

Learning with Artificial Intelligence or Learning from Human Teachers?

A Review of the Psychological Implications for Children's Mental Health and Emotional Development

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Abstract

Artificial intelligence (AI) continues to revolutionise the way educational methods are delivered, as it provides individualised teaching, adaptive learning and round-the-clock access to academic resources. Although AI shows promise in improving academic engagement and outcomes, its growing role as a companion for children raises critical concerns about mental health, well-being, and social learning. This review synthesises the literature from developmental psychology, educational psychology, and AI in education to

outline psychological considerations for learning with an AI agent compared with learning with a human teacher. This review critically examines important themes related to AI-assisted learning, teacher-student relationships, empathy, social-emotional development, critical thinking, and children's mental health. The results suggest that AI enables cognitive learning through personalisation, provision of immediate feedback, and increased accessibility. Yet the human teacher is essential to developing empathy, emotional safety, grit, moral judgement, and social skills through real relationships and relevant socialisation. Interdisciplinary and longitudinal studies of children learning in school settings are called for, but few currently exist on the long-term psychological effects of AI-assisted learning. In the end, it says AI should be considered as an aid to education rather than a replacement for human teachers. An ideal human-AI partnership that optimises educational benefits while maintaining the relational and developmental experiences central to children's mental health is necessary.

Keywords: artificial intelligence; learning; mental health; well-being; social learning

1. Introduction

Artificial Intelligence (AI) is one of the most revolutionary technological advancements of the twenty-first century, greatly redefining education worldwide. Generative AI, intelligent tutoring systems, adaptive learning platforms, and conversational agents are recent advancements in the field that have enabled students to receive personalised learning support outside the classroom. These technologies can provide personalised learning, real-time feedback, adaptive assessments, and ongoing learning opportunities, enhancing access and flexibility in learning. With the growing presence of AI in primary and secondary schools, children are engaging with AI not just as a tool but as a learning companion who is actively involved in their learning process.

The educational potential of AI has been extensively recognised, but learning is not just about acquiring academic knowledge; it is a social, emotional and developmental journey. Human learning results from meaningful interactions with teachers, peers, parents, and other social environments. Teachers can play a positive role by helping their students not only with cognitive growth but also with emotional security, empathy, motivation, resilience, moral reasoning and interpersonal competency. Children's academic success, emotional health, social development and psychological resilience have been consistently linked with positive relationships between children and teachers. This increased use of AI-assisted learning, therefore, raises critical questions about how much technological systems can do to support these broader developmental functions, which are usually performed.

Childhood is a pivotal time in cognitive, emotional and social development. During this period, children develop key socio-emotional skills such as understanding and expressing empathy, managing emotions, communicating, taking others' perspectives, collaborating as a team, and making ethical decisions. Most of these skills are developed in school through interactions with others and through watching people. While modern AI models can mimic empathy and tailor learning to the individual, they lack the emotional depth, consciousness, and social experiences essential to true empathy. This dichotomy has sparked anxiety about the potential psychological consequences of AI's growing influence on children's learning experience.

New studies have found that AI can boost student engagement, optimise learning, and personalise instruction, especially for those who need extra help. But scholars also raise concerns about excessive reliance on AI, reduced opportunities for social interaction,

diminished critical thinking, increased screen time, and a potential decline in interpersonal relationships. As AI gradually permeates children's educational experiences, it is crucial to look beyond its learning capabilities and examine its impact on children's mental health, emotional development, social learning, motivation, and psychological well-being.

Although the literature on AI in education has been growing rapidly, there is comparatively little work examining the psychological distinctions between learning with AI and learning from human teachers. Although there are studies on academic outcomes, technological acceptance, and instructional effectiveness, the developmental and mental health consequences of the substitution and/or augmentation of human interaction with AI-mediated learning have been studied less. This is important, especially with the growing integration of AI-based education tools in schools and households.

The present review is an attempt to critically analyse the literature to compare the AI-assisted learning and human teacher-led learning, focusing on mental health, emotional development, social learning, empathy, motivation, and critical thinking among children. This review aims to synthesise information from various fields, including educational psychology, developmental psychology, and relevant AI research, to provide a holistic perspective on the opportunities and challenges of introducing AI into children's learning spaces. Additionally, the review outlines implications for educators, mental health professionals, parents, policy makers and technology developers to advocate for educational innovation while protecting children psychologically and emotionally.

2. Conceptual Background

2.1. Artificial Intelligence in Education

Artificial Intelligence (AI) is the science of building intelligent computers that can learn, reason, solve problems, process language, make decisions, and recognise patterns like humans. In the context of education, AI has progressed beyond computer-assisted instruction to intelligent tutoring systems, adaptive learning platforms, learning analytics, and generative AI tools for personalised learning support. The technologies use algorithms and machine learning techniques to analyse students' learning patterns, strengths and weaknesses, and tailor education to individual learning needs.

AI in education has revolutionised traditional teaching models to provide personalised learning, instant feedback, automated assessments, and easier access to learning materials. AI systems can assist students in managing the speed and level of difficulty of content, provide personal explanations, and enable self-learning. Such innovations have shown promise in enhancing academic engagement, meeting diverse learning needs, and advancing learning equity, especially for students in need of extra instructional support. Therefore, today AI is beginning to be seen not only as an instrument and a tool but as an active actor in the teaching and learning process.

2.2. Human Teachers as Social and Emotional Facilitators

Teaching goes beyond conveying academic content and is a multidimensional process. Through meaningful interpersonal relationships, human teachers are the key to promoting children's cognitive, emotional, social and moral development. The importance of the social context of learning has been highlighted throughout educational psychology, where the

teacher supports, encourages, provides feedback, and fosters collaborative learning. Teachers also practice empathy, communication, cooperation, ethical behaviour, and emotional regulation in daily school activities, thereby promoting children's psychological growth.

Positive teacher–student relationships have been associated with increased academic motivation, classroom engagement, resilience, self-esteem, and psychological well-being. Teachers are also uniquely positioned to identify behavioural or emotional difficulties, respond sensitively to children's individual needs, and create psychologically safe learning environments. Unlike AI systems, human educators possess emotional awareness, contextual understanding, professional judgment, and the capacity to build authentic relationships that promote both learning and healthy development.

2.3. Child Mental Health and Emotional Development

The World Health Organisation defines mental health as a state of well-being in which individuals recognise their abilities, cope effectively with everyday stresses, work productively, and contribute meaningfully to their communities. In childhood, mental health encompasses emotional well-being, behavioural adjustment, social competence, resilience, and healthy cognitive development. Positive mental health during childhood is strongly associated with supportive relationships, secure attachment, opportunities for social interaction, and emotionally responsive educational environments.

Emotional development refers to the progressive acquisition of skills that enable children to recognise, understand, express, and regulate emotions, as well as to develop empathy, self-awareness, and healthy interpersonal relationships. Schools are among the primary environments in which these competencies are nurtured through interactions with teachers and peers. Consequently, educational experiences influence not only academic achievement but also broader developmental outcomes that contribute to lifelong psychological well-being.

2.4. AI as a Learning Companion: A Developmental Perspective

Conversational AI's rise has ushered in a new era in which technology is not just an educational tool but also a learning partner. AI systems can engage in natural-language conversations, answer questions, explain concepts, and provide continuous academic support. They are interactive, making children feel the item is responsive and socially engaging, changing learning patterns.

This transition highlights some key developmental issues about how children interact with AI. AI can mimic supportive communication and individualise learning experiences, but it doesn't have consciousness, understanding of emotions, experience, or human interactions. Developmental theories highlight the importance of real-life encounters that include shared emotion, observation, collaboration, and relationships with others in the development of children's social, emotional, and moral abilities. Thus, when considering AI as a learning partner, it is important to take into account its potential impact on children's psychological growth, social learning, emotional health, and mental well-being, as well as its educational effectiveness.

2.5. Theoretical Perspectives Underpinning the Review

This paper relies on theories in developmental and educational psychology. According to Lev Vygotsky's sociocultural theory, cognitive development is largely shaped by social interaction with more knowledgeable others, thereby emphasising the pivotal role of teachers and peers in learning. Likewise, Albert Bandura's social learning theory states that children can learn behaviours, attitudes, and emotional responses through observation, imitation, and reinforcement in social contexts.

Moreover, based on John Bowlby's attachment theory, secure and supportive adult relationships play a crucial role in fostering emotional security and psychological resilience. Today's social-emotional learning (SEL) models also highlight that empathy, emotion management, responsible decision making and relationship competencies are learned through real-life social interactions. Together, these theoretical views can serve as a guide for determining whether AI can assist children's cognitive, emotional, and psychological development and work alongside humans in their educational role.

3. Review of Literature

3.1. Artificial Intelligence in Education and Academic Learning

The role of Artificial Intelligence (AI) in educational environments has seen a significant growth and development in the last decade, reshaping the way children access, process and interact with learning. AI in education aims to deliver personalised learning experiences, real-time feedback, and ongoing support through educational technologies such as AI Tutors, adaptive learning platforms, and, more recently, generative AI tools. These technologies have transformed the education system from a more teacher-centred to a more individual, technology-mediated learning experience.

Early work on AI in education focused mainly on how AI can enhance student learning outcomes by providing personalised learning. Olaf Zawacki-Richter et al. (2019) have conducted one of the most comprehensive systematic reviews in the field, in which they analysed the available literature concerning the use of AI in higher and school education and concluded that intelligent tutoring systems and adaptive learning technologies always resulted in increased learning efficiency by adapting learning content to the individual needs of the pupils. The review also indicated, however, that most of the research focused on cognitive outcomes, including academic achievement and problem-solving, with relatively little attention to learners' emotional, psychological, or social development.

Generative AI has furthered the educational capabilities of AI systems. Kasneci, E. et al. (2023) proposed that large language models can help make education more accessible and democratise it by offering personalised explanations, real-time academic support, and greater accessibility for learners across various educational settings. Meanwhile, the authors warned that such technologies must not be used in place of teachers and that good education relies on pedagogical judgment, ethical decision-making, and human interaction. Recent systematic reviews of LLMs in education have identified many potential applications, such as personalised feedback, content creation, assessment aids, and adaptive learning, as well as concerns about excessive reliance on AI, transparency, privacy, and the need for human-centred implementation.

In addition to academic outcomes, some research indicates that AI can positively impact students' engagement and motivation when implemented appropriately in the classroom. Increased learner satisfaction and improved education outcomes have been linked to

personalised feedback, adaptive pacing, and opportunities for self-directed learning. AI-powered systems can also reduce the academic pressure students face by allowing them to ask questions without worrying about embarrassment, thereby fostering confidence in learners who hesitate to participate in standard classroom conversations. However, studies consistently indicate that the advantages of using AI are maximised when it is used as a supportive instructional tool rather than a standalone teaching replacement.

However, recent research in the field of AI in education recognises significant drawbacks to AI-supported learning. AI technology shows promising performance in providing information and adjusting teaching materials. Still, it has limited ability to facilitate dialogue, convey emotional and contextual cues, support interpersonal interaction and collaborative learning, and respond to children's complex interpersonal needs. Human-centred reviews of AI in education thus point to the importance of keeping teachers actively involved in AI-supported learning environments to preserve the ability of educational technologies to foster trust and safety, emotional well-being, and overall child development in addition to academic achievement.

Overall, the current literature suggests significant potential for AI to improve children's learning in the classroom by tailoring support to their individual needs, making learning more accessible, and adapting future instruction. The evidence also indicates that most research has focused on cognitive and instructional outcomes, with little attention to children's mental health, emotional development, empathy, and social learning. This gap creates the basis for this current review to explore whether the educational benefits of AI extend beyond to its broader psychological implications, when contrasted with learning with a human teacher.

3.2. Teacher–Student Relationships and Child Development

There is a substantial body of research in education and developmental psychology showing that learning is fundamentally a social process and that the relationship between teachers and students is one of the most important factors influencing children's success in school, their emotions, and their social interactions. AI education technologies are mainly used to acquire knowledge and skills. Still, emotional support, mentorship, modelling, and the provision of a psychologically safe learning environment are aspects of the teacher's role that can influence children's learning processes. Therefore, teacher–child interactions are not only important for how well they teach but also crucial for children's development in general.

In developmental literature, the critical role of supportive teacher–student relationships is widely recognised. Building on this theory of attachment, John Bowlby (1969, 1988) suggested that a child's ability to explore, be resilient and be emotionally secure depends on how they were treated by significant adults in their lives. Adapting these concepts to the educational context, Robert C. Pianta (1999) suggested that teachers are often secondary attachment figures, especially in the early years of school. Positive teacher–child interactions offer emotional support to children, help build confidence in learning and facilitate adaptive behaviour and emotions inside the classroom.

The importance of these relationships is well supported by empirical evidence. Bridget K. Hamre and Robert C. Pianta (2001) conducted a longitudinal study. They found that the quality of teacher–student relationships in the early elementary years had a significant impact on students' later academic achievement, behavioural adjustment, and emotional functioning. Children who had warm and supportive relationships with teachers were less likely to have behavioural problems, to not attend school, to experience poor academic

performance, to have difficulties with socialisation, or to drop out. The results indicate that the teacher has an impact on children's developmental paths, not only by teaching them but also by handling relationships differently.

Educational psychology also highlights the importance of teachers' roles in facilitating learners' learning through social interaction and guided participation. Cognitive development occurs through collaborative interactions with more cognitively advanced individuals, who provide appropriate guidance to the learner within the ZPD, according to Lev Vygotsky's sociocultural theory (1978). Teachers scaffold learning by adapting explanations, allowing time for reflection, questioning with purpose, and, as competence grows, taking on less and less responsibility. Human teachers can read children's verbal and non-verbal signals, gauge their emotional state, and adjust their approach. In contrast, AI systems can only adapt based on the algorithmic analysis.

Similarly, Albert Bandura's (1977) social learning theory emphasises the importance of observation and modelling for children. Children learn about empathy, cooperation, communication, emotional regulation and conflict resolution by watching how teachers interact and behave in the classroom. Teachers demonstrate respectful communication, ethical decision-making, persistence, and prosocial behaviour, and help children learn these social and emotional skills, which can be learned only through demonstration rather than information. Together, these interpersonal relationships have a profound impact on children's emotional intelligence and social competencies, which are strongly linked to positive mental health outcomes.

Social-emotional learning studies also underscore the significance of teachers' roles in children's psychological growth. According to a pivotal meta-analysis of over 270,000 students, Joseph A. Durlak et al (2011) found that SEL programs in schools had a significant effect on students' emotional regulation, interpersonal skills, prosocial behaviour, academic achievement, and psychological functioning. Of particular interest is that these programmes were delivered in a structured manner, underpinned by teacher-student interaction, reflecting the importance of the teaching staff in promoting emotional competence alongside academic learning.

Recent research reiterates the importance of emotionally supportive classrooms in helping children become resilient and motivated and feel a sense of belonging. Students who feel their teachers are caring, responsive, and emotionally available are more likely to show intrinsic motivation, persist in learning, have higher levels of self-esteem and less anxiety and school-related stress. Teachers are also a key factor in the early detection of emotional and/or behavioural problems and in ensuring timely intervention and referral, if required. These roles involve empathy, context-specific decision-making, and genuine human interaction, which existing AI systems do not easily replicate.

The collective literature shows that teachers have several psychological roles beyond instruction. Teachers provide supportive relationships, are emotionally responsive, socially modelling, and provide direction on developmental issues, thus creating learning environments that foster learning and healthy psychological development. The results offer valuable insights into the growing integration of AI in education, suggesting that while AI can help teachers optimise their workflows, it is not easily replaceable in the relationships and emotional support that teachers provide for children's learning and development.

3.3. Artificial Intelligence, Social–Emotional Development, and Empathy

Social–emotional development is an essential aspect of children's health and well-being and includes awareness of emotions, emotion regulation, understanding of empathy, building positive relationships, and making informed decisions. The development of these skills depends largely on repeated interpersonal interactions with caregivers, teachers, and peers. As a result, there has been significant interest in the potential of AI to either aid or hinder the social and emotional development of children in education settings.

The latest studies of AI in education indicate that AI systems can have a beneficial impact on some aspects of affective learning. AI can support student engagement, confidence, and learning satisfaction through AI tutoring systems and conversational agents that offer encouraging feedback, adapt to student responses, and communicate in an emotionally responsive manner. A recent meta-analytic study in the field of emotional AI in education revealed that emotional AI programs combining cognitive and emotional support had a beneficial impact on knowledge acquisition and a slightly positive impact on emotional learning outcomes. The review, however, also highlighted that while AI emotional support is predominantly rule-based, it largely relies on recognising behavioural cues.

Nevertheless, researchers have always found a difference between simulated empathy and human empathy. Human empathy is emotional understanding, perspective-taking, shared experiences, and context, and it develops within real relationships. On the other hand, AI provides empathetic responses, yet it lacks emotions, as it detects patterns in language and forecasts suitable conversational answers. This is especially relevant in childhood, where emotional competence is acquired not only from information but also from interaction with others.

There has been increased concern about their inclination to anthropomorphise conversational AI when it comes to children. Studies indicate that younger users are more likely to feel an emotional connection and to overrely on AI chatbots, as they tend to view them as trustworthy, lifelike companions. It has been suggested that when the child is in this kind of situation, there may be an "empathy gap", which means that the child imputes to AI the ability to feel what they feel, when they are not actually feeling it. This can lead to misperceptions if AI responds inappropriately, inconsistently, or with an emotional disconnect in psychologically sensitive moments.

Overall, existing research indicates that AI could help augment parts of SEL by providing encouraging, adaptive feedback and emotionally responsive interactions. Nonetheless, empathy, reciprocity and emotional tuning are genuinely human qualities that play a key role in children's healthy psychological development. Therefore, it is crucial to understand that AI must not be seen as a replacement for valuable human interactions.

3.4. Artificial Intelligence and Critical Thinking

Critical thinking is one of the main goals of teaching and learning today, and it involves analysing, evaluating evidence, solving problems, and making one's own judgments. These competencies are nurtured through human teaching, which involves engaging with questions, discussion, challenging assumptions, and encouraging reflective thinking. The rapid generation of AI answers has sparked a lot of discussion about how these technologies enhance or actually undermine critical thinking among young students.

AI has been shown to improve higher-order learning when implemented appropriately in learning practices (several studies). Using adaptive learning systems, students can receive different explanations, receive scaffolding for complex problem-solving, and have multiple points of view presented on academic topics to support analytical reasoning. The use of AI systems in learning has shown promise in enhancing problem-solving abilities and knowledge

acquisition when teachers actively guide students to understand the information provided by the AI systems.

On the other hand, new research raises concerns that unrestricted use of generative AI can diminish students' motivation to make their own logical decisions. Leaders should ensure that AI is not used to accelerate learners' pace or provide immediate answers, as this can lead to greater reliance on AI and reduced persistence, intellectual curiosity, and reflective thinking. Studies have warned against an overreliance on AI-generated solutions, which can lead to shallow learning, decreased creativity and impaired ability to check for credibility and accuracy.

Human teachers are crucial in overcoming these shortcomings by facilitating discussion, challenging assumptions, and enabling students to reflect on and assess different points of view. Opportunities for learners to explain their reasoning, challenge their misconceptions, and become aware of their thinking in the classroom are provided through whole-class discussions, collaborative activities, and inquiry-based learning. Such interactive processes are hard to simulate with AI alone, as they involve continually understanding students' thoughts and feelings in changing social situations.

Based on the literature review, AI can improve critical thinking when used as a cognitive support tool. Its educational potential, however, relies on pedagogical strategies that help students critically assess AI-generated content rather than take it on faith. Human teachers continue to play an important role in developing independent thinking and independence of thought, therefore.

3.5. Artificial Intelligence and Children's Mental Health

The influence of AI on the mental health of children has emerged as a crucial field in psychology. While the promises of AI technologies in enhancing educational access, personalised learning, and emotional support are compelling, researchers have also expressed concerns about overreliance on technology, diminished social connections, increased screen time, and potential psychological effects of relying on AI as a social companion.

Adolescent AI companions have been designed to mimic companionship and empathy, suggesting the potential for the formation of emotionally significant relationships between users and the systems. Although these can give children some relief from loneliness or provide easy access to support, they also have worrisome implications for social development, emotional dependence, and the children's ability to recognise the difference between real and artificial relationships. The American Psychological Association has recommended that high fidelity in AI characters could negatively impact the development of social skills and emotional maturity if human relationships are replaced.

A recent review of the use of AI in child and adolescent mental health also found that AI-driven conversation-based systems have the potential to enhance access to information and deliver early psychological assistance, especially in areas where skilled services are scarce. But these systems can still miss out on more complicated emotional crises, or they may not be able to use professional judgment, or identify or respond to situations of extreme psychological distress. Scientists, consequently, consistently suggest that the use of AI should complement, not supplant, human mental health services and educational advice.

There are other factors to consider in the educational environment. Children have opportunities to build friendships and a sense of belonging, learn to cooperate, and receive

emotional support from teachers and peers at school. If AI-driven learning tools become overused and supplant relationship-based and collaborative learning experiences, there could be a risk of diminishing these opportunities. Hence, scholars advocate extending the assessment of the psychological implications of AI integration beyond academic outcomes to include a wider range of measures of emotional well-being, resilience, social competence, and mental health.

Overall, the literature suggests that AI has great potential to assist children's learning and welfare, provided it is used responsibly. But it is important to preserve positive teacher-student relationships, peer interaction and opportunities for real social involvement to foster healthy psychological development.

3.6. Research Gap

Existing literature on the application of Artificial Intelligence in educational contexts has seen a significant increase in research in recent years, with most studies reporting positive effects on personalised learning, academic performance, learner engagement, and instructional efficiency. In the same vein, numerous studies in developmental and educational psychology have highlighted the role of teacher–student relationships in facilitating children's emotional growth, resilience, social skills, and mental well-being.

However, few studies have directly investigated the psychological aspects of AI-assisted learning compared with human learning, particularly in the context of children. In existing investigations, educational effectiveness, technological acceptance or cognitive outcomes have often been studied. At the same time, the importance of empathy, emotional attachment, social learning, psychological well-being and long-term developmental consequences has received relatively little attention. In addition, many existing studies have been conducted with university students or adult learners, leaving the needs of younger children inadequately addressed.

This knowledge gap has been further exacerbated by the rapid emergence of generative AI, with this evolution of educational technologies outpacing the field of empirical psychology. There is a need for more longitudinal studies on the emotional development of children, collaboration between teachers and AI, digital dependency, and the mental health impacts of AI. Therefore, research is needed that integrates developmental psychology, educational psychology, and artificial intelligence to understand better how AI can be used in ways that not only improve learning but also maintain critical human connections that fuel children's healthy development.

4. Methodology

4.1. Review Design

This study adopted a structured narrative literature review to synthesise evidence and draw conclusions regarding the psychological aspects of using AI to support children's learning compared with learning with a human teacher. Given the novelty of this topic and the lack of studies directly comparing AI learning companions with human teachers, a narrative synthesis was deemed appropriate to integrate research from educational psychology, developmental psychology, child mental health, and AI in education.

4.2. Search Strategy

A comprehensive literature search was conducted using major electronic databases, including Google Scholar, PubMed, PsycINFO, Scopus, and ERIC. Additional articles were identified through reference lists of relevant publications to ensure broader coverage of the literature. The search was restricted to studies published in English.

Searches were conducted using combinations of keywords and Boolean operators, including: Artificial Intelligence, AI in education, generative AI, intelligent tutoring systems, human teachers, teacher–student relationship, child mental health, emotional development, social-emotional learning, critical thinking, empathy, children, adolescents, educational technology, and psychological well-being. These terms were combined using the operators "AND" and "OR" to identify studies examining the educational and psychological implications of AI-assisted learning.

4.3. Inclusion and Exclusion Criteria

Studies were included if they:

1. were published in peer-reviewed journals;
2. were published in English;
3. focused on children or adolescents in educational settings;
4. examined AI-assisted learning, intelligent tutoring systems, generative AI, or related educational technologies;
5. investigated outcomes related to cognitive, emotional, social, behavioural, or mental health development; or
6. explored the role of teacher–student relationships, social-emotional learning, or human interaction in children's educational experiences.

Studies were excluded if they:

1. focused exclusively on higher education or adult learners without implications for children;
2. primarily examined technical aspects of AI development without educational or psychological outcomes;
3. consisted solely of conference abstracts, editorials, opinion pieces, or non-peer-reviewed sources; or
4. were not available in English.

4.4. Data Extraction and Synthesis

Relevant studies were reviewed to identify recurring themes concerning the role of AI and human teachers in children's learning and development. Information regarding study objectives, participants, educational context, methodology, and key psychological outcomes was extracted and compared across studies. Findings were synthesised thematically rather than statistically due to considerable heterogeneity in study designs, AI applications, participant characteristics, and outcome measures.

Thematic synthesis was done under the six major themes that were found in literature repeatedly: (a) AI and academic learning, (b) Teacher–Student Relationships, (c) Empathy

and Social-Emotional Development, (d) Critical Thinking and Cognitive Engagement, (e) Mental Health and Psychological Well-being, and (f) AI as a Learning Companion. This strategy enabled a thorough analysis of the advantages of incorporating AI into children's education and its potential psychological effects.

5. Discussion

This review explored the psychological consequences of learning from Artificial Intelligence (AI) versus a human teacher, focusing specifically on children's mental health, emotional development, empathy, social learning, and critical thinking. Overall, the literature reviewed indicates that AI is a powerful tool for education, providing personalised learning experiences, adaptability, real-time feedback, and accessibility. These qualities make AI a valuable learning tool that can help improve engagement and cater to various learning needs. Overall, though, the results consistently suggest that the educational potential of AI so far lies mostly in cognitive and instructional aspects. At the same time, many functions crucial to children's holistic development remain based on meaningful human relationships.

One major conclusion of this study is that education cannot be explained only as the dissemination of information. Children's learning is organically connected to their relationships, which influence their emotional security, identity, moral reasoning, language skills, and resilience. Empathy, encouragement, observation, mentorship and real-person interaction are all means by which human teachers help facilitate these developmental processes. In contrast to AI, teachers are always interpreting verbal and non-verbal signals, reacting flexibly to children's emotional needs and adjusting their interactions depending on context, experience and professional judgement. Therefore, the teacher's responsibility is not just to teach, but also to support students emotionally, build relationships, and promote students' psychological health.

A key difference between personalised learning and personalised development is also included in the review. AI systems are especially effective in personalising educational materials to align with students' learning levels and other academic skills. They can provide instant feedback, detect learning gaps, and give personalised explanations that enhance learners' performance and confidence in the classroom through adaptive algorithms. However, personalisation in education does not necessarily lead to emotional or developmental development. Children's socio-emotional skills—such as empathy, cooperation, emotional regulation and interpersonal communication—develop mainly through these reciprocal experiences with teachers and peers. These developmental experiences are human relationships that can't be truly replicated by AI, no matter how advanced its conversational capabilities.

A significant discovery is the advancement of conversational AI and its potential impact on children's social and emotional experiences. Though AI systems might produce empathetic text and responses, they lack consciousness, lived experience, and genuine emotional understanding. The distinction may not be evident for younger children who tend to anthropomorphise technology. With the growing interactivity and emotional responsiveness of AI, there is a risk that children may project human attributes onto AI systems or develop a dependency on them for reassurance and companionship. While the evidence remains sparse, these advancements do raise significant questions about emotional dependency, social learning, and the potential long-term impacts of AI-mediated relationships on psychological development.

The results also indicate that the effect of AI on critical thinking is influenced by how these technologies are implemented in education. AI can facilitate higher-order thinking and

independent learning when it is used to stimulate inquiry, encourage exploration and provide multiple perspectives. On the other hand, over-delegation of AI-generated answers can lead to reduced engagement in thoughtful problem-solving, a diminished desire to reason, and dependence on easily accessible information. This makes the role of teachers even more crucial as critical assessors of AI-generated content, challenging AI assumptions, identifying bias, and creating digital literacy. As AI becomes ubiquitous, it could also demand more teachers to teach students how to think analytically and make ethical choices in an AI-driven learning landscape.

Another crucial finding from this review is the scarcity of empirical studies examining the potential long-term effects of AI on children's mental health and emotional well-being. There is relatively little research on outcomes in this area, including resilience, attachment, empathy, school belonging or psychological well-being. In contrast, much of the research is directed towards academic achievement, technology acceptance or instructional effectiveness. Additionally, many current research studies are conducted with University students or adult learners, so the findings may not apply to younger children with different needs. This indicates the need for more collaboration among developmental psychologists, psychiatrists, educators, and AI researchers to generate evidence to inform child-centred educational policies.

As a whole, the evidence synthesised in this review points to a balanced approach to integrating AI in education. Instead, AI and human teachers are not mutually exclusive options but complementary partners, each with unique strengths. AI can supplement teachers to improve the efficiency of education, customise teaching, and expand education. Still, human teachers are irreplaceable in cultivating children's emotional security, empathy, toughness, values, and social skills. Human-centred AI that enhances teaching and learning should thus be a key focus in the future of education. Technology and artificial intelligence should continue to shape educational innovation, but so, too must the developmental, emotional and psychological needs of children themselves; artificial intelligence must enhance learning without eroding the human relationships that are central to the learning process.

5.1. Practical Implications

The findings from this review have implications for educators, schools, parents, policy makers and developers of educational technologies. In the context of education, AI should be used as an instructional aid and not a replacement for the quality of teacher-student relationships. Teachers should still provide opportunities for collaborative learning, emotional support, and critical thinking activities that technology cannot replace. Incorporating AI in schools should support a whole-school approach to wellbeing, focusing on SEL, peer interaction, and psychologically safe learning environments. There is a need for digital literacy initiatives to promote critical thinking about AI-generated information and responsible technology use alongside AI implementation.

It is crucial for parents to actively monitor their child's interactions with AI tools, promote responsible and balanced screen time, and foster opportunities for family bonding, play, and real-world social connections. Encouraging open dialogue with kids about the pros and cons of AI systems can help them set realistic expectations. Policymakers should focus on guidelines that promote the ethical use of AI in education, protect data privacy, advance equity, ensure transparency, and maintain human oversight. Policies should acknowledge that the developmental needs of children do not only relate to academic success but also to opportunities for real-life and personal interactions. Lastly, AI developers need to work with child development experts, educators, and psychologists to create systems that encourage

healthy learning habits, support teachers' instruction, and prevent excessive emotional dependence or social isolation.

5.2. Future Research Direction

While AI is rapidly growing in the education space, some key questions remain unanswered. The first is to conduct longitudinal studies to investigate the long-term impact of AI-assisted education on children's emotional development, social skills, psychological health, and resilience. The majority of research to date is on immediate educational outcomes, making it difficult to understand what happens over time.

Second, direct comparisons between AI-assisted learning and teacher-led learning across different developmental stages should be made in future research. This kind of research would help us understand whether there are differences between how AI affects younger children and adolescents, and what needs to be taken into account in education for these age groups.

Third, further studies are needed to investigate how children emotionally bond with conversational AI, especially given the increasing interaction and human-like qualities of generative AI. Knowing how children perceive, trust and emotionally engage with AI will be critical for devising ethical approaches to education.

Finally, interdisciplinary research involving developmental psychology, educational psychology, neuroscience, and artificial intelligence can help create evidence-based frameworks for the responsible implementation of AI in schools. Lastly, future research needs to explore culturally diverse educational contexts to ensure that AI-related policies and practices are inclusive, fair, and context-sensitive.

5.3. Limitations

There are several limitations to this review. First, there is little literature directly comparing the learning outcomes of using AI in learning with those of using human teachers for children; it needs to synthesise literature from related disciplines such as educational psychology, developmental psychology, and educational technology. Secondly, the fast-paced nature of generative AI development means new evidence is constantly emerging, and findings may need to be updated as technologies and educational practices evolve. Third, only English-language publications were considered, and relevant research in other languages may have been overlooked. Last, the heterogeneity of the designs and characteristics of participants, educational settings, and outcome measures hindered comparisons across studies.

6. Conclusions

In the realm of education, Artificial Intelligence has revolutionised the landscape, presenting unparalleled opportunities for personalised learning, adaptive teaching, and enhancing educational accessibility. This paper summarises evidence showing that responsibly implemented AI can effectively aid children's academic learning and serve as a valuable learning resource. However, education is essentially a human endeavour which involves emotional, social and psychological development as well as academic achievement.

The literature is consistent that human teachers have unique developmental roles beyond their instructional tasks. Empathy, secure relationships, social modelling, emotional responsiveness, and ethical guidance are areas where teachers can offer unique support,

nurturing children's resilience, emotional intelligence, critical thinking, and psychological well-being, which are not fully replicable with current AI technologies. AI can mimic helpful interactions and enable personalised learning, but it cannot replicate the genuine human interaction that is crucial to healthy childhood development.

Therefore, the future of education is not about AI vs human teachers, but a symbiotic relationship where AI serves as a complement to educators, who will remain essential in fostering social, emotional, and psychological development. By maintaining a balance between children's welfare and mental well-being and the use of AI for educational benefit, it will be crucial to ensure that the technology is human-centred and implemented ethically and in a developmentally appropriate manner.

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