Artificial Intelligence and the Future of Human Learning: Opportunities and Psychological Challenges

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ABSTRACT

Artificial Intelligence is changing how humans are taught and how they confront problems in educational, psychological, ethical, and organisational areas. This paper aims to analyse the possibilities available today and the psychological problems that may arise from studying through AI. It is necessary to clarify educational possibilities through the use of AI as well as psychological difficulties that can accompany its use, analyse the influence of human-AI cooperation on the learner's control of his/her own actions, creativity and critical thinking, identify ethical and social problems and develop a human/cognitive model of the relationship between AI and human beings within the educational process. The articles for the research were extracted from Scopus (the keywords 'artificial intelligence', 'learning', 'opportunity' and 'challenges' were used) and then filtered according to subject area, type of document, the language of the articles, keywords, and type of the articles; hence 44 English-language articles were chosen. Five themes were identified. The results suggest that artificial intelligence is most effective for learning when viewed as a support rather than as a replacement. This may be aided by the responsible use of AI, solid knowledge of AI, training of teachers and ethical practice. Neither the aspects of metacognition nor the long-lasting psychological impact of AI are researched enough.

Keywords: artificial intelligence, human learning, human–AI collaboration, cognitive autonomy, critical thinking, learner agency, thematic review

INTRODUCTION

Artificial intelligence has moved from an advanced technology to a growing force in education (Bagherimajd & Khajedad, 2025). Now, AI technologies are regarded as parts of different aspects of education – personalisation of learning, adaptive learning, instant feedback, assessment, content creation, analytics, and assistance for teachers (Bagherimajd & Khajedad, 2025).

The rise of generative AI and advanced language models has sped up the transformation even more because it allows students to interact with an AI using natural language and get explanations, examples, feedback, ideas and educational material (Huber et al., 2024).

The studies indicate that AI influences education not only in terms of technology but also the way of thinking about knowledge, education, teaching, creativity and human agency (Mena-Guacas et al., 2025).

The possible improvements in education that AI can bring are notable. AI technology can offer adaptive education and personalisation in learning, provide immediate feedback to students, allow students to access learning materials easily, and promote inclusivity. AI technologies in education can lead to continuous and autonomous learning, providing students with educational assistance outside traditional classrooms. In higher education, AI has been associated with a number of important concepts such as creativity, innovation, learning

in the digital age and sustainable education (Bagherimajd & Khajedad, 2025). At the same time, emerging technologies can significantly improve the learning experience, but only if they are used with the right teaching methods (Mena-Guacas et al., 2025).

Yet, while the introduction of AI into education is certainly beneficial, the influence of AI may not always be positive. A rise in the use of AI results in a conflict between technological efficiency and human thinking. Although advanced language models can provide quick responses to questions, learners may abuse the outputs produced by AI and therefore miss out on learning opportunities for reflection and building expertise (Huber et al., 2024). Furthermore, research demonstrates that AI can either help students investigate issues deeply or make them less engaged cognitively, depending on how students use it. With the above intention, the researcher formulated the following objectives.

2. Objectives.

The present thematic paper aims to:

I. examine the major educational opportunities associated with AI-supported human learning;

II. identify the psychological and cognitive challenges associated with increasing AI dependence;

III. explore how human–AI collaboration influences learner agency, creativity, and critical thinking;

IV. examine ethical, social, and institutional challenges associated with AI in education; and

V. develop a human-centred conceptual understanding of the future relationship between AI and human learning.

3. Procedure adopted

The approach in the study is document analysis. The researcher collects literature only from Scopus journals, and the four keywords are the basis for searching, such as: “artificial intelligence” AND “learning” AND “opportunity” AND “challenges”. The initial search in the Scopus database yielded 11,483 documents. After using a specific set of criteria for the screening process, which included factors like type of document (article), language of the document (English), keywords (education), and source type (journal), a total of 44 articles were selected for analysis.

Table 1: Inclusion criteria and number of articles (Scopus)

Step	Inclusion criterion	How applied	Articles remaining	Excluded at this step
1	Records identified	Search string: “artificial intelligence” AND “learning” AND “opportunity” AND “challenges”	11,483	NA
2	Education and social context	Subject area: social science	2,666	8,817
3	Peer-reviewed article	Document type: article	1,086	1,580
4	English language	Language: English	1,015	71
5	AI and learning focus	Keywords: artificial intelligence, learning, AI in education, teaching and learning, student learning, learning experiences	556	459
6	Journal sources	Source type: journals	554	2
7	Selected journals	Source titles: Computers and Education: Artificial Intelligence (16), Frontiers in Education (10), Education and Information Technologies (10), International Journal of Artificial Intelligence in Education (4), International Journal of Educational Technology in Higher Education (3), Computers in School (1)	44	510

Table 2: Distribution of articles by journal

Journal	Articles
Computers and Education: Artificial Intelligence	16
Frontiers in Education	10
Education and Information Technologies	10
International Journal of Artificial Intelligence in Education	4
International Journal of Educational Technology in Higher Education	3
Computers in School	1
Total	**44**

3.1 Thematic Analysis Procedure

The selected literature was examined through four stages:

Stage 1: Familiarisation.

The studies were read to identify their central purposes, educational contexts, and major findings.

Stage 2: Initial coding.

Recurring concepts such as personalisation, adaptive learning, creativity, critical thinking, autonomy, co-agency, dependence, privacy, fairness, teacher preparedness, and lifelong learning were identified.

Stage 3: Theme development.

Related concepts were grouped into broader thematic categories.

Stage 4: Thematic synthesis.

The themes were compared across the studies to develop an integrated conceptual interpretation of AI and the future of human learning.

THEMATIC FINDINGS AND DISCUSSION

4.1 AI as an enabler of personalised, adaptive and feedback-rich learning

Overall, the studies considered in this paper demonstrate that generative Artificial Intelligence provides personal assistance and feedback from the instructors, which they are unable to do on a large scale. Pecuchova et al. (2026) conducted a study where they compared three scenarios—AI-based feedback, teacher feedback, and no feedback—across two student groups (N=262). The participants rated the AI feedback as effective as teachers' feedback. Nevertheless, the feedback from the instructors proved to be the most effective in case of complicated processes, while AI feedback was often repetitive and not informative from an educational point of view. Pozdniakov et al. (2024) have developed a framework that focuses on a human being and a Feedback Copilot application that assists teachers in providing feedback during classes of any scale. Pozdniakov et al. (2026) emphasise the importance of AI-based technologies in detecting gaps in students' knowledge and developing tailor-made educational activities.

Tasdelen and Bodemer (2025) discovered that primary school students (N=114) using material and activities that were contextually personalised had more motivation and improved learning outcomes compared to students using non-personalised material. According to Tafazoli (2024), Iranian English language teachers (N=23) considered generative AI as a means of providing personalised learning resources and overcoming technological difficulties. On the other hand, ChatGPT was valued by the university students (N=737) for being always

available. Lastly, Seo et al. (2021) pointed out that both students and teachers were able to see the potential of AI in creating personalised interactions but were also aware of the social limitations surrounding it.

4.2 Human–AI collaboration, creativity, critical thinking and learner agency

Literature on education is increasingly referring to trainees' collaboration with AI and not their passive use. According to research conducted by Ouyang and Jiao (2021), the concept of the learner has gone through several stages – from recipient to collaborator and eventually to leader – which illustrates the movement toward giving the learner agency and personalisation. Anders and Dux Speltz (2025) demonstrated this concept with the help of a group of undergraduates (N = 38) who used a human-centred cycle known as Plan, Iterate, Evaluate that integrates AI literacy and self-regulated learning and increased their self-efficacy in the area of AI literacy. The researchers came to the conclusion that collaboration techniques can enhance students' knowledge and creativity, rather than replacing it.

According to Abouelenein et al. (2025), whether collaboration promotes critical thinking and creativity is conditioned by the AI design. As the study conducted on undergraduate students (N = 70) indicated, those applying the specific R5E strategy to work with ChatGPT developed their programming skills significantly better than those who used this AI with no specific structure in mind. Moreover, those who applied the R5E method asked deeper questions than the rest of the students. Kwon et al. (2026) found out that while there were some high school students who were sceptical, critical, and creative toward AI advice, some were more passive users. Therefore, they stressed that teaching students how to prompt the AI and verify the data provided by the AI is essential because this way AI would be used as a means of support, rather than replacement. Saritepeci and Yildiz Durak (2024), on the contrary, emphasised that both groups of participants improved in creative self-efficacy and reflective thinking, but there were almost no changes regarding design thinking mindset. Finally, Hopfenbeck et al. (2023) confirmed the importance of self-regulated learning and critical thinking in the age of AI.

4.3 Psychological, cognitive and emotional challenges of AI dependence

In this instance, psychological and cognitive requirements were identified as areas of apprehension occurring more frequently than their actual application. Anders and Dux Speltz (2025) described generative AI as presenting various possibilities and dangers from skills deterioration and dependence. Abouelenein et al. (2025) pointed out that without being guided in using ChatGPT, users obtain passive forms of learning. The authors showed that students using ChatGPT in an unstructured way utilized ChatGPT queries more intensively. Kwon et al. (2026) observed a pattern of students adopting a passive or too dependent type of behavior, with students indicating their worry about authenticity, plagiarism and over-dependence.

The same concerns could be found in different contexts and groups. According to Blahopoulou and Ortiz-Bonnin (2025), students were concerned with a devaluation of higher education when using ChatGPT for completing assignments. Almajdoub et al. (2026) referred to teachers in Qur'anic studies who worried about the influence of over-dependence on learners, as well as the disappearance of spiritual and relational aspects of learning. Finally, Velarde-Camaqui et al. (2026) reported that university teachers from the Peruvian Amazon expressed concerns regarding technological dependence. Finally, Javadinejad and Davari (2026), having analyzed 221 sources, mentioned learner over-reliance as one of the major issues.

Little attention has been paid to emotional and motivational aspects. Bittencourt and colleagues (2024) emphasized negative emotions (e.g., frustration, anxiety, boredom, burnout) and advocated applying positive psychology principles to artificial intelligence (AI) in education. Their bibliometric review showed that the focus is on positive emotions and engagement, with no sufficient theoretical support. Seo et al. (2021) also produced evidence of participants' concerns with issues related to responsibility, agency, and monitoring in AI-supported communication. Overall, these results imply that cognitive and emotional risks connected with AI are known but rarely investigated directly.

4.4 Ethical, social and institutional challenges of AI in education

Ethical dilemmas were one of the highlights of all studies reviewed. Mouta, Pinto-Llorente, et al. (2024) indicated in their systematic review that AI enthusiasm could distract users from ethical issues surrounding AI as a non-neutral tool. Chounta et al. (2022) conducted a survey on the Estonian K–12 teachers (N = 140) who appeared to know little about AI, but viewed it as a positive opportunity for discussing fairness, accountability, transparency, and ethics. An et al. (2025) examined the guidelines of the 50 best-rated universities in the U.S. to highlight the themes of academic integrity and privacy as very important ones, noting that 94% of the universities used to have faculty guidelines of a course-specific nature. Zheng et al. (2025) shared the results of the survey on people from Pakistan, with 75% of them having ethical, data privacy, and academic integrity concerns. Many studies have shown that inequality is something that defines who will profit from AI implementations. According to Magwa (2026), the educational inequality based on AI implementation spreads beyond the limited access, having some other limitations, such as lack of AI literacy, support of the institution, and abilities of learners to impact the process of learning with the help of AI resources.

According to Velarde-Camaqui et al. (2026), a lack of sufficient infrastructure and digital equity in rural environments is one of the major gaps, while Bou Zeid and Abouchedid (2026) provided an example of problems related to equity in access to technology in Lebanon, where some schoolchildren had to use borrowed gadgets and remained dependent on WhatsApp. Zheng et al. (2025) revealed that only 8–11% of respondents felt that the institutions were prepared for the implementation of generative models and that less than 35% of them had any formal training in AI.

There is a close connection between the readiness of educators and the governance of institutions. Pei et al. (2026) characterised educators' AI literacy as a multidimensional and context-dependent concept involving communication with AI, the use of tools offered by AI, and the ethical and social effects. Mouta et al. (2025) suggested a higher investment in professional development of teachers to enable them to be in control of ethical challenges, whereas Omar et al. (2024) encouraged intensive training of faculty.

According to Abolina et al. (2026), both learners and educators reported only a medium level of confidence in AI competencies, claiming that they do not possess sufficient skills. From a leadership perspective, Obied and Haj Ali (2026) analysed the findings of fifty studies examining bias of algorithms, privacy of data and ethical issues in academia and emphasised the need for ethical foundations and consistency in leadership responsibility in developing AI solutions. Similarly, Sposato (2025) argued that the lack of a clear framework for implementation of AI at higher education institutions has resulted in disintegration of the AI implementation process and initiated the creation of the ten domains of its application in university governance.

4.5 Towards a human-centred conceptual understanding of AI and human learning

According to various researchers, AI should be viewed as a complement to human learning, rather than as a substitute for it. Ouyang & Jiao (2021) argue that education systems are shifting to a more learner-centred, personalised approach, whereby students monitor their learning and feed information to AI technologies, thereby making the technology adapt to them. Similarly, Anders & Dux Speltz (2025), as well as Kwon et al. (2026), appreciated the benefits of the approach incorporating the learner and keeping them in charge of the process. Moreover, according to Almajdoub et al. (2026), the contribution of AI can be maximised when it is viewed as educational support, whereas teachers need to be responsible for the adequacy and ethical principles. Last but not least, Pozdniakov et al. (2026) applied their findings in practice with the intention to provide teachers with additional assistance rather than to replace them altogether.

Additionally, various scholars have developed different frameworks that cover different aspects of pedagogy, psychology and ethics. The concept of pedagogical ecology of AI in language education was introduced by Javadinejad and Davari (2026), explaining the interaction of such elements as the tools, learners and teachers, learning feedback mechanisms and evaluation systems. Bittencourt et al. (2024) also elaborated a roadmap of connection between positive psychology and AI in education for the purpose of the well-being of students and teachers. Another contribution was made by Pozdniakov et al. (2024), who created a framework of pedagogically

oriented and ethics-based AI tools based on the idea of human-centred design. Mouta, Torrecilla-Sánchez et al. (2024) prepared an instrument kit of various scenarios created during a participatory process of engaging stakeholders, and Obied and Haj Ali (2026) established a five-step framework of ethical governance in AI field, which can be referred to as intelligent AI. The last model, by Bagherimajd and Khajedad (2025) includes a model of AI-based sustainable education which contains seven sections, such as continuous learning, creativity and innovation.

5. Psychological Perspective on the Future of Human Learning

Taking a psychological perspective, it turns out that from the studies reviewed, the future of human learning will rely more on how the human cognitive and motivational processes are activated when using AI technology than on what AI is capable of. One can identify five interrelated concepts that were discussed in 44 articles reviewed: cognitive autonomy, critical thinking, metacognition, creativity, and human agency. Here, most of the results stem from perception-based studies and short-term interventions, leading to the idea that the results should be interpreted not as conclusive but rather as indicative only.

5.1 Cognitive autonomy

Cognitive autonomy, the ability to think, act and learn independently while working with AI, gave rise to the core of tension. Some studies report that AI could support autonomy. Other studies report that the teachers of Islamic Education indicated that AI at least encouraged learner autonomy, confidence, and yet sufficiently self-paced practice in Qur'anic learning. Javadinejad and Davari (2026), meanwhile, reviewed 221 publications and reported learner autonomy as a benefit of AI in EFL/ESL education. The same studies also recounted the opposite danger. The teachers consulted by Almajdoub et al. (2026) cited concerns over a degree of consistent reliance and dependence by learners, while Javadinejad and Davari (2026) mentioned learner over-reliance as a baseline challenge.

Use is what generally determines whether AI facilitates autonomy or not, as pointed out by Aboualenein et al. (2025). They noted that unstructured use of ChatGPT leads to passive learning by students. In their quasi-experiment, it was established that those students who used ChatGPT in a structured manner developed their programming skills better than those who used it in an unstructured way. The sense of the issue is very similar, according to Kwon et al. (2026), who showed that some students critically interacted with AI, while others were passive and dependent on it. Anders and Dux Speltz(2025) regarded generative AI as a source of new opportunities for knowledge acquisition as well as a source of skill loss and dependency, while Blahopoulou and OrtizBonnin (2025) reported on students' fears that using ChatGPT could undermine higher education because students become dependent on this technology.

5.2 Critical thinking

Critical thinking is seen as both a desirable result of using artificial intelligence and as a means of preventing any negative consequences from its use. Tafazoli (2024) indicates that teachers of English in Iran (a group of 23) regard generative AI as a way of encouraging critical thinking, intellectual liberty and tolerance. Abouelenein et al. (2025) developed a specific template for the implementation of ChatGPT for the purposes of active learning and critical thinking in programming studies. Kwon et al. (2026) established that numerous students not only challenge and reconsider suggestions produced by AI, but also face the issue of nebulous AI suggestions and difficulties understanding AI feedback. The authors infer that explicit training in commenting, checking and evaluating is an urgent necessity.

Various research studies prove the importance of critical thinking skills for students. Pecuchova et al. (2026) suggest that AI comments are less rich in pedagogical content and require more repetition than human feedback, indicating that learners must be able to evaluate the quality of AI output. Anders and Dux Speltz (2025) solved the issue of imparting critical literacy in their model with the inclusion of functional and creative components. Hopfenbeck et al. (2023) argued for a renewed emphasis on critical thinking in formative assessment in an AI-driven digital age.

5.3 Metacognition

This area (metacognition) has received minimal attention in previous studies, as only a few researchers discussed it in their works. Rollout and Dux Speltz (2025) exemplify those who investigated the matter by combining AI literacies with self-regulated learning into the Plan-Iterate-Evaluate cycle. The study involved undergraduates (N=38) applying their domain knowledge in the planning stage and setting evaluation criteria, checking their output during the iteration stage, and reflecting upon the collaboration with AI during the evaluation phase. The authors concluded that the combined application of experiential learning techniques together with the principles of AI literacy and metacognition is likely to result in effective collaboration with AI-enabled tools. Hopfenbeck et al. (2023) also emphasised the importance of self-regulated learning in the process of formative assessment with the use of AI tools.

The existing evidence regarding the aspect of reflection appeared to be rather contradictory. Saritepeci and Yildiz Durak (2024) pointed out that there was progress in both the AI-assisted learning and the control segments as regards the level of the two notions – creative self-efficacy and critical reflection. Therefore, the authors could not isolate the specific effect of AI on reflective thinking. Ouyang and Jiao (2021) mentioned that AI-aided education allows students to reflect on their knowledge and provide the AI with information that will enable it to adjust. The terms metacognition and self-regulation, therefore, seem to be more of design principles in the literature than results to rely on; this is regarded as a field to be researched in the future.

5.4 Creativity

The research conducted regarding creativity yielded positive but cautious results as well. In a study conducted by Saritepeci and Yildiz Durak (2024), ChatGPT and Midjourney were used for a period of five weeks of storytelling activities with undergraduate students (87 students in the experimental group and 99 students in the control group). Both the experimental and control groups demonstrated improvement in terms of creative self-efficacy and critical reflection, while the difference in design thinking mindset in the two groups' pre- and post-tests was insignificant. However, on its own, this research does not prove that the application of AI in creative activities produced effects that went beyond those of design activities. Anders and Dux Speltz (2025) studied creativity within the topic of generative AI literacy and discussed the strategies of human-AI partnership cooperation that aim to supplement students' creativity rather than replace it. Flogie et al. (2026) reported that the educational leaders of Slovenia pointed out support for creative activities among the advantages of generative AI; meanwhile, Bagherimajd and Khajedad (2025) categorised creativity and innovation as one of the seven areas of opportunities and challenges presented by AI in the area of sustainable higher education.

Concerns were raised in the literature regarding creativity being affected negatively. Omidvar and Meihami (2025) revealed that over-reliance on AI in EFL teacher education can reduce interpersonal communication and lead to a decrease in teacher creativity. Thus, it can be said that creativity is promoted when AI is used to help in a creative process, but put at risk when the human's creative efforts are forsaken in AI.

5.5 Human agency

Human agency has been mostly related to possible future relationships of artificial intelligence and learning. Ouyang & Jiao (2021) devised a continuum in which the first stage can be described as "learning with AI" and the final stage is marked by learners having agency in their studies." The authors came to the conclusion that moves towards agency of learners are seen in educational contexts. The study by Anders & Dux Speltz (2025) was an implementation of a learner-centred approach showing that learners can be empowered to have agency over their learning. Kwon, Yang & Kim (2026) proposed that it is crucial for learners to have agency and skills in the use of AI as a support to their learning.

Agency is also relevant in terms of the teachers and their enabling the conditions. Seo and co-authors (2021) point out that both learners and teachers welcome the idea of personalised support at scale, but they also raise concerns about accountability, agency, and surveillance. Mouta et al. (2025) focused on the concepts of teacher agency, arguing that, through professional learning, agency can be developed in terms of individual and

collective ability to address ethical issues of AI. Pozdniakov et al. (2026) viewed AI in a supporting role to teachers, while Almajdoub et al. (2026) argued that teachers are still vital for accuracy, ethical alignment, and verification. Magwa (2026), using the Capability Approach, noted that agency is distributed in an uneven way, as different learners have different abilities to utilise AI.

The insights multimodal texts (the original 44 articles) gathered show that the future of AI-assisted learning will depend on the way AI is developed and taught with the aim of increasing independent thinking, critical judgement, reflection, creativity and agency of learners rather than eliminating these traits.

CONCLUSION

This thematic research evaluated the impact of artificial intelligence (AI) on the development of human learning regarding the various educational opportunities provided by AI and the psychological challenges involved in using it. The paper synthesises findings from 44 peer-reviewed journal articles found on Scopus and organises the analysis according to 5 objectives and the resulting 5 themes. Results prove that AI provides genuine educational value, which, however, depends on how learners, educators, and institutions make use of it.

Regarding the first objective of this paper, the review revealed that AI is often referred to as the provision of personalised learning, adaptive learning, and the value of feedback (theme 4.1). The studies state that thanks to generative AI, feedback can be given to large classes (Pozdniakov et al., 2024, 2026) and motivation and interest can be increased by content tailored to students (Tasdelen & Bodemer, 2025), and access to educational materials can be facilitated (Blahopoulou & Ortiz-Bonnin, 2025; Tafazoli, 2024). Nevertheless, the extent of these opportunities is limited. According to Pecuchova et al. (2026), teacher feedback is more effective than AI feedback when it comes to performance improvements on difficult tasks, which shows that AI provide support for education rather than substituting it.

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In connection to the fourth objective, the review noted challenges of an ethical, social, and institutional nature which influence whether AI will be advantageous for all learners (Theme 4.4). Those included ethical blind spots and the issue of privacy and integrity in academic performance (An et al., 2025; Mouta, Pinto-Llorente et al., 2024; Zheng et al., 2025), restrictions caused by the lack of resources and inequalities in terms of the quality of AI literacy and the ability to use it (Bou Zeid & Abouchedid, 2026; Magwa, 2026; Velarde-Camaqui et al., 2026) and the problems related to educator adaptation and educational governance (Abolina et al., 2026; Mouta et al., 2025; Obied & Haj Ali, 2026; Pei et al., 2026; Sposato, 2025). In general, these studies show that the impact of AI implementation is closely connected to the conditions in which it takes place.

Regarding the fifth objective of this research, the review aims to define a more human-centred perspective in terms of future AI/learning interaction (Theme 4.5). The literature has already started to move from the understanding of learners as AI beneficiaries to the role of learners as contributors and driving forces (Ouyang

& Jiao, 2021) and various frameworks depict AI as an assistant to teachers and learners (Bittencourt et al., 2024; Javadinejad & Davari, 2026; Pozdniakov ET AL. (2024).

The evidence analysed indicates that the anticipated future hinges on three key factors: learners who exercise their autonomy through systematic and critical use of artificial intelligence, teachers who utilise training and professional development to gain support, and organisations responsible for implementing AI in a way that upholds ethical principles pertaining to fairness and equity. The review is subject to certain limitations. It analysed 44 scientific papers from one database (Scopus), whereas this study focuses solely on articles published in English within the social science field; thus, other publications on the topic may be missing from the review. In addition, it includes studies that investigate perceptions of AI

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