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Harnessing generative AI for collaborative creativity: A study of university students' engagement and innovation

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Abstract

This mixed-methods study investigates the role of GenAI in enhancing collaborative creativity among university students, focusing on divergent thinking, team dynamics, and evaluation apprehension. Fifty undergraduate students enrolled in a communication skills course were divided into control (non-AI) and experimental (AI-supported) groups to perform the Alternative Uses Task (AUT), a divergent thinking exercise. Quantitative analysis of creative outputs revealed that AI-assisted teams significantly outperformed non-AI groups across all metrics: fluency (22.8 vs. 15.2), flexibility (11.6 vs. 8.4), originality (7.9 vs. 6.1), and elaboration (24.5 vs. 18.3), indicating AI's capacity to augment idea generation and development. Qualitative thematic analysis of students' reflections highlighted AI's dual role in fostering inclusivity by reducing evaluation apprehension (reported by 80% of participants), while introducing challenges such as cognitive fixation on AI-generated ideas (45%) and role ambiguity, where AI was perceived as a dominant "team leader" (30%). Students noted that AI fostered participation but risked overshadowing human agency and critical engagement. These findings underscored that GenAI's potential as a cognitive collaborator in educational settings enhances creative output and psychological safety, yet emphasize the need for pedagogical frameworks that balance AI integration with strategies to mitigate over-reliance. Implications for higher education and future human-AI research are provided.

Keywords: Collaborative creativity, Evaluation apprehension, GenAI, divergent thinking, Higher education, Team dynamics.

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1. Introduction

Creativity holds a firm position among the foundations of human progress, including the ability to form ideas that are new and worthwhile [1, 2]. In the contemporary knowledge economy, the importance of creativity is particularly pronounced in collaborative contexts, where individuals from diverse backgrounds come together to co-construct meaning, solve complex problems, and innovate collectively [3]. Within such settings, creativity is not merely an individual cognitive act but a socially situated process that thrives on interaction, feedback, and the dynamic exchange of ideas [4].

The introduction of generative artificial intelligence (GenAI) tools, such as OpenAI's ChatGPT and DeepSeek, into educational settings brings both exciting prospects and significant challenges [5]. These GenAI tools are capable of producing contextually relevant, linguistically fluent, and often insightful contributions to creative tasks, effectively functioning as artificial collaborators [6, 7]. As such, their role is expanding beyond being simple tools to becoming co-participants in ideation processes, prompting a reconsideration of how creativity is distributed within human-AI teams [8].

Recent research suggests that AI can help to amplify individual creativity by minimizing cognitive load and providing serendipitous associations and increased ideational diversity [9, 10]. However, there is a significant gap regarding how these technologies impact group-level creativity dynamics, particularly in an educational context where collaboration is at the core of pedagogical design. Critical questions about the impact of AI on human interaction processes such as turn-taking, evaluation apprehension, leadership emergence, and the co-construction of knowledge remain unanswered [11, 12].

Higher education centers on developing creative confidence because students need faith in their creative abilities for innovation classes, design thinking, and problem-based learning settings [13, 14]. The presence of an AI "team member" may reduce students' fear of negative evaluation [15], thereby promoting broader participation, particularly among introverted or less experienced individuals. Nevertheless, the widespread reliance on AI brings new risks that threaten human control of decision-making processes while simultaneously reducing critical assessment and causing ideas to become rigid [1, 16].

Against this backdrop, the present study seeks to empirically investigate the role of GenAI in shaping collaborative creativity among university students. Specifically, it examines both the quantitative impact of GenAI on core divergent thinking metrics—fluency, flexibility, originality, and elaboration—and the qualitative perceptions of students regarding GenAI's influence on group dynamics and creative engagement.

The research questions for this study are defined as follows:

1. What are the effects of GenAI on team creativity in terms of fluency, flexibility, originality, and elaboration?
2. How do university students perceive the role of GenAI in mediating collaborative creativity and group interaction in cooperative ideation tasks?

2. Literature Review

2.1. Creativity and Collaboration in Group Settings

Group creativity operates beyond simple mind combination since it results from social interactions that produce useful, novel ideas through collaborative dialogue. Sawyer [3] and Paulus and Nijstad [17] view group creativity as an interactive process that depends heavily on collaborative conditions which determine the quality of the creative product. Group members who represent diverse backgrounds, together with unique thinking perspectives, significantly increase the likelihood of producing innovative ideas. Cognitive diversity within groups enables better access to extensive understandings and alternative ways of viewing problems and solutions [18].

However, working in groups doesn't always guarantee creative success. Research has consistently shown that team-based creativity can be limited by social and structural barriers. One common issue is *evaluation apprehension*—the fear of being judged by others, which can prevent people from sharing bold or unconventional ideas [15]. Another is *production blocking*, which occurs when turn-taking or dominant voices prevent everyone from contributing equally, especially those who are more introverted or unsure [19, 20]. These dynamics often lead to a drop in ideational fluency—the total number of ideas generated—and can create an environment where only a few voices shape the group's creative direction.

To address these challenges, researchers have examined the role of technology as a facilitator of creativity. Digital brainstorming tools, especially asynchronous platforms, have shown promise in helping teams overcome real-time communication bottlenecks. Dennis and Valacich [21] found that electronic brainstorming reduced evaluation pressure and allowed participants to contribute ideas without interruption, leading to a greater number of unique suggestions. Similarly, Fjermestad and Hiltz [22] emphasized that group support systems enhance participation and equity during collaboration.

AI-powered tools have introduced modern capabilities to this field during the recent period. Generative Artificial Intelligence provides language models alongside interactive writing assistants to function as "non-human collaborators" in creative collaborations. The tools provide continuous non-critical feedback, which helps expand creative approaches during group roadblocks [9]. These tools serve as equalizing factors for group conversations because they supply participants with an identical amount of suggestions irrespective of their natural speaking manner or assurance level. AI tools that are integrated with care according to [10] can create flat organizational structures that expand democratic input between group members while raising creative work standards.

Human judgment combined with collaboration remains vital for developing and executing ideas that AI sparks. According to Fischer et al. [4], technology needs to collaborate with humans rather than replace them in creative operations. Successful teamwork develops best when people use digital tools together with inclusive dialogue and a workplace culture of mutual respect, open exchanges, and experimental approaches.

2.2. Generative AI in Education

Educational institutions have started integrating ChatGPT and other large language models, including GPT-4, to revolutionize the way students and teachers approach intellectual work and creative assignments. Large language models function as cognitive collaborators that help learners generate new ideas while clarifying concepts through divergent thinking, according to a study by Mollick and Mollick [23] and Anantrasirichai and Bull [24]. Because of their ability to generate coherent, relevant, and often surprisingly creative text in a matter of seconds, generative AI systems are especially appealing in educational contexts where creativity and ideation are central goals.

Higher education students can use GenAI tools as creative partners to overcome "blank page syndrome" by receiving pertinent stimulation for novel ideas through suggestion prompts with contextual examples. This aligns with what Davis [25] referred to as scaffolding creativity—providing support to learners at the early stages of ideation so they can build more confidently and independently later on. Research indicates that students use ChatGPT and similar tools as a temporary stress relief tool for original content creation, which supports their creative work [26].

However, educational institutions need to address genuine teaching issues that arise from implementing these exceptional GenAI tools in classrooms. Excessive reliance on these tools can actually hinder deep learning and critical engagement [27]. Students who depend excessively on AI-generated responses develop passive consumption patterns, which lead them to simply adopt AI-generated inputs without evaluating their accuracy, originality, or relevance according to Markauskaite et al. [16]. This could stunt the development of critical thinking and reduce motivation for creative risk-taking.

One well-documented risk is idea fixation—a phenomenon where initial suggestions (even if useful) become cognitive anchors that limit further exploration [28]. Highly confident AI outputs could anchor students to specific ideas rather than encouraging them to try new, less obvious creative approaches [29]. The education of critical AI work habits and reflective thinking methods becomes essential for students alongside their training in technological efficiency.

Several scholars support teaching students proper AI literacy skills, which enable them to refine and question AI output instead of mindlessly accepting it. Markauskaite et al. [16] and Holmes et al. [30]. Curricula should incorporate AI as a tool that promotes metacognition, so students must explain AI output lines as well as understand AI reasoning and find possibilities to advance its recommendations. Teaching students to use AI as a cooperative partner will protect their independent creative abilities while they obtain valuable benefits from AI tools.

2.3. AI as a Collaborative Partner in Creative Teams

Scientists now focus on AI integration in creative collaboration because artificial intelligence has shifted traditional technology approaches from tool operation to collaborative creative support. Throughout history, technology has operated as an accessory for human creativity, providing support for particular duties. New advances in GenAI enable these tools to carry out creative projects through active contributions to idea production, content generation, and problem resolution [7, 8]. The new perspective on AI as an active participant in creative processes aligns with a fundamental shift in the understanding of AI across multiple fields when used for collaborative and creative activities.

AI delivers its major advantage through social barrier reduction when people work together. Socially anxious students or team members, as well as those who lack confidence, have difficulties participating in in-person discussions during educational or professional settings. AI operates as a neutral platform that establishes judgment-free spaces where people find security to exchange their thoughts according to Hwang and Won [11] and Selwyn [31]. AI creates an inclusive environment among teams consisting of people with varied backgrounds since it offers a safe space regardless of communication differences. The implementation of AI tools enhances team engagement along with creativity because they establish environments that inspire all participants to share their thoughts without fear of judgment [12].

These results are consistent with CSCW research, which constructs such as anonymity and feedback to be important in promoting group cohesion and idea generation. Anonymity in these CSCW settings facilitates a less inhibiting form of written expression (e.g., decreased social constraints), fostering a divergent and more inclusive level of input [32]. When AI is used in these contexts, it may be anticipated to complement such advantages by providing objective, non-judgmental support to the participants, facilitating more equitable and dynamic group working [33].

However, AI and creative collaborations raise issues of authorship and intellectual property that are significantly more complex. As AI is used more and more to generate content, there are increasing questions about who holds copyright in automatically generated works: the human author or the computer [12]. The problem of algorithmic bias is also important, as many AI tools are developed using existing data, which often include biases that are perpetuated in the output of the AI system [7, 34]. These biases are detrimental to the fairness and objectivity of AI-generated content, including in a heterogeneous collaborative environment.

Another challenge is the opacity of AI decision-making processes. Many AI tools operate as "black boxes," meaning their internal operations are not transparent to the user, which can hinder trust in the technology and its outputs [35]. This opacity is particularly problematic in creative environments, where transparency is crucial for validating the authenticity of content and for fostering trust among collaborators. Users must understand the reasoning behind AI-generated outputs, especially when those outputs are integral to creative works [36].

In an educational context, issues such as those surrounding academic integrity also surface in relation to the wider use of AI. Concerns regarding whether students are using AI to create content that is then submitted as their own are increasingly common [37]. Furthermore, unequal opportunities surrounding AI tools are likely to lead to equity issues, as children without access to high-level AI systems, for example, may be left at a disadvantage [31]. This in turn raises questions about equity in educational assessment and in the larger academic context.

Finally, it is important to discuss the ethical division of cognitive labor between humans and machines. As intellectual tasks are increasingly performed by systems, human creativity and labor may become increasingly devalued or ignored [33]. This requires careful thought about the role of AI in creative processes, ensuring that it acts as a partner rather than a substitute for human contributions.

2.4. Gaps in the Literature and the Current Study's Contribution

Although it has been increasingly accepted that GenAI may augment individual creativity, there is only sparse empirical literature to date on the effect of GenAI on the team-based creative process, especially in higher education where collaborative work is frequently a pedagogical core. Far less is understood about how students perceive GenAI as a credible and trusted ally. This study seeks to fill these gaps by investigating how GenAI tools influence core dimensions of divergent thinking—fluency, flexibility, originality, and elaboration—during group creative tasks, and by capturing students' qualitative perceptions of AI's role in shaping the dynamics and outcomes of collaborative creativity.

3. Methods

3.1. Participants

The study involved 50 undergraduate English major students (25 male and 25 female), aged between 18 and 22 years, enrolled in the "Communication Skills" course at the National University of Modern Languages (NUML), Islamabad, during the spring 2024 semester. The course is designed to enhance students' interpersonal, collaborative, and creative communication competencies through structured teamwork and real-world communication scenarios.

Participants were selected using purposive sampling, as all were enrolled in the same course, ensuring homogeneity in academic exposure and collaborative learning experiences [38]. The participants came from various linguistic and socioeconomic backgrounds, but all had a comparable level of English proficiency due to their academic training.

Prior to data collection, students were informed about the purpose and procedures of the study. Written informed consent was obtained from all participants, and ethical approval was granted by the NUML Research Ethics Committee. The students were then randomly divided into two groups of 25: one group performed the task without AI assistance (control group), while the other used AI (experimental group).

3.2. Research Design and Procedure

This study adopted a between-subjects experimental design, with one group completing a creative task independently and the other completing the same task using AI support. This design allowed for a direct comparison of creative performance and group interaction in AI-mediated versus traditional settings.

3.2.1. Control Group: Non-AI Condition

The control group completed the Alternative Uses Task (AUT), a widely used measure of divergent thinking that requires participants to generate multiple and varied uses for a common object—in this case, a cardboard box. Each group of 25 students had 10 minutes to collaboratively generate ideas. Students worked face-to-face and recorded their responses either on paper or a shared Google document. This task served as a baseline for evaluating creativity in the absence of technological assistance. The AUT is recognized for measuring four core aspects of divergent thinking: fluency, flexibility, originality, and elaboration [39].

3.2.2. Experimental Group: AI-Supported Condition

The participants in the experimental group received ChatGPT-3 training before handling the identical AUT assignment. Students in this condition worked with ChatGPT-3, which OpenAI developed as an AI tool that generates content. Participants directed ChatGPT-3 through specific inquiries to leverage its abilities for developing and advancing original concepts. Participants received instructions to identify and clearly distinguish AI-generated parts from human-written works so that proper authorship attribution could be maintained.

3.2.2.1. Reflective Writing

Following the creative tasks, each participant wrote a reflective piece (250–300 words) on their experience. The reflection required them to comment on their perceived team roles, group communication, and the influence of AI on their creative thinking. These narratives were used as qualitative data to examine the subjective experiences of students working in both AI-mediated and traditional collaborative environments.

3.2.2.2. Measures and Data Collection

A mixed-methods approach was used to evaluate the creativity of the students' output and their experiences. This included both quantitative scoring and qualitative reflection analysis.

3.2.2.3. Quantitative Measures

The outputs from the Alternative Uses Task (AUT) were evaluated based on the four standard dimensions of divergent thinking, as defined by Guilford [39]:

- Fluency – The number of distinct ideas generated.
- Flexibility – The variety of categories represented.

- Originality – The novelty of responses in comparison to a normative sample.
- Elaboration – The richness and detail provided in each response.

Two trained raters independently scored the ideas using a rubric adapted from established creativity research. Inter-rater reliability was calculated using Cohen's kappa**,** a statistical measure that ensures objectivity and agreement between raters [1].

3.2.2.4. Qualitative Measures

Qualitative data from the reflective writings were analyzed using Braun and Clarke [40]'s six-step thematic analysis process. This involved familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final analysis.

The analysis focused on three main thematic categories:

1. Team Roles and Group Dynamics – Including leadership distribution, levels of participation, and decision-making processes.
2. Perceived Influence of AI – How students felt AI impacted creativity, idea development, and communication.
3. Creative Confidence and Engagement – How the task affected students' comfort with innovation, their motivation, and their sense of creative ability.

3.2.3. Reflective Writing

Each participant completed a reflective writing task after the creative activities lasting between 250 and 300 words. The reflective component asked students to describe their observed team functions as well as their views on group discussions and AI's effects on creative processes. Synthetic narratives provided researchers with qualitative information about student experiences within AI-supported collaborative teams as well as traditional networks.

3.2.4. Qualitative Measures

The researchers applied Braun and Clarke [40]'s six-step thematic analysis process to analyze qualitative data obtained from the reflective writings. The analysis process started with familiarization with the data, then moved to initial code generation, followed by theme exploration, theme review, and theme definition until the final analysis was produced.

Researchers analyzed three essential thematic categories during their study.

1. Team Roles and Group Dynamics - Including leadership distribution, levels of participation, and decision-making processes.
2. Perceived Influence of AI - Students evaluated how artificial intelligence affects their creative processes, as well as the development of new concepts and their conversations in this study.
3. Creative Confidence and Engagement - Students' innovation comfort levels, motivational drive, and creative capabilities underwent changes due to the task.

The data were coded using NVivo 12, qualitative data analysis software. To ensure trustworthiness, two independent researchers cross-validated the thematic codes and interpretations [41].

4. Results

4.1. Quantitative Findings

To evaluate the impact of GenAI on creative performance, the Alternative Uses Task (AUT) scores were compared across four key dimensions: fluency, flexibility, originality, and elaboration. The AUT, a well-established tool for measuring divergent thinking [39] required participants to generate as many creative uses as possible for a common object—in this case, a cardboard box. The goal was to compare the creative performance of two separate student groups: one using GenAI (ChatGPT-3) during their brainstorming session and the other working independently without AI support.

An independent-samples t-test was used to assess differences in creative output between the two groups: the AI-assisted experimental group (n = 25) and the non-AI control group (n = 25)**.** Table 1 summarizes the results.

Table 1.
Comparison of Creative Performance with and without AI Assistance.

Metric	Without AI (M ± SD)	With AI (M ± SD)	*t*(48)	*p*-value
Fluency	15.2 ± 4.1	22.8 ± 5.3	-5.80	< .001
Flexibility	8.4 ± 2.2	11.6 ± 3.1	-4.27	< .001
Originality	6.1 ± 1.8	7.9 ± 2.4	-3.20	.002
Elaboration	18.3 ± 5.7	24.5 ± 6.9	-3.90	< .001

As shown in Table 1, all four creativity metrics demonstrated statistically significant differences in favor of the AI-supported group.

4.2. Fluency

The greatest group difference appeared in fluency, which measures the total generated ideas. The group using AI assistance demonstrated higher fluency in generating ideas, with M = 22.8 and SD = 5.3, compared to M = 15.2 and SD = 4.1 of the control group. This difference was highly significant, with t(48) = -5.80 and p < .001. The experimental group achieved both more efficient and extensive idea generation when they incorporated ChatGPT-3 into their process. The tool

functioned as an initial driving force that helped students overcome writing barriers, thus producing increased writing volumes.

4.3. Flexibility

The width of produced ideas defines flexibility in the idea generation process. Results indicated that experimental students achieved higher flexibility (M = 11.6, SD = 3.1) when compared to control students (M = 8.4, SD = 2.2) according to a t(48) = -4.27, p < .001 statistical comparison. The tool enabled students to expand their conceptual thinking about the issue by sparking diverse idea options instead of limiting them to specific perspectives.

4.4. Originality

Participants who used AI tools received higher originality scores when measured against the control group participants (AI group M = 7.9, SD = 2.4 vs Control group M = 6.1, SD = 1.8) t(48) = -3.20, p = .002. The small rise in originality measures after AI use shows that the system supported students in thinking up fresh concepts. Participants developed more detailed responses because ChatGPT-3 generated atypical connections that drove them toward new associations beyond common cognitive patterns.

4.5. Elaboration

The assessment of elaboration evaluates how detailed each response becomes as well as how developed it remains throughout. Participants using AI generated significantly more elaborate responses compared to the control group (AI: M = 24.5, SD = 6.9; Control: M = 18.3, SD = 5.7), which resulted in a significant t-value of -3.90 (p < .001). The study results demonstrate that ChatGPT-3 assisted students in producing concepts while providing essential guidance, which led students to elaborate on their thoughts in more detail.

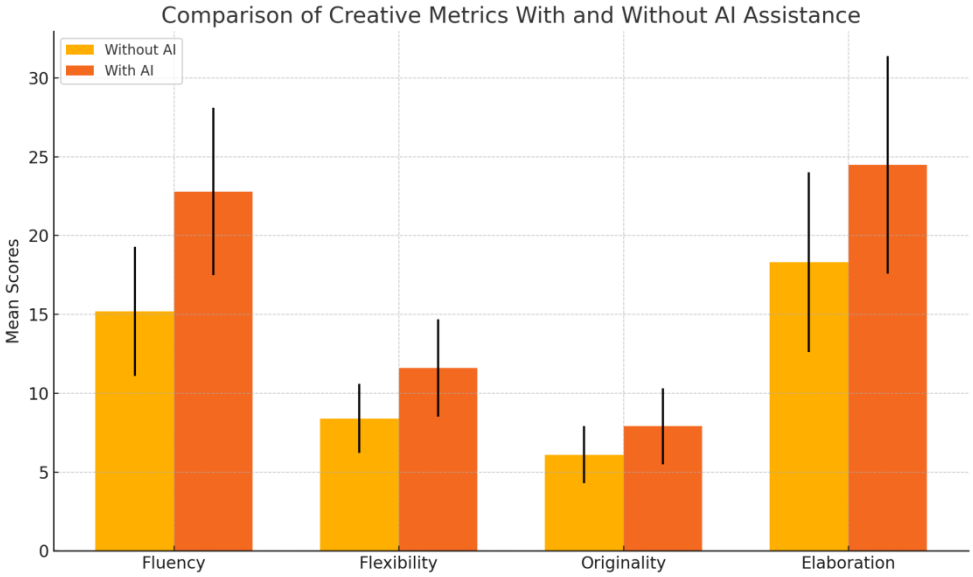

Figure 1.
Graphical Representation of Quantitative Findings.

Figure 1 illustrates creative performance differences between audiences who did not use AI and those who utilized ChatGPT-3 during the creative process. All measurement variables show increased average scores among subjects using AI assistance in Figure 1 with standard deviation ranges illustrated through error bars. The need for AI proved most beneficial for fluency requirements and elaboration demands, thus demonstrating that AI could generate extensive yet detailed concepts. The responses displayed greater flexibility together with heightened originality, which demonstrated better thinking approaches and creative solutions. Data in the graph verifies how ChatGPT-3 improves team creative problem-solving capabilities through diversification of thinking patterns.

4.6. Qualitative Insights

Fifty student reflections underwent thematic analysis, which revealed main themes regarding AI's effects on team cooperation, the development of creative confidence, and changes in workplace relationships. The analysis yielded three main themes, which, according to Braun and Clarke [40]'s framework for thematic analysis, received evidence through selected quotations.

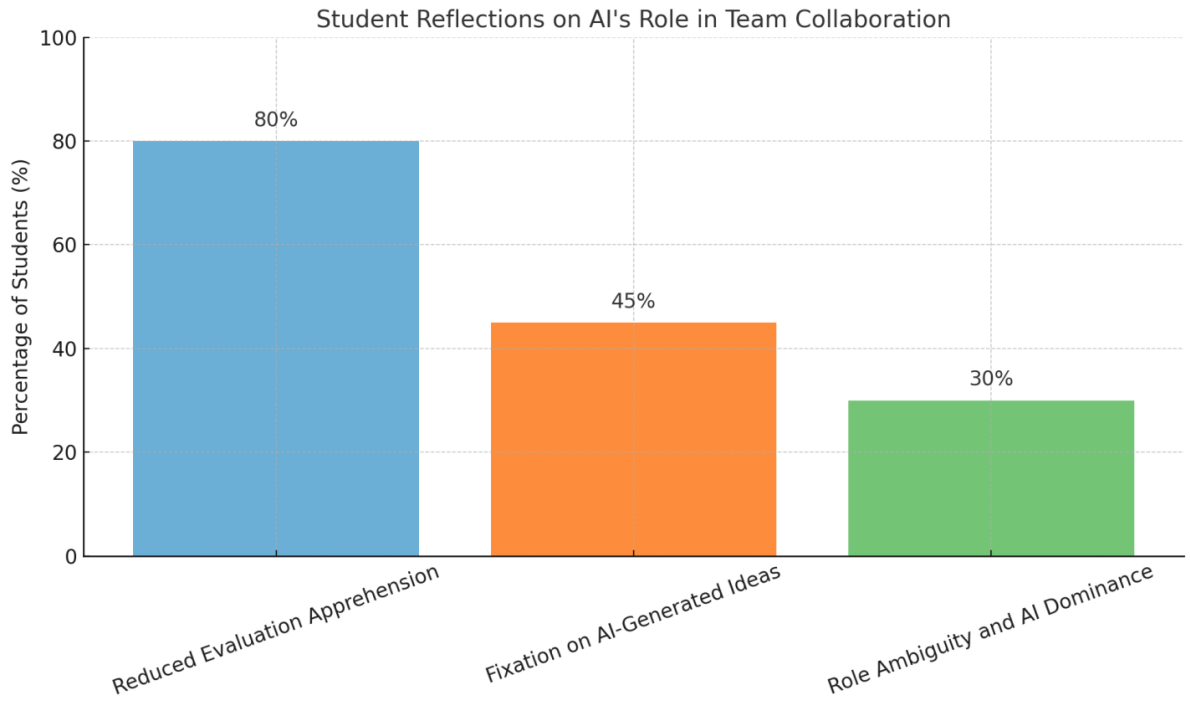

Figure 2.
Student Perceptions of AI in Collaborative Creativity: Thematic Frequencies from Reflective Analysis.

Figure 2 shows thematic findings from the reflections of fifty students who implemented ChatGPT-3 during team creative work. The research established that AI involvement through ChatGPT-3 led to a less evaluative atmosphere that allowed introverted students and those who spoke less frequently to participate comfortably. Students reported this as a major benefit in 80% of cases. The students who used ChatGPT-3 reported that their teams exhibited an excessive dependence on the AI's initial suggestions by relying on them extensively, which restricted the creative thought processes of their team members. Role ambiguity occurred in 30% of cases as teams made the AI assume a leadership position or take charge of the brainstorming process. The changing role of humans during the creative process sometimes minimized both human evaluation and participation, thus endangering creative independence alongside collaborative balance.

The data from 50 student reflections produced three primary themes regarding AI's participation in team creative projects. The following paragraphs explain the themes, which are supported by original quotations. Each theme receives extended analysis.

4.7. Reduced Evaluation Apprehension and Increased Inclusivity

The majority of students (around 80%) expressed that using ChatGPT-3 in brainstorming sessions helped reduce feelings of anxiety and fear of judgment. Many noted that they felt more confident speaking and sharing their ideas when the AI was present, especially those who were usually more reserved in group settings. Students described the AI as a "neutral" or "non-judging" member of the group that made them feel safer and less self-conscious.

One student wrote, "*Before, I felt shy to talk because maybe my ideas were not good. But with ChatGPT, it is not only me who must say something. AI gives ideas too, so I feel more relaxed*." Another reflected, "*AI does not say bad things. It does not laugh. So, I try to speak more. I do not worry that my English is bad.*" These remarks highlight how the AI's non-human, non-critical presence gave students the courage to participate more freely.

Another student mentioned, "*We used ChatGPT first to start. That made talking easy. Before, I was scared to share my first idea. Now, I contribute more after the AI starts."* This illustrates how AI lowered the barrier to contribution, particularly at the early stage of idea generation, which is often where students hesitate the most. The AI helped create a safer psychological space where students no longer felt they had to be the sole originators of creative ideas.

One more student shared, "*Usually I don't say much because I am afraid of being wrong. But now we have AI, I think I can help too. We all work together"*. These responses suggest that the presence of AI made group work feel more equitable. The pressure of originality was distributed across the group—including the AI—reducing the burden on individuals. This allowed quieter or less confident students to step into the conversation without fear.

Taken together, these reflections show that AI can play a valuable role in making group collaboration more inclusive. By reducing social pressure and evaluation apprehension, it can encourage broader participation and help all members feel like valued contributors.

4.8. Fixation on GenAI-Generated Ideas

The students understood ChatGPT's quick idea generation, but 45% of them showed concern about developing AI dependency. Students revealed that they adopted AI-sourced ideas without conducting any critical assessment of their quality

or breadth of development. As a result, the students ended up with reduced creative abilities and fewer unique concepts because of this approach.

The students ask the GenAI tool for an idea, which results in multiple responses that they immediately use. "*Then we just use it. We do not think for ourselves*." Many students believe AI produces excellent work; thus, they accept it as completely accurate content. The students choose to avoid attempting their own ideas when AI generates proposals. The third student noted how everyone initially makes an effort to generate their own ideas. Students lose their capacity to think creatively after receiving AI-generated suggestions. We only use that.

Students depend primarily on the initial textual outputs produced by ChatGPT based on their observations. Numerous groups adopted the AI-generated suggestions as their foundation without conducting any evaluation or adding any new concepts. Students become mentally stuck during the process because they accept the first addressing solution that AI produces rather than searching for additional alternatives.

Students occasionally felt less able to oppose ChatGPT's outputs due to perceiving its speech as more fluent and intelligent compared to their own. A student acknowledged that their proposal lacked superior merit compared to the AI system; therefore, they simply endorsed the AI-generated solution. The article notes that AI delivers information more effectively than the individual could. "I did not change anything."

These observations highlight a risk associated with GenAI use in group creativity: while it can speed up idea generation, it may also limit originality if students treat the AI's suggestions as final answers. Teachers should be aware of this and implement strategies that encourage students to compare, question, and rework AI-generated ideas instead of accepting them passively.

4.9. Role Ambiguity and AI as a Dominant Team Member

A third theme, noted by 30% of students, involved confusion over roles during the group activity. Many students described a situation where the AI became the leader or main contributor in the session. They found themselves simply editing the AI's suggestions rather than creating or debating ideas themselves. As a result, the human contribution to the brainstorming process was reduced.

One student explained, "*ChatGPT gives most ideas. We just follow. It looks like AI is the boss of the group."* Another added, "*We stop talking much. AI says something and we say yes, okay. There is no real team talk after that."* A third commented, "I feel we only work on what AI says. We do not think for ourselves so much."

These reflections indicate that some students saw the AI as having more "authority" or knowledge, and this affected their own willingness to participate actively. They deferred to the AI instead of questioning or discussing its contributions. This kind of role ambiguity can be problematic, especially in learning environments where collaboration and critical thinking are core goals.

It is important to note that the students did not appear to do this out of laziness but rather due to a perceived lack of confidence or skill compared to the AI. One participant said, "*AI is smarter than us, so we follow it. It's an easy way, but maybe not the best way*." Another said, "*We forget our role. AI has become the main person in the team*." Such comments suggest that students may need explicit guidance on how to engage with AI as a collaborative tool rather than as a decision-maker. If roles are not clearly defined, the AI's presence can overshadow the human members, weakening the collaborative learning process.

To sum up, while GenAI integration fosters greater inclusivity by reducing evaluation apprehension and supporting quieter students, it also introduces risks of cognitive fixation and role confusion. The data indicate that, unless carefully mediated, teams may become over-dependent on AI suggestions and cede decision-making authority to the technology. Educators should therefore implement strategies that encourage critical engagement with GenAI outputs and clarify human-AI roles to preserve creative autonomy.

5. Discussion

This study aimed to investigate the influence of GenAI—specifically ChatGPT-3—on creative performance during team-based brainstorming activities. Drawing on both quantitative data from the Alternative Uses Task (AUT), measured across four key creativity metrics (fluency, flexibility, originality, and elaboration), and qualitative data from 50 student reflections, the findings offer a deep understanding of how AI integration affects creativity, collaboration, and group dynamics. Overall, the results suggest that GenAI-supported brainstorming can significantly enhance creative output while also introducing new challenges, particularly around team roles and critical engagement with AI-generated content.

5.1. Impact of Digital Assistance on Creative Performance

This study investigated the role of digital language tools, particularly interactive text generators, in shaping creative performance during group brainstorming tasks. The findings were clear: groups that incorporated digital assistance significantly outperformed those that did not, across all four measured dimensions of creativity—fluency, flexibility, originality, and elaboration.

The main progress was recorded in fluency, which measures the number of separate ideas created. The implementation of digital tools within groups led to a collection of seven additional ideas beyond traditional group structures that lacked digital support. Digital tools serve as "cognitive prosthetics" for idea generation, as described by Osiurak et al. [42], which brings direct alignment to the study findings. The authors explain that tactical technologies stretch human thinking beyond its natural limits to decrease cognitive workloads, resulting in inspiring additional thoughts through external inputs. Amabile

[43] mentioned that external supports, including visual prompts as well as brainstorming software, together with structured collaboration, help people generate ideas freely while diminishing inhibiting factors that commonly restrict performance.

Research findings revealed that, along with producing a greater number of ideas, digital tools helped participants increase their thought capabilities [44]. The diversity of ideas across different categories or perspectives determines the flexibility measures of a concept. Groups using the tool showed a better ability to change between separate themes while considering problems through multiple approaches and creating unexpected solutions Paulus and Nijstad [17]'s theoretical model receives evidence from this research as it demonstrates that external stimuli expand cognitive processes in group creativity. Diverse prompts given to people enable them to escape automatic thinking, which creates opportunities for investigating fresh conceptual frameworks. The research demonstrated that the digital tool implemented conceptual disruption strategies, which, according to Smith [45], enhances creativity by forcing mental discomfort on participants.

While originality, or the novelty of the ideas produced, did show improvement among digitally assisted groups, the gains were less dramatic compared to fluency and flexibility. Students' ideas were often somewhat fresher and more inventive but did not consistently rise to the level of groundbreaking or entirely unprecedented. This nuance resonates with Runco and Acar [1] distinction between idea generation and true originality. Although external tools can greatly expand the range and number of ideas, the creation of truly original insights still relies heavily on internal, often unconscious, cognitive processes. As Boden [46] explains, genuine creative originality involves not just generating novel ideas but also ensuring they are surprising and valuable—two qualities that cannot be fully supplied by algorithms or external tools alone.

Interestingly, the greatest improvement among all creative dimensions was found in elaboration, the extent to which ideas were well-developed, detailed, and clearly explained. The groups that used digital tools achieved an average elaboration score of 24.5, up from 18.3 in the control groups. This suggests that digital support did more than just help students generate ideas; it encouraged them to refine, expand, and clarify their creative outputs. As Benedek et al. [47] observed, access to cognitive aids often improves elaboration by helping individuals structure and extend their thinking in more detailed ways. In this study, the interactive tool appeared to serve that very function, prompting students not only to brainstorm but also to build upon their ideas with richer examples, deeper reasoning, and clearer articulation.

An important takeaway from these results is the collaborative role digital tools can play in group creativity. They should not be viewed merely as passive resources but as active participants in the creative process, helping to reduce performance pressure, encourage experimentation, and provide a launchpad for deeper discussion. Yet, as Petty and Cacioppo [48] pointed out in their Elaboration Likelihood Model, surface-level engagement with external prompts is insufficient for meaningful outcomes. Deeper cognitive processing and critical evaluation are essential for truly creative results. In this context, the digital suggestions served as starting points—but it was ultimately the human participants who added nuance, depth, and coherence to the final ideas.

It is also crucial to recognize that while digital tools can enhance creativity, they are not a replacement for human ingenuity. Over-reliance on algorithm-generated suggestions risks creative stagnation or groupthink, especially when participants fail to move beyond the initial prompts. Sawyer [49] emphasizes that effective group creativity requires both *divergent* thinking (generating a wide range of possibilities) and *convergent* thinking (narrowing down and refining those ideas). While the digital tool clearly supported divergent thinking by increasing the number and diversity of ideas, the process of converging, selecting, refining, and critically developing those ideas depended heavily on the active engagement of the students themselves.

In summary, this study provides compelling evidence that thoughtfully designed digital tools can meaningfully enhance the creative performance of student groups. They foster a greater quantity of ideas (fluency), a broader range of thematic exploration (flexibility), and deeper development of ideas (elaboration), with some improvement in novelty (originality) as well. However, the most innovative and valuable outcomes were achieved not through passive acceptance of digital suggestions, but through critical engagement and creative human intervention. These results highlight the promising future of integrating digital assistance into educational and collaborative settings, but they also underline the importance of maintaining human agency, intentionality, and critical reflection in the creative process.

5.2. Qualitative Insights: AI and Team Dynamics

The thematic analysis of students' post-task reflections revealed rich insights into how GenAI, specifically ChatGPT-3, shaped the social and interpersonal dynamics of group creativity during team-based brainstorming sessions. These qualitative findings add depth to the earlier quantitative results by illuminating the psychological, behavioral, and relational shifts that unfolded when an AI agent was introduced into collaborative creative contexts.

Evaluation apprehension became dramatically lower within such environments according to participants because social psychology and creativity research highlight this phenomenon. Participants indicated through their responses that the virtual team inclusion of ChatGPT-3 yielded a psychological safety zone for 80% of them who became comfortable expressing unusual thinking with unfinished or imperfect thoughts. The relaxed atmosphere fostered among students led to more natural spontaneous thinking because they no longer needed to worry about peer judgment. Social risk reduction stands vital as demonstrated by Paulus and Brown [50] research while having a direct impact on enhancing various and broad ideas at group levels. Psychological safety, along with intrinsic motivation, strengthens creative performance both at an individual and team level according to Amabile [43]. More introverted and hesitant students became more willing to actively participate under the impression that the AI system was not judgmental or threatening.

Although AI-based psychological safety contributed positively to the learning process, it developed new difficulties for users to manage. The survey produced a significant counter-theme that involved students excessively depending on the AI to produce content. Students reported that their groups accepted ChatGPT-3 suggestions without critical evaluation or alteration

in 45% of cases. Students displayed anchoring behavior in their intellectual processing similar to what Tversky and Kahneman [51] documented, as this cognitive bias produces an initial credible idea that dominates subsequent thinking. Participants illustrated cases where AI-generated ideas took control of discussions, causing team members to stop exploring alternative creative possibilities. The findings from participants match the creative fixation worries described by Amankwah-Amoah et al. [52], which state that uninhibited AI usage might reduce innovativeness by having AI results function as boundaries rather than starting points for creativity. Using AI suggestions to an excessive degree creates an ironic effect by restricting creativity while it should support deeper creativity.

Role ambiguity reached critical levels within groups that collaborated together. ChatGPT-3, according to the participants, claimed pseudo-leadership roles throughout the brainstorming sessions about 30% of the time. Students admitted to following AI system recommendations rather than sharing their thoughts on the subject because it presented itself as "the smartest member" of the team. Human-AI collaboration encounters major changes because of the new authority perceptions that emerge Brynjolfsson and McAfee [53], demonstrated through their research that algorithms surpass human capabilities as trustworthy and competent members during human-machine collaborations. A learning environment where the AI tool is perceived as having higher authority leads to reduced student autonomy and restricts opportunities for leadership growth as well as critical thinking development needed for independent problem-solving.

This phenomenon of role confusion also points to a broader pedagogical issue: the lack of clear instructional scaffolding surrounding the integration of AI into group work. When there is no specific direction or defined roles determined for the AI tool during the group work process, students tend to give it excessive influence and power. Learning environments show their best potential when students receive guided mediation through structured interactions according to the perspectives expressed by Resnick [54] and Vygotsky [55]. The lack of proper scaffolding systems would not only create group work disruptions but could also undermine important educational targets involving collaboration, agency development, and creative thinking.

In summary, implementing ChatGPT-3 as a GenAI tool creates synergies for inclusive, fluent teamwork yet introduces management challenges that professionals need to handle carefully. AI technology establishes lower barriers to student involvement while creating mental comfort for all participants and expanding collective thinking, particularly for students who were previously timid or reserved. Groups sometimes encounter cognitive problems, which include anchoring effects and creative fixation, but human influence in leadership and the changes to team dynamics become unexpected challenges as well. Educational contexts require both strategic AI-trained instruction and thorough AI literacy training because of the pressing necessity for these interventions. Students require instruction in both AI tools' utilization and collaborative engagement with AI systems that use AI as an ally instead of imparting leadership or substituting creative leadership. The purposeful implementation of AI needs configuration that sustains human imagination along with sustained critical thinking and active participatory reflection. AI serves as an effective group creativity enabler, provided students understand how to use it properly to enhance human collaboration rather than replacing it. Educational practices in the future need to give students access to AI technology and education about how to thoughtfully use these tools while developing critical abilities to find creative solutions in human-machine collaborations.

6. Conclusion

The study evaluated how AI technology, specifically through ChatGPT-3, affects team-based brainstorming creativity levels in group work sessions. The study findings show that AI technologies produce noticeable improvements in creative results within four key aspects, including creativity strategies and output quality. AI tools, when integrated appropriately, can work as efficient cognitive collaborators that provide scaffolding support to human creative thinking while extending group conceptual capabilities. The greatest increases in performance rates occurred through fluency along with elaboration, which demonstrates AI's strong capability to support team idea generation and detailed idea development. The research study demonstrated vital constraints that need thorough examination. Many participants admitted that they depended heavily on GenAI suggestions to the point where they accepted suggestions without examining them. The mindset of complete dependence on GenAI puts human creativity in danger while converting cooperative work into mechanical sessions that exceed the control of humans. Unrestricted AI integration creates role ambiguity, which makes the advanced technology appear superior to human workers, thus damaging the organizational contribution balance. The qualitative research demonstrates how AI systems can make creative processes more equitable through their ability to minimize social anxiety among users while promoting group participation. The desirable effects of model associations need to be considered jointly with the necessity to sustain substantial human interactions throughout the idea creation process. Educational leaders and facilitators need to build defined safeguards that help people evaluate AI outputs properly while maintaining human creative autonomy during assisted AI work. The power of AI to reshape creative teamwork requires proper management to convert it from a replacement to an enabling tool. Future studies need to analyze the long-term effects of using AI in creative training along with determining methods to maintain human creative autonomy within creative teams that combine AI systems and humans.

6.1. Implications for Teachers and Future Research

The research outcomes from this study create essential effects on educational practices alongside new research approaches. Educational settings need to be mindful of dependency issues because AI tools such as ChatGPT-3 clearly improve creative performance operations mainly in fluency, flexibility, originality, and elaboration aspects. Students exhibit a tendency to automatically trust AI-generated content according to studies that have shown this phenomenon [10, 56], leading to decreased critical thinking and creativity among human students. The implementation of structured reflection activities should become part of instructional design to help students evaluate and critique AI-sourced content or develop it

through multiple revisions. Dominant methods allow students to develop metacognitive skills while keeping human creativity authentic [49].

The critical element for collaborative work that includes AI requires a clear understanding of roles for all participants. When AI acts as a group participant, it may accidentally replace human members, thus leading to confusion and potential loss of authority. The need for autonomy, coupled with intrinsic motivation, represents vital elements of creativity according to Amabile [43]. Teachers need to design collaborative environments where students both accept AI suggestions and maintain the authority to adjust the AI input or stop it from affecting their work according to their own judgment. The proper alignment of human and machine collaboration as supportive partners instead of dominating roles will preserve democratic creative processes [54].

Finally, future research needs to focus on long-term and multidisciplinary studies about integrating artificial intelligence into education systems. The current investigation shows short-term benefits of creativity but provides no insight into the lasting effects of these improvements after the study period ends. Studies following students over time would provide information about possible transformations in their creative self-efficacy combined with changes in epistemic beliefs and collaborative approaches. A thorough investigation of AI capabilities throughout narrative creation and engineering problem-solving, as well as visual design, would result in insights regarding both domain-specific benefits and limitations [7, 57]. The approach of AI as a tool to enhance human capabilities will help educators and researchers create ethical and effective learning strategies for collaborative AI-human educational practices.

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