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Generative Artificial Intelligence and Students' Creativity in Elementary English Writing: Evidence from Grade 5 Students in Islamabad

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Abstract

This research paper examines the influence of generative artificial intelligence on student's creativity in elementary English writing. In examining the impact of AI-assisted writing on the creative performance of Grade 5 students, there is a clear focus on one objective. This study employed a one group pre-test/post-test design that involved 20 fifth grade students from a private school in Islamabad. Four English writing tasks (Alternative Uses, Story Titles, Sentence Expansion, Picture Description) were used for assessing creativity. The four aspects of dimensions of creativity were defined as fluency, flexibility, originality and elaboration. The Statistically Significantly Greater Improvement occurred on the Story Titles task, revealing that AI can aid students in starting to write, help them brainstorm ideas, and alleviate blank-page syndrome. However, there was a also statistically significant decrease in Sentence Expansion, indicating that AI may lead to decreasing student elaboration and expressive control when relying heavily on AI-generated wording. The total creativity score rose slightly, the difference did not prove to be statistically significant. The results indicate that generative AI does not necessarily enhance students' creativity. The limitations exist in the type of creative task, extent of student engagement, and the extent to which students adapt AI recommendations to make their own. It is concluded that AI can be most helpful with initial idea generation, but that independent elaboration should focus on the language and thinking of the students themselves.

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I. Introduction

Generative artificial intelligence has been a hot topic in education due to its ability to generate text, examples, explanations, outlines, vocabulary, and feedback when prompted by the students. In a writing classroom, these can be used to help students who need help getting started on a task or to give students ideas for what words they can use. Writing, meanwhile, is not necessarily the creation of grammatical sentences. It requires the use of original thought, meaningful expression, revision, and choice of ideas and language. Thus, an important education-related question is whether can generative AI promote the creativity of students, or whether it will substitute reasoning for creativity.

The present paper has a single objective, which is to analyze how generative AI has affected students' creativity. The emphasis is Grade 5 English writing because students at the grade 5 level need to develop the use of language independently, imagination, self-regulation and confidence in writing the English language. While AI can generate ideas quickly, younger students might take ready-made suggestions and fail to delve into the concept. This renders the elementary writing segment a zone to be explored to observe the genuine creative output of AI.

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Creativity is commonly understood as the production of ideas that are both original and useful. Novelty plus appropriateness, is how Runco and Jaeger (2012) put it in relation to creativity. For EW in the elementary grades, this means that out-of-the-ordinary does not suffice; the creative response must be appropriate for the writing task. For instance, stories should have an interesting and relevant title, picture descriptions should be meaningful and sentences expansions should add clear and expressive detail. This paper takes creativity to therefore examine several task based indicators, instead of a general score.

Four sub-tasks in the study are Alternative Uses, Story Titles, Sentence Expansion and Picture Description, which are related to writing. These tasks are based on various aspects of creative performance. Creative applications can show flexible and unusual modes of thought. Story Titles may demonstrate brainstorming and creativity. Sentence Expansion can demonstrate elaboration and control of language for expression. Picture Description may demonstrate Observation, Detail and imaginative Response. The study compares the students performance on the tasks before and after using the AI to see if the AI can be used to facilitate all aspects of creative writing or just parts of creative writing.

This is an important topic in the Pakistani context too. There is mixed uptake in digital learning within schools. While larger opportunities might exist in urban settings like Islamabad with respect to access to devices and internet, student digital literacy, responsible use of AI, and effective rules for the classroom are still maturing. Connecting to equity, readiness, and responsible governance is paramount for AI in education, according to Miao et al. (2021). These are particularly important considerations regarding younger students as they have yet to develop their competence and capacity to evaluate the originality, accuracy, and usefulness of AI-generated text.

Possible impacts of AI in education are largely discussed in the context of higher education and academic integrity and at the level of the university and the writing of texts. Elementary students are unique; they are building their writing habits, authorship, and confidence. Kasneci et al. (2023) discuss how large language models provide a learning opportunity for students, alongside potential dangers including reliance rather than independence, misinformation, and difficulties measuring student's performance and contributions. To contribute to the above discussion, the present study emphasized on the creativity of the elementary English students in writing.

This paper does not assume generative AI to be all good or all bad. Instead, it investigates the possibility that the impact of AI is task specific. AI can provide a multitude of potential ideas but it cannot assist with students' own sentence making and detailed language. This cautious interpretation is justified in terms of the results of this study; one task showed a significant increase, one showed a significant decrease, while the total creativity score reflected no significant change.

The paper is divided into segment literature review, methods, results, discussions, implications for future research and concluding. The methodology section details the student experiment, creativity tasks, Score Sheet and statistical analysis. The pre-test/post-test comparison is presented in the results section. Findings are analyzed and discussed related to students' creativity and AI-assisted writing. The final sections provide directions for future research and culminate with the final argument that generative AI should be assessed as a creativity support tool rather than a general answer for creative development.

II. Literature Review

AI in education has documented armoring from the fixed tutorial framework to versatile instruments which can react to the learner in normal language. Previous systems primarily focused on checker, feedback or content adjustment based on learner performance. Generative AI is unique in that it can create new text, questions, examples, and suggestions. According to Lo, 2023, ChatGPT and other chatbots have sparked new opportunities and challenges for education. That's the flexibility of importance when writing in English, as the composition process may involve several ideas and choices of language, as well as thoughts on the utterance itself.

Writing can be supported using Generative AI to provide learners with starting points. When a student requests possible story ideas, vocabulary words, sentence examples, or feedback on a short paragraph. Baidoo-Anu and Owusu Ansah (2023) propose that ChatGPT can aid learning process with explanations, on-demand and personalized responses and interactive assistance. In elementary writing, these attributes can lower anxieties and boost interest. The same aspects may, however, render it easier for students to rely on others' answers rather than building up their own thoughts.

One such area is in the field of learning languages where generative AI seems particularly relevant. L2 writing meets the challenge of simultaneous control of vocabulary, grammar, sentence construction and meaning. Kohnke et al. (2023) propose that ChatGPT can be utilized to give models and rehearse chances in language learning. In grade 5 AI-generated examples could be used as starter prompts, directing possible routes. The learning value depends, of course, on whether students take these examples as input for reflection instead of output for copying.

Creativity is considered to be an important educational goal in order to enable the learners to produce new ideas, relate their ideas and solve problems in flexible ways. Guilford (1950) highlighted divergent thinking that is the process of developing multiple answers rather than merely seeking to identify any single answer. The ability to think in a divergent manner is clearly associated with such behaviors as generation of several story titles, description of a picture in several ways and imagining unusual uses for an object. Generative AI can provide students with more ideas, but the process of choosing, modifying, and articulating ideas remains a personal endeavor of students.

Originality and usefulness are the two components of the current definition of creativity (Runco & Jaeger, 2012). This definition is most pertinent for writing in English. A response that is very unusual for the task, but does not show an understanding of the task is not fully creative, and a correct but predictable response does not necessarily evidence strong creativity. Therefore, this study evaluates students' writing through originality, fluency, flexibility, and elaboration. These dimensions clarify to some degree how AI impacts various aspects of creativity.

Torrance (1974) has created very influential models to evaluate the creative thinking, which are fluency, flexibility, originality and elaboration. The number of relevant ideas is referred to as fluency. Flexibility: The diversity of types or directions in the ideas. Originality: Rare or unusual responses. Elaboration is the degree of detail provided about an idea. The dimensions in this study are applied to the measurement of creativity in four types of writing. This is to prevent a judgement on basis of mere grammar/correctness.

These dimensions are potentially impacted in various ways by generative AI. It could improve fluency, providing multiple suggestions to rapidly generate answers and could assist flexibility by providing multiple routes to an answer. It can, however, diminish the originality of the produced student work if multiple students provide the same suggestions or if students reproduce the first AI response without editing. Instead, Doshi and Hauser (2024) found that generative AI can help turn individual creative writing but can diminish the overall diversity of writing. This matters for elementary writing in that a class can seem to be writing better, and yield more similar writing responses.

AI is also found to infinite and constrict creativity during the brainstorming and design process. Wadinambiarachchi et al. [2024] highlights the potential impact of generative AI on divergent thinking and design fixation. In fixation a learner becomes "married" to an example without being able to advance beyond it. If a student uses AI for a kick off for an idea, they might use too many AI words in their writing. If it does, it would be written fluently but probably wouldn't be a reflection of the poem created by the student.

AI literacy is thus needed – but age appropriate – even for young learners. Ng et al., (2021) describes AI literacy as the ability to understand, assess, and engage with AI systems. AI literacy for the elementary grades isn't about algorithms. It involves knowing basic guidelines like being able to tell if the idea is sensible, turning AI-generated ideas into personal ones, articulating the reasoning for accepting an idea and not copying directly.

Prompting also influences the outcome of learning. Instead of simply writing the answer to a prompt, for example 'write my answer', a prompt like 'list 3 possible answer ideas that I can develop' could be more effective in encouraging students to think creatively. Therefore Mollick and Mollick (2023) suggest defining the role of learning for AI. In the present study AI is regarded as an assisted condition where the students are given ideas and language support. The issue is whether or not this support enhances the performance in all creativity tasks or only for those types of writing.

Assessment is another important issue too. Pointing to this, Sharples (2023) sees that generative AI be examined in terms of its responsible and social uses, as well as from a cheating perspective. This implies, in terms of student creativity, that assessment should take into account how they use artificial intelligence, the ways they develop and modify those suggestions, and the distinction between performance with AI and performance without AI. Using a pre-test/post-test approach can demonstrate if students respond differently when AI is accessible, but it does not necessarily illustrate how each response came about.

The literature is suggestive of a balanced perspective. The AI can help students in the form of suggestions, illustrations, word usage, and comments. It could also be limiting creativity if students rely on it too heavily or if the type of suggestions kill diversity and individual expression. The present study aims to explore the issue namely through conducting the empirical comparison between Grade 5 students' pre and post creativity score in English writing tasks by using generative AI. The research gap is that in the area of elementary AI-assisted writing, there is a need for task-level evidence with regard to students' creativity, particularly in the context of Pakistan.

III. Methods

This study employed one group pretest – postest quantitative design. This design was chosen since the aim was to examine the alterations in students' creativity before and after

generative AI exposure. Each student performed creativity tasks twice, once with and once without the use of AI. When the same participants are measured in two related conditions, then paired-samples analysis can be used (Field 2018).

Twenty Grade 5 students from Islamabad in a private school participated in the study. The school was chosen because the students could complete small digital writing-shorts during the intervention. The sample size was very limited; the results are preliminary and not transferable to all elementary school children. Nevertheless, the design can be applied to study the change in creativity at the task level in students' transition from independent writing to AI-assisted writing.

In the study four creativity tasks were used. Alternative Uses was the first; students brainstormed unusual ways to use a familiar object. The second task was Story Titles where students created potential titles for a story idea. Sentence Expansion, where students expanded a single sentence with information, was the 3rd task. The fourth task was Picture Description where the students described a picture. The selection of these tasks were based on simplicity for Grade 5 learners and likewise, they encompass the various types of creative English writing.

There were three phases of the procedure. For the pre-test, students performed all four tasks using the "no AI" condition. The orientation phase, a brief simple guidelines were provided to the students on utilization of generative AI. During the post-test phase, students were given the same creativity tasks with the help of AI. The goal was not to see the level of students' AI competence, but to examine the students' creative achievement between the independent condition and the AI-assisted condition.

The data were analyzed using descriptive statistics and paired-samples t tests. The withoutAI and with AI condition mean scores were computed for each task. A statistical comparison was made between the two conditions. Four task scores were also combined to assess the total creativity score. However, due to the fact the design was based upon a small sample and there was no separate control group, the results were taken cautiously as evidence as to change within that group only and not as definitive evidence for broader casual relationships.

IV. Results

The results show that generative AI had a mixed impact on students' creativity. The creativity score did not alter significantly whereas tasks did change in the individual tasks in different directions. This means that the impact of AI in creative writing was not consistently the same.

Table 1

Summary of Mean Scores for Creativity Tasks

Creativity task	Without AI mean	With AI mean	Difference (Without - With)	Result direction
Alternative Uses	5.95	6.55	-0.60	Positive change with AI
Story Titles	3.65	4.75	-1.10	Positive change with AI

Sentence Expansion	8.20	6.35	1.85	Negative change with AI
Picture Description	4.55	5.10	-0.55	Positive change with AI
Total creativity score	22.25	22.75	-0.50	Small positive change with AI

Table 1 reveals that the mean score has increased for the following: Alternative Uses; Story Titles; Picture Description; and Total Creativity Score. But the mean score decreased in respect of Sentence Expansion. The most positive change was in Story Titles and the most negative change was in Sentence Expansion. This pattern indicates that the AI was not as useful as a tool for generating students' detailed language as compared to the process of coming up with the idea to write.

Table 2

Paired Samples Statistics for Individual Tasks and Total Score

Task/score	**Condition**	**Mean**	**N**	**Std. deviation**	**Std. error mean**
Alternative Uses	Without AI	5.9500	20	1.73129	.38713
Alternative Uses	With AI	6.5500	20	1.79106	.40049
Story Titles	Without AI	3.6500	20	1.66307	.37187
Story Titles	With AI	4.7500	20	1.68195	.37609
Sentence Expansion	Without AI	8.2000	20	1.54238	.34489
Sentence Expansion	With AI	6.3500	20	2.92494	.65404
Picture Description	Without AI	4.5500	20	1.82021	.40701
Picture Description	With AI	5.1000	20	2.12504	.47517
Total score	Without AI	22.2500	20	4.64390	1.03841
Total score	With AI	22.7500	20	4.67777	1.04598

Descriptive statistics for each paired condition are shown in table 2. Sentence Expansion showed higher SD in the AI condition, indicating that students' responses decreased when AI was included for this task. Some students may have used AI to a good effect but others may have relied on AI in a way that diminished their elaboration.

Table 3

Paired Samples Correlations

Task	N	r	p	Interpretation
Alternative Uses	20	.332	.153	Weak, non-significant association
Story Titles	20	.155	.513	Very weak, non-significant association
Sentence Expansion	20	.544	.013	Moderate, significant association
Picture Description	20	.203	.391	Weak, non-significant association
Total score	20	.534	.015	Moderate, significant association

The correlations indicate the relationship between students' scores between the two conditions. There was a significant relationship with Sentence Expansion and the total score. However, these values are simply a reflection that student positioning with higher and lower scores within one condition was similar for those comparisons.

Table 4

Paired Samples Test Results

Task	Mean diff.	SD	SE	t	f	p (2-tailed)	Result
Alternative Uses	-.60000	2.03651	.45538	-1.318	9	.203	Not significant
Story Titles	-1.10000	2.17401	.48612	-2.263	9	.036	Significant improvement
Sentence Expansion	1.85000	2.45539	.54904	3.370	9	.003	Significant decline
Picture Description	-.55000	2.50210	.55949	-.983	9	.338	Not significant
Total score	-.50000	4.50146	1.00656	-.497	9	.625	Not significant

Table 4 is principle inferential result. The mean difference was characterized as the score withoutAI – the score withAI. A negative difference, thus, means that the score was higher with AI. AI was statistically significant for the Story Titles, t(19) = -2.263, p = .036. Results indicated that there was a statistically significant decrease in Sentence Expansion with AI: t(19) = 3.370, p = .003. Alternative Uses and Picture description and the overall score for creativity was found to be statistically insignificant.

Table 5

One-Tailed Significance Summary

Test	Mean/difference	One-tailed p	Result status
Alternative Uses	-0.60	0.1015	Not significant
Story Titles	-1.10	0.018	Significant positive effect
Sentence Expansion	1.85	N/A*	Significant negative effect
Picture Description	-0.55	0.169	Not significant
Total creativity score	-0.50	0.3125	Not significant

The one-tailed summary agrees with the overall summary. A positive impact of AI was found for Story Titles only. It was not shown to be a significant improvement in

Alternative Uses, Picture Description or the total creativity score. It also had negative impact on Sentence Expansion. Thus, we cannot broadly assert that the general application of generative AI positively impacts the creativity of students in writing. Instead, it sustains a conclusion that is related to the task.

V. Discussion

The results indicate mixed effects of the generative AI on students' creativity. The highest positive findings were in the task Story Titles. This is an idea generation task, where students came up with potential titles. AI might have made students more aware of what they have in mind, made them less hesitant, and also got them started on the task at hand. This corroborates the possibility that generative AI can be of benefit as input during the initial brainstorming phase of writing.

This improvement in Story Titles is a testament to how AI can boost fluency with its real-time suggestions. But, this doesn't necessarily mean that the result confirms that AI boosts creativity in everything. Titles is a short, open-ended activity, with many possibilities. AI can be particularly useful for such activities as this expands the field of possibilities. Even then, students need to select, modify and individualize these ideas giving a creative "twist" to their value.

The most important caution comes from the Sentence Expansion task. In this task, students were required to extend a sentence, adding relevant detail. This involves elaboration, control of meaning and ownership of language. This substantial drop indicates that AI might have negatively affected students' thinking at the sentence level. Some learners might not have fully applied AI-generated phrases in their work. Some may have been inactive in determining how to extend the clause.

This is significant since elaboration is key to creativity. The expressive using of detail, relevant and personal, is a sign of greater than surface correctness on the part of the student. Weakening of the creative learning process will be felt if AI provides a fluent sentence but the student cannot transform, understand, and control them. This observation aligns with the literature which highlighted some of the dangers of generative AI like overreliance and diminishing the range of diversity, as well as individuality and expression (Doshi & Hauser, 2024; Kasneci et al., 2023).

Alternative Uses and Picture Description showed small positive changes, but these changes were not statistically significant. That is, AI did not definitely enhance flexible thinking or visual descriptive creativity for this sample. Alternative Uses calls for some out of the box thinking that you may not pick up automatically even if you're getting a suggestion.

The requirement for observation, imagination, and emotional response that Picture Description relies upon may make an observed response to AI that is based on a generic output not significantly enhanced. The findings indicate that AI's impact on creativity is a multifaceted phenomenon, meaning the enhancement of creativity is not a uniformly consistent effect across different tasks.

There was also no significant difference in the total creativity score. This is one of the major insights of the study with regard to the objective of the study. Voting only by Story Titles may make it look like the outcome is good, however. But if one took only the Sentence Expansion result into account, the conclusion would be negative. Considering all of these

tasks as a whole, however, makes it easier to interpret: generative AI can enhance some parts of students' creativity, but impair others. The overall impact is therefore conditional and task dependent.

Results can be interpreted in the light of Vygotsky's (1978) theory of assisted performance. Support can be beneficial if it enables learners to progress towards independent capability. If students do use AI to generate ideas, they can use it as a scaffold to develop their own answer. However, support becomes problematic when it bypasses the learner's effort.

According to Ng et al. (2021), there is a need for understanding and evaluation of AI output by user. This involves, for grade 5 students, asking questions instead of expecting answers, weighing suggestions and removing inappropriate vocabulary and rephrasing with their own words. Such skills are necessary for AI assistance to create effectively more original student work. The objective of such measures is not to ban or allow the use of AI, but to help educate students to be active and responsible users.

In the overall discussion the notion of selective use is supported. Generative AI seems better for brainstorming, title generation and exploring vocabulary as well as initial planning. There is a need to be more cautious in the use of it in tasks where elaboration of the students' own sentences and the final written product is required. It is important for the creative process in writing to be student centered in the elementary grades. AI can give a helping hand, but the creative decisions should be left to the student.

Table 6

Discussion Matrix Connecting Student Results with Interpretation

Finding from results	**Interpretation**	**Implication for AI-assisted writing**
Story Titles improved significantly	AI supported idea generation and helped students begin creative thinking.	Use AI for brainstorming, title options, and first-stage planning.
Sentence Expansion declined significantly	AI may have weakened students' own elaboration and expressive control.	Do not use AI as a sentence-writing substitute for young learners.
Alternative Uses was not significant	AI did not automatically strengthen flexible or unusual thinking.	Ask students to modify, combine, or reject AI suggestions.
Picture Description was not significant	Observation-based writing may need student attention before AI support.	Let students observe and draft first, then use AI only for revision prompts.
Total creativity score was not significant	The overall effect was mixed rather than generally positive.	Use AI selectively according to the creative task.

The discussion matrix provides the important outcomes of the study. Generative AI should not be sold as a general catalyst for creativity. The importance of its value is related to the task being close to idea generation and/or independent expression. Artificial Intelligence

can support the task when it comes to exploring potential options. If the task necessitates personal elaboration, there can be a decrease in student control if AI is applied inappropriately.

VI. Implications for further research

There is a need for more future research with a larger and more varied sample. Private school in Islamabad involved in present study was only one school with 20 grade 5 students. A larger sample might have involved inclusion of public and private schools, boys and girls schools, location of schools among socioeconomic families and other grades. This might help extend or reduce the scope of the themes and questions suggested in this research to other classrooms or to elementary AI-assisted writing more generally.

The use of AI should be a research topic to compare various applications. The current study was conducted in general AI-assisted condition. Some studies show, however, that students will perform differently if they use AI to brainstorm only, for feedback (only) or after an independent first draft or for only vocabulary. According to Mollick and Mollick (2023), AI has an impact on the learning process when assigned to do a specific role. A comparison of these models for the use of AI tools would demonstrate how each model addresses the issue of creativity improvement without diminishment in the effort of the students.

Though there is a need for longitudinal research as well. In the present study, the immediate performance on the assistance of AI was measured. The effectiveness of using AI support for activities and whether students will raise their level of creativity as writers in the future without AI has not yet been observed. Further testing is needed (in the future) including delayed post tests and independent writing tasks after weeks or months. This would indicate whether or not the use of AI to support is translated into student's own ability to be creative in the future.

The collection of process evidence should also be part of future research studies. Using the scores will not fully account for how students used AI, but will reveal whether there was a change in performance. Prompt logs, drafts, screen recordings, student reflections, or brief interviews might illustrate how students adapted, edited, or posed a query to AI suggestions or how they transformed them. This could account for the increases in Story Titles and decreases in Sentence Expansion.

Access and equity need to be analysed in research in Pakistan. The availability of and access to digital devices, the Internet, English language supports, and AI tools varies among students. As technology can exacerbate inequalities if it is not addressed in terms of access and governance, a warning was issued by UNESCO (2021). More research into the use of AI to assist students' creativity in multi-lingual classrooms, rural settings, low-fee private schools and public schools is therefore needed.

Therefore, AI literacy activities for elementary writing should be designed in future studies based on the age appropriateness of the activity. When using AI the student should understand that they should not use the AI's language as if it was their own; rather, it is a source of ideas. Research can be conducted to determine if simple statements like, “ask for ideas only,” “select one idea,” “rewrite it in your own words” and “explain your changes” enhance creative product. This type of research would shift the discourse from a general statement about AI to empirical verifications about student's centeredness in creativity.

VII. Conclusion

In this paper, the influence of generative AI on the creativity of students' English writing in the primary stage was analyzed. This study only emphasized on students performance and adopted pretest – post test control group design involving 20 Grade 5 students in Islamabad. A number of creative writing tasks were applied to four creativity tasks for investigating various domains of creativity including Alternative Uses, Story Titles, Sentence Expansion and Picture Description.

The results indicate a mixed impact of generative AI. It drastically enhanced Story Titles which indicates that the AI can be utilized for concept generation and to start creative projects. It however had a significant negative effect on Sentence Expansion, indicating that the AI is able to negatively affect students' own elaboration and sentence level expression when it is used as an alternative to writing. The overall score on creativity slightly increased and was not statistically significant.

Overall, the conclusion drawn is that the use of generative AI does not necessarily enhance student's creativity. It can have an impact with regards to the task. AI should be used with caution in instances where it is required for students to write in detail about the specific language they used to develop an idea or to brainstorm. Elementary writing is a type of writing where using artificial intelligence is a little bit auxiliary to thinking, but it can't replace students' thinking. Creativity is best developed where students select, transform and express ideas in their own words.

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