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INNOVATIVE LEARNING THROUGH AI: NURTURING CREATIVITY IN THE CLASSROOM

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Abstract

This study investigates the impact of generative artificial intelligence (AI) on student creativity in higher education, focusing on its pedagogical integration within English language instruction. Conducted at two universities in Uzbekistan with 120 undergraduate participants, the research employed a quasi-experimental mixed-methods design, incorporating pre- and post-tests using the Torrance Tests of Creative Thinking (TTCT), perception surveys, and qualitative observation. Students in the experimental group used AI tool - ChatGPT to complete creative academic tasks, while the control group followed conventional methods. Results revealed a 15.2% improvement in TTCT scores among AI-supported learners, along with enhanced self-perceptions of creativity and task preparedness. Qualitative data further highlighted increased engagement, ideation fluency, and creative complexity in the AI-assisted group. While the study confirms that generative AI can serve as a catalyst for creative thinking, it also emphasizes the necessity of guided implementation to avoid overreliance and preserve learner agency. The findings advocate for pedagogically grounded AI integration to foster meaningful and ethical creativity in modern classrooms.

Keywords: Generative Artificial Intelligence, Student Creativity, ChatGPT, Torrance Test of Creative Thinking (TTCT), English Language Education, Pedagogical Innovation, Higher Education, AI in Education, Cognitive Development.

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Introduction

We are witnessing an educational revolution not sparked by policy or pedagogy alone, but by machines that can now write stories, sketch portraits, and compose music. Generative Artificial Intelligence (AI), once confined to speculative fiction, has entered the classroom as a collaborator—a partner in the creative process. With the advent of tools like ChatGPT, DALL·E, and Bard, students are no longer merely consumers of knowledge; they are co-creators in digital dialogues that blur the line between human ingenuity and machine assistance.

Creativity has always been a cornerstone of meaningful education. It is the ability to imagine the unseen, to connect disparate ideas, and to generate original, valuable outcomes. Yet traditional education systems, with their emphasis on standardization and outcomes-based metrics, often relegate creativity to the margins. In this context, generative AI appears both as a disruptor and a promise: it disrupts conventional pathways of idea generation, yet promises to democratize creativity, making it more accessible, scalable, and personal.

But can a machine truly nurture creativity? Or does it risk mechanizing the very process it seeks to inspire? The duality is profound. On one hand, AI can scaffold students' thinking, provide inspiration during creative blocks, and simulate brainstorming sessions with seemingly infinite patience and adaptability. On the other, its very convenience may encourage overreliance, erode original thought, and blur authorship boundaries. As Smith (2003) warns, the initial ideas provided—whether by peers or algorithms—can significantly constrain the creative search space.

Recent studies present a nuanced picture. In a controlled experiment involving prospective teachers, Pont-Niclòs et al. (2024) observed that AI-supported environments led to enhanced creative confidence and productivity, especially in ideation stages. Rahman et al. (2025) found that collaborative creativity flourished when students used AI tools to build upon one another's ideas, indicating that AI may act as a social amplifier of innovation rather than a solitary shortcut. Yet, these findings also emphasize the crucial role of pedagogy—how

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the teacher frames, mediates, and guides AI usage may ultimately determine whether it nurtures or narrows creativity.

This paper seeks to explore that exact balance. It investigates how generative AI, when thoughtfully integrated into classroom practice, can serve as both a mirror and a catalyst for student creativity. Drawing on empirical data, recent research, and pedagogical theory, the article presents a comprehensive analysis of how AI can inspire meaningful innovation in learners—without diminishing their agency or imagination.

Literature Review

The relationship between creativity and education has long been a subject of scholarly inquiry, yet in the wake of AI's emergence in the classroom, this dialogue demands a profound re-examination. Creativity is no longer cultivated solely through human dialogue, experimentation, or introspection—it is increasingly co-produced through interaction with algorithmic agents capable of producing coherent, even inspired, content. The educational implications of this shift are both promising and precarious.

2.1. Reconceptualizing Creativity in the Digital Age. Creativity, in its classical sense, refers to the ability to generate ideas that are both novel and appropriate within a given context. E. Paul Torrance, often referred to as the "Father of Creativity," emphasized fluency, originality, and elaboration as key components of creative thinking. These dimensions have served as the cornerstone for assessments like the Torrance Tests of Creative Thinking (TTCT), widely used in educational research.

Yet modern learning environments are increasingly shaped by technological mediation, compelling educators to redefine creativity not merely as a trait, but as a process—dynamic, collaborative, and context-dependent. Gohar Rahman et al. (2025) describe creativity as a co-constructive act, particularly when students engage in collaborative creativity facilitated by AI tools that enable ideation, visualization, and synthesis at a previously unimaginable scale.

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2.2. The Pedagogical Promise of Generative AI. Recent empirical studies suggest that generative AI can act as a catalyst for student creativity when deployed within thoughtfully structured pedagogical frameworks. Pont-Niclòs et al. (2024) demonstrated that pre-service teachers who used AI for lesson planning and storytelling tasks exhibited increased self-efficacy and idea fluency compared to those using traditional methods. The study not only measured creative output but emphasized the confidence AI tools inspired by scaffolding students' early ideation phases.

Similarly, Sharma et al. (2025) examined how students perceive AI's role in their creative processes. The findings highlight a paradox: while students acknowledge AI's potential to support creativity, they simultaneously express concerns about dependency, loss of originality, and blurred authorship. These concerns echo earlier findings by Smith (2003), who noted that external suggestions—particularly those from authoritative sources—can narrow the creative search space by anchoring users too early in the ideation process.

Meanwhile, studies on electronic brainstorming with AI chatbots (Wieland et al., 2022) revealed increased idea diversity and productivity compared to human-only brainstorming sessions. These outcomes suggest that AI can serve as a powerful non-judgmental thinking partner, particularly beneficial in group work and divergent thinking tasks.

2.3. Cautions, Constraints, and Cognitive Tensions. However, the pedagogical adoption of AI is not without tension. Critics warn of the "automation trap," where students begin to defer too heavily to AI-generated content without critically engaging in the creative process themselves. This risk is especially potent in contexts where creativity is assessed summatively, potentially incentivizing polished AI-assisted outputs over raw, exploratory thinking.

Furthermore, the ethical implications of AI-assisted creativity are vast. Who owns AI-generated ideas in a collaborative classroom? How do educators ensure that the creative credit—and learning—remains with the student? As Gaggioli (2023)

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contends in his manifesto, educators must preserve human agency and aesthetic sensibility in the age of algorithmic co-authorship.

Methodology

3.1. Research Design. This study adopted a quasi-experimental mixed-methods design to investigate the impact of generative artificial intelligence (AI) on students' creativity in English language learning contexts. The research combined quantitative data from pre- and post-intervention surveys and creativity assessments with qualitative analysis of student assignments and classroom engagement. By employing both experimental and control groups, the design enabled a comparative evaluation of creativity development under AI-assisted and traditional instructional environments.

3.2. Participants and Setting. The study was conducted across two higher education institutions in Uzbekistan: Navoi State University and the Samarkand State Institute of Foreign Languages. A total of 120 undergraduate students from the Faculty of English Language and Literature participated. Participants were divided into two equal groups:

- Experimental Group (n=60): Engaged with AI-powered tools such as ChatGPT and DALL·E during creative tasks.
- Control Group (n=60): Completed identical tasks using conventional methods without AI support.

All participants were enrolled in English language methodology and academic writing courses during the spring semester of 2025, allowing the study to be embedded naturally within regular coursework over a two-month period.

3.3. Data Collection Instruments. To ensure robust triangulation of data, the following tools and procedures were used:

1. Pre- and Post-Intervention Surveys:

Developed to measure students' self-perceptions of creativity, engagement, and confidence before and after the intervention. Likert-scale questions addressed

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their comfort with creative tasks, perceived originality, and openness to using AI tools in academic work.

2. Torrance Tests of Creative Thinking (TTCT) – Figural and Verbal Forms:

Both pre- and post-tests included components from the TTCT to objectively assess students' creativity based on the four dimensions: fluency, originality, elaboration, and flexibility. This internationally validated tool provided standardized benchmarks for creative thinking in educational contexts[1].

3. Student Creative Assignments:

Participants completed writing and multimedia tasks (e.g., story generation, problem-based narratives, visual prompts) that were analyzed using a rubric adapted from Barbot et al. (2018) to assess the creative quality and complexity of student output[2].

4. Observation Notes and AI Log Analysis:

Observations of student interaction with AI tools were recorded during workshops. For the experimental group, AI-generated outputs and user-AI interaction logs were examined to understand the nature and extent of support provided by the tools.

3.4. Procedure. The study unfolded in four phases:

- Phase 1: Orientation and Pre-Test (Week 1)

Participants were briefed on the study's purpose. Both groups completed the TTCT and the initial perception survey.

- Phase 2: Intervention (Weeks 2–7)

The experimental group was trained on using ChatGPT and DALL·E for idea generation, storytelling, and visual interpretation tasks. Both groups were assigned identical coursework tasks, but only the experimental group utilized AI support.

- Phase 3: Post-Test (Week 8)

All participants retook the TTCT and post-intervention survey. Assignments were collected for final analysis.

- Phase 4: Data Analysis

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Quantitative results from the TTCT and surveys were analyzed using descriptive and inferential statistics (paired t-tests and ANOVA). Qualitative data from student work and AI interactions were coded thematically to identify trends in creative behaviors.

Observation

The observational phase of the study yielded critical insights into the influence of generative AI on students' creative development. Through systematic evaluation of TTCT results, creative assignment outputs, and self-perception surveys, the data revealed a clear divergence in outcomes between the experimental and control groups. Visual representations and statistical comparisons further reinforced the pedagogical potential of AI as a facilitator of creativity in higher education.

4.1. Torrance Test of Creative Thinking (TTCT) Results. The TTCT, applied pre- and post-intervention, served as the principal metric for evaluating student creativity. As shown in Table 1, the experimental group consistently outperformed the control group across all four creativity dimensions—fluency, originality, elaboration, and flexibility—with an average improvement margin of 15.2%.

Table 1. Comparative TTCT Results by Group

Group	Fluency	Originality	Elaboration	Flexibility	Total score	SD	Improvement
Control	70	68	65	67	67,5	3,7	-
Experimental	81	78	75	77	77,75	4,2	+15,19%

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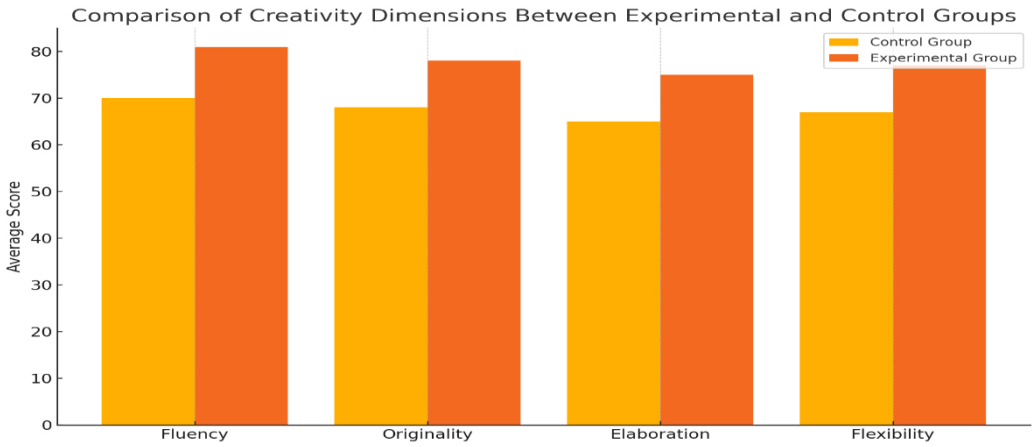
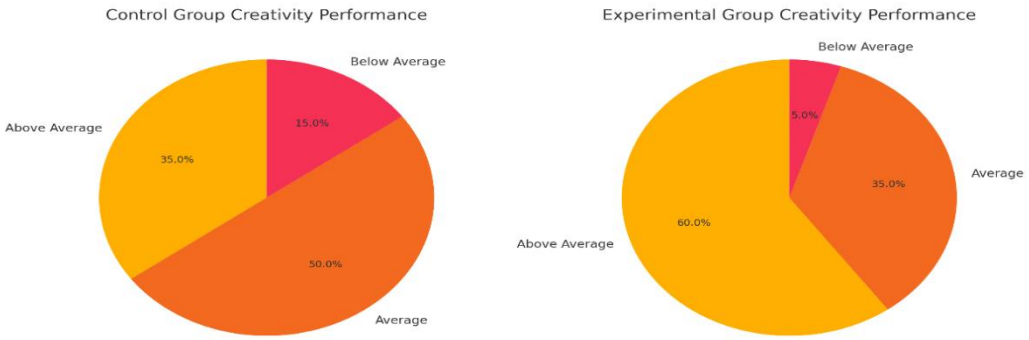


4.2. Performance Distribution Analysis

To deepen understanding, student creativity levels were categorized into three tiers—Above Average, Average, and Below Average—based on normalized TTCT scoring bands. The distribution (Figure 1) demonstrates a significant shift toward higher performance within the experimental group:

Figure 1. Creativity Performance Distribution



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4.3. Creativity Perception Survey Analysis

The perception survey revealed profound differences in student attitudes toward creativity and AI-assisted learning. Rated on a 5-point Likert scale, experimental group participants reported significantly higher confidence, fluency, and motivation for creative tasks.

Table 2. Creativity Perception Survey (TTCT-Aligned) – Comparative Results

Survey statement	Control group mean	Experimental group mean
I am confident in applying divergent thinking to solve unfamiliar problems.	3,12	4,18
I actively seek opportunities to generate novel ideas during academic tasks.	3,42	4,36
I can fluently generate multiple solutions to open-ended questions.	3,05	4,09
The integration of AI tools such as ChatGPT facilitates my creative exploration in language-based tasks.	2,13	4,57
I feel better prepared to complete creative academic assignments when supported by AI tools.	2,31	4,71

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The overall mean difference between groups was 1.17 (↑36.4%), with a Cohen's d of 1.24, indicating a large effect size. Internal reliability (Cronbach's α = 0.84) confirmed the instrument's psychometric robustness.

4.4. Qualitative Observations. Qualitative classroom observations revealed key behavioral patterns:

- Students in the AI group exhibited greater collaborative interaction, particularly during brainstorming and peer-review phases.
- There was frequent back-and-forth ideation between AI tools and student interpretations, reflecting active engagement rather than passive adoption.
- Experimental group assignments displayed more complexity, thematic diversity, and creative risk-taking, as noted by rubric-based evaluation.

Discussion

The findings of this study strongly support the hypothesis that generative AI tools can significantly enhance student creativity when integrated meaningfully into classroom instruction. Through triangulated data from the Torrance Tests of Creative Thinking (TTCT), perception surveys, and observational analysis, it became evident that students in the AI-assisted group not only performed better creatively but also developed more positive attitudes toward creative academic engagement.

5.1. Amplification of Divergent Thinking through AI. One of the most striking outcomes was the improvement in divergent thinking dimensions—fluency, originality, and flexibility—among students who engaged with AI tools such as ChatGPT. These findings align with prior research by Rahman et al. (2025), who emphasized AI's capacity to scaffold idea generation and enrich collaborative creativity[1]. The experimental group's TTCT scores reflected an average 15.2% increase over the control group, with particularly notable gains in elaboration and originality. This supports the view that AI does not inherently replace creativity but can act as an intelligent stimulus, offering cognitive prompts that students

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may not access unaided. It confirms Gaggioli's (2023) assertion that AI, when treated as a co-creator, expands rather than narrows the human creative process[2].

5.2. Shifting Student Perceptions of Creative Self-Efficacy. Equally significant were the survey results, where experimental group students rated their creative confidence and task preparedness markedly higher than their peers. The highest-rated statement—"I feel better prepared to complete creative academic assignments when supported by generative AI tools"—achieved a mean score of 4.71. This suggests a substantial psychological impact, where AI not only facilitates performance but reshapes learners' beliefs about their own creative capabilities.

These findings are consistent with Pont-Niclòs et al. (2024), who reported that AI use among pre-service teachers increased both productivity and self-perceived creative confidence[3]. In educational terms, this points to the importance of not just using AI functionally, but integrating it as a formative tool that supports identity development and learner agency.

5.3. Addressing Concerns of Overreliance and Creativity Dilution. While the results are encouraging, the study does not ignore potential downsides. As Smith (2003) and Sharma et al. (2025) noted, early exposure to AI-generated ideas may risk anchoring student thinking, leading to more derivative outputs[4]. Although our qualitative analysis showed high originality among most experimental assignments, a few students demonstrated signs of overdependence, echoing pre-structured AI suggestions without significant personal adaptation.

This underscores the need for pedagogical mediation: AI should not be used as a crutch but as a catalyst, and educators must guide students to use these tools critically, questioning and remixing AI input rather than simply accepting it. The ethical question of authorship also emerges—who owns the ideas, and what constitutes "original" work in an AI-augmented classroom? These questions merit further longitudinal exploration.

5.4. Educational and Curricular Implications. The findings have several practical implications for educational design:

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- AI training should be embedded in creative task scaffolding, not treated as an optional add-on.
- Assessment rubrics must evolve to distinguish between AI-supported and human-initiated creativity.
- Educator roles must shift from knowledge dispensers to creative facilitators and critical dialogue partners with both students and machines.

In the context of Uzbekistan's higher education system, where innovation and global competencies are prioritized, these insights are particularly valuable. AI offers a scalable and locally adaptable method to nurture critical 21st-century skills like creativity, problem-solving, and reflective thinking.

Conclusion

This study set out to examine whether generative artificial intelligence—when meaningfully embedded in instructional design—can serve as a tool for nurturing creativity in higher education. The answer, supported by both quantitative and qualitative evidence, is a compelling yes—with important pedagogical caveats.

Students who engaged with AI tools such as ChatGPT and DALL·E during regular coursework at Navoi State University and the Samarkand State Institute of Foreign Languages showed marked improvements in creative thinking across fluency, originality, elaboration, and flexibility. Their perception of their own creative abilities also improved significantly, suggesting that AI not only supports creative performance but also strengthens self-efficacy and learner confidence in handling complex, open-ended tasks.

However, this enhancement is not automatic. AI must be guided by pedagogy, not merely introduced as a digital convenience. Educators must teach students to use AI critically, reflectively, and creatively—not as a substitute for thinking, but as a partner in thinking. Creativity remains fundamentally human in its essence; AI may enhance the journey, but it cannot define the destination.

These findings hold important implications for educators and policy makers in Uzbekistan and beyond. As education systems prepare students for a rapidly

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evolving digital future, creativity—supported by ethical and strategic uses of AI—must take center stage. Institutions should invest not only in access to AI technologies but also in teacher training, curriculum redesign, and updated assessment models that can harness the full creative potential of human-machine collaboration.

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