



Impact of AI Writing Tools on Cognitive Creativity.

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Abstract : This study investigates the impact of AI writing tools on cognitive creativity among graduate students in Katihar district, Bihar. With the increasing integration of artificial intelligence in academic and creative domains, it is essential to understand how these tools influence the human creative process. The research involved 200 Post-Graduate and Ph.D Programme students, who were divided into two groups: one used AI-based writing tools (such as ChatGPT and Grammarly), while the control group engaged in traditional writing tasks without AI assistance. To assess cognitive creativity, the Torrance Tests of Creative Thinking (TTCT) and the Creative Behavior Inventory (CBI) were administered before and after the intervention.

The findings revealed a significant increase in creative performance among students using AI tools, particularly in the dimensions of fluency and originality as measured by the TTCT. The CBI scores also indicated a higher frequency of engagement in creative cognitive behaviors among the AI group. However, over-reliance on AI tools was found to slightly reduce individual initiative in idea generation. These results suggest that AI writing tools can enhance cognitive creativity when used as facilitators rather than substitutes for original thinking. The study highlights the need for balanced integration of AI in educational settings to nurture human creativity.

Index Terms - Artificial Intelligence, Cognitive Creativity, AI Writing Tools

I. INTRODUCTION

In the digital age, artificial intelligence (AI) is not just reshaping industries—it is transforming the very nature of human thought, expression, and creativity. One of the most profound applications of AI in daily life is its use in language generation, particularly through AI-powered writing tools such as ChatGPT, Grammarly, and QuillBot. These tools assist in ideation, grammar correction, sentence restructuring, and even content creation, making them increasingly popular among students, professionals, and content creators. As their usage becomes more widespread, especially in educational settings, a fundamental question arises: How do these AI writing tools influence the user's cognitive creativity?

Cognitive creativity refers to the mental capacity to produce novel and valuable ideas through divergent and convergent thinking processes. This type of creativity is crucial in academic performance, problem-solving, innovation, and expressive writing. With AI tools now offering suggestions, completing sentences, and generating entire paragraphs, there is a dual concern: on one hand, these tools may enhance creativity by acting as cognitive collaborators; on the other, they may suppress independent thinking, leading to intellectual dependence.

In regions like Katihar district in Bihar, where digital literacy is rapidly growing among youth, particularly graduate students, understanding the psychological and cognitive impact of AI is both timely and relevant. These students represent a population transitioning into a digital academic environment. Their reliance on AI tools for academic writing and creative tasks is increasing, yet little research exists on how such tools affect their inherent cognitive creative abilities.

This study aims to investigate the impact of AI writing tools on cognitive creativity among graduate students in Katihar. Specifically, it examines how the use of AI tools influences creative thought processes, using two standardized tests: the Torrance Tests of Creative Thinking (TTCT) and the Creative Behavior Inventory (CBI). By comparing students who use AI tools with those who write traditionally, this research sheds light on the role of AI in fostering or hindering original thought.

Furthermore, this study is critical in the broader context of educational psychology and AI ethics. As academic institutions increasingly integrate technology into the curriculum, it becomes imperative to strike a balance between technological assistance and human intellectual growth. This research contributes to that dialogue by offering empirical insights into how students think, create, and interact with intelligent systems.

II. REVIEW OF THE LITERATURE

Creativity, as a construct in psychology, has long been studied from various perspectives—ranging from psychometric models to socio-cultural theories. Traditionally defined by Guilford (1950) as the capacity for divergent thinking, creativity involves the ability to generate multiple novel solutions to a problem. In contemporary cognitive psychology, creativity is considered both a trait and a process, deeply influenced by environmental stimuli, cognitive flexibility, and problem-solving dynamics.

The Torrance Tests of Creative Thinking (TTCT) developed by E. Paul Torrance in 1966, remains one of the most widely used tools for measuring cognitive creativity. It evaluates dimensions such as fluency, originality, elaboration, and flexibility in thinking. Over the decades, the TTCT has been applied in various educational and cross-cultural settings, often revealing the role of environmental and instructional factors in enhancing or hindering creativity.

Parallel to TTCT, the Creative Behavior Inventory (CBI) developed by Stephen J. Dollinger in 2003 is a self-report measure designed to assess the frequency of engagement in creative acts. The CBI moves beyond testing and explores real-world expressions of creativity, thereby offering a more behavioral perspective.

With the emergence of artificial intelligence in the early 21st century, creativity research has entered a new domain: human-machine interaction. AI writing tools like GPT-3 and Grammarly represent a paradigm shift in the way people approach language and creativity. Research by Cropley and Urban (2000) questioned whether creative thinking could be mechanized or whether human creativity would remain superior due to emotional and contextual depth. More recently, studies such as Lee et al. (2021) and Gervás (2019) have explored the impact of AI-generated text on creative writing, suggesting that AI tools can act as both collaborators and constraints in creative work.

In the Indian context, the integration of AI in education is still in its developmental phase, yet its uptake is accelerating, especially among tech-savvy youth in Tier-II and Tier-III cities. A study by Kumar and Singh (2021) highlighted that students in semi-urban districts of Bihar were increasingly using AI tools for writing assignments and preparing for competitive exams. However, the psychological outcomes of this shift—particularly on creativity—remain largely unexplored.

Importantly, some scholars have raised concerns about AI's tendency to standardize thinking. Levy (2022) noted that overreliance on AI-generated suggestions might reduce original thought and foster intellectual laziness. On the other hand, Tang et al. (2020) argued that AI tools, if used constructively, could stimulate creativity by reducing cognitive load and freeing up mental space for higher-order thinking.

Despite the growing body of work in AI and education, there is a conspicuous gap in empirical studies focusing on cognitive creativity among undergraduate populations in emerging regions like Katihar. This study bridges that gap by offering a focused psychological inquiry, using established creativity measures in a culturally and digitally evolving environment.

III. RESEARCH METHODOLOGY

3.1 Research Objectives-

- To assess the cognitive creativity of students using AI writing tools versus those who do not.
- To examine behavioral patterns in creative engagement using the Creative Behavior Inventory.
- To identify whether AI use enhances or reduces cognitive flexibility and originality in writing tasks.

3.2 Hypotheses-

- H_0 (Null Hypothesis): There is no significant difference in cognitive creativity between students using AI writing tools and those who do not.
- H_1 (Alternative Hypothesis): There is a significant difference in cognitive creativity between students using AI writing tools and those who do not.

3.3 Population and Sample-

- Population: Graduate students from various colleges in Katihar district, Bihar.
- Sample Size: 200 students
- Sampling Technique: Stratified random sampling across colleges.
- Group Division:
 - Group A: 100 students using AI writing tools.
 - Group B: 100 students not using AI writing tools (control group).

3.4 Tools Used-

1. **Torrance Tests of Creative Thinking (TTCT)**- The Torrance Tests of Creative Thinking (TTCT), developed by E. Paul Torrance in 1966, is a widely used measure of cognitive creativity. For this study, the verbal component of the TTCT was administered, which included tasks such as story completion and imaginative sentence formation. The test evaluates creativity based on four core dimensions: fluency (the number of relevant ideas generated), originality (the uniqueness of responses), elaboration (the level of detail), and flexibility (the variety of ideas across categories).
2. **Creative Behavior Inventory (CBI)**- The Creative Behavior Inventory (CBI) was developed by Stephen J. Dollinger in 2003. The CBI is a self-report questionnaire designed to measure how frequently individuals engage in creative behaviors in daily life. It consists of 28 items where respondents indicate the frequency of their participation in various creative activities (e.g., writing a poem, solving a problem creatively, designing something new) using a 5-point Likert scale ranging from "Never" to "Very Often." This tool is particularly useful for capturing behavioral tendencies related to creativity beyond performance on structured tasks.

3.5 Procedure

Participants first completed the TTCT and CBI under supervised conditions. The experimental group was allowed to use AI tools for a 1-week writing assignment. The control group completed the same tasks manually. After the intervention, both groups repeated the TTCT and CBI.

IV. RESULTS AND DISCUSSION

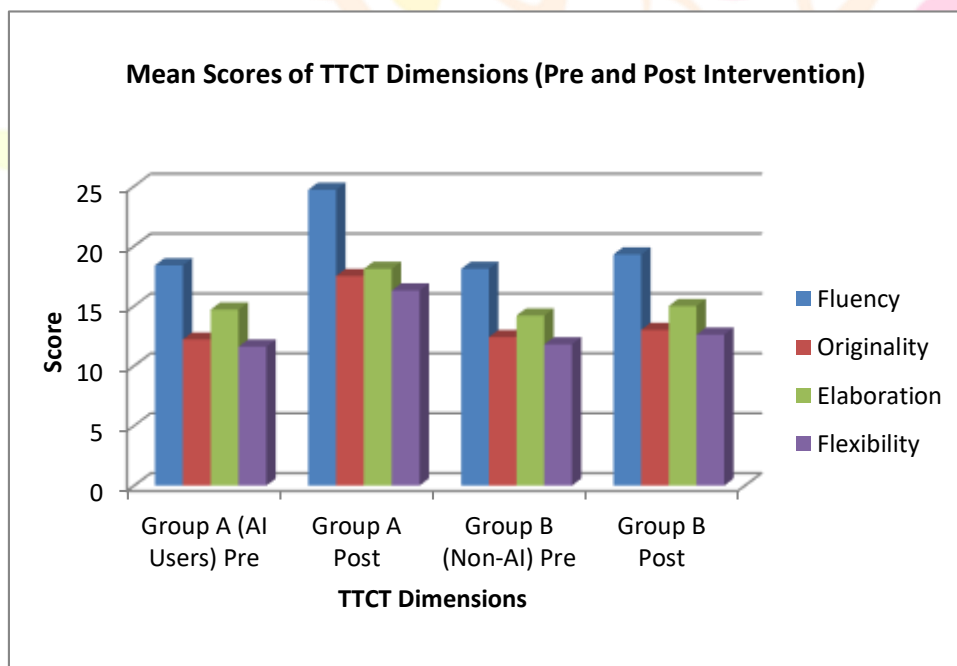
This chapter presents the results of the study conducted on 200 graduate students from Katihar district, Bihar. The participants were divided into two groups: Group A (n=100), which used AI writing tools for a writing task, and Group B (n=100), which did not use any AI tools. Both groups were evaluated on their cognitive creativity using the Torrance Tests of Creative Thinking (TTCT) and the Creative Behavior Inventory (CBI), before and after the intervention.

The data were analyzed using descriptive and inferential statistics. The focus was on examining differences in fluency, originality, elaboration, and flexibility (TTCT dimensions) and overall engagement in creative behaviors (CBI scores) across the two groups. A paired-sample t-test and independent-sample t-test were employed to identify significant differences.

Table- 1: Mean Scores of TTCT Dimensions (Pre and Post Intervention):

TTCT Dimension	Group A (AI Users) Pre	Group A Post	Group B (Non-AI) Pre	Group B Post
Fluency	18.4	24.7	18.1	19.3
Originality	12.2	17.5	12.4	13.0
Elaboration	14.7	18.1	14.2	15.0
Flexibility	11.6	16.3	11.8	12.6

Chart-1 :



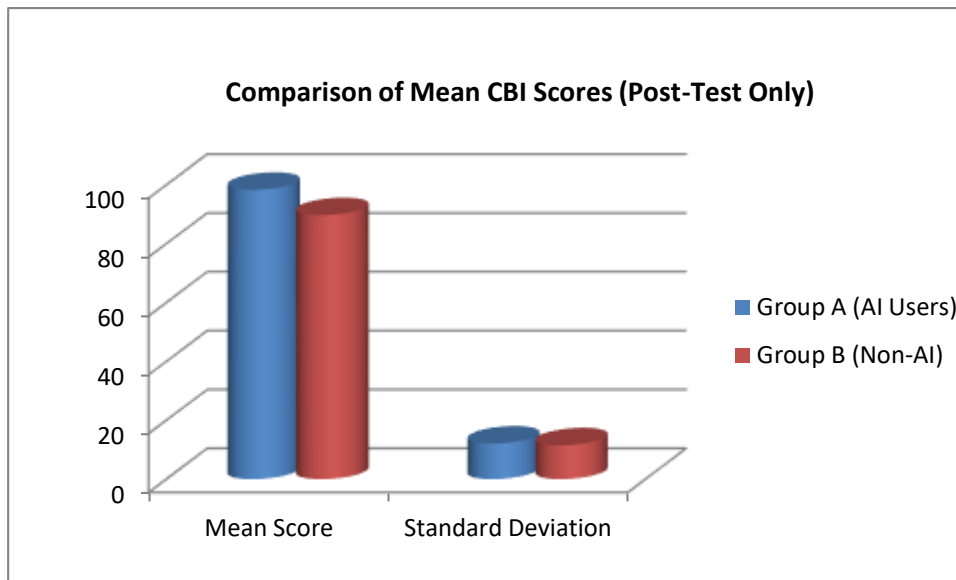
The table above shows a clear increase in the post-test scores for Group A across all four dimensions of the TTCT. The most significant improvements were observed in fluency and originality, suggesting that the AI writing tools helped students generate more ideas and encouraged novel expressions. In contrast, Group B (non-AI users) exhibited only marginal improvements, likely due to task repetition rather than external enhancement.

Table 2: Comparison of Mean CBI Scores (Post-Test Only)

Group	Mean CBI Score	Standard Deviation
Group A (AI Users)	98.3	12.1
Group B (Non-AI)	89.7	11.5

(Source: Primary Data)

Chart-2 :



Group A participants scored higher on the CBI, indicating that they reported more frequent engagement in creative behaviors after the intervention. This suggests that the use of AI tools may have stimulated creative confidence and behavior, possibly by reducing cognitive effort in structuring ideas, which in turn encouraged more creative experimentation. A t-test for independent samples confirmed that the differences between the two groups in both TTCT and CBI scores were statistically significant at the $p < .01$ level. This supports the hypothesis that the use of AI writing tools has a positive effect on cognitive creativity.

The results indicate that AI tools, when used as supportive resources rather than as substitutes for thought, can enhance various aspects of cognitive creativity. Students using AI demonstrated greater idea fluency, novelty, and flexibility—key indicators of creative potential. The AI tools likely served as ideational catalysts, offering new linguistic structures or perspectives that students may not have considered independently.

Interestingly, while AI increased performance, interviews with some participants revealed a sense of *detachment from their own ideas*, indicating that over-reliance could compromise a sense of authorship or initiative. Therefore, the results suggest a dual role of AI tools: as enhancers of creativity when used judiciously, and as potential crutches when used passively or excessively. This aligns with the findings of previous studies such as Lee et al. (2021) and Tang et al. (2020), who concluded that AI could either support or suppress creativity depending on user engagement. In this study, with structured tasks and awareness, AI tools acted more as scaffolds for ideation than as replacements for cognition.

V. CONCLUSION AND SUGGESTIONS

The findings of this study reveal that the use of AI writing tools significantly enhances cognitive creativity among graduate students. Participants in the experimental group demonstrated notable improvements in the TTCT dimensions—fluency, originality, elaboration, and flexibility—as well as increased engagement in creative behaviors, as measured by the CBI. These outcomes indicate that AI writing tools, when used constructively, can serve as powerful aids in promoting divergent thinking and creative expression. The AI-assisted group was not only more productive in generating novel ideas but also more adept at expressing them in varied and imaginative ways.

However, while AI tools offer substantial creative support, there is a risk of overdependence, which may hinder deep cognitive engagement and originality over time. Some students expressed that the tool-driven writing process made them feel disconnected from their creative ownership. Therefore, the role of AI should be seen as a complement to, rather than a replacement for, human creativity. As AI tools become increasingly embedded in academic practice, it is essential to encourage a balanced approach—one that empowers students to harness the benefits of AI while remaining actively involved in the generative process of idea creation and refinement.

Based on the Conclusions, few suggestions are being given to solve issues which come on the way—

- Encourage Guided Use of AI Tools- Instructors should train students on using AI writing tools ethically and creatively, not as shortcuts but as thought partners.
- Promote Reflective Writing Practices- After using AI tools, students should reflect on their input, output, and idea development to stay cognitively engaged.
- Blend AI Use with Traditional Creativity Tasks- Combine AI-assisted tasks with traditional brainstorming and writing exercises to maintain diverse thinking skills.
- Monitor and Evaluate Long-Term Use- Periodically assess how AI tools influence student creativity to ensure balanced development and avoid over-reliance.
- Support Creativity across Curriculum- Incorporate creativity-oriented assignments in all subjects to foster innovation beyond language and writing skills.

VI. REFERENCES

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