Growing Interest in AI in Education: Systematic Literature Review

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Abstract: Although AI in education has been written about for decades, recent years have seen exponential growth in this area. The aim of this paper was to determine the distribution of content and areas of education in which AI is researched. The article provides an overview of the newest research in the field of AI in education, available in open access journals. In the theoretical part, an overview of the historical context is given. Also, key definitions and approaches for understanding the topic are listed. In the methodological part, Systematic Literature Review was used, with AI and education as search words. Publish research studies between January 2023 and December 2023. The research found that there is a difference in the amount of AI research at certain degrees and fields of education. The application of AI is particularly explored in higher education. As specific areas of research, the ethical issues of applying AI in education and the possibilities of applying AI in the learning and teaching process appear.

Keywords: artificial intelligence, learning, STEM education

Introduction

AI Foundations: An Overview of the Fundamental Structural Elements

The incorporation of Artificial Intelligence (AI) in education mainly focuses on three fundamental architectural elements that collectively aim to transform traditional learning environments and pedagogical techniques. Advanced AI technologies are leading the way in this change, employing robust adaptive learning systems that customize instructional content to suit individual learning styles and speeds. These systems utilize advanced

data analytics to carefully examine student interactions and successes, allowing for personalized feedback and learning paths. In addition, AI enhances efficiency in administrative procedures by automating repetitive work, enabling educators to allocate more focus to interactive instruction. Natural Language Processing (NLP) technology improves communication in educational environments, enabling students to interact with intelligent conversational agents that facilitate learning experiences. Machine learning algorithms enhance this field by making predictions about student outcomes and identifying learners who are at danger, allowing for prompt implementation of intervention techniques. Five important pillars are shown in Figure 1:
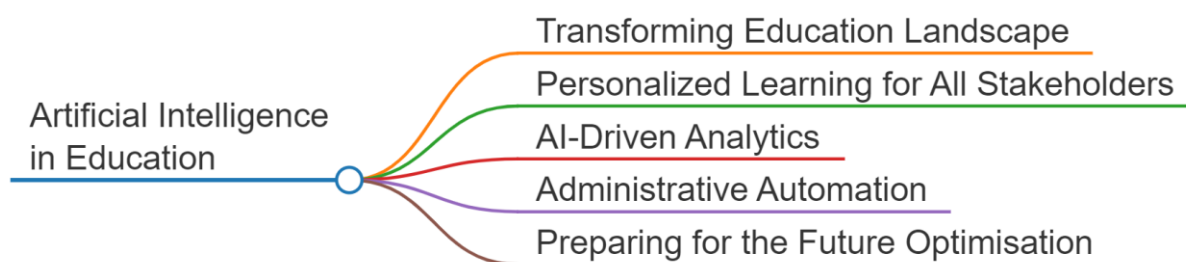

Figure 1. Important pillars in AI for education

As shown in figure 1, there are important aspects in which AI is transforming the educational environment. The pillars encompass following - AI technologies are significantly reshaping the education environment by offering innovative approaches to distributing material and improving interactive learning experiences. This process frequently entails combining artificial intelligence (AI) with conventional teaching approaches to establish hybrid learning environments that are highly adaptable and sensitive to the requirements of students. In this context, AI enables individualized learning by customizing educational information and adjusting the pace of learning to match the individual learner's style and degree of proficiency. This customization not only benefits students but also empowers instructors and other individuals involved by offering them personalized insights and tools that assist various learning processes and results. Also, by utilizing AI-powered analytics, educational institutions may get significant insights into student learning patterns, performance indicators, and educational outcomes. These analytics facilitate data-driven decision-making to enhance instructional tactics, curriculum design, and overall educational efficacy. In this context, AI facilitates the automation of administrative duties, including scheduling, attendance monitoring, and student enrollment procedures. This automation decreases the burden on administrative personnel, enabling them to allocate more attention to student involvement and less to laborious, manual chores. AI enhances educational systems by streamlining processes and resources, therefore preparing them for future problems. This includes the creation of predictive models that anticipate future patterns and needs in learning, allowing proactive adaptations to educational tactics and infrastructure. Each pillar shown in figure 1 illustrates a key area where AI technologies may be used to improve and advance the educational sector. This may result in a more effective, inclusive, and forward-looking environment that meets the expectations of 21st-century education.

As Khosravi et al. (2022), stated, there is increasing awareness over the *Fairness, Accountability, Transparency,*

and Ethics (FATE) of educational efforts that depend on AI algorithms. An effective method to increase confidence in AI systems is by using eXplainable AI (XAI) techniques. Explainable Artificial Intelligence (XAI) encompasses the use of methods that produce coherent and logical justifications for the choices made by AI systems.

Artificial intelligence development in the educational context

Artificial Intelligence (AI), as a concept and field of research, has existed since the 1950s when Alan Turing posed the question, "Can machines think?" (Gonçalves, 2023). Since then, the development of AI has undergone various phases and challenges, from initial enthusiasm to the "AI winter" periods of the 1970s and 1980s. The history of AI spans nearly a century, marked by milestones in hardware, software, programming languages, and various technologies (Mukherjee, 2023). This development has advanced from rule-based statistical approaches to data-driven methods in fields such as computer vision, natural language processing, and machine learning (Guerrero, 2023; Zhang, 2023). AI's impact on society has been significant, with a shift towards human-machine collaboration and a focus on computing power for sustainable development (Zhang, 2023). Additionally, the rise of AI is intertwined with the development of the Internet, leading to its widespread application in society and everyday life over the past decade. In recent years, thanks to advancements in computing power and the availability of large data sets, AI is experiencing a renaissance and is being applied in increasingly diverse areas, from speech recognition to task automation. This historical trajectory reflects the complex interaction between technical progress, philosophical perspectives, and social implications in the evolution of AI.

The development of AI in an educational context presents a range of opportunities and challenges. Classrooms are increasingly being transformed through the use of AI-driven tools and applications, enabling new approaches to learning and teaching. Artificial General Intelligence (AGI) is gaining recognition for its potential to revolutionize education by replicating human intelligence (Latif et al., 2023). AGI aims to improve tasks that require human-level intelligence, like solving problems and understanding emotions (Latif et al., 2023) by using what we have learned from big language models like GPT-4 and ChatGPT. AGI's goal is to create machines capable of human-level cognitive performance across various tasks, drawing inspiration from the human brain. AGI has the potential to significantly impact society in many ways. However, the development of this technology also brings a range of challenges that need to be carefully addressed. Continuing research and responsible development of AGI are crucial for harnessing the potential of this technology for the benefit of humanity.

Furthermore, AI applications in education (AIED) are developing to support autonomous student learning through systems such as Learning Generated Content (LGC), which aids students in self-directed learning (D. Lee et al., 2023). LGC involves students creating digital materials to enhance learning experiences, such as posters and videos that facilitate content acquisition and language skills development. This approach encourages collaboration between students and teachers, resulting in dynamic information resource that evolve over time. Integrating LGC into education offers numerous benefits, including a personalized learning experience, improved pedagogy, and enhanced support for students in learning and homework completion. The diversity of

AI chatbots, such as those for personalized teaching (Ada), emotional support (Replika), concept understanding (Socratic), text processing (ChatGPT, Bard), fostering good study habits (Habitica), and online discussions (Piazza), can potentially enrich the educational experience (Labadze et al., 2023).

AI offers the potential to extend assessments and evaluations in the classroom, including automated scoring of open-ended teacher responses. It is important to carefully consider the implications and potential biases of AI systems in the educational context to avoid undesirable consequences (Amyatun & Kholis, 2023). Their impact on education can result in potential improvements in learning outcomes, increased student motivation, and provide an exceptional tool for knowledge acquisition, problem-solving, and self-regulation. From the teacher's perspective, AI systems for writing evaluation can automate feedback and grading, facilitating teachers' tracking of student progress. AI tools for monitoring provide real-time information about student engagement and learning, helping teachers personalize instruction and enhance the learning experience (Amyatun & Kholis, 2023). Teachers often have an unclear opinion about AI, necessitating continuous education and training to understand the power and applications of this technology. How research findings on AI are presented can affect their perceived credibility among teachers (Amyatun & Kholis, 2023).

Despite potential benefits, integrating AI chatbots into education raises concerns about reliability, accuracy, ethical dilemmas, and the possible impact on the development of critical thinking in students, their limited ability to understand complex issues, and the need to address ethical issues, develop evaluation methods, and create high-quality AI systems (Labadze et al., 2023). AI chatbots have the potential to significantly impact education. They can provide a personalized learning experience, assist students, and improve teaching. However, the challenges and concerns associated with these technologies must be considered. Numerous studies and initiatives are exploring the use of AI in various environments, from intelligent tutoring systems to teacher monitoring tools and automated writing evaluation. AI in education represents a journey into the unknown, full of promise and risk. Developing a deeper understanding of AI, responsible use of tools, and continuous evaluation of impacts are key to the successful integration of this technology into the future of education. Integrating AI tools and technologies in education is crucial for improving the teaching, learning, and decision-making processes in the digital age.

Method

For our research we choose Systematic Literature Review. Publish research studies between January 2023 and December 2023.

Through this research, we aimed to find answers for following research questions :

Q1: Does science monitor the influence and possibilities of AI on education and care at all levels?

Q2: What are the key questions related to AI in the field of education, which are addressed by scientific papers?
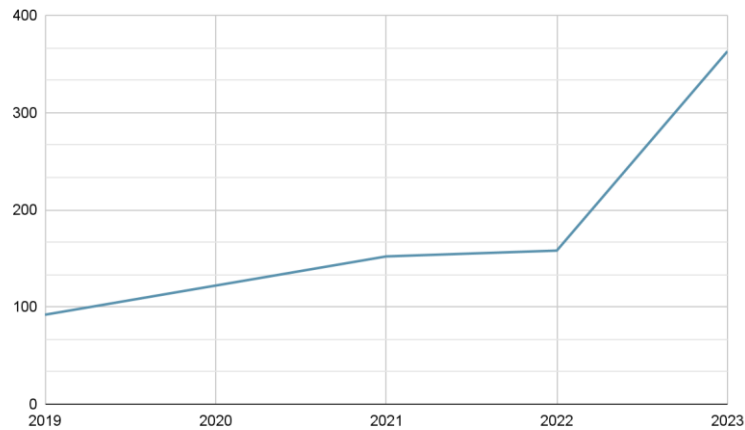
Figure 2. Number of scientific articles about AI in Education in DOAJ base for period 2019-2023

In the first step, we entered the keywords 'AI' (or artificial intelligence) and 'education' into the DOAJ database and limited the period from 2019 to April 9, 2024. The total number of all published papers in the DOAJ database with these keywords is 1590 papers. Figure 2 shows the distribution of the number of published papers in the DOAJ database for the mentioned period.

Table 1. Inclusion and Exclusion Criteria

Criterion	İnclusion	Exclusion
Keywords	Artificial Intelligence, AI, Education	All other
Subject area	Education	Not education
Language	English	Non English
Timeline	2023	Before 2023, 2024
Literature type	Peer Reviewed Journals, Single article in regular number	Conference proceedings, journal articles that are not published in Peer Reviewed Journals, Editorials, Special numbers, Books
Content	Research; at least one of educational topics and at least one of educational level	Not Research

In the second step, we decided to limit the research to the year 2023. With this criterion, there are 363 papers in the database. In the third step, we added other criteria, shown in Table 2. Of the remaining 76 papers, after a detailed reading, 57 papers remained for further content analysis.

Results

The Science of AI in education

Does science monitor the influence and possibilities of AI on upbringing and education at all levels?

After all papers that did not meet the set criteria were excluded, the analysis of the texts was approached. The number of papers dealing with each level of education is shown in Table 2. It is evident that a considerable number of papers pertain to higher education, and that the number of papers decreases with the level of education. There are almost no papers in the early school period, while they are completely absent in early and preschool education and care.

Table 2. Number of articles according to the level of education

level of education	number of articles
kindergarten and preschool	**0**
elementary /primary school	**4**
high / secondary school	**5**
higher education	**37**
general education	**10**
professional development	**1**

What are the key questions related to AI in the field of education, which are addressed by scientific papers?

To answer the second research question, we proceeded with a detailed reading and analysis of the entire group of articles. Content analysis led to several key themes. The first set of themes relates to the (1) application of AI in education, which includes content related to the advantages and disadvantages of its use, attitudes of students and teachers towards the use of AI in education, and individual tools and AI systems that are used or can be used in education. Within this, two dominant themes emerged: Chatbots in education and Language development using AI in education. The second key group of themes covered in the papers is the (2) ethics of applying AI in education, which encompasses the possibilities of unethical use of AI in teaching by students, issues of fairness, transparency, authenticity, and academic integrity, and the question of AI ethics policy in education.

Discussion

Possibilities of AI in Education

Many potential applications of AI in education have been recognized, but some of them encounter difficulties in implementation, while the impact of others is still being examined. The authors whose works are analyzed here recognize many benefits of using AI in education, but with cautious consideration of possible dangers and unknowns (Tlili et al., 2023). "The Impact of Artificial Intelligence on Learning, Teaching, and Education" (2018) is a JRC Science for Policy report published by the EU. The goal of the report itself is to stimulate an

informed discussion about artificial intelligence, its possibilities, and potential impacts on upbringing and education. The integration of AI into educational processes requires further research into the "digital divide" and social inclusion, risks associated with such innovations, and opportunities that technologies offer to address these issues with new approaches (Gentile et al., 2023). The question of the teacher's role also arises, namely what competencies are needed and what tools are necessary to be conscious actors in the innovation processes in the field of AI (Gentile et al., 2023). Generative AI could become the most efficient technology in education (Bozkurt, 2023, p.262). It offers many possibilities and potentials (Ningsih, 2023) (Ningsih, 2023), but by itself, it means nothing. Thus, teachers are expected to creatively integrate the potentials of AI according to the "evolving educational landscape" (Bozkurt, 2023, p.262).

A particularly significant advantage of using AI in education is the personalization of learning, i.e., the adaptation of the curriculum and tailored learning experience (Fowler, 2023; Gómez Martínez et al., 2023) to each student or pupil. In this regard, AI and machine learning techniques can be a means of identifying (Gómez Martínez et al., 2023) and strengthening student motivation. However, the paradox that the authors warn about is at the same time a danger of bias (Fowler, 2023), as algorithms carry the hidden potential to amplify existing inequalities. Particularly significant are the possibilities of applying AI to working with children and students with difficulties (Toyokawa et al., 2023), and the possibility of identifying students at risk (Ouyang et al., 2023), and opportunities for support and counseling (Akiba & Fraboni, 2023). Students and pupils can receive useful feedback on the motivational and behavioral aspects of their learning using data from the digital traces of their activities (Suraworachet et al., 2023). AI can enable personalized and adaptive learning systems that adjust content, activities, and feedback to the needs and interests of students, improving engagement and outcomes (Tarisayi, 2024).

One of the recognized potentials of AI in education is tutoring (Imam Karya Bakti et al., 2023), or mentorship. AI functions that are currently widely implemented on various educational technology platforms serve as virtual mentors. AI has the ability to provide feedback on students' learning activities and exercises, and then recommend materials that need to be reviewed (Suparyati et al., 2023). An example is Blackboard (Suparyati et al., 2023), an AI tool often used for publishing lecture notes, assignments, quizzes, and tests, allowing students to ask questions and submit assignments for grading. This tool can identify the reasons behind students' misunderstandings and offer the student solutions that the professor has previously ensured and programmed (Suparyati et al., 2023). Therefore, AI adjusts content and tasks to students' abilities and needs and directly affects the learning experience. On the other hand, AI also helps teachers more effectively assess student progress and provide timely and accurate feedback. Artificial intelligence thus becomes a means of aligning the curriculum with the demands and needs of the market (Suparyati et al., 2023). Furthermore, the Metaverse has the potential to serve as a revolutionary learning environment that can redefine educational experiences for students worldwide (Qian et al., 2023). Metaverse technology allows students to access and participate in educational settings without time and location restrictions (Qian et al., 2023). AI provides opportunities for designing and implementing innovative teaching methods, managing workload, expanding and improving evaluation (Laupichler et al., 2023), and the overall education process (Gentile et al., 2023).

Furthermore, AI can help in providing feedback and assessing progress. Special attention is given to the advantages of automated scoring and immediate feedback (Ningsih, 2023). When it comes to assessment, AI increases the efficiency of assessment, reduces subjectivity, and improves accuracy (Ningsih, 2023). Students themselves rate the online testing system for AI positively. The benefits of such an assessment system are manifested in flexibility, convenience, ease of use, engagement, immediate feedback, accessibility, efficiency, enjoyment, clarity, and unique features (Ningsih, 2023).

Different levels of education will likely develop different applications of AI, due to the specificities of children's developmental periods and their learning. However, there are also tools and systems that will be common, especially in the domain of the teacher's application. AI in early education is seen as a catalyst for promoting learning and teaching (So & Lee, 2023). In this regard, robotics has already been implemented at this level in many parts of the world. It is a departure from traditional teaching methods, which improves the learning experience and student interactivity. The role of the teacher in this changes, becomes less direct, and more resembles the role of a facilitator (So & Lee, 2023). The authors emphasize that this is in line with the settings of the constructivist approach. Robots are very attractive to children and have a positive effect on their motivation. However, the path to the everyday use of robots in teaching is long. Robots are still too expensive for most educational institutions and require certain technical support. Technical problems are recognized as one of the biggest challenges in their use (So & Lee, 2023). Interestingly, children see a humanoid robot as more fun and friendlier than a teacher (So & Lee, 2023).

Various studies on student engagement in virtual and digital education suggest that such teaching and learning environments can indeed encourage educational growth. However, there is a question of effective teacher-student interactions in this process, as the same studies have shown that almost half of the students do not believe that online lectures effectively facilitate interaction and collaboration (Sadegh-Zadeh et al., 2023). Managing student engagement within a virtual educational environment is key to encouraging success in online learning (Sadegh-Zadeh et al., 2023). Perhaps the solution is somewhere in the middle, the use of AI in a real environment, where an informed teacher can be a significant example of a quality ratio of virtual and real experience.

The application, possibilities, and discussions related to AI are extensively researched in the field of higher education (Greiner et al., 2023; Teferi et al., 2023). Using AI in education, first of all, requires knowledge and understanding, and awareness of limitations and potentials. It is necessary to understand that, for example, tools like ChatGPT, to realize their potential, must themselves receive strategically well-formulated queries. However, many such tools offer information that is already partially outdated, as they were used in their training.

Also, many studies have pointed to the creation of false articles, although giving references may seem like they are about real articles. This is particularly important in the context of informing and educating students, who may be unaware of these dangers, and thus exposed to the unconscious creation of their own false works, and

raises the question of whether students using these tools achieve the intended learning outcomes (Lancaster, 2023). The ethical issue will be discussed more in the later part of this paper.

The use of AI in academic programs is not yet sufficiently prevalent (Li & Qin, 2023). It is necessary to modernize academic curricula, but considering the methods and time frames for changes to academic programs on one hand, and the speed of AI progress on the other, it will certainly take a significant amount of time before changes occur. Students inform themselves independently, which raises discussions about awareness of ethical issues in this domain. It is particularly important to consider introducing an AI curriculum into academic programs in areas where AI is already very functionally used and has a significant contribution, such as medicine. Li & Qin, (2023) emphasize that three key points should be considered: Raising student awareness; Enriching the curriculum; and addressing student needs. Similar settings can be applied to other areas of higher education. It is essential to ensure alignment between the labor market and its needs with the education of future professionals in that labor market (Li & Qin, 2023).

New learning and assessment opportunities enabled by AI, according to Williams, (2023), are visible in support for individual students and collaborative scientific work. In this context, AI's potential in supporting individual students is seen in individual academic activities and students' self-regulatory skills through dynamic information filtering, curating notes, creating summaries, and connecting resources, as well as support for team project work and problem-based learning through dynamic information filtering, curating notes, creating summaries, and connecting resources, among many others. Williams (2023) discusses the implications of cheating with AI in academic circles. He concludes that it is impossible to ban the use of AI by students, so the general use of summative assessment should be considered a weakness that must be transformed. It provokes questions about the purpose of assessment and even about the delivery and assurance of higher education.

The full potential of AI use in education is still not known. However, many areas have begun testing changes in school curricula, such as geography teaching, for example. Innovators emphasize that there is a gap between ideas and implementation, meaning that education often lags behind technological innovations, and the implementation of new technology-based teaching methods requires time - time for designing teaching, teacher training, and updating educational policies to adapt to these changes (Lee, 2023).

New technologies like AI design tools offer an efficient and effective way for elementary school teachers to create attractive educational materials (Hong Chuyen & Vinh, 2023). Scientific research should also have an applicable application in the field of design and development. For example, a study aimed at investigating the intention to use AI design tools among elementary school teachers (Qian et al., 2023), with a special focus on the dimensions that influence their adoption and use of these tools, offers practical implications relevant for both designers and developers of AI design tools. It provides insights into factors that can positively influence user intent to adopt the examined tools, such as performance and effort expectations, peer influence, and the availability or accessibility of resources. The study emphasizes the need to focus on improving the usability and ease of use of these tools, while simultaneously highlighting their potential benefits and the support they can

provide in the design process (Qian et al., 2023).

Attitudes Towards the Use of AI in Education

Study findings suggest that students have a positive attitude towards generative AI technologies and want to integrate them into their learning, such as ChatGPT. Students who are more familiar with these technologies and use them more frequently are more inclined to use them in the future (Chan & Hu, 2023). It is important to create supportive environments that emphasize the importance of AI and offer adequate technological resources and technical assistance to encourage students to learn AI. Students who perceive higher levels of efficiency and usefulness in learning AI are more likely to learn AI (Wang et al., 2023). Gender differences have been identified. Male students perceive higher levels of supportive environments and expectancy-value beliefs in learning AI, indicating a need for greater attention to supportive environments and expectancy-value beliefs among female students to improve their learning in AI (Wang et al., 2023). Therefore, according to research, students are positive about the application of AI in their education but are also aware of its shortcomings and express skepticism about the quality of information and sources that, for example, ChatGPT provides (Lozano & Blanco Fontao, 2023).

Chatbots in education

Chatbots, among other things, have been recognized as potential in higher education teaching across various disciplines. However, there is a need for further development. Research by Gregory (2023) found that chatbots provide better responses to questions based on real situations than hypothetical ones, especially when it comes to requests for redefining terms. Nevertheless, during the research, Chat GPT showed rapid progress (Gregory, 2023). According to some authors, ChatGPT could refresh the education system, for both students and teachers. Its use could significantly reduce the time spent preparing tasks, especially for tasks that address individual differences among students. AI can certainly reduce the time for various administrative tasks that have significantly burdened teachers' work (Lozano & Blanco Fontao, 2023). By alleviating these burdens, teachers could focus more on the students themselves. The special value of AI in education has been recognized in the personalization of tasks, or the possibility of frequent application of Universal Design for Learning (Lozano & Blanco Fontao, 2023).

ChatGPT can be used in many ways in teaching. For example, it can generate exercises related to topics with which students are not familiar and offer them some advice instead of solutions. It can provide steps in problem-solving. Furthermore, ChatGPT can be an outcome for group discussions or an integral part of graded tasks. Its potential is visible in formative assessments, providing real-time feedback after activities (Liang et al., 2023).

The mentioned tools are limiting in creating content and connecting information as well as in-depth insight from different positions, and when they do provide insight from different positions, they do so by separating information about each area.

AI does not have the ability to understand how to strategically connect information that has been previously used (Davis & Lee, 2023). Also, despite all the information it possesses, ChatGPT still lacks more detailed insights that integrate elements relevant to students and their learning environment (Davis & Lee, 2023).

Further research on the impacts of integrating chatbots into upbringing and education should provide insight into their long-term sustainability over time. Such information is crucial for educational policymakers. The integration of artificial intelligence, including chatbots, is not an insignificant issue before making any long-term decisions, and one should be well informed (Labadze et al., 2023).

Language and AI

A significant number of studies explore the possibilities of AI application specifically in the field of language, where its contribution is recognized (Ningsih, 2023). On one hand, the quality of tools is questioned, and on the other, attitudes towards them. Although AI tools have significantly improved in recent years, they still create illogical and unusual translations, as well as linguistic and grammatical errors (Makeleni et al., 2023). Research indicates that there is a diverse array of AI writing tools (e.g., Quillbot, Jenni, Chat GPT, WordTune, Copy.ai, Paperpal, and Essay writer) that are actively used among teachers of English as a Foreign Language (EFL) (Marzuki et al., 2023). The growing trend of using these AI tools has a positive impact on students' overall academic performance. It positively affects motivation and enriches the learning experience and writing skills. However, as in other areas, we encounter possible challenges here. Teachers warn of potential dependency and the risk of limiting critical thinking and personal creativity. Therefore, there is a need for balanced use of AI tools, encouraging both creative assistance and independent thinking (Marzuki et al., 2023).

One of the costlier tools for natural language processing using artificial intelligence and language processing technology today is QuillBot. The primary goal of QuillBot is to assist users in writing, summarizing, and improving text, i.e., creating more sophisticated and influential written content.

QuillBot AI indicates an improvement in the writing abilities of eleventh-grade students in creating hortatory expository texts (Amyatun & Kholis, 2023). Using QuillBot AI as a media tool in combination with a problem-based learning approach can lead to multiple improvements in the educational context. For example, it helps in paraphrasing and improving written content; it helps students express their ideas more effectively, ensuring that their solutions and thought processes are articulated so that peers and instructors can easily understand them; it assists students in enhancing their written explanations and reports, as well as improving students' writing abilities and confidence(Amyatun & Kholis, 2023).

Most teachers, according to Putra (2023), do not believe that AI writing correction tools can positively influence the increase in the level of critical thinking among students. As promising aspects of using these tools, they see the discovery and correction of errors, while students see AI as help in meeting deadlines for fulfilling obligations, i.e., saving time (Putra, 2023). Interestingly, neither students nor teachers saw AI writing tools as a

means of cheating and plagiarism. Teachers, however, show a deeper understanding and knowledge of various writing tools (Putra, 2023; Marzuki et al., 2023).

Ethics and AI in education

In most of the analyzed papers, authors touch on the ethical issue of using AI in education in some way. The use of artificial intelligence is recognized as a threat to the traditional view of academic honesty (Fowler, 2023). There is a visible need for the education system and the accompanying scientific community for a clearer understanding of the possibilities and dangers of using artificial intelligence. Also, there is a noticeable need for systematic support of educational policy and policy in general, leadership of educational institutions, and the connection of educational actors and scientists with designers and developers of AI.

One of the exposed problems is related to the potential dangers of student misuse of AI in creating their papers. In this regard, much research is focused on questioning the effectiveness of tools for detecting AI-generated text, i.e., distinguishing human text. Many studies have shown that ChatGPT is not always objective and accurate, nor are other generative models, because their effectiveness depends on the quality and diversity of materials used in training (Grassini, 2023). These materials are often raw data. Although this can be seen as a problem of artificial intelligence on one hand, on the other hand, in a world that is just learning to live with AI, including in the academic part, inconsistencies and inaccuracies allow for easier detection in checking student papers (Grassini, 2023). Plagiarism has become a significant problem and concern of educational institutions in the context of AI application (Grassini, 2023). Parallel to generative models, various anti-plagiarism systems are being developed, which, in addition to checking for plagiarism, also check for the presence of AI in student texts.

Studies indicate that AI detection tools can to some extent distinguish content created by humans from that generated by AI. However, the same research emphasizes that their performance is inconsistent and varies depending on the sophistication of the AI model used to generate content. Therefore, AI detection tools should not be used as the sole determining factor in cases of plagiarism and academic integrity questions (Elkhatat et al., 2023). Even widely used academic AI text detection tools have shown significant rates of false negatives, but also false positives (Farrelly & Baker, 2023). False positive results can lead to wrongful accusations of students, and false negatives allow students to avoid detection of unauthorized content generation, gaining an unfair advantage and avoiding sanctions (Weber-Wulff et al., 2023). In addition to the issue of misuse of various tools for writing student papers, another ethically questionable practice appears here. Namely, AI text detection tools imply the submission of student papers, without consent, to a multitude of freely available platforms that can be easily found with a simple internet search (Farrelly & Baker, 2023). The educational communities play an extremely important role in conveying academic values and academic integrity (Nam & Bai, 2023) to students, including in the area of ethical use of AI, both in writing papers and in its broader possibilities of application. To make this possible, the highest standards of professional and personal ethics must exist in all spheres of academic life, and teachers themselves must be trained to apply various artificial intelligence systems

(Lozano & Blanco Fontao, 2023).

Policies on the ethics of artificial intelligence in higher education are a growing concern of academic communities (Chan, 2023), so many colleges and universities are increasingly adopting and integrating AI systems into their operations and decision-making processes. The emphasis is placed on issues of fairness, transparency, accountability, security, and human autonomy (Slimi & Villarejo Carballido, 2023). The use of AI in admissions, financial aid, and other student services could exacerbate existing biases and discrimination based on race, gender, and socioeconomic status. Therefore, everything AI does should be understandable and easily verifiable. Institutions of higher education should prioritize the formulation of robust digital literacy programs, which represent a key mechanism for mitigating the harmful impact of artificial intelligence on academic integrity (Fowler, 2023).

Care must be taken to ensure that decisions made by the AI system are aligned with human values and do not undermine human independence. Universities must be aware that their administrations are responsible for the actions and decisions of AI and for ensuring mechanisms for control, corrections, and other issues that may arise in this domain. Existing AI ethics policies, such as those of the European Commission, can help them (Slimi & Villarejo Carballido, 2023). Therefore, the priority must be on the ethical use of AI, AI literacy, and the development of frameworks that empower students and educators to safely harness the full potential of these technologies (Farrelly & Baker, 2023). AI still cannot replace humans. According to Greiner et al., (2023), the differences between human-to-human communication or with AI are visible in capabilities (AI may not be able to understand or respond to complex or abstract concepts in the same way as a human), responses (AI's responses may be more limited and predictable than those of humans), empathy (AI may not be able to respond to emotional signals or provide emotional support in the same way as a human), learning (AI may not be able to adapt to new situations or learn from its own experiences in the same way as a human), and trust (the level of trust in information provided by AI is lower than that we have when it is spoken by a human).

The strategic leadership of universities plays a key role in guiding the appropriate adoption and innovation of AI to balance benefits and risks. It is crucial that the leaders themselves have a deep understanding of the possibilities of AI, trends, challenges, and applications tailored to higher education, with the aim of maximizing benefits while minimizing potential harm (Tarisayi, 2024).

Conclusion

It is evident that the educational community is facing global changes, shifting from traditional to contemporary methods of teaching and evaluating all segments of the upbringing and education process. There is a growing interest in the number of published works on the topic of AI in education. Many possibilities for the development of education have been observed, as well as significant potential in the use of AI in many spheres of education, especially in the field of higher education. Alongside a series of recognized advantages of using AI

in education, and the development of a range of AI tools and systems intended for the educational process, many questions and unknowns also arise. The field of AI is advancing significantly faster than the practical and scientific part of education. Thus, works published in 2023 in many ways show already nearly outdated data, at a time when the awareness of respondents is growing, and new tools are being applied. Among the most significant advantages of using AI in education are the possibilities of personalizing the educational process for students and pupils, reducing administrative obligations and the time invested in them for teachers, influencing motivation and learning processes in children and students, opportunities for tutoring and mentoring, significant contributions to foreign language learning, assessment and feedback that are immediate and tailored to the needs of students and pupils, and many others. The tools and systems used are diverse, and as such, can meet the needs of the entire vertical of the educational system, and various subject areas. On the other hand, questions arise related to the dangers of applying and doubts about AI, many ethical dilemmas, the possibility of creating an even greater gap and discrimination, the question of the impact on critical and creative thinking, the absence of personal experience of relationships, the question of the role of teachers and others.

Significant research on AI in education relates to the academic community. Many potentials are visible there. However, for these potentials to be realized, the academic community must simultaneously deal with many challenges related to the ethics of using AI, which calls into question the very operation of higher education institutions and its fundamental postulates, academic honesty, integrity, professionalism, intellectual property, and autonomy. Universities must approach this issue responsibly and in a timely manner, taking into account the speed of the emergence of novelties, labor market needs, and ethical recommendations of educational policy, and adapt in time, acting as a model for students, with clear guidelines based on informed use of AI in education.

Recommendations

AI offers revolutionary changes to the education system by providing personalized learning experiences, improving accessibility, enhancing assessment, and automating tasks. However, it is crucial that AI is used in a way that is ethical, responsible, and integrated into the existing curriculum.

The use of AI in education brings with it a number of ethical dilemmas that need to be carefully considered. The development and implementation of sound ethical guidelines are crucial to ensure that AI systems are used in a transparent, fair, and responsible manner.

Furthermore, educational institutions should invest in comprehensive digital literacy programs to enable educational stakeholders to deal with the complexity of AI. These programs should equip people with the skills and knowledge they need to critically evaluate and responsibly use AI-generated content. In doing so, ongoing research is needed to monitor the impact of AI on education, including its long-term sustainability and its impact on learning outcomes.

By implementing the above recommendations into policy and practice, we can harness the full potential of AI to transform education while ensuring ethics, fairness, and benefit for all involved in the educational process.

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