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ChatGPT's Impact on Students Creativity and Academic Performance

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Abstract

This study explores the impact of ChatGPT on students' creativity and academic performance, focusing on their perceptions and gender differences. This study adopts a quantitative research approach, gathering data from 190 participants. The data were analyzed using statistical methods, including mean, correlation, t-tests, and regression, to explore the relationships and impacts of ChatGPT on creativity and academic performance. Findings indicate that ChatGPT is broadly recognized as an effective academic tool, appreciated for its ease of use and its role in enhancing academic work. It supports creativity by facilitating brainstorming and generating innovative ideas, although its contribution to creative problem-solving is moderate. In terms of academic performance, ChatGPT aids significantly in saving time and improving clarity in learning. Strong positive correlations were found between ChatGPT usage, creativity, and academic performance. No significant gender differences were

observed in perception or usage, confirming its broad applicability, while regression analysis highlighted its substantial contribution to both domains.

Keywords: Academic; ChatGPT; Creativity; Performance; Student

INTRODUCTION

In 1950, British mathematician Alan Turing released a seminal paper titled "Computing Machinery and Intelligence," which paved the way for the emergence of the field that would come to be known as Artificial Intelligence (Smith, McGuire, Huang, & Yang, 2006). AI has rapidly advanced in the recent years, spreading its applications throughout various fields such as education, entertainment, healthcare (Rashid & Kausik, 2024). AI now, is a science that is associated with the ability of a computer system to mimic the behavior of human brain (Montenegro-Rueda et al., 2023).One of the prominent generative AI tools that has evolved the learning concept in the field of education is Chat Generative Pre-Trained Transformer, known as ChatGPT (Javaid et al., 2023). It is an AI conversational chatbot developed by an AI research company, OpenAI and it was released on 30th November, 2022. ChatGPT is an artificial intelligence (AI)-powered big language model that helps with a wide range of tasks including writing, brainstorming, and problem-solving while producing human-like answers to user inquiries (Javaid, Haleem, Singh, Khan, & Khan, 2023; Karki, et al., 2024). The integration of ChatGPT into educational field offers both the opportunities and the challenges especially in terms of its impact on students' creativity and their academic performance (Parajuli, Mahat, & Kandel, 2023). Since the release of ChatGPT, it has been used widely in the educational field, revolutionizing the traditional learning processes and methods (Han, 2024).

The potential of ChatGPT to improve students' learning experiences by offering prompt, individualized support has generated a lot of interest in its usage in education (Montenegro-Ruedaet al., 2023).It acts as a personal virtual tutor, assisting students with their course-assignments and simplifying the complex concepts which can improve the academic outcomes of the students (Lo, 2023; Parajuli, Mahat, & Lingden, 2022). For many, this improves productivity and reinforce the independent learning. There are concerns about an excessive dependence on these AI tools, as they may adversely affect creativity and analytical thinking abilities (Zhai, Wibowo, & Li, 2024; Mahat & Mathema,

2018). Studies show that while ChatGPT can assists with the elaboration of complex topics and creative tasks, it may reduce the originality, flexibility and exploration which are the core of divergent thinking (Habib, Vogel, Anli, & Throne, 2024).

Moreover, over-reliance on these AI tools may also hinder the problem solving capacity and creative minds of students leading to more uniform ideas and less innovative ones (Tümen-Akyıldız, 2024). The use of ChatGPT has raised some ethical concerns such as plagiarism and the ability of students to bypass brainstorming by using AI to do their assignments completely (Chan & Hu, 2023). Also, the responses generated by the ChatGPT are not 100% accurate which can mislead the students towards wrong direction (Lo, 2023; Elkhatat, 2023). These challenges highlight the necessity of integrating AI tools in educational sector carefully, with a focus on guiding the students to use these tools responsibly and aiming to create a balance between creativity and AI assistance (Mahat & Kumar, 2024; Mahat, 2024). This research seeks to explore the dual impact of using ChatGPT on students' creativity and their academic performance while highlighting its potential benefits and risks. By studying how students' use ChatGPT in their academic life, this paper aims to provide address the following research questions.

1. What is the perception of the student's towards ChatGPT relating their creativity and academic performance?
2. Is there any relationship between ChatGPT on student's creativity and academic performance?
3. Is there any difference between the perception of male and female towards ChatGPT?
4. What is the impact of ChatGPT on student's creativity and academic performance?

Objective

1. To access the perception of student's towards ChatGPT
2. To examine the relationship between ChatGPT on Student's Creativity and Academic Performance
3. To identify the difference between male and female perception towards ChatGPT

4. To analyze the impact of ChatGPT on student's creativity and Academic Performance

Conceptual Framework

The conceptual framework illustrates how ChatGPT serves as a tool influencing two key outcomes: creativity and academic performance. ChatGPT acts as an input, providing resources, ideas, and insights that can enhance creative thinking by stimulating new perspectives and innovative solutions. The arrows signify the direct influence of ChatGPT on these two aspects. Overall, the framework showcases how AI technology can be utilized to achieve multifaceted benefits.

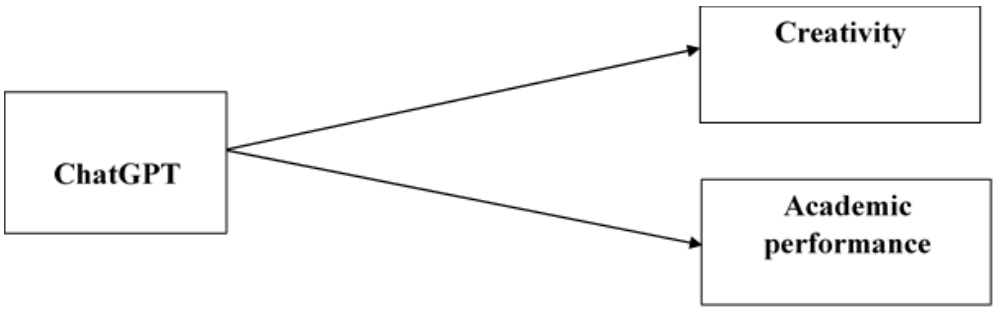

Figure1: Conceptual Framework

Literature Review

Lo (2023) studied "the impact of ChatGPT on education" which focuses on ChatGPT's advantages, uses, and risks. Creswell's coding methods, which comprised open, axial, and selective coding, were among the tools and strategies utilized to carry out the research for the content analysis. The PRISMA framework for systematic reviews was used in the research technique. Data from 50 carefully chosen papers on ChatGPT in education was gathered using the rapid review approach technique. According to the study, ChatGPT performs differently in several topic areas. It fared exceptionally well in critical thinking-based subjects and even beat typical students in economics. Although it performed poorly in topics like mathematics, medical education, and sports science, it demonstrated acceptable results in programming and English language comprehension. The study emphasizes the possible advantages of incorporating ChatGPT into learning environments. For responsibilities like creating course materials, providing individualized learning experiences, and supporting evaluations, it might be especially helpful. But there are also significant issues, such as its propensity to produce false or misleading information, the danger of student plagiarism, and the ability to avoid plagiarism.

Adeshola & Adepojuc (2023) conducted a study titled "The opportunities and challenges of ChatGPT in education," which focused on both the potential benefits of ChatGPT for education and the issues it presents. The Valence Aware Dictionary for Sentiment Reasoning (VADER) approach was employed for sentiment analysis in this work, while the Latent Dirichlet Allocation (LDA) method was used for topic modeling. The vast majority of participants think that ChatGPT has a beneficial effect on schooling. Encouraging academic integrity by the creation of precise rules and regulations. Creating tests with a little amount of text produced by AI.

Habib et al. (2024) studied on "the effect of generative artificial intelligence (AI) on student creativity" which focuses on student's creativity and divergent thinking. The researchers used Alternative Use Task (AUT) test to measure creativity dimensions like flexibility, fluency, elaboration, and originality. They found that AI supported divergent thinking by increasing fluency and elaboration in idea generation, though it also presented challenges such as fixation and potential over-reliance. The study suggests a balanced approach to integrating AI in education, allowing it to assist without overshadowing human creativity. However, the study also identified potential drawbacks. Some students became overly reliant on AI, they became more dependent on the machine's suggestions rather than generating their own ideas. This risk of over-reliance could limit students' ability to think independently, which is a critical part of the creative process.

Brown & Mann, (2020) studied on Impact of The Usage of ChatGPT on Creativity among Postgraduates Student &quote focusing on its capabilities, applications, and challenges. Discussed ethical concerns (such as the potential for biased outputs from models) high in environmental impact because of the computational needed. Analyzed news cycle effects, like disinformation threats.

AlBadarin et al. (sep 6, 2023) studied on "A Systematic Literature Review of Empirical Research on ChatGPT in Education", focusing on its capabilities, applications, and challenges. Dimensions.ai, Lens.org, Scopus, Web of Science (WoS), and ERIC. These sources were chosen for their extensive academic content and diverse research outputs. The research methodology followed the PRISMA framework for systematic reviews. Data was gathered through out of 114 articles 14 article is eligible for analysis on ChatGPT in education. *ChatGPT Use*: Learners enhance learning; educators improve productivity and teaching methods. *Concerns*: Inaccurate info, access issues, academic integrity, and

misuse. *Limitations*: Few studies, based on older versions (GPT-3/3.5); need for further research. *Action needed*: Clear guidelines, training, and ongoing research to ensure responsible use.

Lee & Chung, (2024). Studies on "An empirical investigation of the impact of ChatGPT on creativity", focusing on the potential of the ChatGPT for helping humans tackle problems that require creativity. This study used in the research were brainstorming, mind mapping design thinking and the SCAMPER technique. ChatGPT provided the result or findings, sometimes that would not have crossed the human minds meaning providing with relatively new result. The result of the question asked to ChatGPT when influenced properly and positively provided a united or as a whole finding provided a fluent presentation of ideas.

Research Gap

While the previous research and studies focused on the impact of ChatGPT in education in a broad perspective and within the context of specific nations, this research intends to explore the impact of ChatGPT on the educational sector in the context of Nepal. Being a developing country, Nepal is way backward in terms of technological advancement than many countries. However, after the COVID-19 pandemic that first appeared in Nepal in January 2020, the use of technology was boosted in many fields including education. This research seeks to explore the dual impact of using ChatGPT on students' creativity and their academic performance while highlighting its potential benefits and risks. This study also intends to explore gender perspectives on the impact of using ChatGPT in education.The introduction must be clear and written descriptively.

METHODS

This study adopted a descriptive and causal-comparative research design with a cross-sectional time horizon, collecting data from students in the Kathmandu Valley who are enrolled in various colleges. A sample of 190 participants was selected using convenience sampling, a non-probability sampling technique. Data were collected through Google Forms with a 5-point Likert scale questionnaire. SPSS software was utilized to analyze the data, applying inferential statistical tools. Informed consent was obtained in writing from all participants before data collection, and they were given the option to voluntarily participate or withdraw at any time to ensure ethical considerations. To assess

the reliability of the data, Cronbach's alpha test was conducted, offering insights into the internal consistency of the survey instrument.

Table 1: Reliability Statistics

S.N	Variables	Cronbach's Alpha	N of Items
1	ChatGPT	.746	5
2	Creativity	.859	6
3	Academic Performance	.886	7

The reliability analysis shows that the scales used for measuring ChatGPT usage, creativity, and academic performance have acceptable to excellent internal consistency. The ChatGPT usage scale, with 5 items, has a Cronbach's alpha of 0.746, indicating acceptable reliability. The creativity scale, consisting of 6 items, has a higher Cronbach's alpha of 0.859, reflecting good reliability. Finally, the academic performance scale, with 7 items, shows excellent reliability with a Cronbach's alpha of 0.886.

RESULTS AND DISCUSSION

This study consists of descriptive statistics and frequencies for various demographic variables among 190 respondents. The variables include gender, education level, field of study, and comfort with using technology. In terms of gender, 46.8% of respondents were male (89 individuals), while 53.2% were female (101 individuals), with a total of 190 valid responses for gender. Regarding education levels, the largest group consisted of undergraduates, making up 58.9% (112 respondents). High school graduates accounted for 28.4% (54 individuals), postgraduate respondents were 12.1% (23 individuals), and a small percentage of respondents held a doctorate degree (0.5%, or one individual). As for the field of study, the majority (57.4%, 109 respondents) were from the management field, followed by 22.1% (42 respondents) from science, 16.3% (31 respondents) from other disciplines, and 4.2% (8 respondents) from arts. The comfort with using technology was categorized as follows: 35.8% of respondents (68 individuals) were regular users, 58.4% (111 individuals) sometimes used technology, and 5.8% (11 individuals) did not use technology at all. Finally, the descriptive statistics for age show that the respondents ranged in age from 16 to 34 years, with a mean age of 21.55 years and a standard deviation of 2.59, indicating that the majority of respondents were young adults in their early twenties.

Table 2: Perception of student's towards ChatGPT

	N	Minimum	Maximum	Mean	Std. Deviation
Cgpt1	190	1.00	5.00	3.9211	.76226
Cgpt2	190	1.00	5.00	3.8000	.89206
Cgpt3	190	1.00	5.00	3.6211	.76537
Cgpt4	190	1.00	5.00	3.8316	.80544
Cgpt5	190	1.00	5.00	3.4632	.94629

The descriptive statistics provide insights into participants' perceptions and usage of ChatGPT for academic and related purposes. All five statements were rated on a 5-point Likert scale, with 1 indicating strong disagreement and 5 indicating strong agreement. The statement "It is easy to use ChatGPT for your task" (Cgpt1) received the highest mean score of 3.92 (SD = 0.76), indicating general ease of use among respondents. Following closely, "ChatGPT is useful in enhancing your academic work" (Cgpt4) achieved a mean of 3.83 (SD = 0.81), underscoring its perceived utility in academic contexts. "I often use ChatGPT for academic purposes such as assignments, research, or studying" (Cgpt2) had a mean of 3.80 (SD = 0.89), reflecting frequent usage for academic endeavors. The statement "I find ChatGPT's response to be relevant" (Cgpt3) showed a slightly lower mean of 3.62 (SD = 0.77), indicating moderate agreement on relevance. Lastly, the statement "ChatGPT helps me think of unique and original ideas" (Cgpt5) received the lowest mean of 3.46 (SD = 0.95), suggesting a relatively lesser but still positive perception of its creativity-enhancing potential. These results highlight participants' general appreciation of ChatGPT's ease of use, relevance, and contribution to academic tasks, albeit with varying levels of agreement on its creativity enhancement.

Table 3: Perception of student's towards Creativity

	N	Minimum	Maximum	Mean	Std. Deviation
Cre1	190	1.00	5.00	3.5842	.91476
Cre2	190	1.00	5.00	3.3684	1.00320
Cre3	190	1.00	5.00	3.5526	.91134
Cre4	190	1.00	5.00	3.6053	.84011
Cre5	190	1.00	5.00	3.5579	.93961
Cre6	190	1.00	5.00	3.5105	.85906

The descriptive statistics provide a detailed understanding of respondents' views on ChatGPT's impact on creativity. All six items were rated on a 5-point Likert scale, where 1 indicates strong disagreement and 5 indicates strong agreement. Among the statements, "Using ChatGPT makes it easier for me to brainstorm ideas in group discussions" (Cre4) received the highest mean score of 3.61 (SD = 0.84), suggesting participants find ChatGPT particularly helpful for collaborative ideation. This is followed closely by "ChatGPT helps me generate creative ideas for my project" (Cre1), with a mean of 3.58 (SD = 0.91), and "I rely on ChatGPT to simplify complex creative tasks" (Cre5), with a mean of 3.56 (SD = 0.94), indicating its perceived usefulness in simplifying and inspiring creativity in individual tasks. The statement "ChatGPT enhances my confidence in completing creative tasks" (Cre3) garnered a mean score of 3.55 (SD = 0.91), reflecting moderate agreement on its ability to build confidence in creative endeavors. Furthermore, "ChatGPT's suggestions have made my creative outputs more diverse and innovative" (Cre6) scored a mean of 3.51 (SD = 0.86), highlighting its role in fostering diversity in creative outputs. Lastly, "Using ChatGPT has improved my ability to solve problems creatively" (Cre2) obtained the lowest mean score of 3.37 (SD = 1.00), suggesting a comparatively weaker, but still positive, perception of its influence on creative problem-solving. These findings collectively indicate that while participants recognize ChatGPT's overall contribution to creative activities, its impact varies across different aspects of creativity.

Table 4: Perception of student's towards Academic Performance

	N	Minimum	Maximum	Mean	Std. Deviation
Ap1	190	1.00	5.00	3.4947	.93575
Ap2	190	1.00	5.00	3.7211	.82364
Ap3	190	1.00	5.00	3.5474	.85781
Ap4	190	1.00	5.00	3.6263	.85594
Ap5	190	1.00	5.00	3.6211	.89299
Ap6	190	1.00	5.00	3.6316	.86131
Ap7	190	1.00	5.00	3.9526	.85627

The descriptive statistics reveal participants' perceptions of ChatGPT's impact on their academic performance. All seven items were rated on a 5-point Likert scale, where 1 signifies strong disagreement and 5 indicates strong agreement. The statement "Using ChatGPT has saved me time finding relevant information for my academic assignments"

(Ap7) received the highest mean score of 3.95 (SD = 0.86), reflecting strong agreement on its efficiency in information retrieval. Similarly, "ChatGPT has adapted well to my individual learning needs and preferences" (Ap6), with a mean of 3.63 (SD = 0.86), and "I find ChatGPT's explanations and responses to be clear and precise" (Ap4), with a mean of 3.63 (SD = 0.86), indicate positive perceptions regarding its personalization and clarity. The statements "Interacting with ChatGPT has made my studying experience more interactive and engaging" (Ap5) and "ChatGPT has provided me with valuable resources and references for further learning" (Ap2) scored means of 3.62 (SD = 0.89) and 3.72 (SD = 0.82), respectively, highlighting its role in enhancing interactivity and providing educational resources. Meanwhile, "ChatGPT has increased my confidence in tackling challenging academic tasks" (Ap3) achieved a mean score of 3.55 (SD = 0.86), showing moderate agreement on its influence on academic confidence. The statement "Using ChatGPT has improved my ability to solve academic problems independently" (Ap1) received the lowest mean of 3.49 (SD = 0.94), suggesting that while participants see some benefits, they perceive less impact on independent problem-solving. Overall, the findings indicate that participants view ChatGPT as a valuable tool for enhancing academic performance, particularly for its efficiency, adaptability, and clarity, though its role in fostering independence may be perceived as less pronounced.

Table 5: Relationship between ChatGPT, Student's Creativity and Academic Performance

Correlations

		CGATGPT	CREATIVITY	ACADEMIC
CGATGPT	Pearson Correlation	1	.707**	.747**
	Sig. (2-tailed)		.000	.000
	N	190	190	190
CREATIVITY	Pearson Correlation	.707**	1	.751**
	Sig. (2-tailed)	.000		.000
	N	190	190	190
ACADEMIC	Pearson Correlation	.747**	.751**	1
	Sig. (2-tailed)	.000	.000	
	N	190	190	190

****. Correlation is significant at the 0.01 level (2-tailed).**

The correlation matrix examines the relationships between ChatGPT usage (CGATGPT), Creativity, and Academic Performance. All correlations are significant at the 0.01 level (2-tailed), indicating strong and positive relationships between the variables.

ChatGPT usage shows a significant correlation with both Creativity ($r = 0.707$, $p < 0.01$) and Academic Performance ($r = 0.747$, $p < 0.01$). This suggests that increased use of ChatGPT is associated with greater perceptions of creativity and enhanced academic performance. Similarly, Creativity is strongly correlated with Academic Performance ($r = 0.751$, $p < 0.01$), indicating that fostering creativity, potentially with tools like ChatGPT, contributes positively to academic achievements.

The strength of these correlations highlights a close interconnection among the variables, emphasizing that ChatGPT's role not only supports creativity but also enhances academic outcomes, with both domains being mutually reinforcing.

Table 6: Difference between male and female perception towards ChatGPT

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
ChatGPT	Male	89	3.7528	.59469	.06304
	Female	101	3.7050	.58760	.05847

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
ChatGPT	Equal variances assumed	.390	.533	.557	188	.578	.04786	.08591	-.12162	.21734
	Equal variances not assumed			.557	184.426	.578	.04786	.08598	-.12177	.21749

Male participants exhibited a mean ChatGPT usage score of 3.75 (SD = 0.59), while female participants showed a slightly lower average of 3.70 (SD = 0.59). The equality of variances between the two groups was confirmed by Levene's test (p = 0.533). An independent samples t-test indicated no statistically significant disparity in ChatGPT usage scores between males and females (t = 0.557, p = 0.578). The mean difference of 0.048 was small, and the confidence interval ranged from -0.122 to 0.217. This indicates that gender does not significantly influence ChatGPT usage levels in this sample.

Table 7: Impact of ChatGPT on Creativity

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.707[a]	.500	.498	.49571

a. Predictors: (Constant), ChatGPT

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.245	1	46.245	188.195	.000[b]
	Residual	46.197	188	.246		
	Total	92.442	189			

a. Dependent Variable: CREATIVITY

b. Predictors: (Constant), ChatGPT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.404	.231		1.751	.081
	CGATGPT	.839	.061	.707	13.718	.000

a. Dependent Variable: CREATIVITY

The analysis explores the impact of ChatGPT on Creativity. The Model Summary shows that the model explains 50% of the variance in Creativity, as indicated by an R2 value of 0.500, with an adjusted R2 of 0.498. The standard error of the estimate is 0.49571, reflecting the accuracy of predictions. The ANOVA table confirms the model's statistical significance, with a regression F-value of 188.195 and a p-value of 0.000 ($p < 0.01$). This indicates that ChatGPT usage significantly predicts Creativity. In the Coefficients table, the unstandardized coefficient β for ChatGPT is 0.839, suggesting that a one-unit increase in

ChatGPT usage is associated with a 0.839-unit increase in Creativity. The standardized beta coefficient is 0.707, highlighting a strong positive effect. The t-value of 13.718, with a significance level of 0.000 ($p < 0.01$), further confirms that ChatGPT usage is a highly significant predictor of Creativity. The constant term is not significant ($p = 0.081$), indicating that without ChatGPT usage, the model's base creativity score is not reliable.

In summary, ChatGPT usage strongly and significantly enhances Creativity, explaining half of its variance, underscoring the tool's effectiveness in fostering creative capacities.

Table 8: Impact of ChatGPT on Academic Performance

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.747[a]	.558	.555	.44731

a. Predictors: (Constant), ChatGPT

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	47.400	1	47.400	236.903	.000[b]
	Residual	37.616	188	.200		
	Total	85.016	189			

a. Dependent Variable: ACADEMIC

b. Predictors: (Constant), ChatGPT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.492	.208		2.363	.019
	ChatGPT	.849	.055	.747	15.392	.000

a. Dependent Variable: ACADEMIC

The analysis examines the impact of ChatGPT on Academic Performance. The Model Summary reveals that the model explains 55.8% of the variance in Academic Performance, as indicated by an R2 value of 0.558, with an adjusted R2 of 0.555. The standard error of the estimate is 0.44731, indicating the precision of the model's predictions. The ANOVA table demonstrates that the regression model is statistically significant, with an FFF-value of 236.903 and a p-value of 0.000 ($p < 0.01$), signifying that

ChatGPT usage substantially predicts Academic Performance. In the Coefficients table, the unstandardized coefficient β for ChatGPT is 0.849, meaning that a one-unit increase in ChatGPT usage results in a 0.849-unit increase in Academic Performance. The standardized beta coefficient is 0.747, showing a strong positive impact. The t-value of 15.392, with a significance level of 0.000 ($p < 0.01$), confirms the high significance of ChatGPT usage as a predictor. The constant term is significant ($p = 0.019$), indicating that even without ChatGPT usage, there is a baseline level of academic performance. In summary, the findings highlight that ChatGPT usage is a significant and robust predictor of Academic Performance, explaining more than half of the variance, emphasizing its role as a transformative tool for academic success.

CONCLUSION

This study provides valuable insights into the impact of ChatGPT on students' creativity and academic performance. The findings demonstrate that ChatGPT is widely perceived as a useful tool for academic tasks, enhancing both efficiency and clarity. Its ease of use and relevance in generating ideas for assignments, projects, and research highlights its transformative role in education. Additionally, the results show a strong positive relationship between ChatGPT usage, creativity, and academic performance, with the regression analysis revealing that ChatGPT significantly predicts outcomes in both domains. While ChatGPT facilitates brainstorming, idea generation, and time-saving, its moderate impact on fostering creative problem-solving and independence in academic tasks points to potential areas for improvement. The study also confirms no significant gender-based differences in ChatGPT usage, suggesting its applicability across diverse student groups. These findings underscore ChatGPT's potential as a powerful educational tool that supports creative and academic growth. However, educators and developers should focus on strategies to enhance its role in promoting independent learning and creative problem-solving. Further research is recommended to explore its long-term impacts on learning outcomes and to assess its effectiveness across various educational contexts.

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