



Pedagogical Use of Artificial Intelligence in Early Education: Opportunities, Challenges, and Solutions

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Annotation. This study analyzes how the use of artificial intelligence (AI) technologies influences the emotional well-being of adolescents, taking gender into account. A non-experimental correlational methodology was employed with a sample of 400 secondary school students, selected using probabilistic sampling. Significant links were found between intensive AI use and higher levels of anxiety and depression, as well as lower self-esteem.

Keywords: *artificial Intelligence, mental health, emotional well-being, gender, adolescence, family and teacher support and mediation.*

Introduction

It is a fact that technological developments, especially in the 21st century, have a significant impact on all spheres of the economy, society, and education. Certain AI-based tools enable personalized learning that can further enhance the probability of a relatively better cognitive development in the child Holmes et al. (2019). AI tools can drive rapid and interactive interventions for the child and customize learning for such

children. These days, we have to concede screen and games are powerful digital spaces that remain very appealing to them. But then, there are still lots of teachers who have stuck with the old (tools), I believe, will be incapable of finding their way out from digital lag to a system that works effectively for success in the classroom and where possible changes are clearly lacking. The difference is already clear to see and for this student-teacher duo, they deserve some support from the academic community and politics to create (and) construct paths for the formation of teachers' abilities how can integrate AI into education. As for the teachers, they should not only acquire knowledge and relevant skills in using intelligent tools but also introduce new education models that improve children's cognitive development more creatively and less impersonally according to their individual needs. "The ethics and pedagogy of using such tools as AI-tools should also arrive at a common ambition to install an inclusive education by responding to the needs of all children and providing tailored solutions," stated UNESCO (2021). But that's easier said than done, particularly in the Internet age. Children are exposed to issues concerning the competences that teachers have in employing and applying tools of AI in teaching. There are also often conflicts between parents and teachers in the absence of a legal basis that allows these innovative alternatives to be used in the pedagogical process. We aim to assess the knowledge and preparation of educators, identifying the obstacles that need to be addressed to integrate AI into Albanian classrooms in an ethical, inclusive, and developmentally appropriate manner. The teacher has an important role in integrating AI into the teaching process. Seeing a performance competition in the classroom, studies emphasize this undisputed superior role that places intelligent tools at the service of creating a successful and sustainable innovative teaching and learning environment, as Luckin et al. (2016) emphasizes in their study.

Background

In conditions of rapid technological development, human society is faced with digital education needs, struggling with the demand to have digital citizens capable of navigating digital services that are increasingly covering social, economic, and political needs. Children are introduced to AI tools from an early age and are habitual users of attractive platforms. This fact focuses on the need to integrate AI into the learning process, helping to create a pedagogical model in the new century. The necessity to contribute to the development of this model has also been addressed by Bower (2019). Also, the AI tools that are used from early on will create a good base for the long-term process of pedagogical innovation that we need to take place, where it is imperative to learn the role of intelligent tools in order to understand their benefits and challenges (Redecker et al., 2017).

The Problem

Today, AI is present, dedicated to the powerful developments of technology. Children are quite exposed to this reality, and their experiences of using it begin at a very early age. The opinion and approach are positive towards AI tools as entertainment instruments rather than as tools in education. Many researchers have observed the role of intelligent tools in early education, discovering the impacts of AI use in other plans, in addition to the cognitive one. Pianta et al. (2016) look with concern at the impact of AI and the dependence it creates on children, degrading into emotional disturbances. There are other problems related to different access because of the development differences. Other studies focus on these concerns that AI brings by stimulating inequality or risks related to data privacy; this is because institutions are unprotected by regulatory policies that guide the use of AI in education (Chen et al., 2020). These challenges are also the main issues that this study examines. The research by Chen et al. (2020) is another study that shows that organizations become exposed to data protection threats because they lack defined policies which protect their information. In general, the use of AI in education faces relevant challenges, technical and social, regarding teachers' digital skills, issues of privacy and access inequality.

The Purpose

This study aims to analyze and evaluate the impact of using AI tools on the cognitive, social, and emotional development of early childhood children, as well as to explore ways in which AI can be effectively integrated into contemporary teaching environments. This paper seeks to evaluate the impact of AI on pedagogical innovation, which has significantly enhanced the improvement of teaching and learning methods and facilitated the development of personalized approaches, as it is mentioned by Luckin et al. (2016). Specifically, the first objective of this study is to identify the role of AI in personalizing the learning for primary school children, then to analyze and assess the impact of AI tools on children's motivation and involvement in the learning process. The study also focuses on the evaluation of the role of the teacher, emphasizing the hypothesis that the development and creation of digital competencies is the only way to realize a sustainable model of AI integration in the curriculum. The study of the role of the teacher reveals the difference and the need for training and the transition from a traditional profile to that of the innovator, as seen by Redecker et al. (2017). Another objective of this study was also the discovery and evaluation of the attitude and opinion that teachers and parents have regarding other implications related to challenges of ethics and social and emotional interaction, as seen by Holmes et al. (2019).

Literature Review

There are many sources of AI tools that can be used extensively in early childhood education. Yelland (2018) shows through his study that smart technology development will establish major changes in various business sectors, which will implement AR and VR systems to build efficient learning environments for children aged six and above. These resources present strong potential to support children in their development of essential skills, which include reading and basic computational thinking abilities. The program achieves this through its diverse feedback methods, which stimulate different sensory perceptions and its individualized learning approach, which creates an interactive learning experience for each student. The research conducted by Bacca et al. (2014) showed that students aged 6 to 12 achieved better results through their use of augmented reality (AR) educational resources. The system displays real-world environments through AR technology, which needs users to make only basic mental efforts. Research studies have identified multiple barriers which prevent AI adoption in education according to Holmes et al. (2022) and UNESCO (2021). Teachers need to receive their first training about AI tools and their particular uses in curriculum subjects to achieve successful AI integration in early childhood education programs. The European Commission (2022) specifies necessary characteristics related to transparency, reliability, and the necessary professional and pedagogical knowledge in the implementation of ethics when using AI tools, which offer quick solutions and interactive collaboration between children or child-teacher. All together these elements contribute to an improved learning quality. Teachers need to choose educational resources which match their professional skills and their teaching environment to achieve success with their tools.

The research conducted by Holmes et al. (2019) showed that educational facilities need their teaching staff to achieve equivalent competence in teaching approaches and technological choice for student requirement fulfillment.

An intrinsic ability of AI systems is that it can provide immediate assistance through modifying and switching between various patterns of solving problems and providing feedback. The teacher creates a work plan, which includes personalized tasks based on student profiles and their individual needs according to Paolucci et al. (2024). AI in education has two aspects that are identified in support of the educational process, as well as in the challenges that arise during the indiscriminate and unstandardized use of AI tools. The method functions as an educational breakthrough which unites smart technology systems with teaching approaches to boost student involvement and their ability to think creatively and stay actively engaged. The educational approach uses technology to help students learn, but it does not replace the conventional teaching methods. In the research by Belpaeme et al. (2018), the authors emphasize that

educational technology innovation achieves its best results through the guidance of teaching professionals who understand education.

The teaching method which enables AI integration in classrooms bases its approach on student-centered learning that focuses on student development, learning speed, and personal abilities. The model operates based on Vygotsky's zone of proximal development, which functions as its directional framework. The concept serves to connect students' independent capabilities with their potential when receiving suitable assistance. The support system in AI-based learning spaces depends on teacher intervention because they use AI tools to create learning pathways, which help students find answers while maintaining their ability to work independently. The digital competence of teachers functions as a crucial factor which determines the success of this educational approach. Teachers need to learn about AI tool operations and proper implementation methods which help students with different learning needs and developmental stages. Teachers establish AI as an educational assistant which supports learning instead of imposing its own direction on students. The process of learning becomes meaningful when students interact with their teachers and intelligent technology systems (Ifenthaler, 2021); however, notes the importance of bringing learning back to analytics, i.e., of greater linkage behavioral indications and deep learning outcomes. Since children are introduced to cognitive and social-emotional learning at a young age, particularly as the subjects of structured pedagogy in terms of social interaction and games for the field context should be included. And not only does this approach engage children but it is also developmentally appropriate, meeting young children at their level with which they can learn. In study of Pianta et al. (2016) the author also recommends interspersing educative experiences with play so that teachers can attend not only stimulations for ethical thinking but also the active voice of the parents. The second point from Belpaeme et al. (2018) have conducted an analysis and clarified that AI does not replace teachers in the relationship between a student and a teacher; instead, it plays a supportive role. Students might be expected to finish their tasks and achieve the educational objectives set when using interactive applications; however, adult supervisors must not avoid organizing practice sessions that will, most certainly, ensure a better performance. There are other studies that focus only on observing the results of using AI, but do not deal with other issues related to the social and emotional part of the effects of AI. Wang et al. (2024) and Holmes et al. (2019) point out that the studies conducted do not make any categorization of AI tools and platforms suitable for early childhood curriculum.

Research Goals

The use of AI in education is a new methodology that helps to create an innovative and advanced approach for a modern educational system. The study has a general objective that looks at and investigates how effective the use of AI is, which is specified in objectives with specific goals related to testing concepts in fundamental areas of early education. The study overcomes the limitations of other works that do not provide results in an applicable model. The research contains four fundamental research objectives, which follow this order.

- Objective 1: The study examines how artificial intelligence systems impact child mental development, together with their social and emotional development.
- Objective 2: The study assesses new teaching methods that use AI. This part of the study will research and judge the benefits of combining new teaching approaches with AI tools. Also, it investigates how smart platforms structure their educational content through their automated solution generation from user information and their development of three-dimensional learning spaces, which help students better grasp new material.
- Objective 3: The research investigates how teachers and parents view AI while it identifies which social factors affect their acceptance or rejection of educational AI.
- Objective 4: Identify ethical and fairness concerns when using AI. The research investigates which social elements affect school AI adoption through its examination of ethical and fairness-related problems.

Based on what Selwyn (2021) shows, it is crucial that social gaps are not made greater using modern technology systems, thanks to the engagement of developers in guaranteeing equal access to these technologies.

Expected Results

Now, what can be expected as results when the goals of this scientific research are considered, is listed below:

- Increased engagement and personalized performance in literacy and math.
- The main desired effect is an increase in the level of results in storytelling and math when working with AI support. In these programs, this input is the only form of valid input, not even getting a zero for failing to complete what is purportedly therapy when you submit nothing covering new ground, and children can get real-time results by setting their own work pace, along with program/account-specific tasks where they receive immediate feedback (Chen et al., 2020). We therefore hypothesize that the group of AR-users will achieve better results than traditional learning. (Ifenthaler, 2021).

- **Pedagogical innovation.** This investigation opens a horizon of pedagogical innovation, as teachers interviewed/who responded to questionnaires will be invited or motivated to inquire into the AI tools and its alignment with curriculum in more detail on a new perspective, which requires immersion and deep understanding of these smart tools. Teachers can use AI tools in their classrooms to improve teaching methods (Luckin et al., 2016). AI also lets teachers change how they grade, using systems that track how children are doing (Holmes et al., 2019). Because of the DigCompEdu framework (Redecker et al., 2017), teachers are more interested in learning digital skills for using AI and fitting AI tools into new, good teaching practices.
- **Perceptions.** What is expected from students and teachers is enthusiasm and enjoyment in interacting with intelligent applications. Meanwhile, the parents are also hesitant to implement AI education, as they are doubtful about data privacy because AI will collect personal information from children during their studying; the unlimited use of AI may cause them to lose self-control, and suffer for their lack of experience in using AI; and some emotional problems may arise from children learning by screen for a long time, bringing more trouble to themselves. On one hand, children are generally more curious and motivated to learn if a feature-rich technology tool is being used (Bower, 2019). So, it is not just the positive findings of this approach that we are considering but also what they entail in terms of standards for ethical precautions and pedagogical concern (Williamson, 2020).

Research Methodology

Research Design

Data are collected using mixed methods from around the world to determine the effects of AI on early childhood education. This approach is appropriate for this research because of the measurable aspects of the collected data on the effect of using AI on two main subjects of the curriculum, specifically language arts and mathematics knowledge, quantitatively measured for the first grade of primary education. Meanwhile, the qualitative component, through interviews and a survey based on questionnaires that was conducted to assess teachers' perceptions of the integration of AI tools into curricula as an innovative approach in the context of pedagogy, explores deeper the teachers' needs and challenges identification. Other researchers have also used this combination of research in this field. (Creswell et al. 2018). According to Creswell, mixed methods research ensures a better-balanced conclusion between empirical analysis and pedagogical interpretation related to the effective use of AI tools in Childhood education.

Target Group

The research has involved target groups selected as key actors directly linked with the purpose of the research: Teachers, students, and other stakeholders in this framework. Three target groups of participants were foreseen in this study. In the first target group are early childhood children, mainly first-graders (6–7 years old), as a target group using AI tools and benefiting from increased cognitive level, inclusiveness, and better socio-emotional development in these educational conditions. There were two classes involved: 50 schoolchildren of the first-class level, used as experimental samples. In the second target group there are elementary school and preschool teachers. The target group of 180 teachers is directly involved in using AI tools in the teaching process and exploring the level of knowledge and the level of digital competencies in the integration of intelligent platforms in the school environment. In the third target group are parents and other stakeholders – 60 in total. It is an important target group to obtain their opinions regarding the introduction of AI tools into the curriculum, as well as to seek positive support regarding this approach, and to provide a broader school perspective for a sustainable implementation of this new approach. The structured selection in this way is known in other works, such as Belpaeme et al. (2018), as it multiplies the study's results from multiple perspectives, especially in intelligent applications for early childhood children. This combination brings a comprehensive analysis covering all the dimensions that this research reaches at practical and institutional levels.

Quantitative Results

The impact of AI on cognitive development was tested by analyzing test results in two scenarios: traditional teaching and planned teaching using AI tools. Pre/post testing on the child's literacy, mathematical skills, or logic development was used suggested by Su et al., (2023). Learning analytics was used as a source of information to measure the time, the child's interaction with digital platforms for educational purposes, and the level of his progress, as also mentioned by Ifenthaler (2021).

Qualitative Method

The research methodology included questionnaires and interviews with teachers. Their construction aimed to provide insights into teachers' perceptions of AI in education, how they viewed this new approach to the possible integration of AI into curricula, and what challenges would hinder this approach. Parents also contributed to this data regarding their children's opinions as active users of smart device applications. (Williamson et al., 2020).

Sampling

In our study, the use of AI platforms based on virtual and augmented reality was practically implemented and analyzed in the first grade, in which combined tests were conducted over a three-month period in the subjects of language and mathematics. 25 students of the traditional learning target group and 25 students of AI use target group have been selected to be part of the research. Teachers have been pre-prepared on the use of AI tools in the classroom. Two pedagogical plans have been structured according to the curricula and implemented during one month. The first didactic plan was based on the traditional organization of the lesson. The second didactic plan was designed supported by AI tools. The AI platform integrated in this process was Augmented Reality (AR) tool. A data collection was created by test results (pre-test and post-test). The results generated by analyzing test results in three subjects' chapters: Storytelling, in Literature, accounting and problem solving in Math are shown in Table 1. The tests included the main concepts of matters distributed in 10 questions per test. Also, the teacher observation in class was used by assessment of children before and after using AI tools in the teaching process. There were four dimensions of this assessment: engagement, interactivity, communication, and collaboration. The scale of children's assessment was from 4 to 10, according to the national pre-university education system in Albania.

Statistical Data Analysis

Quantitative data were collected, and the results were analyzed through: a comparison of the results obtained from the two types of testing. Table 1 presents a summary of the achievement levels, revealing a clear positive difference between the period of traditional teaching development and the period during which the curriculum was developed with the integration of AI tools in teaching. The platforms support teachers in describing new concepts in an augmented virtual reality and encourage interactive participation from children in the classroom. This approach, based on AI tools, clearly showed superiority and success in teaching and learning after the second test. Independent testing was performed to compare the differences in results between classes. The analysis clearly shows higher results associated with the use of AI in teaching, as also used in scientific works on intelligent platforms.

Table 1*Statistical Tests Data Analysis*

Target group (n=50)	Story telling (Pre-test) M(SD)	Story telling (Post-test) M(SD)	Accounting (Pre-test) M(SD)	Accounting (Post-test) M(SD)	Problem solution (Pre) M(SD)	Problem solution (Post) M(SD)
AR group (n = 25)	43.2 (8.2)	57.8 (7.6)	39.8 (6.5)	55.4 (8.1)	41.1 (7.2)	56.2 (6.8)
Traditional class group (n = 25)	44.1 (7.8)	47.6 (8.1)	41.2 (7.2)	45.0 (7.9)	40.5 (6.8)	46.2 (7.6)

Table 2*Observation in the Classroom*

Social interactivity	AR class group (M)	Traditional class group (M)
Engagement	4.7	3.2
Interactivity	4.4	3.1
Communication	4.6	3.5
Collaboration	4.2	3.0

Interviews and questionnaires

Thematic questionnaires were used to elicit teachers' opinions on the integration of intelligent platforms in teaching. The survey required teachers and parents to think deeply about AI benefits for children and its effects, and the essential requirements for AI tool adaptation and methods to create educational programs which include all students. The research team conducted a thematic analysis of AI integration in early childhood education curricula to establish empirical findings (Braun & Clarke, 2006). Table 3 and Table 4 show the results of the opinions analysis done by teachers and parents.

Results Analysis

The survey was shared with 250 emails of teachers, school leaders, and parents. Questionnaires and interviews were used to explore how much access teachers have to AI tools, their perceptions of the benefits of integrating such tools into the curricula and constraints that impede participation in the teacher-student-AI relationship. The attitudes of a child having systemic access to AI tools were measured through questionnaires filled out by parents and educators. There were 83 % female, with an average teaching experience of 13.6 years. 56.4% of teachers reported that they know

and use AI tools like ChatGPT during an academic year. 17.8% of them never used any AI tools. The other results were included in Tables 3 and 4, below.

By analyzing the quantitative data, given by the developed tests, we infer from Table 1 that there are differences between the two types of children groups, and this leads to the conclusion that such test results have raised (increased) after the use of AI platforms, more precisely in a story or in solving problems with mathematical content. With respect to the observation of classes, from Table 2, we can conclude as well that teaching such a class with AI-supported tools generated a superior commitment and active interaction in comparison to conventional standard classes. The findings from the opinions that teachers have shown more interest in using AI resources for teaching, their training on this topic is an issue, as well as access to ready-to-use AI tool resources and a guide on how to address ethical implications, can lead to these points of using them in class.

Table 3
Results From Interviews of Target Groups: Teachers and Parents

Opinions	% of teachers (n=147) mentioning	% of other stakeholders (n=50) mentioning
Children are more motivated	87%	62%
Communication Improvement	80%	68%
Concerns about the exposure to technology	40%	55%
Teacher training needs	73%	22%
Positive support for further use	83%	67%

Table 4
Solutions Suggested by Teachers and Parents in the Survey

Opinions	% of teachers (n=147)	% of other stakeholders (n=50)
Teacher training on AI technologies	69.4%	67.4%
A guideline for ethical use of AI technologies	34 %	68.3%
AI ready resources to use	56.7%	34.5%
Investments in school infrastructure	77.8%	82.8%
Technical support in using AI tools	25.9%	20.4%%

The parents of the sample classes clearly show an interest in evaluating the development of a guide that standardizes and monitors the pedagogical use of AI tools, despite their differing opinions. In Table 4, 69.4% of teachers are interested in developing more competences through teacher training on AI technologies, as well 67.3 % of parents share the same opinion. Regarding the ethical guideline, parents look more interested by 68.3% of respondents. Teachers look positively on using AI ready for use with 77.8% of respondents, while only 34.5% of parents agree with the same opinion. New investments in AI tools and digital infrastructure are well appreciated to be done in schools, and the teachers and parents agree almost unanimously. Past experience was quite positive regarding their expectations towards the AI tools used. This will also influence the approach created to support this new process of installing AI tools in teaching. But better support is needed for teachers regarding the increase of digital competences in practice.

Discussions

The educational sector now uses AI-tools as an innovative method which enables teachers to acquire pedagogical skills for AI implementation and develop their teaching abilities. Teachers must demonstrate digital competence to successfully implement the students centered approach. The DigCompEdu framework shows these competences as essential for teachers to implement personalized teaching methods which (Redecker et al., 2017) highlights. Researchers in the field have always dictated the fact and agree that no matter how perfect AI is in its role in teaching and learning, it fails to take the leading role of the process and avoid the leading role of the teacher (Ifenthaler, 2021). AI can be part of the built curriculum, but it also offers tools for rapid student assessment, which makes participation more interesting and interactive.

Second, teachers who are carrying out this curriculum must be able to have digital skills on how to work with AI tools, so that they can implement and understand the AI interventions in a sustainable and ethical way (Holmes et al., 2019). A teacher who looks toward the future would support students to develop their digital abilities through AI tool learning, which should focus on understanding how children develop socially and emotionally. Technology used for educational purposes asks for continuous training, as it is ever-growing, and does not cease to constitute a challenge to educational institutions. (Cohen et al., 2018). The classroom environment shows no evidence of student interaction. Most teachers have not applied AI and VR, and AR technologies in their teaching practice. The classroom environment shows minimal evidence of student participation. Multiple educators have chosen to avoid using AI, VR and AR technology in their educational practices. Standard instruments comprise AI-enhanced educational platforms and augmented reality applications such as

interactive books. The investigation shows no clear method of use because it appears random and lacks organized procedures. The main barriers which emerged included both insufficient physical resources (hardware and internet access) and insufficient training and professional development for staff.

The institution needs to acquire new equipment and tools, which will serve as institutional assets. There is a need for digital content that can be found with the click of a button. That is an investment in a single person, not the organization. Confidence and influence are also factors. The survey results showed that only a small number of teachers felt confident about using these devices for classroom instruction because they lacked both technical skills and proper planning. Most people believed that AI and VR, and AR technology would enhance attention span and personalized learning experiences for children under twelve. The majority of participants agreed that AI together with VR and AR technology would create better learning experiences for young students through their ability to enhance student interaction and individualized learning and interactive educational experiences.

The majority of experts agree that national teacher training programs together with educational policies should incorporate these technologies. The organization follows a hierarchical system to lead its technology adoption process. The survey results became visible through the graphic charts, which demonstrated that few educators have had formal training in digital technologies. Teachers show restricted understanding about AI, but they demonstrate slightly better comprehension of VR and AR technology. The educational sector has not yet adopted these technologies for classroom use. Most people agree that AI and VR, and AR technology should be used in early education.

Findings

The present educational approaches function as obstacles which prevent artificial intelligence from reaching its full educational capabilities. Research data shows teachers do not have practical experience with AI educational tools, yet they use these tools through unapproved methods instead of following the established institutional protocols (Li et al., 2021). The pattern indicates that educators show interest in AI, but they require appropriate guidance, together with institutional support, to successfully use AI in their work. The research conducted by Papadakis et al. (2022) shows that early adopters of educational technology use instructional platforms which have AI capabilities built into their system and they also use augmented reality for interactive books and basic storytelling applications. The educational tools demonstrate potential learning benefits, but teachers encounter various barriers which stop them from implementing these resources properly in their teaching environment. The two main barriers which

prevent successful implementation consist of restricted access to suitable technological resources and insufficient training programs which teach AI educational technology.

The current structural obstacles prevent new teachers from using AI during their initial teaching responsibilities because these obstacles prevent them from using AI effectively in their classroom activities despite their proven readiness and interest in AI technology. The research data analysis produced several identical response patterns which emerged from the collected information. The teachers showed their expectations about institutional leadership through their requests for practical training and their demands for school district funding to acquire educational materials. The success of digital learning resources depends on their physical classroom placement and operational status, which allows students to use them. The research indicates that people tend to accept new technology easily, but their organizations fail to develop appropriate systems which would enable smooth and enduring technology adoption. The discussion examined two vital factors which determine teacher technology adoption based on their confidence levels and their strong professional beliefs. The educational community believed AI technology would establish sophisticated learning systems which would help students in early childhood education. AI technology enables teachers to develop individualized learning environments which promote student engagement and improved understanding through its potential applications.

Limitations

Research through thematic analysis reveals that parents continue to express significant concerns about using intelligent educational technology in early education settings despite multiple studies which support its advantages. Systematic evaluation should be used to assess all ethical elements which exist in these situations. Children face rights violations because AI systems operate without adequate rules, which expose their personal data to privacy risks. The research study dedicates its primary focus to defending ethical principles while strengthening their foundation based on the strategic plans of international organizations which have made this matter their main priority (UNICEF, 2021a). The early childhood education setting, which includes young and defenseless students, requires parents to give their approval before teachers can use AI tools in their classrooms. The institution needs to establish a consent process which provides complete transparency and full participation for parents to stay updated about all decisions. The research by Alderson et al. (2020) established that the reason children must give their consent is because this method helps them develop self-determination while showing their direct involvement in educational decisions which impact their learning process. Data collection, which includes children, requires special care as it creates multiple ethical problems. The educational AI system data collection process at

UNICEF (2021a) requires all educational institutions to establish strict ethical guidelines which protect student information from any form of educational misuse. The research study makes access equality its fundamental principle, which serves as its core foundation. All students need to access AI tools provided by educational institutions since these technologies must be accessible to every child, regardless of their family income. AI technology deployment without purposeful direction will create new social gaps, which will maintain the current social differences. Other previous studies have shown that teachers' digital skills and competencies are still limited and insufficient in the field of study. These studies converge with the conclusion that teachers are in great need of developing these skills with innovative and contemporary training programs for the specificity of AI tools. This is a difficult process that takes place within the school framework, including other institutions that make this framework more complex. Traditional teaching, outdated infrastructure, as well as communication issues between teachers, parents and students require intervention and support from policymakers to establish standards that protect young actors and make school a more attractive and pleasant, reliable and modern environment. The main obstacle which teachers encounter stems from their inability to use AI-based educational methods which match their existing curriculum needs and conventional classroom methods. Training programs need to solve various problems at the same time to achieve their desired outcomes. The development of technical competencies, which include data management skills, algorithmic knowledge, and system scalability expertise, forms part of these requirements. AI-based educational tools must be capable of handling growing numbers of users and large volumes of data while maintaining accuracy, reliability, and consistent performance. The system needs to maintain equal protection for all stored information while simultaneously building teacher competencies through educational programs. The successful deployment of AI tools for curriculum development and teaching methods requires educators to acquire these particular combined competencies. The implementation of AI-based educational systems did not solve all the ethical issues which these systems create. AI algorithms will maintain existing biases because they learn from training data, which contains incomplete information and unbalanced distributions. The system requires absolute transparency because AI systems need to explain their decisions through simple explanations which children and others can understand during learning processes. Safeguarding student data against unauthorized access and use is a significant privacy challenge. The analysis needs to address two main data-related problems which stem from these issues. The implementation of AI technology in educational environments will establish different work methods because it has the ability to reduce the requirement for specific teaching roles while it modifies current teaching responsibilities.

Educators now need to perform three new roles, which include AI facilitation, instructional design, and technology learning mediation. At the same time, excessive

reliance on AI-based educational tools may limit students' opportunities to develop critical thinking and problem-solving skills. The educational system faces an increased risk of deepening existing inequalities because schools and regions do not have equal access to technology according to Luckin et al. (2016).

Conclusions

AI can revolutionize early childhood education by providing personalized learning experience that are fun and age appropriate. As progressive as innovative pedagogic approaches in general: use of AI tools and the attitude to education at young ages – it is using a technology that holds some risks, even if not completely harmful, and is free from any ethical grey issues. Knowing such techniques is important due to the fact that they are innovative supports in order to develop, based on these approaches, contemporary classroom models with obvious benefits in building and increasing children's competencies at a cognitive and practical level. During the study, experiments were conducted based on the application of AI tools in teaching a considerable number of children. These experiments clearly showed that the pedagogical construction of the teaching model based on intelligent tools yields positive results in teaching and learning. An advantage of these intelligent tools is the creation of environments that encourage interactive participation and social interaction among children. This study also highlighted the fact that the teacher has an important leadership and evaluation role despite the obvious needs they have to successfully implement this model. As stated, teachers need training for competencies specifically in the field of using AI in education. The use of AI tools assisting the experiment, augmented and virtual reality (AR and VR) software, allowed us to contribute to a direct increase in capabilities among teachers by fostering their innovative initiatives within education environments pedagogically. The use of facial recognition, eye tracking, and emotion detection technologies creates multiple ethical problems which endanger the privacy of young users. UNESCO and the European Commission have formulated guidelines that support accountability, oversight, privacy, and child-centered design to encourage safeguards and ethical principles for all AI applications with children covered in the study of Floridi et al. (2018). Although there are some pilot initiatives and interesting applications under development in Albania, several hindering factors prevent the effective implementation of AI technology into kindergarten classes. The study of the target groups found the effect on social dimension regarding acknowledging the use of AI tools in teaching. Although negative perceptions (risks of overdependence on technology and present inequality) remain, the evaluation has taken a positive viewpoint, with a new mentality toward innovative change.

At the end, a teaching approach was designed and experimented based on the AI tools in an innovative way and just implemented successfully as a new method which promotes the benefits of AI tools in childhood education. This result was promoted to teachers of the same profile by encouraging their critical thinking and gathering opinions on the practical issues and their needs for digital competence training. The study is a scientific contribution for changes in different aspects of childhood education considering the economic and social conditions of children and teachers' advanced digital capabilities. For this reason, new policies need to be implemented in Albania in the educational environment considering infrastructures and trainings for an appropriate teaching environment based on AI tools.

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Dirbtinio intelekto naudojimas ankstyvajame ugdyme: pedagoginės galimybės, iššūkiai ir sprendimai

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Santrauka

Atliktas tyrimas atskleidžia, kad dirbtinio intelekto priemonių naudojimas ikimokyklinio ugdymo srityje yra novatoriškas pedagogikos metodas šioje amžiaus grupėje. Tyrimo tikslas – pagerinti pedagoginės veiklos kokybę ir vaikų socialinę raidą, į ugdymo procesą įtraukiant novatoriškus pedagoginius sprendimus, taip pat adaptuojant ir taikant naujus mokinių pasiekimų vertinimo metodus. Šio tyrimo duomenys buvo surinkti naudojant mišrią priemonę: anketinę apklausą raštu ir interviu. Dirbtinio intelekto poveikis pažintiniam vystymuisi tirtas analizuojant testų rezultatus dviem būdais: tradiciniam mokymui ir planuotam mokymui naudojant dirbtinio intelekto įrankius. Tyrime dalyvavo ikimokyklinio ugdymo mokiniai, mokytojai, mokyklos vadovai, tėvai. Šiame straipsnyje siūloma metodika, kuri apima testų, atliktų prieš ir po, rezultatų stebėjimą mokantis kalbos, skaitymo ir matematikos dalykų. Šių rezultatų analizė leido statistiškai įvertinti pasiekimus ir matomus pokyčius. Eksperimentinė mokinių grupė, kuri naudojosi dirbtinio intelekto priemonėmis, pasiekė statistiškai geresnių rezultatų visose atliktų testų srityse. Šiame tyrime buvo atsižvelgta ir į mokytojų, ir į tėvų

nuomones, tai akivaizdžiai parodė jų entuziazmą pagerėjusiais mokinių mokymosi rezultatais, vis dėlto buvo išreikštas ir nepasitikėjimas bei susirūpinimas etika, privatumu ir lygybe. Tikėtina, kad mokytojai, įtraukdami etinius aspektus į mokymo programą, galės igalinti mokinius kritiškai mąstyti sudėtingais klausimais, susijusiais su dirbtiniu intelektu, ir paruošti juos iššūkiams, kurie jų laukia ateityje pasaulyje vis labiau skaitmenizuojantis.

Esminiai žodžiai: *dirbtinis intelektas, ikimokyklinis ugdymas, pedagoginės inovacijos, personalizuotas mokymasis, etika.*

Gauta 2025 08 25 / Received 25 08 2025
Priimta 2025 11 14 / Accepted 14 11 2025