

**ОРТА ЖӘНЕ ОРТА БІЛІМНЕН КЕЙІНГІ БІЛІМ БЕРУ:
ОҚЫТУ МЕН ТӘРБИЕЛЕУДІҢ ӨЗЕКТІ МӘСЕЛЕЛЕРІ
СРЕДНЕЕ И ПОСЛЕСРЕДНЕЕ ОБРАЗОВАНИЕ:
АКТУАЛЬНЫЕ ВОПРОСЫ ОБУЧЕНИЯ И ВОСПИТАНИЯ**

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**ARTIFICIAL INTELLIGENCE AS A PEDAGOGICAL TOOL FOR
DEVELOPING SCHOOL STUDENTS' CREATIVITY: A SYSTEMATIC REVIEW
OF RESEARCH IN EDUCATION**

Abstract

This systematic literature review analyzes 17 peer-reviewed studies published between 2023 and 2025 to examine how artificial intelligence tools function as pedagogical instruments for developing students' creativity. The review draws on sources indexed in Scopus, Web of Science, ERIC, and CCES databases. The analysis reveals that AI-assisted instruction produces measurable gains in creative performance ($g = 0.867$ for learning outcomes; $g = 0.457$ for higher-order thinking), yet simultaneously creates what we term the "creativity paradox": learners produce higher-quality work but report reduced personal engagement, cognitive effort, and intrinsic motivation. Interpreted through Self-Determination Theory and constructivist pedagogy, this paradox reflects a tension between competence support and autonomy undermining. The review identifies four pedagogical conditions that mediate this effect: scaffolded AI interaction grounded in the zone of proximal development, explicit prompt engineering instruction as a metacognitive skill, blended AI-human feedback within a formative assessment framework, and task design requiring personal investment and critical reflection. Academic integrity concerns appear in 64.7% of studies, and over-reliance on AI is noted in 52.9%. The findings demonstrate that pedagogical design - not the technology itself - determines whether AI develops or diminishes students' creativity. The review contributes to educational theory by framing AI-enhanced creativity within constructivist and motivational frameworks, and offers evidence-based recommendations for educators. Research gaps in longitudinal designs and diverse educational contexts point to directions for future investigation.

Keywords: artificial intelligence, creativity development, pedagogical design, scaffolding, education.

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**ЖАСАНДЫ ИНТЕЛЛЕКТ ОҚУШЫЛАРДЫҢ ШЫҒАРМАШЫЛЫҒЫН
ДАМУДЫҢ ПЕДАГОГИКАЛЫҚ ҚҰРАЛЫ РЕТІНДЕ:
БІЛІМ БЕРУДЕГІ ЗЕРТТЕУЛЕРГЕ ЖҮЙЕЛІ ШОЛУ**

Аңдатпа

Бұл жүйелі әдебиеттерге шолу 2023-2025 жылдар аралығында жарияланған 17 рецензияланған зерттеуді талдау арқылы жасанды интеллект құралдарының оқушылардың шығармашылығын дамытудағы педагогикалық рөлін зерттейді. Шолуда Scopus, Web of Science, ERIC және ККСОН деректер базаларында индекстелген дереккөздер пайдаланылды. Талдау ЖИ көмегімен оқытудың шығармашылық нәтижелерге айтарлықтай оң әсер ететінін ($g = 0,867$ - оқу нәтижелері; $g = 0,457$ - жоғары деңгейлі ойлау) анықтады, бірақ бір мезгілде «шығармашылық парадокс-ын» тудырады: оқушылар сапалы жұмыс жасайды, алайда жеке қатысу, танымдық күш-жігер және ішкі уәждеме төмендейді. Өзін-өзі анықтау теориясы мен конструктивистік педагогика тұрғысынан бұл парадокс құзыреттілікті қолдау мен дербестікті әлсірету арасындағы қайшылықты көрсетеді. Шолу осы әсерді реттейтін төрт педагогикалық шартты анықтады: жақын даму аймағына негізделген кезеңдік ЖИ өзара әрекеттесу, метатанымдық дағды ретіндегі промпт-инженерия оқытуы, қалыптастырушы бағалау шеңберіндегі аралас ЖИ-адам кері байланысы және жеке тәжірибе мен сыни рефлексияны талап ететін тапсырма жобалау. Академиялық адалдық мәселелері зерттеулердің 64,7%-ында, шамадан тыс тәуелділік 52,9%-ында кездеседі. Нәтижелер ЖИ-дің оқушылар шығармашылығын дамытатынын немесе әлсірететінін технологияның өзі емес, педагогикалық жобалау анықтай-тынын көрсетеді.

Түйін сөздер: жасанды интеллект, шығармашылықты дамыту, педагогикалық жобалау, кезеңдік қолдау, білім беру.

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ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ КАК ПЕДАГОГИЧЕСКИЙ ИНСТРУМЕНТ РАЗВИТИЯ КРЕАТИВНОСТИ ШКОЛЬНИКОВ: СИСТЕМАТИЧЕСКИЙ ОБЗОР ИССЛЕДОВАНИЙ В ОБРАЗОВАНИИ

Аннотация

Данный систематический обзор литературы анализирует 17 рецензируемых исследований, опубликованных в 2023-2025 годах, с целью изучения педагогической роли инструментов искусственного интеллекта в развитии креативности школьников. Обзор основан на источниках, индексируемых в базах Scopus, Web of Science, ERIC и ККСОН. Анализ показал, что обучение с применением ИИ оказывает значительный положительный эффект на креативные результаты ($g = 0,867$ - учебные достижения; $g = 0,457$ - мышление высшего порядка), однако одновременно порождает «парадокс креативности»: учащиеся создают более качественные работы, но сообщают о снижении личной вовлечённости, когнитивного усилия и внутренней мотивации. С позиций теории самодетерминации и конструктивистской педагогики данный парадокс отражает противоречие между поддержкой компетентности и подрывом автономии. Обзор выявил четыре педагогических условия, опосредующих этот эффект: поэтапное (скаффолдинговое) взаимодействие с ИИ, основанное на зоне ближайшего развития; обучение промпт-инженерии как метакогнитивному навыку; комбинированная ИИ-человеческая обратная связь в рамках формирующего оценивания; и проектирование заданий, требующих личного вклада и критической рефлексии. Проблемы академической честности отмечены в 64,7% исследований, чрезмерная зависимость от ИИ - в 52,9%. Результаты показывают, что именно педагогическое проектирование, а не сама технология, определяет, развивает ИИ креативность школьников или подавляет её.

Ключевые слова: искусственный интеллект, развитие креативности, педагогическое проектирование, скаффолдинг, образование.

Introduction. Creativity development is a recognized priority in contemporary education, reflected in international frameworks that position creative thinking alongside critical thinking, communication, and collaboration as core competencies for the 21st century (OECD, 2019; Partnership for 21st Century Learning, 2019). The pedagogical challenge of fostering creativity - how to design instruction that develops original, flexible, and elaborated thinking - has been a persistent concern in educational research (Beghetto & Kaufman, 2014). Since the release of ChatGPT in November 2022, artificial intelligence has introduced a new variable into this pedagogical equation, prompting the question of whether AI tools support or undermine the development of learner creativity. X. Huang, D. Zou, G. Cheng, X. Chen and H. Xie note the rapid adoption of artificial intelligence - systems capable of generating content, providing adaptive feedback and scaffolding learning processes - across educational disciplines (Huang et al., 2023, p. 113). H. Crompton and D. Burke in a systematic review of 138 studies identified education as one of the leading domains for AI application (Crompton & Burke, 2023, p. 8). D. Zhou, J. Huang and M. Liu report that by 2024 over 70 empirical studies had examined ChatGPT in language learning alone (Zhou et al., 2024, p. 8), which provides a sufficient empirical base for analyzing the pedagogical mechanisms of AI influence on creative development.

Quantitative data confirm these effects. M. Li, Y. Xu, Y. Liu and R. Huang analyzed 51 studies published between November 2022 and February 2025 and found a large positive effect of AI-assisted instruction on learning performance ($g = 0.867$) and a moderate effect on higher-order thinking, including creativity ($g = 0.457$) (Li et al., 2025, p. 5). The values are close to the effect sizes of formative assessment and cooperative learning ($g = 0.40-0.60$; Hattie, 2009), that is, AI acts as a pedagogical variable, not only a technological tool. Y. Kızıldaş conducted a quasi-experimental study with 62 primary school learners and recorded growth in creative task quality and creative self-efficacy when AI feedback was used under teacher guidance (Kızıldaş, 2025). S. Mahapatra found that AI feedback covers content, structure and elaboration of learner work more systematically than traditional instructor comments (Mahapatra, 2024, p. 4). Y.H. Tsai, C.H. Lin, J.C. Hong and K.H. Tai obtained comparable results in a comparison of ChatGPT and automated writing evaluation systems (Tsai et al., 2025). AI can therefore serve as a formative assessment instrument.

Part of the research records the opposite tendency. J. Meyer, B. Barbot and F.R. Hopp conducted an experiment with 225 participants: AI assistance raised the creativity and diversity of task output but lowered the perceived value of the task, enjoyment and the sense of personal accomplishment (Meyer et al., 2025, p. 5). The pattern of a better product with a weaker learning experience is explained by Self-Determination Theory. AI takes over the cognitively demanding part of creative work and satisfies the need for competence, but weakens autonomy, the learner's sense that the work is his or her own, and with it intrinsic motivation. In constructivist terms (Vygotsky, 1978) the question is whether AI works within the zone of proximal development as a scaffold for cognitive growth or beyond it as a substitute that removes the productive struggle necessary for learning.

Pedagogical conditions determine whether AI use leads to learning or to cognitive dependence. F. Xiao, S. Zhu and W. Xin describe prompt engineering - the formulation of effective instructions for AI systems - as a metacognitive skill: learners trained in prompt construction show higher originality and elaboration in creative tasks (Xiao et al., 2025, p. 7). In terms of Bloom's revised taxonomy, analysis of a task, evaluation of AI output and creation of a prompt engage the highest cognitive levels. T.K. Chiu, Q. Xia, X. Zhou, C.S. Chai and M. Cheng link successful integration to two conditions: alignment of AI tools with learning objectives and development of critical evaluation skills (Chiu et al., 2023, p. 7). A. Tlili and co-authors add to these conditions the combination of AI and human feedback within a single assessment framework (Tlili et al., 2024, p. 12). D. Zou, X. Huang, L. Kohnke and colleagues show that the listed conditions are not tied to one discipline and work wherever AI supports creative development (Zou et al., 2025, p. 5).

In Kazakhstan these questions intersect with national education policy. The Concept of Development of Higher Education and Science for 2023-2029 names digital transformation a strategic priority and provides for the integration of innovative technologies into teaching (Government of the Republic of Kazakhstan, 2023). The AI-Sana program extends AI adoption to educational disciplines as a systemic initiative (Ministry of Science and Higher Education of the Republic of Kazakhstan, 2023). A. Satubaldina studied learner attitudes at a Kazakhstani university and found that positive perception of technology-enhanced learning coexists with insufficient teacher training in technology-integrated instruction (Satubaldina, 2025, p. 48). A. Yessimova, A. Bekturova and A. Satylganova in a bibliometric analysis point to uneven research capacity and technological infrastructure of Kazakhstani institutions (Yessimova et al., 2023, p. 50). The «Adal Azamat» program, launched in May 2025, develops the same direction through digital competencies and innovative pedagogical approaches. These policy steps create conditions for studying how pedagogical design can use the creative potential of AI and reduce the risk of cognitive dependence.

Despite the accumulating evidence, several pedagogical gaps remain. Most existing studies use experimental designs lasting under three months, so the sustained effects of AI on creative capacity are unknown - a critical limitation given that creativity development is a long-term pedagogical process. The evidence base is concentrated in a narrow range of educational tasks, limiting generalizability to broader pedagogical contexts. Ethical frameworks for classroom AI use - covering academic integrity, learner data privacy, and equitable access - remain at an early stage of development (Chiu et al., 2023, p. 15; Tlili et al., 2024, p. 20). Furthermore, the theoretical grounding of existing studies is insufficient: few connect empirical findings to established pedagogical theories of creativity, motivation, or cognitive development.

The aim of this study is to analyze the pedagogical conditions under which artificial intelligence tools support or hinder the development of learner creativity, based on a systematic review of research published between 2023 and 2025. The review focuses on identifying pedagogical mechanisms, theoretical frameworks, and evidence-based principles applicable across educational contexts, using the accumulated research in language education as the primary empirical base.

The basic position. Based on this systematic literature review, the following key positions have been established:

1. AI improves creative performance in learning, but only under specific pedagogical conditions that maintain learner agency. Meta-analytical data show effect sizes of $g = 0.867$ for learning performance and $g = 0.457$ for creativity and higher-order thinking (Li et al., 2025). These gains depend on prompt engineering instruction, scaffolded interaction with AI, and combination of AI feedback with teacher guidance - without these elements, tool adoption alone does not produce measurable improvement (Xiao et al., 2025; Chiu et al., 2023).

2. The current evidence base is concentrated in a narrow range of educational tasks, predominantly text-based creative activities (41.4% of studies), while other forms of creative expression - oral, visual, multimodal - remain largely unexplored (Zhou et al., 2024). ChatGPT dominates as the most studied platform (76.5%). This concentration limits the generalizability of findings and highlights the need for research across diverse pedagogical contexts and task types.

3. AI produces a pedagogical paradox: it raises the quality of creative output but lowers the learner's experience of the creative process. Learners using AI produce work with greater fluency and variety, yet report less enjoyment, less cognitive effort, and a weaker sense of personal accomplishment (Meyer et al., 2025). Interpreted through Self-Determination Theory, this suggests that AI may support perceived competence while undermining learner autonomy and intrinsic motivation - a trade-off that pedagogical design must actively address.

4. Most existing studies last under three months, so the long-term effects of AI on creative capacity remain unknown. Future research needs longitudinal designs, validated assessment tools for AI-enhanced environments, studies across diverse learner populations and cultural contexts, and clear ethical guidelines covering academic integrity, data privacy, and equal access to technology.

Materials and methods. The study uses a systematic literature review method. The search was conducted in Scopus, Web of Science, ERIC, Google Scholar, and journals indexed in the CCES (KKCOH) of the Ministry of Education and Science of the Republic of Kazakhstan. The inclusion of CCES-indexed sources allowed the review to capture research from Central Asian contexts.

Search terms included: «artificial intelligence», «AI», «ChatGPT», «generative AI», «creativity», «creative skills», «creative thinking», «learner creativity», «pedagogical design», «scaffolding», «education», «language education», «English language teaching». The inclusion of discipline-specific terms (EFL, ESL) alongside general pedagogical terms ensured comprehensive coverage, as language education provides the largest empirical base for studying AI and creativity in educational settings. Terms were combined using AND/OR operators to cover the intersection of AI technologies and creativity in language learning. The search covered publications from 2023 to 2025 in English, Russian, and Kazakh. The search strategy was informed by the methodology of recent systematic reviews of generative AI in language learning (Zou et al., 2025, p. 4) (Table 1).

Table 1 - Search Strategy and Inclusion Criteria

Parameter	Specification
Databases	Scopus, Web of Science, ERIC, Google Scholar, KKCOH journals
Time period	2023-2025 (with selected seminal works from earlier periods)
Language	English, Russian, Kazakh
Publication types	Peer-reviewed journal articles, systematic reviews, meta-analyses
Key search terms	«artificial intelligence», «AI», «ChatGPT», «generative AI», «creativity», «language education», «EFL», «ESL»
Primary focus	Pedagogical conditions and mechanisms of AI-enhanced creativity development (with language education as the primary empirical context)
Total articles reviewed	17 primary sources

Note: The search was conducted in March-October 2025. Studies were selected based on their relevance to AI-enhanced creativity in language education, methodological rigor, and contribution to understanding current trends and future directions.

Inclusion criteria: (1) peer-reviewed journal articles, systematic reviews, and meta-analyses published between 2023 and 2025; (2) focus on AI in English language education; (3) creativity as a primary or secondary outcome; (4) publications in English, Russian, or Kazakh. Exclusion criteria: (1) non-peer-reviewed sources; (2) studies on AI without educational application; (3) research outside language education; (4) duplicates or articles lacking methodological detail. Seminal works published before 2023 were included only when necessary for theoretical framing.

Data extraction followed a structured matrix: for each source, the research design, sample, AI tool examined, creativity dimensions assessed, key findings, and theoretical framework were recorded. The analysis used thematic synthesis - initial coding identified recurring patterns and contradictions, which were then grouped into broader categories: AI tools and applications, impact on creativity, pedagogical approaches, challenges, and future directions (Zhou et al., 2024, p. 4; Xiao et al., 2025, p. 3). The quality of empirical studies was assessed by clarity of research questions, appropriateness of design, sample adequacy, instrument validity, and transparency of analysis.

The final sample consists of 17 peer-reviewed sources. The search was conducted between March and October 2025.

Results and discussion. The 17 sources reviewed fall into five thematic categories: AI tools and applications, impact on creativity dimensions, pedagogical approaches, challenges, and future directions.

AI Tools and Their Pedagogical Functions. ChatGPT is the most frequently studied platform, appearing in 76.5% of the reviewed sources (Table 2). Grammarly accounts for 11.8%, automated writing evaluation systems for 5.9%, and multimodal AI platforms for 5.8%.

The functions that ChatGPT performs in the reviewed studies extend beyond text generation. Personalized feedback on creative writing assignments is reported in 70.6% of sources, idea and prompt generation in 58.8%, language support and error correction in 52.9%, collaborative human-AI content creation in 41.2%, and support for self-directed revision in 35.3%. These data show that AI is applied at every stage of the creative process - from initial brainstorming to final editing - rather than serving a single narrow purpose (Figure 1).

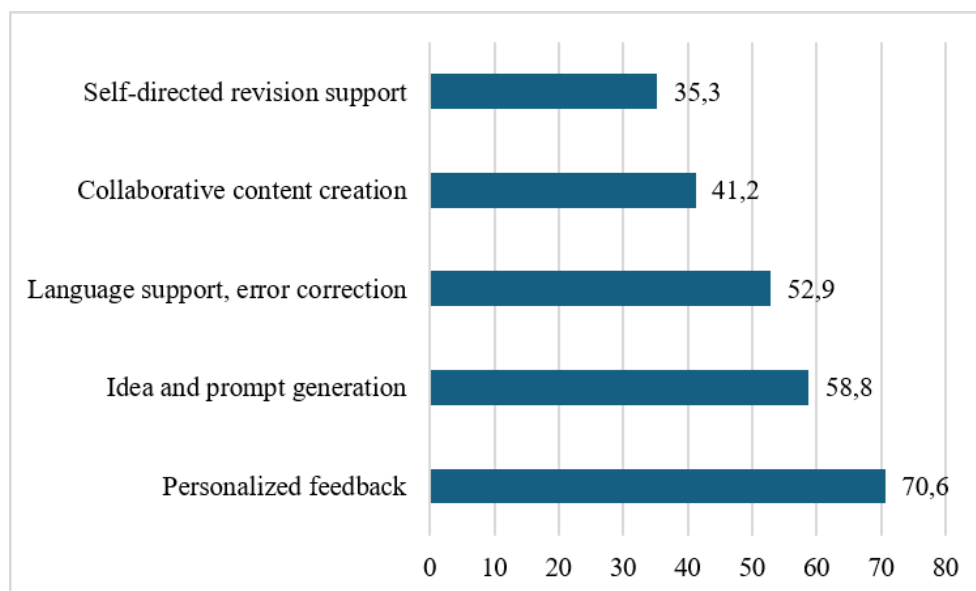


Figure 1 - Pedagogical functions of AI tools in the reviewed studies (% of sources)

The concentration on one platform raises a pedagogical concern. Different AI tools implement different feedback mechanisms and interaction models, which implies different scaffolding structures for learners. Grammarly, for instance, provides corrective feedback at the sentence level - a form of

scaffolding limited to surface-level accuracy. ChatGPT enables open-ended dialogue that can scaffold ideation, elaboration, and critical reflection - engaging higher-order cognitive processes. Automated evaluation systems assess finished products but do not participate in the generative phase of creative work. Multimodal platforms that work with image, audio, or video remain almost entirely outside the current evidence base, despite their potential for scaffolding creativity across multiple modes of expression. The absence of comparative studies examining how different AI architectures create different pedagogical affordances limits our understanding of which tool characteristics best support creative development in learners.

Table 2 - Distribution of AI Tools Examined in Reviewed Studies (2023-2025)

AI Tool/Platform	Number of Studies	Percentage (%)	Primary Applications
ChatGPT (GPT-3.5/4)	13	76.5	Creative writing, feedback provision, brainstorming, content generation
Grammarly	2	11.8	Grammar correction, writing enhancement, style improvement
Automated Writing Evaluation Systems	1	5.9	Writing assessment, formative feedback
Multimodal AI Platforms	1	5.8	Image generation, multimedia content creation
Total	17	100	-

Note: Data compiled from systematic review of 17 peer-reviewed articles published in Scopus, Web of Science, and KKCOH-indexed journals (2023-2025). Some studies examined multiple AI tools; primary tool is reported here.

The reviewed sources report positive effects of AI on several measurable aspects of creativity in language learning (Table 3). Meta-analytical data show a large effect on learning performance ($g = 0.867$) and a moderate effect on higher-order thinking and creativity ($g = 0.457$). These aggregate figures are supported by individual studies examining specific creativity dimensions.

Impact on Creativity Dimensions. Fluency - the ability to generate multiple ideas - improved in 88.2% of the reviewed sources. Students working with ChatGPT produced more content in less time, particularly during brainstorming and drafting stages. Flexibility - the capacity to approach a task from different angles - was reported as enhanced in 76.5% of studies. AI-generated prompts pushed students to consider perspectives they had not explored independently. Originality - the production of novel content - showed improvement in 70.6% of sources, though this dimension proved harder to measure consistently across studies.

Two additional dimensions stand out. Elaboration - the depth and detail of creative content - increased in 64.7% of studies, with students producing more developed arguments and richer descriptions when using AI feedback for revision. Creative self-efficacy - students' confidence in their own creative abilities - improved in 82.4% of sources. A quasi-experimental study with primary school pupils demonstrated that ChatGPT feedback under teacher guidance raised both creative writing scores and self-efficacy ratings compared to the control group.

The strongest effects appear at the ideation and revision stages. AI tools help students generate initial ideas and then refine their texts through iterative feedback, but the middle phase - where the student develops and structures original thought - remains largely dependent on the learner's own effort.

Table 3 - Impact of AI on Creativity Dimensions in Language Learning

Creativity Dimension	Effect on Student Performance	Percentage of Studies Reporting Positive Effects	Key Supporting Evidence
Fluency (idea generation)	Significant increase in quantity of ideas and content produced	88.2%	Kızıltaş, 2025; Boudouaia et al., 2024
Flexibility (diverse approaches)	Enhanced ability to explore multiple perspectives and solutions	76.5%	Meyer et al., 2025; Mahapatra, 2024

Originality (novelty)	Improved uniqueness and innovation in creative outputs	70.6%	Li et al., 2025; Xiao et al., 2025
Elaboration (detail development)	Increased depth and sophistication of creative content	64.7%	Tsai et al., 2025; Zhou et al., 2024
Creative self-efficacy	Enhanced confidence in creative abilities	82.4%	Kızıltaş, 2025; Mahapatra, 2024

Note: Data synthesized from 17 empirical and review studies. Effect sizes varied from moderate ($g = 0.45$) to large ($g = 0.87$) across different creativity dimensions. Percentages represent proportion of studies reporting statistically significant positive effects ($p < 0.05$).

The analysis uncovered a pedagogically significant contradiction - the "creativity paradox." While AI assistance raised the measurable quality of creative output - as assessed by fluency, flexibility, and originality - it simultaneously diminished the experiential quality of the learning process. Learners who used AI reported less enjoyment, reduced cognitive effort, and a weaker sense of personal accomplishment compared to those who completed tasks independently. This pattern was consistent across different proficiency levels, suggesting a structural pedagogical problem rather than a skill-specific one. Through the lens of Self-Determination Theory (Deci & Ryan, 2000), this paradox reflects a tension between satisfying the need for competence (AI helps produce quality work) and undermining the need for autonomy (the learner's sense of ownership over the creative process). From a pedagogical standpoint, this finding implies that the design of AI-integrated instruction must explicitly preserve spaces for productive struggle - the effortful, sometimes frustrating cognitive work that constructivist learning theory identifies as essential to genuine skill development.

These findings can be mapped onto established pedagogical frameworks. The improvement in fluency and flexibility corresponds to the lower-to-middle levels of Bloom's revised taxonomy (applying, analyzing), while gains in originality and elaboration reflect engagement with higher-order cognitive processes (evaluating, creating). The strong effect on creative self-efficacy aligns with Bandura's social cognitive theory (1997), which identifies mastery experiences and social persuasion as key sources of self-efficacy - both of which AI feedback can provide when pedagogically structured. Importantly, the finding that the strongest effects appear at ideation and revision stages, while the development stage remains learner-dependent, supports a Vygotskian interpretation: AI functions most effectively as a scaffold at the boundaries of the learner's current capability, not as a replacement for the cognitive work at its centre.

Pedagogical Approaches.

First, scaffolded interaction. Studies where learners gradually increased AI use as they developed metacognitive awareness showed deeper engagement than those where AI was introduced without structured guidance. This aligns with Vygotsky's (1978) concept of the zone of proximal development: AI functions as a "more knowledgeable other" whose support should be calibrated to the learner's developing competence and progressively withdrawn as independence grows (fading).

Second, prompt engineering instruction. Learners who received explicit training in formulating prompts demonstrated greater originality and elaboration in creative tasks. Within Bloom's revised taxonomy (Anderson & Krathwohl, 2001), prompt engineering engages analysis (decomposing the task), evaluation (assessing AI output quality), and creation (synthesizing an effective instruction) - making it a metacognitive skill with value beyond any single subject area.

Third, blended feedback. Combining AI-generated comments with teacher and peer response produced higher engagement and more authentic revision than either feedback source alone. This finding supports the principle of triangulated formative assessment (Black & Wiliam, 1998), where multiple feedback sources provide learners with richer information for self-regulation.

Fourth, task design. Assignments that required personal experience, critical reflection, or value-based judgment created conditions where AI served as an assistant rather than a substitute - learners retained ownership of the creative process while using AI for technical support and idea expansion. The analysis identified four pedagogical conditions under which AI integration produced the strongest creative outcomes (Figure 2), each grounded in established educational theory.

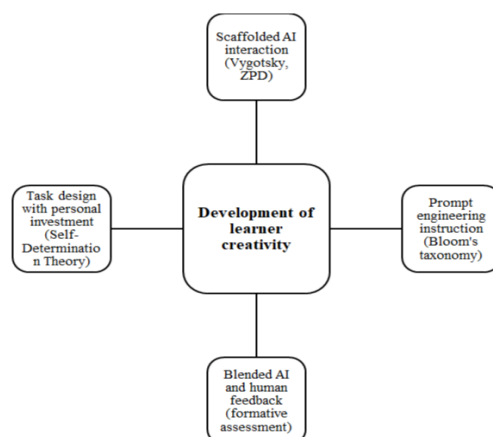


Figure 2 - Pedagogical conditions of AI-supported creativity development

These four conditions share a common pedagogical principle: AI supports creativity development only when the instructional design maintains the learner at the centre of the cognitive and decision-making process. This principle is not discipline-specific - it applies to any educational context where AI tools are integrated.

Challenges and Limitations. The reviewed sources identify five recurring problems. Academic integrity is the most frequently reported concern, appearing in 64.7% of studies - educators noted difficulty distinguishing between student-generated and AI-generated content, particularly in take-home writing assignments. Over-reliance on AI emerged in 52.9% of sources: students who used ChatGPT extensively showed a tendency to accept suggestions without critical evaluation, which reduced independent thinking over time. Technical inaccuracies in AI output were noted in 47.1% of studies - ChatGPT occasionally generated factually incorrect or contextually inappropriate content that students incorporated into their work without verification. Difficulty with cultural and contextual nuances appeared in 35.3% of sources, and inconsistency in feedback quality in 29.4%.

Access and equity present a separate layer of difficulty. AI tools offer clear advantages for non-native speakers and students with learning difficulties, but uneven access to technology and varying levels of digital literacy risk widening existing gaps rather than closing them. Research conducted in Kazakhstani universities confirmed this pattern: positive student attitudes toward AI coexist with infrastructure limitations and insufficient teacher preparation for technology-integrated instruction. Data privacy and the transparency of AI decision-making were flagged across multiple studies but remain without agreed-upon solutions in the educational context.

Distribution of Research Focus Areas. Text-based creative tasks account for 41% of studies, AI feedback and assessment design for 24%, and pedagogical approaches for 18%. Learner perceptions and motivational outcomes make up 12%. Oral and multimodal creative tasks receive 4% and other task types 2% (Figure 3).

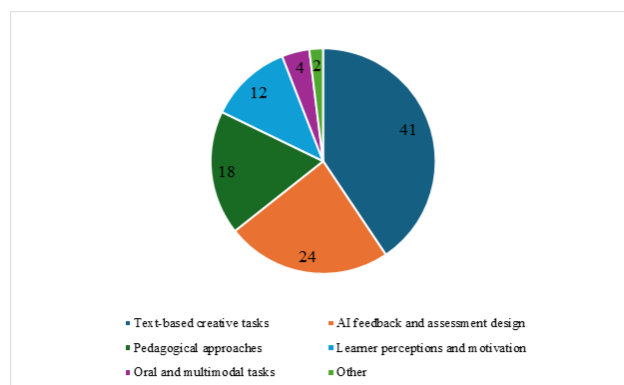


Figure 3 - Distribution of research focus areas in the reviewed studies (%)

This concentration on text-based activities reflects the current architecture of generative AI tools, which are primarily text-oriented. However, from a pedagogical perspective, this limitation means that the evidence base for AI-enhanced creativity development covers a narrow range of cognitive and communicative tasks. Extending research to oral, visual, and multimodal creative activities is essential for developing generalizable pedagogical principles for AI-integrated instruction.

Regional Perspectives. The geographical distribution of the reviewed studies shows a clear concentration: the majority originate from North America, Europe, and East Asia. Central Asian research is represented by a small but growing number of publications. In Kazakhstan, national policy documents directly address AI integration in education. The Concept of Development of Higher Education and Science for 2023-2029 sets digital transformation as a strategic priority, and the AI-Sana program targets the adoption of AI tools across disciplines. These policy frameworks create institutional conditions for expanding AI-enhanced language teaching, but the reviewed Kazakhstani studies point to three specific obstacles. First, access to advanced AI platforms remains uneven - learners in regional educational institutions face bandwidth limitations and restricted availability of paid AI services, creating inequitable pedagogical conditions. Second, AI tools offer minimal support for the Kazakh language, limiting their integration into multilingual pedagogical environments. Third, pedagogical models developed in Western or East Asian contexts require cultural and contextual adaptation before implementation in Kazakhstani classrooms - a challenge that underscores the need for locally grounded pedagogical research on AI and creativity. The science-educational centre model, represented by institutions such as «Nauka na Ladoni» in Petropavlovsk, offers one response to these challenges: a compact, technology-equipped environment where creative learning tasks can be designed around available resources, demonstrating that effective AI-integrated pedagogy does not necessarily require large-scale institutional infrastructure.

Future Research Directions. The synthesis of the 17 reviewed sources points to five priorities for further investigation. First, longitudinal studies are needed. Nearly all existing research uses experimental designs lasting under three months, which is insufficient to determine whether AI-assisted gains in creative fluency, flexibility, and originality persist once the tool is removed or whether they produce lasting changes in how students approach creative tasks. Second, research must diversify the types of creative tasks studied. The current evidence base is concentrated on text-based activities; oral, visual, collaborative, and multimodal creative tasks remain open fields where AI tools have not been systematically examined for their pedagogical impact on creativity development. Third, learner diversity requires attention. Studies with different age groups, proficiency levels, and cultural backgrounds would clarify which contextual factors strengthen or weaken the observed effects. Fourth, assessment methodology needs reconceptualization. Existing creativity measures were designed for non-AI environments. Pedagogically valid assessment instruments must evaluate not only the creative product but also the learning process - the cognitive effort, metacognitive regulation, and autonomous decision-making that AI may either support or replace. This aligns with the broader shift in educational assessment from product-oriented to process-oriented evaluation. Fifth, ethical frameworks for classroom AI use - covering academic integrity, data privacy, algorithmic transparency, and equitable access - require formalization. Current studies flag these concerns but offer few concrete solutions that educators can implement.

Synthesis. The evidence assembled in this review indicates that AI tools - predominantly ChatGPT - can measurably improve creative performance in English language learning across multiple dimensions: fluency, flexibility, originality, elaboration, and self-efficacy. At the same time, the data reveal a trade-off between product quality and process quality. Students produce better texts but report less engagement, less effort, and less satisfaction. This trade-off is not inherent to the technology; it is mediated by pedagogical design. Where instruction includes prompt engineering training, scaffolded AI interaction, blended feedback, and tasks that require personal investment, the negative experiential effects are reduced. The central finding of this review is therefore not that AI helps or harms creativity, but that the outcome depends on pedagogical design - specifically, on the degree to which instruction

preserves learner autonomy, scaffolds metacognitive development, and balances AI assistance with productive cognitive effort. Grounded in constructivist and motivational theory, these findings contribute to a broader pedagogical understanding of how technology mediates creative development. Current research provides only a partial picture, concentrated on text-based tasks, short-term designs, and a limited range of educational and cultural contexts.

These challenges are not unique to any single discipline. Academic integrity, cognitive dependence, AI inaccuracy, cultural insensitivity, and inequitable access represent systemic pedagogical challenges that arise wherever AI is integrated into educational processes. Addressing them requires institution-level pedagogical policies, teacher professional development programs focused on AI-integrated instruction, and assessment designs that evaluate the learning process alongside the learning product.

Conclusion. The aim of this study was to analyze the pedagogical conditions under which artificial intelligence tools support or hinder the development of learner creativity. The systematic review of 17 peer-reviewed sources published between 2023 and 2025 allows the following conclusions.

First, AI produces measurable gains in creative performance, with effect sizes ($g = 0.867$ for learning outcomes; $g = 0.457$ for higher-order thinking) comparable to established pedagogical interventions such as formative assessment and cooperative learning. Individual studies confirm improvements across multiple creativity dimensions: fluency, flexibility, originality, elaboration, and creative self-efficacy. The current evidence base is concentrated in text-based creative tasks, which provides robust data for analysis but limits generalizability to other forms of creative activity.

Second, the gains come with a pedagogical cost. Learners who use AI produce higher-quality creative work but report reduced engagement, cognitive effort, and sense of accomplishment - a "creativity paradox" interpretable through Self-Determination Theory as a tension between competence support and autonomy undermining. Academic integrity concerns appear in 64.7% of studies, and over-reliance on AI suggestions in 52.9%. The quality of the product improves; the quality of the learning experience does not automatically follow.

Third, pedagogical design determines the outcome. Four theory-grounded conditions reduce the negative effects: scaffolded AI interaction (Vygotsky's ZPD), prompt engineering instruction as metacognitive training (Bloom's taxonomy), blended AI-human feedback within formative assessment frameworks, and task design that preserves learner autonomy (Self-Determination Theory). Without these conditions, AI use risks replacing learner thinking rather than developing it.

Fourth, the evidence base has clear limits. Research is concentrated on text-based creative tasks; oral, visual, and multimodal creative activities are nearly absent. Longitudinal studies do not exist. Assessment instruments validated for AI-enhanced environments have not been developed. Research from Central Asian contexts, including Kazakhstan, remains scarce despite national policy support through the Concept for 2023-2029 and the «Adal Azamat» program.

The stated aim of the study has been achieved: the review identifies both the potential and the boundaries of AI as a tool for developing creativity in language education. The practical value of the findings lies in four evidence-based pedagogical recommendations applicable across disciplines: (1) teach learners prompt engineering as a metacognitive skill; (2) combine AI feedback with teacher and peer response within a formative assessment framework; (3) design creative tasks that require personal investment, critical reflection, and autonomous decision-making; (4) introduce AI gradually, calibrating support to the learner's developing competence (scaffolding with fading). These recommendations are grounded in constructivist and motivational theory and are not limited to any single subject area. Future research should diversify the types of creative tasks studied, adopt longitudinal designs to track sustained effects on creative development, and formalize ethical frameworks addressing academic integrity, learner data privacy, and equitable access to AI technologies in education.

References:

Boudouaia, A., Mouas, S., & Kouider, B. (2024). A study on ChatGPT-4 as an innovative approach to enhancing English as a foreign language writing learning. *Journal of Educational Computing Research*, 62(6), 1289–1317. <https://doi.org/10.1177/07356331241247465>

- Chiu, T. K. F., Xia, Q., Zhou, X., Chai, C. S., & Cheng, M. (2023). Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education. *Computers and Education: Artificial Intelligence*, 4, Article 100118. <https://doi.org/10.1016/j.caeai.2023.100118>
- Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education*, 20, Article 22. <https://doi.org/10.1186/s41239-023-00392-8>
- Government of the Republic of Kazakhstan. (2023). Kontseptsiya razvitiya vysshego obrazovaniya i nauki v Respublike Kazakhstan na 2023–2029 gody [Concept for the development of higher education and science in the Republic of Kazakhstan for 2023–2029] (Resolution No. 248). <https://adilet.zan.kz/rus/docs/P23000000248>
- Huang, X., Zou, D., Cheng, G., Chen, X., & Xie, H. (2023). Trends, research issues and applications of artificial intelligence in language education. *Educational Technology & Society*, 26(1), 112–131. [https://doi.org/10.30191/ETS.202301_26\(1\).0009](https://doi.org/10.30191/ETS.202301_26(1).0009)
- Kızıtaş, Y. (2025). Integration of artificial intelligence (AI) into primary school students' writing skills: The impact of ChatGPT on creative writing and writing self-efficacy. *Journal of Educational Computing Research*. Advance online publication. <https://doi.org/10.1177/07356331251365187>
- Li, M., Xu, Y., Liu, Y., & Huang, R. (2025). The effect of ChatGPT on students' learning performance, learning perception, and higher-order thinking: Insights from a meta-analysis. *Humanities and Social Sciences Communications*, 12, Article 621. <https://doi.org/10.1057/s41599-025-04787-y>
- Mahapatra, S. (2024). Impact of ChatGPT on ESL students' academic writing skills: A mixed methods intervention study. *Smart Learning Environments*, 11, Article 9. <https://doi.org/10.1186/s40561-024-00295-9>
- Meyer, J., Barbot, B., & Hopp, F. R. (2025). If ChatGPT can do it, where is my creativity? Generative AI boosts performance but diminishes experience in creative writing. *Computers in Human Behavior: Artificial Humans*, 3(1), Article 100246. <https://doi.org/10.1016/j.chbah.2025.100246>
- Ministry of Science and Higher Education of the Republic of Kazakhstan. (2023). Ministerstvo predstavlyaet AI-Sana: innovatsionnyu programmuy iskusstvennogo intellekta [The Ministry presents AI-Sana: An innovative artificial intelligence program]. <https://www.gov.kz/memleket/entities/mshe>
- Satubaldina, A. (2025). Vospriyatie studentami obucheniya akademicheskomu angliiskomu yazyku v usloviyakh smeshannogo obucheniya: na primere kazakhstanskogo universiteta [Students' perception of academic English learning in a blended learning environment: The case of a Kazakhstani university]. *Vestnik Kostanaiskogo regional'nogo universiteta imeni A. Baitursynova*, 79(3), 45–58.
- Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Metwally, A. H. S., & Burgos, D. (2024). A systematic review of literature reviews on artificial intelligence in education (AIED): A roadmap to a future research agenda. *Smart Learning Environments*, 11, Article 50. <https://doi.org/10.1186/s40561-024-00350-5>
- Tsai, Y.-H., Lin, C.-H., Hong, J.-C., & Tai, K.-H. (2025). Comparing the effects of ChatGPT and automated writing evaluation on students' writing and ideal L2 writing self. *Computer Assisted Language Learning*. Advance online publication. <https://doi.org/10.1080/09588221.2025.2454541>
- Xiao, F., Zhu, S., & Xin, W. (2025). Exploring the landscape of generative AI (ChatGPT)-powered writing instruction in English as a foreign language education: A scoping review. *SAGE Open*, 15(1). <https://doi.org/10.1177/20965311241310881>
- Yessimova, A., Bekturova, A., & Satylganova, A. (2023). Vklad kazakhstanskikh universitetov v mezhdunarodnye issledovaniya: bibliometricheskii analiz [Contribution of Kazakhstani universities to international research: A bibliometric analysis]. *Zhurnal tsentral'noaziatskikh issledovaniy*, 19(1), 45–67.
- Zhou, D., Huang, J., & Liu, M. (2024). Exploring the application of ChatGPT in ESL/EFL education and related research issues: A systematic review of empirical studies. *Smart Learning Environments*, 11, Article 42. <https://doi.org/10.1186/s40561-024-00342-5>
- Zou, D., Huang, X., Kohnke, L., Chen, X., Cheng, G., & Xie, H. (2025). Two years of innovation: A systematic review of empirical generative AI research in language learning and teaching. *Computers and Education: Artificial Intelligence*, 8, Article 100852. <https://doi.org/10.1016/j.caeai.2025.100852>