AFFECTIVE AFFORDANCES IN AI-MEDIATED LEARNING: A SCOPING REVIEW ON ADOLESCENT MOTIVATION

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ABSTRACT
This paper examines how the activation and promotion of positive emotions influence the learning experience of students aged 11 to 18 when interacting with artificial intelligence assistants in a school setting. The theoretical framework integrates Self-Determination Theory (Deci & Ryan, 2000), the Control-Value Theory of Achievement Emotions (Pekrun, 2006), the broaden-and-build theory (Fredrickson, 2004), and the concept of affordance (Gibson, 1979; Norman, 2013). The goal is to clarify how interaction design can promote emotions that are functional for learning, specifically epistemic curiosity, a sense of perceived competence, and relatedness. Using a scoping review approach across three databases, a final corpus of 21 empirical studies was analyzed. The study aims to identify design principles for emotionally responsive educational systems, offering theoretical and practical implications for the development of GenAI in schools, while highlighting the exploratory nature of current evidence.

KEYWORDS
Generative AI; affective affordances; AI-mediated learning; self-determination theory; secondary education.

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1. Introduction

1.1 Self-Determination Theory (SDT)

Self-Determination Theory (SDT) offers a contribution by placing motivation along a continuum from controlled to autonomous regulation and postulates three fundamental psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000). When these needs are met in learning environments, students are more likely to exhibit intrinsic motivation, persistence, and deep engagement. In educational contexts where technology is present, SDT has been used to analyze how design features support or hinder these needs, such as whether an AI-based tutor offers meaningful choices (autonomy), optimal challenge and feedback (competence), and a sense of being seen and supported (relatedness) (Chiu et al., 2025; Hsie et al., 2026).

Recent experimental studies with tenth-grade students using AI-based chatbots in the classroom demonstrate that intrinsic motivation to learn with AI depends on both teacher support and students' experience with self-regulated learning and digital literacy. Teacher behaviors that facilitate students' use of AI, such as clarifying expectations, co-constructing prompts, and modeling critical evaluation, enhance perceived competence and relatedness, but may also slightly reduce perceived autonomy when guidance is overly directive. These findings suggest that, from an SDT perspective, AI-mediated learning should be framed as a triadic system (student-teacher-AI) in which design choices redistribute opportunities for need satisfaction (Chiu et al., 2025).

1.2 Control-Value Theory of Achievement Emotions (CVT)

Control-Value Theory explains achievement emotions (e.g., enjoyment, curiosity, anxiety, boredom) as arising from students’ appraisals of control over

learning activities and the subjective value they ascribe to these activities and outcomes (Pekrun, 2006). Meta-analytic evidence across 186 studies in technology-based learning environments shows that enjoyment and curiosity are positively related to perceived control and value, whereas anxiety and boredom are associated with low control or low value. These emotions, in turn, predict engagement, learning strategies, and achievement in largely similar ways across online and face-to-face settings (Loderer et al, 2020).

Studies indicate that the affordances of digital systems (immediate feedback, adaptive difficulty, multimodal representations) can modify students' control and value appraisals, and thereby their emotional experiences. This has direct implications for AI-mediated learning because an AI tutor that makes tasks more understandable and appropriately challenging can enhance control, while one that generates opaque outputs or overwhelms students can undermine it, increasing anxiety (Hsie et al., 2026; Daniels and Stupinsky, 2012).

1.3 Broaden-and-Build Theory of Positive Emotions

Broaden-and-build theory proposes that frequent experiences of positive emotions broaden individuals' thought–action repertoires and build enduring psychological, social, and cognitive resources (Fredrickson, 2004). In school, positive emotions during class time are linked to higher engagement and are also associated with adaptive coping strategies, which partially mediate the relation between emotions and engagement: this creates a virtuous circle in which positive affect supports resilience and learning (Reschly et al., 2008). When applied to AI-mediated learning, broaden-and-build suggests that interaction designs that elicit curiosity, enjoyment, and a sense of mastery may expand students' exploratory behavior (e.g., asking more questions, trying alternative solutions) and accumulate resources such as self-efficacy,

metacognitive skills, and social connectedness. Conversely, design features that inadvertently elicit confusion, shame, or anxiety may narrow attention and motivate avoidance, especially for adolescents already experiencing academic vulnerability (Fredrickson, 2004).

1.4 Affordance and affective affordances

The concept of affordance, borrowed from ecological psychology, refers to the possibilities for action that the environment offers an organism, in relation to its capabilities (Gibson, 1979; Norman, 2013). In human-computer interaction and design, affordances describe how interface features invite, enable, or constrain certain actions and interpretations. Recent studies on technology-mediated language learning underlines how digital tools enable both cognitive operations and shape emotional experiences (Ahmed, 2024).

Affective affordances in technology-mediated teaching are defined as the emotional possibilities that emerge from the interaction between students, tools, and the social context; emotions are viewed as socially constructed, embodied, and distributed in interactions between humans and technology (Ahmed, 2024). Research on emotions in technology-based learning environments shows that states such as enjoyment and curiosity/interest are consistently associated with greater engagement, deeper learning strategies, and better outcomes, while boredom, frustration, and anxiety tend to correlate with lower engagement and poorer performance, and these relationships remain fairly stable across different types of digital environments (Loderer et al., 2020; Lajoie et al., 2020). Digital tools that make content more understandable, monitorable, and adaptive tend to increase the perception of control and value, fostering enjoyment and curiosity (Pekrun, 2006; Loderer et al., 2020). Within this landscape, the affective turn in technologically

mediated education studies has introduced the notion of "affective affordances," highlighting how technologies can shape actual emotional landscapes (Ahmed, 2024).

Studies on Generative Artificial Intelligence (GenAI) systems in secondary schools apply this framework to chatbots and conversational assistants: in structured classroom contexts, such tools can be experienced by students simultaneously as pedagogical affordances (expansion of knowledge, immediate feedback, familiar interface) and as a source of new concerns related to the accuracy of responses, anxiety about the correctness of AI feedback, and ethical implications (Sivenas, 2025). In several cases, “epistemic safeguarding” strategies also emerge, whereby students limit the use of AI to domains that they can still independently verify, all of this to preserve epistemic control and agency (Sivenas, 2025; Loderer et al., 2020).

1.5 Conceptual Synthesis & Research Gap

The body of scientific literature addressing the topic of generative AI in secondary education is growing rapidly; however, it tends to focus primarily on specific aspects, such as cognitive advantages and disadvantages and technical usability. A significant gap remains in research regarding the emotional and psychological impact of these tools on vulnerable adolescent learners. This review addresses this gap by synthesizing multiple psychological constructs, such as motivation, epistemic curiosity, anxiety, and identity, under the unifying conceptual umbrella of "affective affordances." Affective affordances are treated as the design-level construct, that is, the emotional possibilities that an AI-mediated learning environment offers given its interface features, task design and classroom culture. SDT and control-value theory identify the psychological mechanisms through which these affordances may operate: the

satisfaction of the needs for autonomy, competence and relatedness, and appraisals of control and value.

Motivation, achievement emotions (e.g., curiosity, enjoyment, anxiety) and engagement are treated as outcomes, while identity and the anthropomorphic perception of AI are considered relational dimensions of the interaction that may shape both affordances and outcomes. Broaden-and-build theory provides a rationale for why positive emotions matter beyond the moment of interaction. This framework guided the organisation of the thematic synthesis.

2. Methods

2.1 Defining research questions

The integration of GenAI in secondary education is triggering a fundamental shift in the pedagogical landscape, moving from traditional teacher-led teaching to highly personalized, AI-enhanced learning environments. Initial empirical investigations reveal a critical paradox: while GenAI has the potential to significantly improve student engagement, autonomy, and reduced performance anxiety, its misuse, for example through passive delegation of cognitive tasks, risks stifling the development of essential epistemic skills (Zarkadoulas & Virvou, 2025; Zheng, 2024). Current literature highlights that adolescent aged 11-18 occupy a delicate developmental stage where self-esteem and identity are heavily influenced by relational evaluations. As students increasingly interact with AI-based chatbots that provide human-like responses, they are not merely using a tool; they are entering a complex, hybridized identity as "Digital Centaurs" (Soldatova et al., 2025). This transition necessitates a departure from viewing AI as a neutral utility, prompting the central research question: How can educators and AI-driven platforms act as "Strategic Mediators" to transform AI from a passive surrogate for thought into

a proactive catalyst for epistemic curiosity and emotional resilience?

Developing this inquiry requires addressing three core dimensions: (1) the calibration of cognitive load to maintain an optimal state of "productive struggle" (Demir et al., 2025); (2) the mitigation of affective barriers, such as math and language-learning anxiety, through the affordances of a non-judgmental AI environment (Zarkadoulas & Virvou, 2025; Zheng, 2024); and (3) the promotion of critical epistemic insight, ensuring students recognize the situated nature of knowledge across disciplines (Billingsley et al., 2025). By synthesizing evidence from the Self-Determination Theory (Xia et al., 2022; Alasgarova & Rzayev, 2024) and emerging studies on discovery curiosity (Demir et al., 2025), this research seeks to establish a framework that empowers students to reclaim their cognitive agency. The ultimate aim is to move beyond the binary of AI as either a threat or a panacea, defining instead a structured approach where the AI-mediated learning process fosters the development of self-regulated, resilient, and epistemically aware learners in an increasingly algorithmic world. Given the scoping design, the review maps the empirical evidence relevant to this question and uses the notion as a heuristic conceptual lens.

2.2 Search strategy and selection criteria

The study adopts a scoping review methodology, following the PRISMA extension for Scoping Reviews (PRISMA-ScR; Tricco et al., 2018). To ensure alignment with the research focus on AI as a Strategic Mediator in adolescent educational contexts, explicit inclusion and exclusion criteria were established prior to screening. Studies were included if they involved a direct AI-based intervention, targeted learners aged 11–18, explicitly examined psychological or motivational constructs (e.g., self-esteem, anxiety, curiosity), and were published between 2022 and 2026 to reflect the emergence and evolution of

Generative AI models. Both peer-reviewed journal articles and conference proceedings were considered to capture the most recent developments in the fast-evolving field of Generative AI; books, and grey literature were excluded. Regarding language, only studies published in English were retained. Studies were further excluded if they focused exclusively on teachers without any student interaction, consisted solely of modelling or statistical analyses absent of pedagogical or applicative intervention, or treated AI purely as an object of technical programming rather than as an educational affordance or relational mediator. Additional exclusion criteria applied during full-text screening included misalignment with the target population, absence of clearly defined affective or emotional variables, and insufficient specification of the study population, which precluded reliable assessment of eligibility. The systematic search was conducted across three bibliographic databases (ERIC, Scopus and WoS) using query strings adapted to each platform's syntax, maintaining full conceptual consistency. All strings combined three thematic clusters: GenAI tools ("Artificial Intelligence", "Generative AI", "AI assistant*"), affective and motivational constructs ("affective affordance*", "positive emotion*", "epistemic curiosity", "perceived competence", "relatedness"), and adolescent educational contexts ("secondary school", "high school", "adolescent*"). In ERIC, terms were searched across all available fields; in Scopus, the TITLE-ABS-KEY operator restricted retrieval to titles, abstracts, and keywords; in Web of Science, the TS (Topic) field operator was applied equivalently. The searches were conducted in May-June 2026.

2.3 Screening and study selection

The selection process was carried out in four sequential phases, following the PRISMA 2020 statement (Page et al., 2021), as illustrated in Figure 1. In the identification phase, a total of 90 records were retrieved across three

databases (ERIC, Scopus, and Web of Science). After the removal of 31 duplicate records, 59 records were screened by title and abstract. During title and abstract screening, 30 records were excluded based on the pre-established eligibility criteria: 14 studies involved university-level populations without direct implications for secondary education, 3 focused exclusively on early childhood or kindergarten contexts, 8 lacked clearly defined affective or emotional variables or presented an insufficiently specified study population, 3 were ineligible publication types (e.g., books or editorials lacking empirical content), and 2 were written in languages other than English (specifically Korean). This screening phase left 29 records to proceed to the full-text eligibility assessment. The remaining 29 records proceeded to full-text eligibility assessment. At this stage, a further 8 studies were excluded: 3 were purely theoretical or statistical modelling papers without an applied educational context, 4 focused on teachers' administrative perspectives without addressing pedagogical support for student needs, and 1 was excluded due to a primary focus on non-formal, out-of-school recreational activities that did not align with the strategic mediation framework. A final corpus of 21 studies was thus retained for inclusion in the review.

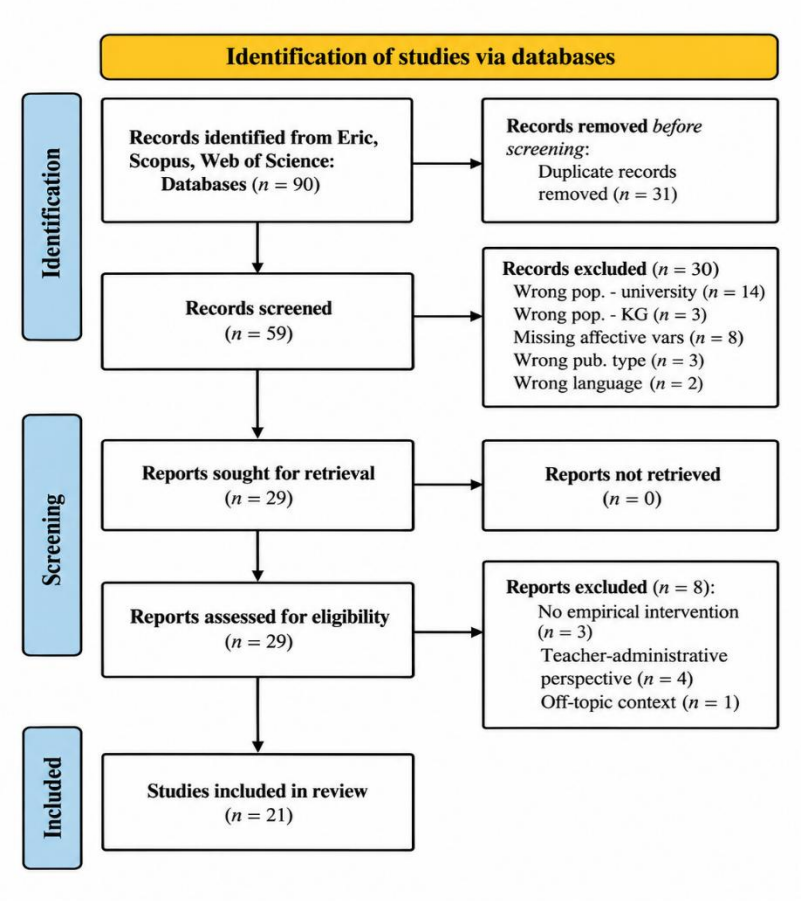


Figure 1: The PRISMA flow diagram illustrating the selection process across the four phases of the review.

3. Results

3.1 Characteristics of Included Studies

A total of 21 studies met the inclusion criteria and were included in the review. The publication dates of the studies range from 2022 to 2026, with the majority between 2024 and 2026: this is due to the growing academic attention to the role of GenAI in social contexts.

The studies were conducted across a diverse range of geographical settings, including Asia (China, Hong Kong, Taiwan, Singapore, Malaysia, the Philippines, Azerbaijan, and South Korea), Europe (Finland, Greece, Romania, Russia, Spain, Sweden, and the United Kingdom), North America (United States) and the

Mediterranean region. This distribution highlights the international scope of current research on AI-mediated learning.

In terms of study population, most investigations focused on adolescents or secondary school students. Several studies examined specific learner groups, including students from minority backgrounds, learners with disabilities, and neurodivergent adolescents. Two studies also incorporated teacher perspectives to examine the role of instructional support and human mediation in AI-mediated learning environments.

On the methodological level, the evidence base was heterogeneous. Quantitative designs represented nearly half of the included studies (n=10), including experimental, longitudinal, and structural equation modelling (SEM) approaches. Eight studies adopted mixed-methods designs, frequently combining quantitative outcome measures with qualitative data collection through semi-structured interviews and thematic analysis. Two studies employed purely qualitative methodologies, including focus groups and scenario-based inquiry, while one study adopted a Wizard-of-Oz experimental paradigm.

Table 1. Characteristics of the included studies (N = 21)

Author, country	Study type	Study type	Key findings
Xia et al. (2022), Hong Kong	Experimental study	Experimental study	An SDT-based design approach to inclusive AI education was reported to reduce anxiety towards AI in both low- and high-achieving students.
Kang et al. (2023), China	Not stated	Not stated	Emotional feedback was reported as means of lowering barriers to participation for students with medical conditions.
Garcia et al. (2025), Sweden	Pre/post longitudinal evaluation	Pre/post longitudinal evaluation	Using AI methods to analyze linguistic responses makes it possible to obtain assessments of learning outcomes that are just as valid and precise as those yielded by traditional methods.
Chavez & Palaoag (2024), Philippines	Descriptive survey	Motivational feature preferences (SDT)	AI-driven mobile applications impact student motivation and reading comprehension
Sim et al. (2024), Malaysia	Mixed methods	Design-Based Research (DBR)	AI-enhanced activities were reported to support metacognitive reflection and interdisciplinary reasoning
Billingsley et al. (2025), UK	Mixed methods	Design-Based Research (DBR)	AI-enhanced activities can encourage inquiry, metacognitive reflection and interdisciplinary insight
Zarkadoulas & Virvou (2025), Greece	Quantitative	Exploratory Factor Analysis	Interaction with algebra chatbots was associated with lower math anxiety and greater student confidence
Demir et al. (2025), USA	Mixed methods	Wizard-of-Oz design (Exploratory)	AI tutor teammates that adapted to learners were associated with discovery curiosity; the AI was perceived as a “teammate”
Choi et al. (2025), South Korea	Qualitative	Structural Equation Modeling	The LLM-based programming learning environment has demonstrated a positive impact on student motivation.
Alasgarova & Rzayev (2024), Azerbaijan	Qualitative	Experimental	AI-supported learning was linked to inquiry and motivation, but also to concerns about misuse, dependency, epistemic mistrust and academic integrity.

Roinita (2026), Romania	Quantitative	Comparative pilot study	Knowing that a text was AI-generated led to more critical re-evaluation of its creativity and emotional depth ("label effects").
Lim et al., (2026), Singapore	Quantitative	In situ crossover experiment (LLM vs. Text)	Learning with LLM results in higher quiz scores compared to learning from curated human texts.
Jarske et al., (2024), Finland	Quantitative	SBD and Groups	The non-human identity of social robots was perceived as an advantage in climate communication aimed at fostering hope.
Hsieh (2024), Taiwan	Quantitative	Emotions and perceptions in multimodal digital storytelling	The integration of digital storytelling and robot-assisted language learning has fostered engagement, perseverance, and positive affect.
Cai (2025), China	Quantitative	Experimental study	The integration of generative AI and artificial neural networks (ANNs) based on EBR theory has enabled dynamic emotion recognition in the classroom.
Choi et al., (2025)	Quantitative	Exploratory Research	Integrating AI tool competence and school support into the TAM framework enhances its applicability in the K–12 context
Chiu et al (2026), China	Mixed methods	Field experiment	Teacher support and need-supportive design emerged as key conditions for moving learners from extrinsic to intrinsic motivation
Santana- Monagas et al. (2025), Spain	Quantitative	Semiautomated Analysis	The use of LLMs to transcribe and classify teachers' empathetic messages (emotion, evaluation, context) made it possible to measure the impact of empathy and enthusiasm on student performance.
Hmoud & Al-Adwan (2025), Spain	Quantitative	Moderation analysis	The use of GenAI tools can support task-oriented motivation.
Zheng (2024), China	Quantitative	Chatbot experiments	Chatbot-assisted learning was associated with reduced foreign language reading anxiety and greater perceived emotional safety.
Han et al. (2025), China	Mixed methods	Corretional study	AI-powered adaptive learning was associated with learning engagement among rural students.

3.2 Synthesis of the Thematic Findings

3.2.1 Affective Regulation and Performance Anxiety Mitigation

A substantial proportion of the included studies examined the capacity of AI-mediated learning environments to support emotional regulation and reduce learning-related anxiety. Most of these studies suggested that conversational and adaptive AI systems can create psychologically safer learning conditions by providing non-judgmental, responsive, and personalised interactions (Zarkadoulas & Virvou, 2025; Wu, 2025; Zheng, 2024). In language-learning contexts, AI-supported interventions were associated with reductions in Foreign Language Reading Anxiety and increased perceptions of emotional safety when learners engaged with conversational agents perceived as supportive (Zheng, 2024). In a study on algebra chatbots, interaction with the chatbot was associated with lower math anxiety and greater student confidence. (Zarkadoulas & Virvou, 2025).

Studies conducted in diverse educational settings also suggested that AI-supported learning may contribute to greater educational equity by extending access to personalised learning opportunities (Xia et al., 2022; Wu, 2025). An SDT-based design approach was reported to be associated with reduced anxiety towards AI in both low- and high-achieving students and with overall well-being (Xia et al., 2022)

3.2.2 Epistemic Curiosity and Discovery-Oriented Engagement

A second cluster of findings concerned the role of GenAI in fostering epistemic curiosity, exploratory behavior, and knowledge construction. Several studies reported that AI-supported learning environments encouraged learners to formulate questions, and engage in deeper inquiry processes (Alasgarova & Rzayev, 2024; Billingsley et al., 2025; Demir et al., 2025). Design-Based

Research studies underline that AI-enhanced educational activities can support metacognitive reflection and interdisciplinary reasoning by encouraging learners to connect knowledge across domains (Billingsley et al., 2025; Sim et al., 2024). Evidence suggests that adaptive AI tutoring systems and teachable agents can effectively stimulate curiosity-driven interactions, particularly when learners are provided with personalized scaffolding to investigate complex problems (Demir et al., 2025; Han et al., 2025). In these settings, curiosity is described as an important driver of sustained engagement and knowledge construction (Demir et al., 2025; Han et al., 2025). Motivation, Self-Determination, and Intrinsic Engagement Motivation represented one of the most frequently investigated outcome domains. Drawing explicitly or implicitly on Self-Determination Theory (SDT), several studies examined how AI-supported learning environments satisfy learners' needs for autonomy, competence, and relatedness (Alasgarova & Rzayev, 2024; Chavez & Palaoag, 2024; Han et al., 2025; Xia et al., 2022).

Findings indicated that AI systems offering personalised feedback, adaptive learning pathways, and learner control were associated with higher levels of intrinsic motivation and engagement (Chavez & Palaoag, 2024; Han et al., 2025). Teacher support emerged as a critical moderator, with evidence suggesting that instructional guidance and need-supportive design appear important to help learners transition from extrinsic to intrinsic forms of motivation, particularly for underrepresented groups such as girls or low achievers (Chiu et al., 2026; Xia et al., 2022).

Research conducted in diverse contexts also suggested that AI-mediated learning may promote engagement among students from rural or minority populations (Han et al., 2025; Wu, 2025). Moreover, AI-powered Adaptive Learning Systems were shown to enhance learning engagement in rural areas by improving technology acceptance (Han et al., 2025

3.2.3 Identity, Anthropomorphism, and Relational Dimensions of AI Interaction

A distinct line of inquiry examined how adolescents perceive and relate to AI systems as social and collaborative entities, focusing on the interplay between anthropomorphism, social presence, and identity construction (Soldatova et al., 2025; Vanhoffelen et al., 2025; Wu, 2025). Evidence suggests that learners frequently attribute social characteristics to conversational agents, particularly when interactions involve personalised communication and human-like embodiments (Vanhoffelen et al., 2025; Wu, 2025). Interactions with customised embodied agents featuring friendly avatars, youthful voices, and approachable styles have been shown to enhance students' social presence and emotional engagement, while reducing the interpersonal pressure and fear of negative evaluation (Wu, 2025).

One study explored emerging models of human-AI identity, most notably the "Digital Centaur" strategy (Soldatova et al., 2025). It represents a technologically augmented individual who consciously integrates AI to enhance personal capabilities while ensuring the human element remains dominant in the collaboration (Soldatova et al., 2025). The successful implementation of this hybrid identity appears to be determined by personal predictors such as emotional intelligence and mindfulness, viewed as protective factors against the risk of losing agency or self-integrity in technology-saturated environments (Soldatova et al., 2025).

Furthermore, research highlights how perceived authorial identity mediates adolescents' evaluative frameworks. While knowledge of an AI origin can lead to "label effects" where creativity and emotional depth are re-evaluated more critically, in other contexts like climate communication, the non-human identity of AI is seen as a strategic advantage (Jarske et al., 2024; Roiniță, 2026). Adolescents are increasingly navigating a complex relational landscape where AI is viewed as a "teammate" or social companion capable of fostering trust and emotional connectedness (Demir et al., 2025; Vanhoffelen et al., 2025).

3.2.4 Adaptive Learning, Cognitive Load, and Educational Inclusion

The final outcome domain concerned the capacity of AI systems to support adaptive learning experiences while addressing individual learner differences and promoting educational inclusion. Evidence indicated that personalised AI interventions, such as AI-powered Adaptive Learning Systems and reading applications, can facilitate engagement by tailoring content difficulty, feedback, and learning pathways to students' specific needs and preferences (Chavez & Palaoag, 2024; Han et al., 2025).

One study using in situ physiological analysis (electrodermal activity) found that learning with LLMs was associated with lower skin conductance levels, suggesting reduced cognitive load compared to traditional curated texts (Lim et al., 2026). AI-supported environments could cater to students with specific educational needs or from underserved populations (Kang et al., 2023; Wu, 2025; Xia et al., 2022). Adaptive AI interfaces were found to reduce barriers to participation for students with specific medical conditions affecting emotional expression and provided "one-to-one" tutoring support that may mitigate regional disparities in access to high-quality instruction (Han et al., 2025; Kang et al., 2023).

4. Discussion

4.1 Theoretical interpretation

Across the 21 studies included in this review, a convergent pattern emerges: when AI-mediated activities are designed to offer clear goals, scaffolded feedback, and opportunities for exploration, they tend to support positive achievement emotions and reduce anxiety among secondary school students (Zarkadoulas & Virvou, 2025; Zheng, 2024). This pattern is consistent with SDT, which posits that the satisfaction of autonomy, competence, and relatedness

needs fosters more autonomous forms of motivation and deeper engagement (Ryan & Deci, 2000). Furthermore, AI systems that provide adaptive hints, choice over tasks, and relationally framed feedback were more often associated with increases in perceived competence and self-determination: well- designed GenAI tools may function as contextual supports for basic psychological needs, although this remains an interpretation rather than an established mechanism (Chavez & Palaoag, 2024; Xia et al., 2022). The reviewed evidence supports a relational view of AI as part of an affective ecology: design choices around conversational tone, anthropomorphism, and opportunities for collaboration appear to configure specific affective affordances reinforcing the idea of AI as a strategic mediator of adolescents' emotional and epistemic agency (Billingsley et al., 2025; Wu, 2025). In particular, interactions with customized agents that reduce interpersonal pressure and fear of negative evaluation could foster flow-like experiences by maintaining an optimal balance between challenge and support, a hypothesis that future studies should test (Wu, 2025; Demir et al., 2025).

4.2 AI as strategic mediator and affective affordances

GenAI systems in secondary education are able to support cognitive operations such as information retrieval or text generation and to configure specific emotional possibilities that emerge from the interplay between task design, interface features, and classroom culture (Ahmed, 2024). Affordances such as always-available feedback, conversational interaction, and personalization are repeatedly associated with reductions in performance anxiety (Zarkadoulas & Virvou, 2025; Zheng, 2024), increases in curiosity and perceived self-efficacy (Demir et al., 2025; Han et al., 2025), and, in some cases, with new forms of dependency or epistemic mistrust when hallucinations and opacity are not adequately mediated (Alasgarova & Rzayev, 2024). This suggests extending the concept of affective affordance beyond static descriptions of "positive" or "negative" emotions to a more dynamic account in which AI participates in the

ongoing regulation of adolescents' affective experience (Garcia et al., 2025; Hsieh, 2024; Jarske et al., 2024).

The review highlights the identity-related dimensions often implicit in descriptions of AI in schools. Studies in which adolescents describe AI as a teammate, assistant, or co-author indicate that affective potentialities are intertwined with how students come to perceive themselves as learners in hybrid human-AI settings (Demir et al., 2025; Roiniță, 2026). Some studies suggest that adolescents are navigating a transition toward technologically augmented identities, where emotional intelligence or mindfulness strategies serve as critical protective factors (Soldatova et al., 2025). This perspective highlights the need for research and educational design that explicitly interrogate how AI-mediated activities can help students perceive themselves as agentic and competent, curious, and ethically responsible subjects (Billingsley et al., 2025; Wu, 2025).

5. Limitations

Several limitations must be acknowledged. First, the search strategy, although aligned with PRISMA 2020 recommendations, was restricted to three major databases (ERIC, Scopus, Web of Science), to a relatively short time window (2022- 2026), and to English-language publications, which may have led to the exclusion of relevant studies indexed in other databases, published in other languages, or disseminated through grey literature. Second, the eligibility criteria focused on empirical interventions involving GenAI with secondary school students, thereby excluding purely theoretical contributions, teacher-only studies, and research in primary or higher education; while this choice ensured a coherent corpus, it inevitably narrows the generalizability of findings beyond the 11–18 age range and formal schooling contexts. Third, the evidence base itself is heterogeneous in design and quality: most included studies rely on cross-sectional or quasi-experimental designs with relatively small samples, short intervention periods, and heavy reliance on self-report

measures of emotions and motivation, often without triangulation through behavioural, physiological, or trace data. This contrasts with more mature areas of research on emotions in technology-based learning, where meta-analytic syntheses quantify effect sizes across large, diverse datasets (Loderer et al., 2020). However, because most included studies are exploratory or observational, the interpretive claims advanced in the Discussion, and in particular the notion of AI as a strategic mediator, remain hypotheses that require confirmation.

6. Conclusion

This study mapped the empirical literature from 2022 to 2026 regarding the intersection of generative artificial intelligence, affective affordances, and psychological constructs among secondary school students aged 11–18. By synthesizing evidence from 21 peer-reviewed studies across five core thematic domains, the investigation reveals that intelligent conversational agents and adaptive tutoring platforms can act as dynamic "Strategic Mediators" within a triadic socio-educational ecology comprising the student, the teacher, and the AI interface. The findings underline that when AI tools are designed to prioritize conversational responsiveness, non-evaluative feedback, and tailored learning pathways, they unlock significant affective affordances. These features systematically satisfy adolescents' basic psychological needs for competence and autonomy, offering a psychologically safe space that lowers performance barriers such as foreign language reading anxiety and mathematics stress.

The evidence suggests that curiosity-triggering architectures may be associated with higher-order cognitive engagement and epistemic insight, and may help counteract the risk of cognitive offloading or automated dependency, although this remains to be tested in longitudinal and experimental designs. Ultimately, this study suggests that the educational value of GenAI in secondary schooling may depend on instructional calibration and human oversight. Operational

frameworks like SDT and CVT clarify that active teacher scaffolding remains a critical moderator in preserving learner agency. For educational technology to foster resilient, critical, and curious learners, future systems should move beyond mere computational efficiency. Interaction design must purposefully integrate emotionally responsive and inclusive principles, framing AI as a cognitive partner that can empower the student's internal motivation and intellectual autonomy.

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