, 2018). The main questions are formulated to cover topics such as benefits, challenges, and ways of interacting with AI tools, while follow-up questions are used to deepen the answers and capture the nuances of personal experiences. To ensure the validity and reliability of the data, interviews are recorded with the consent of the participants and will be fully transcribed after each interview, so that a detailed analysis can be conducted.

Interview questions for teachers:

1. What are your thoughts on the use of artificial intelligence (AI) in primary education, even if you do not currently use it in your practice?
2. When you hear the terms "artificial intelligence" or "chatbot" (e.g., ChatGPT), what initial thoughts come to mind regarding their applications in education?

3. Do you have experience with using AI-based tools (such as ChatGPT, apps, platforms) in the classroom? If so, what are some concrete examples; if not, what do you think has hindered their use?

4. In your opinion, what potential benefits can be offered to teachers by using AI tools – e.g., in lesson planning, materials creation, or student assessment?

5. If these tools are to be used, how do you think they might affect student motivation and engagement?

6. What challenges do you think an educational institution would face if it tried to integrate AI tools into the teaching process, regardless of the current use?

7. In your opinion, what are the main obstacles to the effective use of AI in primary education – such as lack of training, infrastructure, or institutional support?

8. Do you have concerns regarding ethical issues and the protection of student privacy in the context of the use of AI tools? How do you think these issues can be addressed?

9. How do you think the use of AI tools can affect your role as a teacher – as a supporting tool for improving teaching or as a challenge that can change traditional teaching methods?

10. What recommendations do you have for using the potential of AI in primary education and how do you see the future of these technologies in 5-10 years?

### Procedure

Participants participated voluntarily, and before the interview, we informed them about the procedure for conducting the semi-structured interview. The semi-structured interview consisted of 10 questions; the data of the interviewees were coded as: I1, I2, I3, (teachers 1-20). The data from the participants were coded in order to maintain confidentiality, for ethical principles. The research was conducted with interviews in the period January-June 2025, in the premises of the participating schools, without disrupting the teaching process. The interviews were conducted individually, while the questionnaires were administered in small groups under supervision. All data were collected and analyzed in accordance with ethical and scientific standards.

### Validity and Reliability

To ensure the validity and reliability of the research, several key steps were followed. Initially, the instruments were piloted and revised in accordance with the feedback received, allowing for improvement during the interview at any time. Also, the data were reviewed through the use of combinations of interviews, which contributed to increasing the reliability of the results. Furthermore, the participants were informed in advance about the purpose of the study and gave their consent, guaranteeing ethics and transparency in the process (Leung, 2015).

### Ethics

Ethical approval was obtained from the directorates of the participating schools. Participants were informed about the voluntary nature of participation, the right to withdraw participation at any time, and to maintain the confidentiality of their data. The data were encrypted and stored securely to protect the identity of the participants. During the interviews, the ethical aspect and the protection of the rights of the participants were strictly respected. Participants were informed in advance about the purpose of the research and were informed that participation was voluntary, the process was carried out with the support of the school directors. The interviews were designed without including personal information, guaranteeing anonymity and confidentiality of the data. The data were used only for scientific

purposes and were treated responsibly throughout the research (Ramrathan et al., 2017).

### Findings

Analysis of interviews with teachers This section presents the main findings from interviews conducted with 20 primary school teachers. The analysis was conducted by referring to thematic analysis models and identifying the most important themes that were repeated in the participants' statements. According to the methodology explained earlier, the interviews were transcribed and coded, in order to highlight teachers' attitudes regarding the role of artificial intelligence, teachers' experiences, benefits and challenges, student motivation, ethical issues and privacy, and expectations for the future.

### Teachers' Attitudes Towards AI in Primary Education

Most teachers see artificial intelligence as a potential opportunity to improve the quality of the teaching process and make their work easier. Most emphasize that AI can help increase interactivity and adapt content to the level of each student. *"AI is part of the future in education and a balanced approach will be needed to integrate it"* (M1) *"I think AI can be a great opportunity to improve the learning process, especially in creating more interactive opportunities for students"* (M2) *"AI technology can make a difference in some cases, but it must be used carefully and in balance with traditional methods"* (M4) *"For me, AI is very useful for creating personalized learning materials that adapt to the needs of each student. I do not see AI as a threat, but as an opportunity to develop new skills, as well as to help teachers be more efficient"* (M3, M5) *"Yes, I think AI can increase student engagement, but in no case should it replace traditional learning"* (M6) *"Students may become more passive and overly dependent on technology, which is concerning to me"* (M7) *"I think we need to have a healthy balance between technology and classical teaching methods, we need to be careful that AI does not replace fundamental processes like manual writing and reading"* (M8, M9)

*“In some cases, AI can help students who are struggling, but for other students it can be very disorienting” (M10)*

*“I think it could be a risk for basic skills, like writing and reasoning, that could fall into the hands of technology” (M11)*

*“In addition to the benefits, I believe there is a need for ongoing oversight to ensure the appropriate use of AI” (M12)*

*“We should not see AI as something that will replace teachers, but as an auxiliary tool to improve student outcomes” (M13)*

*“AI can be very valuable in developing new skills in students, but it should always be under the control of teachers.” (M14)*

*“I think AI should be an addition to education and not a substitute for teachers.” (M15)*

*“Given that technology is developing rapidly, teachers should be ready to use AI to keep up with the times.” (M16, M17)*

*“I am not very sure that AI will have a big impact on education, but it is probably an opportunity that should not be neglected.” (M18)*

*“AI in some cases, can be a great opportunity, but not in every situation. The use should be appropriate.” (M19)*

*“I think that integrating AI into education will require major changes in teaching approaches and strategies, to be used effectively.” (M20)*

### **Current Experiences and Obstacles in Using AI**

Most teachers stated that they do not use AI directly in their daily practice. The main reasons, according to them, are related to:

*“We don’t have any specific training on how to use ChatGPT or other applications...” (M3, M5)*

*“There are not many opportunities for training on using AI for teaching.” (M7)*

*“A full training on these technologies would be very useful.” (M9)*

*“Many schools don’t even have enough internet, let alone computers for all the students.” (M10)*

*“Using AI requires an infrastructure that most of the time we don’t have.” (M12)*

*“In many schools there is not enough equipment, and this is a big obstacle to using technologies.” (M13, M14)*

*“New technologies are a challenge for older teachers. Some are afraid of changes.” (M15, M17)*

*“For teachers with longer experience, it is more difficult to adapt to these new technologies, we have difficulties in using these tools due to age and lack of technological knowledge.” (M18, M19)*

*“I have used platforms like CODE.org to teach my students the basics of coding.*

*“Using virtual reality in teaching has been successful in some experimental activities.” (M20)*

### **The Potential Benefits of AI in Teaching**

Although some of the interviewees declare a lack of experience with AI, there is a broad awareness of its benefits if used properly, both for planning and creating materials, with teachers mentioning that AI can help them in:

*“AI can help us generate new and interesting ideas for teaching projects.” (M1)*

*“Through AI, we can generate ideas that help us keep students engaged during class.” (M3)*

*“Preparing lesson plans can be made faster and more efficient with the help of AI, by getting ideas and expanding knowledge.” (M4)*

*“AI can provide suggestions for lessons and content that is appropriate for each level.” (M5)*

*“In addition to preparing materials, we can use AI to adapt lesson plans to the different needs of students.” (M6)*

*“Using AI for assessments can reduce the time needed to correct tests.” (M7) “IA e kam përdorur për krijimin e pyetjeve për testime, që janë të larmishme dhe të përshtatshme për çdo lëndë, me IA, krijimi i pyetjeve testuese është më i shpejtë” (M8, M9)*

*“With AI, we can perform automatic assessments and provide immediate feedback, saving time.” (M10)*

*“AI can automate the assessment process, which will help us focus more on pedagogical activities.” (M11, M12)*

*“We can create personalized exercises that match the needs of each student, AI can provide opportunities for additional exercises for those who have difficulties, increasing inclusion.” (M14, M15)*

*“AI can reduce administrative tasks and allow us to focus more on teaching.” (M16, M17)*

*“With the help of AI, we can better manage records and prepare reports without wasting much time, because of AI, administrative tasks are much easier and faster.” (M18, M20)*

## Impact on Student Motivation and Engagement

Optimistic teachers believe that AI and similar tools can increase student motivation and engagement because:

*“AI can increase student motivation and engagement, providing opportunities for more interactive learning that students enjoy.” (M1)*

*“Students tend to be more engaged when learning is interactive and offers them the opportunity to use technology, as this is something they understand and use frequently.” (M2)*

*“Through the use of AI, we can create a learning environment that is more engaging and that students can see as an opportunity to develop, but not overuse.” (M3)*

*“The quick responses and personalized feedback that AI provides help students feel more supported and engaged in the learning process.” (M4)*

*“When students are given the opportunity to get information and answers quickly, they feel more confident in their abilities and are more willing to participate in different activities.” (M5)*

*“A major concern is that students may become passive and rely on AI to get information, without trying to think or analyze for themselves.” (M6, M7)*

*“Sometimes, students may use AI to ‘copy-paste’, missing the opportunity to develop their critical thinking and analysis skills.” (M8, M9)*

*“If students use technology as a tool to enable learning without actively engaging, their basic skills such as reading and writing may be damaged.” (M11)*

*“Overuse of AI can lead to a dependency on technology, where students always expect ready-made answers and do not develop their own thinking skills.” (M12)*

*“... students can lose the ability to work with information critically and lack responsibility in the learning process.” (M13, M14)*

*“Use AI in a way that supports active learning and requires continuous engagement from students.” (M15)*

*“To prevent students from becoming solely dependent on AI, it is necessary to create a balance, where technology serves as an aid and not as a substitute for the learning process.” (M16, M17)*

*“We need to ensure that students develop critical thinking skills and make deep*

*connections with the learning content, regardless of the use of technology.” (M18)*  
*“AI can increase students’ enthusiasm, it is necessary for teachers to be careful to guide them so that they do not lose the ability to think and act independently.” (M20)*

## Main Challenges and Obstacles

From the analysis of the transcripts, several main pillars of challenges are identified:

*“One of the main obstacles is the lack of infrastructure, such as poor internet and the lack of computers or tablets for students and teachers.” (M1)*

*“...teachers point out that they do not even have personal computers in the classroom, which makes it difficult to use technology in teaching.” (M2)*

*“Without sufficient infrastructure, it is difficult to use technology effectively, and this may limit the possibilities for using AI in teaching.” (M3)*

*“Another problem is that many schools are unable to update their technology, leaving students and teachers without the tools they need for more advanced learning.” (M4, M5)*

*“The challenge is the lack of adequate training for teachers. They require professional training and practical guidance to use AI in teaching.” (M5)*

*“To use AI effectively, teachers need specialized training that can help them understand the best ways to apply the technology in the classroom.” (M6)*

*“...many teachers feel unsure about using AI and may hesitate to incorporate it into the teaching process.” (M7)*

*“Teachers are looking for opportunities to participate in ‘pilot projects’, where they can experiment with the technology and see the results in practice.” (M8, M9)*

*“The obstacle is limited institutional support. Many schools do not have a formal strategy for the use of AI, and this leaves teachers to act independently.” (M10)*

*“Without strong government support, any initiative to use technology remains in the hands of teachers, who may face difficulties in implementing large projects.” (M12)*

*“In addition, many schools do not have specific funds to invest in technology, which is another obstacle to the use of AI in teaching.” (M13, M14)*

*“If there is no institutional support and a dedicated budget for this, it is difficult for*

*teachers to be able to apply technology in a sustainable way.” (M15)*

*“Another challenge that has been identified is the resistance from some teachers, who believe that traditional teaching methods are better and safer.” (M17, M18)*

*“There is a great fear of change, and some teachers are of the opinion that students should work more on their own, pushing them to be more involved in the learning process.” (M19)*

*“For some teachers, AI is not something that can be seen as a replacement for traditional methods, and they feel unsure about integrating modern technologies.” (M20)*

### **Ethical Issues and Privacy Protection**

A large number of teachers cite concerns about privacy:

*“A large number of teachers mention concerns about privacy and data collection. They ask: Who collects the data? How will it be stored? Can it be misused?” (M1, M2)*

*“The exposure of children online and the possibility of misuse of materials such as photos, voice or other data are important concerns for teachers.” (M3)*

*“...there should be clear rules’ for protecting privacy, there are still no detailed protocols around the use of AI in primary schools.” (M4)*

*“I agree that it is necessary for relevant institutions to draft a legal and ethical regulatory framework for the use of AI in education.” (M4)*

*“In addition, we must ensure that any use of AI respects the rights of students and is in line with ethical norms.” (M5)*

*“One of the positions expressed is that AI can ease administrative tasks and enable personalized learning, but the teacher remains the ‘heart of the classroom’.” (M7, M8)*

*“Over time, the use of AI may change the way lessons are organized and create opportunities for more student involvement, but teachers should still remain leaders of the learning process.” (M9, M13)*

*“AI may have an impact on children’s*

*emotional and social development. They suggest that the use of AI should be balanced with activities that involve social interactions and the development of emotional skills.”*

*(M15, M17)*

*“We need to ensure that any information that AI collects is protected and not used for commercial purposes.” (M19)*

### **Future Prospects and Recommendations**

A good portion of teachers say that “AI is inevitable” and will most likely be used within 5-10 years, especially for:

*“AI will be inevitable, especially for planning and assessing students.” (M1)*

*“The use of virtual reality and AI can be very effective in subjects such as natural sciences and geography.” (M2, M3)*

*“Skepticism comes from the lack of policies that support the implementation of AI.” (M4)*

*“It can only remain a theory if educational policies are not updated.” (M5)”*

*Teachers need to have practical and specialized training in AI.” (M6, M7)*

*“...teachers should be able to apply AI directly in teaching.” (M8)*

*“Infrastructure needs to be improved, especially in schools located in poorer areas.” (M9)*

*“A legal and regulatory framework is needed that protects student data.” (M10, M11)*

*“Balance is important, AI can support, but not replace, the teacher.” (M12)*

*“To integrate AI, a long-term plan is needed that includes training and investment.” (M13)*

*“Improving teaching through AI requires ongoing support for teachers.” (M14)*

*“Students need to develop technological skills, but human interaction must also be maintained.” (M16, M17)*

*“There is a need for support for schools to create an environment suitable for AI.” (M19)*

*“As a teacher, I can contribute by sharing best practices and helping colleagues to prepare.” (M20)*

**Table 2.***Summary of Findings from Interviews on the Use of Artificial Intelligence in Primary Education*

| <b>Category</b>                             | <b>Themes</b>                                       | <b>Description</b>   |
|---|---|--|
| Teachers' attitudes, experiences            | Teachers' attitudes towards AI in primary education | -part of the future in education<br>-balanced approach<br>-great opportunity<br>-balance with traditional methods<br>-AI<br>-should not replace learning<br>-become more passive<br>-balance<br>-do not replace basic processes like writing and reading<br>-Help Students<br>-supervision<br>-replace teachers<br>-assistive tool<br>-Technology is developing rapidly<br>-ready to use AI<br>-concrete training on how to use it<br>-ChatGPT |
|   |   |  |
| Benefits and challenges, student motivation | Current experiences and barriers to using AI        | -other applications<br>-training<br>-school<br>-use of AI<br>-infrastructure<br>-big obstacle<br>-challenge<br>-longer experience  |
|   | Potential benefits of AI in teaching                | -virtual reality in learning<br>-new ideas<br>-expand knowledge<br>-reduces time<br>-implement automatic assessments<br>-immediate feedback<br>-automate the assessment process<br>-personalized exercises<br>-needs of each student<br>-increases motivation  |
| Ethical Issues and Privacy                  | Impact on student motivation and engagement         | -student engagement<br>-opportunity for interactivity<br>-attractive<br>-Students can become passive   |
|   | Key challenges and barriers                         | -AI to do 'copy-paste.'<br>-their basic skills like reading and writing, can be damaged  |
|   | Ethical issues and privacy protection               | -dependence on technology<br>-create a balance<br>-technology serves as an aid<br>-critical thinking<br>-AI can increase enthusiasm  |
| Expectations for the Future.                | Future perspectives and recommendations             | -internet<br>-lack of training<br>-concerns about privacy<br>-have clear rules for protecting privacy<br>-detailed protocols about the use of AI in schools<br>-respect students' rights<br>-be in line with ethical norms<br>-children's emotional and social development<br>-appropriate environment   |

## Discussions

Based on the contemporary literature and the findings of this study, AI in primary education is seen as a promising opportunity for transforming the learning process, but it is accompanied by challenges and requires caution in implementation. Below are some key points that connect the interview results with theoretical discussions from the literature.

Some teachers see AI as a natural step towards modernizing teaching, in line with Vinay's (2023) perspective, which emphasizes its role in personalizing content. Interviews showed that, although current use is limited, there is a clear understanding of the benefits that AI offers in planning, assessment, and creating personalized materials (Vinay, 2023). This is consistent with the assessment of Kaur, Tandon & Matharou (2020), who consider AI as a driver of flexibility and adaptability in schools (Kaur et al., 2020). However, teachers highlight the difficulties in "computerizing" classrooms due to the lack of equipment and infrastructure. The literature also shows that economic and administrative factors hinder the widespread diffusion of AI, underlining the need for systemic investments to increase the quality of teaching in the digital age (Thomas et al., 2024; European Union, 2022).

Some teachers point out that AI technologies can save time on routine tasks such as planning, correction and progress analysis, allowing them to focus on creative aspects and interaction with students. This is consistent with the views of Baker, Smith & Anissa (2019), who point out that the role of the teacher can evolve towards a strategic mentor when AI is used as a support (Baker M. J., 2000). Such a transformation can bring greater vitality and connection between teacher and student, increasing the motivation of the latter, (Southgate et al., 2018). Some teachers express concern about students' reliance on AI, reducing engagement and critical thinking. This highlights the need to balance technology with traditional methods to maintain basic skills such as writing, reading, and reasoning.

Most interviewees emphasize that the lack of infrastructure, equipment, internet and training remains the main obstacle. This is consistent with the position of Bergdahl

& Sjoberg (2025), who emphasize that formal training and institutional support are essential, as even the most advanced AI tools are ineffective without the right preparation and conditions (Bergdahl & Sjoberg, 2025). This dynamic is also reinforced by the study by Kaur et al. (2020), which shows that in developing countries, the adoption of AI often remains in the "experimental" phase, due to the lack of a clear national or local strategy (Kaur et al., 2020). Many teachers demonstrate individual autonomy, but with little institutional support. A key issue that emerged from the interviews is ethics and privacy. Contemporary literature, such as Commission (2022), proposes an ethical framework for the use of AI in education, emphasizing data protection and algorithmic transparency. (European Union, 2022). The data shows that teachers are aware of the risk of data misuse and the impact on student privacy. Some are concerned about children's online exposure, while others emphasize the need for oversight by institutions to ensure legal and technical standards (Mendoza & Ureña, 2024).

The research shows that AI requires a rethinking of pedagogical approaches, as many teachers see it as an opportunity to make learning more interactive and personal. This is consistent with Luckin & Holmes (2016), who emphasize that AI should act as a consistent partner in learning, facilitating the teacher's routine tasks. Without this balancing approach, there is a risk that either traditional methods will be weakened, or the technology will be prejudiced as harmful (Luckin & Holmes, 2016).

According to interviews, most teachers expect AI to play a greater role in the curriculum, classroom environment, and teacher role in the next 5–10 years. Thomas et al. (2024) also emphasize that the gradual and planned use of AI can bring benefits, such as increasing interest in STEM and identifying special needs in students (Thomas et al., 2024). On the other hand, the lack of a clear strategy as seen in some schools increases the risk of shallow experimentation (isolated pilot projects) that do not bring about radical change (European Union, 2022).

To effectively leverage AI in education, the interviews highlight several key guidelines that are consistent with the literature: the need for digital training for teachers,

adequate technological infrastructure (computers, internet, devices), and ethical regulations for data protection. Also, balancing traditional methods with the use of AI helps create more active and engaged classrooms. (Luckin & Holmes, 2016). This study shows that primary school teachers are interested in using AI as a support tool, especially in planning, assessment and personalization of teaching. However, implementation requires infrastructure, pedagogical training, legal framework and ethical protection. As Xue & Wang (2022) emphasize, AI should be an assistant to the teacher, with a focus on holistic student development and continuous monitoring to avoid risks. The discourse on AI in primary school will continue to develop, requiring new studies and reforms (Xue & Wang, 2022).

### Conclusions

From the combination of contemporary literature and the analysis of findings from this research, it can be concluded that artificial intelligence (AI) in primary education presents an important opportunity to make the learning process more effective, personalized and inclusive (Vinay, 2023; Xu, 2024). If implemented carefully, AI can help teachers facilitate routine tasks, create materials, and assess students, better focusing on individual needs and increasing their motivation (Vinay, 2023; Luckin & Holmes, 2016; Pertiwi et al., 2024). However, participants' enthusiasm for the benefits of AI faces a number of challenges, such as a lack of infrastructure and equipment (Kaur et al., 2020; European Union, 2022), limited training for teachers (Bergdahl & Sjoberg, 2025), resistance to change, and ethical concerns over data protection. The study shows that the lack of computers or stable internet hinders the sustainable use of AI, risking inequality in education. However, the role of the teacher remains key; AI can help with personalization and automation, but the teacher must be the leader who balances traditional methods with technology (Mendoza & Ureña, 2024; Luckin & Holmes, 2016). In this way, students benefit from digital technologies without losing the key aspects of collaboration and critical thinking. The success of AI in primary education

requires institutional support, investment in infrastructure, clear ethical policies and continuous training for teachers. With these conditions, primary education can be transformed into a dynamic and digital environment, which empowers motivation, creativity and active learning for the academic and social development of students. (Karan & Angadi, 2024; Pertiwi et al., 2024). Based on the findings of this study and the contemporary literature, focusing on the need for investment in infrastructure and clear policies for the use of AI, it can be said that the integration of artificial intelligence in primary education represents a vast research space that still awaits full exploration. Challenges such as inadequate infrastructure, lack of adequate training and ethical dilemmas should not be seen as insurmountable barriers, but as invitations for young researchers to contribute to building a more equitable and innovative education system. Future research can help create models of sustainable implementation of AI, which empower teachers and provide equal opportunities for all students. This dynamic and rapidly evolving field requires new, critical research, ready to examine open questions and find solutions that advance education towards a more inclusive future. Therefore, young (other) researchers have a unique opportunity today to truly impact the transformation of primary education, building bridges between technology and development in the field of education.

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