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Exploring the impact of generative artificial intelligence on enhancing digital design thinking skills and academic creativity among university students

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Abstract

This study aimed to explore the relationship between the use of generative artificial intelligence (AI) and the enhancement of digital design thinking skills and academic creativity among university students. With the rapid development of AI technologies, this research addresses a critical gap in understanding how generative AI can be harnessed in higher education to develop essential 21st-century competencies. A descriptive-analytical approach was used to investigate the impact of generative AI on a sample of 57 students from the College of Education at King Khalid University. A validated scale consisting of 32 items was applied across three dimensions: the use of generative AI, digital design thinking skills, and academic creativity. Statistical analyses included means, standard deviations, analysis of variance, and Pearson's correlation coefficient. The results revealed a high level of generative AI use among students, with corresponding high levels of digital design thinking and academic creativity. The study also found significant positive correlations between the use of generative AI and digital design thinking skills ($r = 0.538$, $p < 0.01$) and academic creativity ($r = 0.600$, $p < 0.01$). Notably, students with high technological proficiency demonstrated significantly greater benefits in all areas assessed. The results confirm the transformative potential of generative AI in enhancing students' creativity and problem-solving abilities. The study highlights that proficiency in digital technologies increases the effectiveness of AI tools in educational contexts. The study recommends the integration of generative AI into pedagogical frameworks to support innovation-based learning. Higher education institutions should also integrate generative AI applications into curricula, provide targeted training for faculty and students, and establish ethical guidelines to regulate the use of AI. These initiatives will foster critical thinking, creativity, and adaptability skills that are critical in the digital economy.

Keywords: Academic creativity, Digital design thinking, Educational technologies, Generative AI, Innovation in education.

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1. Introduction

Artificial intelligence (AI) has become a pivotal catalyst for progress in various fields, notably in education. Recent advancements in this domain include Generative AI, an advanced type of artificial intelligence that surpasses conventional data processing and decision-making. It can generate creative and interactive digital content, including text, photos, audio, and various educational media. This new capability establishes Generative AI as a significant asset in higher education, where cultivating students' design and creative thinking skills is crucial for preparing graduates to navigate the complexities of an innovation-driven environment. Generative AI comprises a collection of models and algorithms that enable machines to produce creative outputs, such as literature, graphics, and music, thus providing exceptional opportunities for learners to enhance their creativity and design thinking skills [1]. Its function in education extends beyond providing helpful tools; it significantly transforms student engagement with knowledge. Generative technologies enable learners to conceptualize, produce, and prototype solutions, thereby enhancing their academic and professional skills. Consequently, generative AI is increasingly regarded as one of the most revolutionary technologies in modern higher education.

Generative AI's usefulness resides in its capacity to replicate human ingenuity and problem-solving, thereby creating new opportunities for enhancing educational experiences [2]. Within the realm of university education, generative AI can be utilized to customize educational resources, provide immediate feedback, and create adaptive learning systems designed to meet the specific needs of individual students [3]. These tools can enhance the efficiency and quality of teaching for instructors by streamlining the preparation of lecture materials, automating assessment design, and offering different learning resources [4]. Moreover, generative AI can substantially enhance adaptive learning by evaluating student data and producing educational materials customized to specific learning requirements. This tailored methodology increases student involvement and leads to better academic results [5]. Moreover, generative AI can enhance the creation of simulations and immersive educational experiences by incorporating virtual and augmented reality technologies. These programs enable students to interact with intricate subjects in a more dynamic, captivating, and efficient manner [6].

Generative AI possesses significant potential to revolutionize the educational experience at institutions. It can be utilized to create course materials, produce electronic evaluations, and provide educational content that adjusts to the changing requirements of learners [7]. Empirical evidence substantiates this potential; a recent study indicated that generative AI enhanced student engagement with course materials by 35% relative to traditional instructional techniques, due to its capacity to offer interactive and simulation-based learning environments [8].

To ensure the effective and sustainable integration of generative AI into higher education, it is essential to establish clear legislative frameworks that encourage ethical usage. Prominent academic institutions, including Harvard University, have established policies that govern the ethical integration of generative AI into the educational setting while maintaining educational quality [8]. Notwithstanding its advantages, the use of generative AI in education nevertheless presents significant ethical and privacy issues. Therefore, it is essential to formulate thorough regulations and to deliver continuous training for both students and instructors concerning the ethical and informed utilization of these instruments. The Saudi Ministry of Education has released a national handbook detailing the definition, benefits, and hazards of generative AI in education, as well as recommended methods for its ethical and effective utilization by all stakeholders [9]. Generative artificial intelligence (AI) technologies and applications have emerged as a transformative force in higher education, providing a diverse range of innovative tools that can substantially enhance educational quality and promote innovation in teaching and learning practices. To fully harness the potential of these technologies, it is essential to adopt suitable pedagogical strategies, establish clear institutional policies, and implement ethical frameworks that guarantee responsible usage, while also addressing any emerging challenges.

Design thinking, a user-centric methodology for problem resolution, is based on iterative stages that encompass empathizing with users, defining issues, ideating, prototyping, and testing solutions. Generative AI can act as a potent facilitator in this process by assisting students in producing innovative solutions to academic challenges. AI solutions like ChatGPT and DALL·E can aid learners in the ideation and prototype stages by generating novel concepts and content. Generative AI enhances students' creative potential and refines their problem-solving and critical thinking skills by processing extensive datasets and producing innovative outputs [2]. The development of design thinking and creative abilities is increasingly regarded as vital for equipping students to address the expanding requirements of today's intricate and rapidly changing labor market. These qualities empower individuals to confront real-world difficulties with creativity and flexibility. The incorporation of generative AI into university instructional frameworks has demonstrated significant potential in improving students' critical thinking, creativity, and capacity to devise successful design solutions [9]. The

integration of technology and pedagogy fosters the creation of dynamic, interactive learning environments that promote students' exploration and use of their creative abilities. Notwithstanding its increasing significance, empirical studies on the direct impact of generative AI on students' design and creative thinking skills are still scarce. A significant portion of the current work emphasizes generic applications of AI in education or the technical aspects of generative models, neglecting to clearly examine their pedagogical influence on the development of creative skills [10]. This study aims to address this gap by investigating the correlation between generative AI utilization and the improvement of students' creative and design thinking skills, while also analyzing how the systematic incorporation of these technologies might enhance the learning experience.

Generative AI significantly contributes to enhancing academic creativity. Empirical research demonstrates that students utilizing AI technologies for generating original ideas or written content exhibit significant improvements in creative writing and originality. A study at Mansoura University employed generative AI to instruct student instructors in creative writing skills, leading to improved performance and heightened motivation among participants [11]. Research conducted at the University of Tokyo indicated that the implementation of AI-based applications in educational settings markedly enhanced students' ability to devise innovative solutions to intricate problems [12].

A further intriguing use of generative AI exists in the field of academic evaluation. AI-driven platforms can facilitate the creation of assessment activities that compel students to engage in critical and creative thinking, such as composing essays or resolving intricate problems. Instruments such as QuillBot and Grammarly provide students with immediate feedback and revision assistance, enhancing the quality and originality of their written assignments, therefore augmenting the academic experience, and promoting more involvement in learning endeavors [13]. However, the use of generative AI in educational settings poses several obstacles. Foremost among these are ethical issues, especially those pertaining to bias in AI training data and the possible diminishment of genuine human innovation. Educators and students are increasingly concerned that overdependence on AI tools may erode vital cognitive abilities, including critical thinking and independent problem-solving [2, 11].

In conclusion, generative AI emerges as a promising avenue for augmenting creative and design thinking among university students. When judiciously incorporated into the academic curriculum, these tools provide learners with the opportunity to tackle challenges innovatively and develop more sophisticated solutions. To fully realize these benefits, it is essential to deploy these tools properly and address the associated ethical, pedagogical, and cognitive issues.

1.1. Study Problem

Higher education is experiencing a revolutionary period characterized by the incorporation of modern technology designed to improve student skills. Among these technologies, generative artificial intelligence (Generative AI) has emerged as a formidable tool, with intriguing applications for enhancing design thinking and intellectual innovation. Notwithstanding its increasing prevalence, a significant gap persists in the academic comprehension of how generative AI influences the cultivation of these critical abilities in university environments.

Academic institutions face increasing challenges in preparing students with design and creative thinking skills, especially amid the rapid advancement of AI tools and technology. Despite an expanding body of literature examining the overarching role of artificial intelligence in education, there remains a notable deficiency in targeted research assessing the specific impacts of generative AI on enhancing creativity and design-oriented problem-solving skills among university students [8]. Design thinking and academic creativity are fundamental elements of 21st-century education, empowering students to critically assess challenges, conceive novel concepts, and execute original solutions. The emergence of generative AI tools such as ChatGPT, DALL·E, and Midjourney has facilitated the development of interactive instructional materials, the simulation of cognitive functions, and assistance in design ideation. Nevertheless, empirical evidence elucidating the impact of these technologies on creative and design thinking at the university level is still scarce. Moreover, the operational frameworks for incorporating these tools into higher education curricula remain inadequately delineated [8, 14].

Recent studies indicate that AI integration may improve critical thinking, creativity, and problem-solving; nevertheless, much of this research has focused on general education or secondary school levels [6]. Contemporary research predominantly emphasizes learning analytics, data-driven assessment, and content automation, while insufficiently addressing the pedagogical application of generative AI to enhance interactive, creativity-oriented learning experiences [7].

Johar [15] examined the application of AI-driven tools to enhance creative writing among EFL learners and reported significant advancements in students' fluency and clarity of expression. This study, however, did not encompass the wider aspects of design thinking or its implementation across other academic fields. Lee [8] similarly, a prospective vision for physics curricula has been suggested, integrating AI-based technologies to augment design thinking. The findings indicated that AI utilization facilitated students' methodical planning and creative problem-solving; however, the study was limited to primary and secondary education and did not specifically examine generative AI or its application in higher education.

From this viewpoint, the necessity for the present investigation is apparent. A significant gap exists in the literature regarding the correlation between generative AI and the enhancement of design and creative thinking skills among university students. Addressing this deficiency through comprehensive scientific analysis can improve curriculum design, aligning educational practices with the demands of the digital age.

1.2. Study Objectives

This study aims to investigate the correlation between generative artificial intelligence and the enhancement of design thinking skills and academic creativity among university students, considering the essential role of these competencies in preparing graduates for the challenges of the digital era and the evolving job market.

1.3. Research Questions

1. What is the extent of generative artificial intelligence utilization among university students?
2. What is the level of digital design thinking skills among university students?
3. What is the level of academic creativity among university students?
4. What are the statistically significant differences at the 0.05 level in the use of generative artificial intelligence among university students based on the variables: Academic degree, level of technology usage, and age?
5. What are the statistically significant differences at the 0.05 level in digital design thinking skills among university students based on the variables: Academic degree, level of technology usage, and age?
6. What are the statistically significant differences at the 0.05 level in academic generative creativity among university students based on the variables: Academic degree, level of technology usage, and age?
7. What is the nature of the correlational relationship between the use of generative artificial intelligence and digital design thinking skills and academic creativity among university students?

1.4. Importance of the Study

The importance of the current study is evident in the following:

1. To address the current research deficiency about the influence of generative artificial intelligence on design thinking and academic creativity in higher education.
2. To augment pedagogical approaches by incorporating generative AI as an auxiliary instrument to cultivate creativity and design thinking in university students.
3. To assist in the development of a sophisticated curriculum that utilizes generative AI to motivate students to produce unique concepts and solutions.
4. To enhance the active learning experience by allowing students to utilize AI technologies in exploring innovative methods for problem-solving and project design.
5. To ascertain the most efficacious smart tools and generative AI apps that facilitate the enhancement of pupils' design thinking and academic creativity talents.
6. To examine the impact of generative AI on creative thinking processes and evaluate the extent to which students benefit from these technologies in digital learning contexts.
7. To equip graduates for the exigencies of the modern labor market by enhancing their abilities in design thinking and creative problem-solving skills that are progressively esteemed across various professional domains.
8. To foster creativity and entrepreneurship by enabling students to leverage generative AI in the creation of academic and professional ventures.
9. To recommend pragmatic techniques for the use of generative AI in university curricula to augment design and creative thinking abilities.
10. To develop explicit evaluation frameworks and measuring instruments for assessing the influence of generative AI on students' creative and design thinking abilities.

2. Data and Methodology

2.1. Research Design

This study adopted a descriptive-analytical correlational design, suitable for exploring the relationship between the use of generative artificial intelligence (AI) and both digital design thinking skills and academic creativity among university students. This design enabled the researchers to measure existing variables and assess the strength and direction of their interrelationships without manipulating them.

2.2. Research Sample

The research sample consisted of 57 male postgraduate students enrolled at the College of Education, King Khalid University, Saudi Arabia. The participants were purposefully selected to ensure familiarity with educational technologies and were diverse in terms of academic level (Bachelor’s, Master’s, PhD), age (30–50 years), and levels of technological experience (moderate and high).

Table 1.
A description of the demographic variables of the sample

Variables	Sub Variables	N	Percentage
Academic degree	Bachelor	8	14.04%
	Master	20	35.09%
	PhD	29	50.88%
Level of technology usage	Moderate Experience	36	63.16%
	High Experience	21	36.84%
Age	30 to less than 40 years	24	42.11%
	40 to 50 years	33	57.89%
	Total	57	100 %

2.3. Data Collection Tool

A researcher-developed scale was used to assess the three key variables:

1. Use of generative AI (10 items)
2. Digital design thinking skills (11 items)
3. Academic creativity (11 items)

All items were rated on a 3-point Likert scale (High = 3, Moderate = 2, Low = 1). The instrument demonstrated high validity and reliability, with Cronbach's alpha coefficients ranging from 0.910 to 0.928 for sub-dimensions and 0.956 for the full scale. Internal consistency was confirmed through Pearson's correlation coefficients between items and their respective domains, all statistically significant at $p < 0.01$.

2.4. Research Tool

The researchers prepared a scale for the usage of generative artificial intelligence and the enhancement of digital design thinking skills and academic creativity among university students.

This scale aimed to measure the usage of generative artificial intelligence and the enhancement of digital design thinking skills and academic creativity among university students. The initial form of the scale included 32 items distributed across three main dimensions: use of generative artificial intelligence (10 items, numbered 1 to 10), digital design thinking skills (11 items, numbered 11 to 21), and academic creativity (11 items, numbered 22 to 32). All items are formulated as self-report statements and are positively worded, allowing students to read each item and respond using a three-point rating scale (High, Moderate, Low); these responses are scored as 3, 2, and 1, respectively.

The psychometric properties of the scale were verified by the judgment of nine arbitrators specialized in psychology, Educational Technology, and Curriculum and Teaching Methods. The arbitrators agreed on the appropriateness of the scale for its intended purpose and the research sample. The internal consistency of the scale was assessed after its application to a sample of 57 male students at KKU. This was done by calculating Pearson's correlation coefficients between the items and the total score of the respective dimension, with values ranging from 0.562 to 0.869. The correlation coefficients between individual items and the overall scale score ranged from 0.436 to 0.784. For the three sub-dimensions, Use of Generative Artificial Intelligence, Digital Design Thinking Skills, and Academic Creativity, the correlation coefficients with the overall scale score were 0.806, 0.898, and 0.906, respectively. All these coefficients were statistically significant at the 0.01 level, indicating that the scale possesses a high degree of internal consistency.

The reliability coefficients for the sub-dimensions of the scale, using Cronbach's alpha coefficient, were 0.917, 0.928, and 0.910, respectively, and for the scale as a whole, it was 0.956. Using the split-half method, the Guttman split-half coefficients for the sub-dimensions were 0.926, 0.908, and 0.850, respectively, and for the entire scale, it was 0.887. These high values confirm the validity of the scale for application.

2.5. Data Collection and Analysis

Data were collected through self-report questionnaires administered directly to the participants. Quantitative analysis was conducted using SPSS, involving descriptive statistics (means and standard deviations).

ANOVA tests to examine differences based on demographic variables, and Pearson's correlation coefficients to assess relationships among variables.

2.6. Comparison with Prior Studies

Unlike many prior studies that have broadly explored AI in education or focused on cognitive performance alone, this study uniquely concentrates on generative AI and its specific influence on design thinking and academic creativity, skills central to innovation in the digital age. While some earlier works [10, 11] emphasized creative writing or curriculum design, they lacked empirical evidence on students' actual competencies. This study bridges that gap through validated instruments and quantitative data, highlighting the role of technological proficiency as a moderating factor in benefiting from AI tools, an aspect largely underexplored in prior literature.

3. Findings, Discussion, and Conclusion

3.1. First Question Answer

What is the extent of generative artificial intelligence utilization among university students?

Table 2.
The level of generative artificial intelligence usage among university students.

Item	Statement	Mean	SD	Percentage	Level	Rank
4	I am eager to learn about new generative AI technologies continuously.	2.81	0.52	93.57%	High	1
10	Generative AI is useful for organizing my educational tasks.	2.67	0.61	88.89%	High	2
1	I effectively use generative AI tools in designing and producing my educational projects.	2.60	0.56	86.55%	High	3
2	I can select the appropriate generative AI tools for my academic tasks.	2.53	0.68	84.21%	High	4
3	I benefit from generative AI to improve the quality of my academic production.	2.53	0.71	84.21%	High	5
6	I am able to utilize generative AI in scientific writing.	2.51	0.68	83.63%	High	6
5	I can use generative AI to solve complex educational problems.	2.46	0.68	81.87%	High	7
9	I can apply generative AI in daily life situations.	2.46	0.71	81.87%	High	8
7	I can clearly interpret the results generated by generative AI.	2.37	0.77	78.95%	High	9
8	I can employ AI to analyze extensive educational data sets.	2.30	0.80	76.61%	Moderate	10
	Overall	2.52	0.51	84.04%	High	11

Table 2 demonstrates that university students (the study sample) had a high level of engagement with generative artificial intelligence across all categories. For item number 8 ("I can use AI to analyze large-scale educational data"), the use of artificial intelligence was scored at a moderate level, whereas all other assertions received a high rating. This is shown in Figure 1.

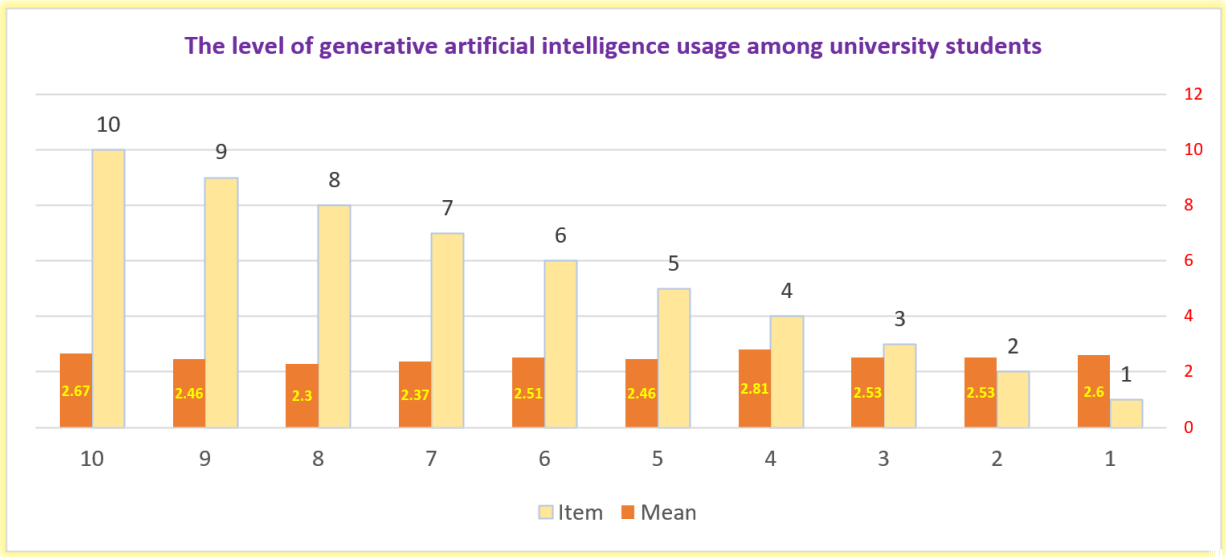

Figure 1.
The level of generative artificial intelligence usage among university students.

3.2. Second Question Answer: What is the Level of Digital Design Thinking Skills among University Students?

Table 3.
The proficiency of digital design thinking skills among university students

Item	Statement	Mean	SD	Percentage	Level	Rank
2	I innovate new digital solutions based on user needs.	2.49	0.60	83.04%	High	1
1	I use design thinking methods to solve digital problems.	2.44	0.71	81.29%	High	2
4	I refine digital models based on feedback.	2.44	0.71	81.29%	High	3
10	I use feedback to enhance digital designs.	2.44	0.76	81.29%	High	4
7	I participate in workshops that enhance design thinking skills.	2.40	0.68	80.12%	High	5
11	I can easily assess the impact of digital solutions on society.	2.40	0.78	80.12%	High	6
5	I can identify and analyze problems in the digital environment.	2.39	0.73	79.53%	High	7
6	I am capable of integrating design thinking into academic projects.	2.37	0.75	78.95%	High	8
8	I can critically evaluate digital ideas for improvement.	2.35	0.72	78.36%	High	9
3	I am capable of designing prototypes for my digital projects.	2.32	0.74	77.19%	Moderate	10
9	I tackle digital difficulties with creativity	2.30	0.76	76.61%	Moderate	11
	Overall	2.39	0.55	79.80%	High	

Table 3 demonstrates that the digital design thinking competencies of university students (the study sample) were consistently strong across all items. Nonetheless, for item number 3 ("I can design prototypes for my digital projects") and item number 9 ("I approach digital challenges creatively"), the digital design thinking skills were assessed at a moderate level, whereas all other items received a good rating. This is shown in Figure 2.

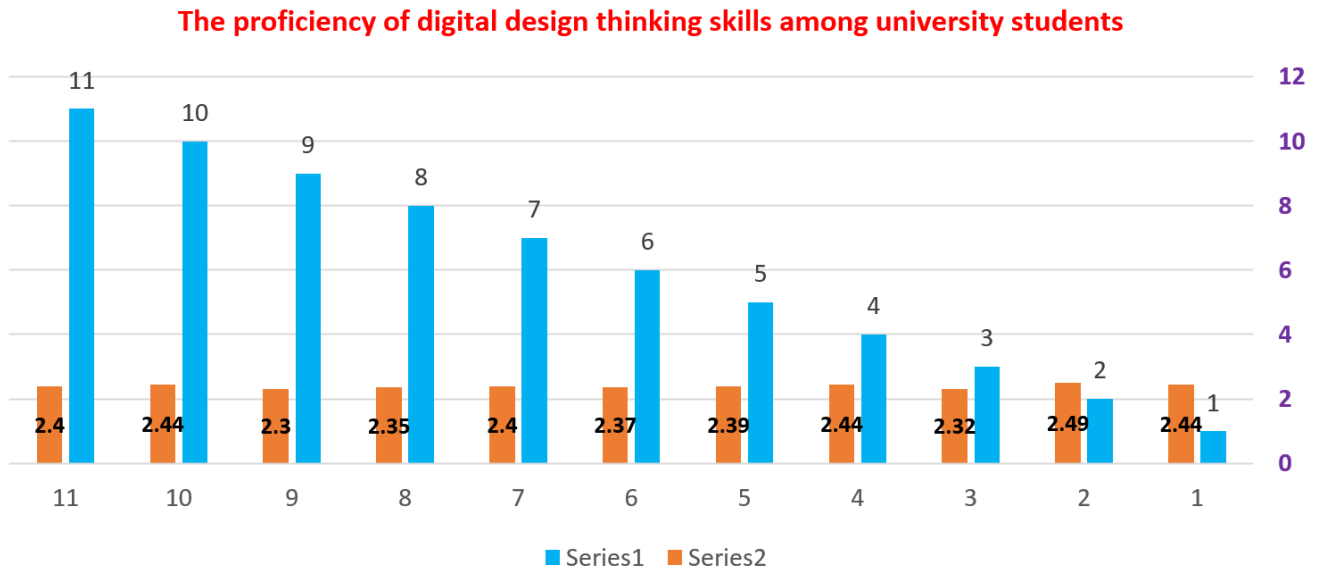

Figure 2.
The proficiency of digital design thinking skills among university students.

3.3. Third Question Answer: What is the Level of Academic Creativity among University Students?

Table 4.
The level of academic creativity among university students.

Item	Statement	Mean	SD	Percentage	Level	Rank
3	I seek new resources to enrich academic understanding.	2.68	0.63	89.47%	High	1
2	I handle academic challenges with flexibility.	2.67	0.58	88.89%	High	2
11	I demonstrate creativity in delivering academic presentations.	2.67	0.64	88.89%	High	3
9	I benefit from feedback to improve my academic production.	2.63	0.64	87.72%	High	4
7	I can easily apply new techniques in academic writing.	2.61	0.65	87.13%	High	5
10	I participate in discussions to foster intellectual creativity.	2.58	0.63	85.96%	High	6
1	I can innovate new ideas for my academic projects.	2.56	0.68	85.38%	High	7
4	I participate in activities that enhance innovative thinking.	2.56	0.68	85.38%	High	8
6	I provide innovative solutions to educational challenges.	2.53	0.57	84.21%	High	9
5	I develop new strategies to solve academic problems.	2.49	0.63	83.04%	High	10
8	I work on research projects that require innovative skills.	2.40	0.75	80.12%	High	11
	Overall	2.58	0.47	86.02%	High	

Table 4 demonstrates that the academic creativity of university students (the study sample) was elevated across all claims and in the aggregate score. This is shown in Figure 3.

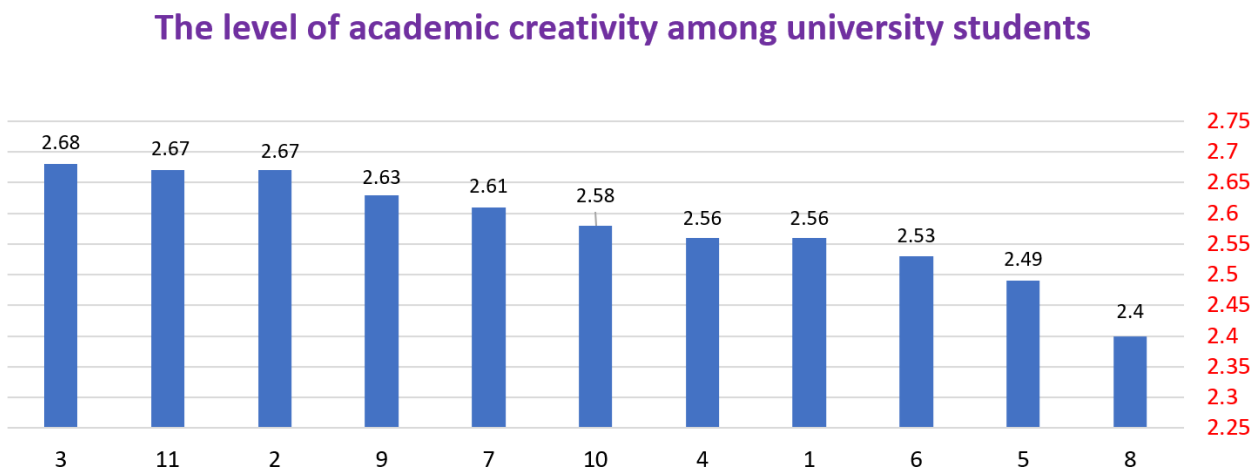

Figure 3.
The level of academic creativity among university students

3.4. Fourth Question Answer: What are the Statistically Significant Differences at the 0.05 Level in the Use of Generative Artificial Intelligence among University Students Based on the Variables: Academic Degree, Level of Technology Usage, and Age?

Table 5.
One-Way ANOVA for Differences in Participants' use of generative artificial intelligence by Academic degree, level of technology usage, and age.

	Source of Variance	Sum of Squares	DF	Mean Square	F	Sig.
Academic degree	Between Groups	61.738	2	30.869	1.179	0.315
	Within Groups	1413.735	54	26.180		
	Total	1475.474	56			
level of technology usage	Between Groups	112.216	1	112.216	4.527	0.038
	Within Groups	1363.258	55	24.787		
	Total	1475.474	56			
age	Between Groups	8.625	1	8.625	0.323	0.572
	Within Groups	1466.848	55	26.670		
	Total	1475.474	56			

Table 5 shows no statistically significant differences at the 0.05 significance level in the use of generative artificial intelligence among university students (the study sample) based on academic degree (Bachelor's, Master's, Doctorate) or age group (30 to less than 40 years vs. 40 to less than 50 years). However, the results revealed statistically significant differences ($p < 0.05$) related to the level of technology use (moderate vs. high experience); students with high technology proficiency significantly outperformed those with moderate proficiency. The mean score for generative artificial

intelligence use among students with high technology experience was 27.05, which is significantly higher than the mean score of 24.14 for students with moderate technology experience.

3.5. Fifth Question Answer: What are the Statistically Significant Differences at the 0.05 Level in Digital Design Thinking Skills among University Students Based on the Variables: Academic Degree, Level of Technology Usage, and Age?

Table 6.
One-Way ANOVA for Differences in Participants' digital design thinking skills by Academic degree, level of technology usage, and age.

Variables	Source of Variance	Sum of Squares	DF	Mean Square	F	Sig.
Academic degree	Between Groups	97.731	2	48.866	1.351	0.268
	Within Groups	1952.935	54	36.165		
	Total	2050.667	56			
level of technology usage	Between Groups	108.873	1	108.873	3.084	0.085
	Within Groups	1941.794	55	35.305		
	Total	2050.667	56			
age	Between Groups	12.163	1	12.163	0.328	0.569
	Within Groups	2038.504	55	37.064		
	Total	2050.667	56			

Table 6 indicates no statistically significant differences at the 0.05 significance level in digital design thinking skills among university students (the study sample) based on academic degree (Bachelor's, Master's, Doctorate), level of technology use (moderate vs. high experience), or age group (30 to less than 40 years vs. 40 to less than 50 years).

3.6. Sixth Question Answer: What are the Statistically Significant Differences at the 0.05 Level in Academic Generative Creativity Among University Students Based on the Variables: Academic Degree, Level of Technology Usage, and Age?

Table 7.
One-Way ANOVA for Differences in Participants' academic generative creativity by Academic degree, level of technology usage, and age

Variables	Source of Variance	Sum of Squares	DF	Mean Square	F	Sig.
Academic degree	Between Groups	8.442	2	4.221	0.155	0.857
	Within Groups	1473.066	54	27.279		
	Total	1481.509	56			
level of technology usage	Between Groups	132.334	1	132.334	5.395	0.024
	Within Groups	1349.175	55	24.53		
	Total	1481.509	56			
Age	Between Groups	6.175	1	6.175	0.230	0.633
	Within Groups	1475.333	55	26.824		
	Total	1481.509	56			

Table 7 indicates no statistically significant differences at the 0.05 significance level in academic generative creativity among university students (the study sample) based on academic degree (Bachelor's, Master's, Doctorate) or age group (30 to less than 40 years vs. 40 to less than 50 years). However, statistically significant differences ($p < 0.05$) were observed regarding the level of technology use (moderate vs. high experience). Students with high technology proficiency significantly outperformed those with moderate proficiency. The mean score for academic generative creativity among students with high technology experience was 30.38, which is significantly higher than the mean score of 27.22 for students with moderate technology experience.

3.7. Seventh question answer: What is the nature of the correlational relationship between the use of generative artificial intelligence and digital design thinking skills and academic creativity among university students?

To answer this question, Pearson's correlation coefficient was calculated between the use of generative artificial intelligence, digital design thinking skills, and academic creativity among university students. The results are shown in the following table:

Table 8.
The correlational relationship between the use of generative artificial intelligence and digital design thinking skills and academic creativity among Participants.

Variables		Digital design thinking skills	Academic creativity
Use of the generative artificial intelligence	Pearson Correlation	0.538**	0.600**
	Sig. (2-tailed)	0.000	0.000
	N	57	57
Academic creativity	Pearson Correlation	0.770**	
	Sig. (2-tailed)	0.000	
	N	57	

Table 8 indicates a statistically significant positive correlation at the 0.01 level between the use of generative artificial intelligence and both design thinking skills and academic creativity. Furthermore, a statistically significant positive correlation at the 0.01 level was found between design thinking skills and academic creativity.

4. Discussion of Results

The findings of this study indicate a high level of generative AI use among university students, accompanied by elevated digital design thinking skills and academic creativity. These results align with recent research by Gonzalez and Lee [7] who confirmed that integrating generative AI in university education improves students' innovation capabilities and engagement with problem-solving tasks. Similarly, Chen and Li [10] found that generative AI significantly supports iterative thinking processes vital to design-based learning environments. The positive correlations observed between generative AI use and both design thinking skills ($r = 0.538$) and academic creativity ($r = 0.600$) reaffirm the transformative role of these tools in fostering creative competencies. Al-Qadi [11] supports this finding by demonstrating enhanced creativity in higher education students when AI tools such as ChatGPT and Midjourney are incorporated into coursework. Additionally,Takeda and Murata [13] found that AI-supported environments facilitated students' ability to formulate original solutions in open-ended academic challenges.

However, not all research fully supports these findings. A recent study by Johar [15] although acknowledging improved writing fluency through AI, it was cautioned that over-reliance on such tools may lead to diminished originality, especially when students replicate AI-generated ideas without critical engagement. Patel and Rogers [16] similarly, it was noted that while AI tools can enhance productivity, they may inadvertently hinder deep cognitive processing and long-term creative growth if not paired with reflective learning strategies. The current study differs from previous works by specifically identifying technological proficiency as a significant variable; students with higher digital experience achieved greater benefits. This insight is corroborated by Hassan and Abdullah [5] who found that digital fluency acts as a mediator in the relationship between AI adoption and student creativity. However, Zhou et al. [17] argued that excessive emphasis on digital skills may marginalize students with limited access to or confidence in technology, thus reinforcing educational inequalities.

In light of these findings, the current research contributes to a nuanced understanding of how generative AI can be harnessed in educational settings while also acknowledging potential limitations. It highlights the importance of not only integrating AI tools but also ensuring that pedagogical strategies are in place to foster critical engagement, ethical awareness, and balanced technology use.

5. Conclusions

This study's findings indicate the increasing significance of generative artificial intelligence tools in enhancing design thinking abilities and academic creativity in university students. The data indicated a significant prevalence of generative AI utilization within the group, accompanied by a marked improvement in design thinking and academic creativity skills. This signifies that these technologies have a concrete beneficial effect on the enhancement of students' creative skills. A statistically significant positive correlation exists between the utilization of generative AI and both design thinking and academic creativity. This illustrates the benefits of these technologies when systematically and strategically incorporated into university learning environments, as they foster students' critical thinking, enhance their capacity for innovation, and address academic challenges creatively.

While no statistically significant variations were noted for academic degree or age, the degree of technological experience emerged as a distinguishing feature. Students possessing superior technological proficiency excelled in utilization levels as well as in creative and design-related competencies. This underscores the necessity of cultivating digital competencies in students to guarantee equal and effective use of new tools. This study emphasizes the necessity of incorporating generative AI into university curricula, offering specialized training programs for students and staff, and formulating explicit regulations to guarantee the ethical and responsible utilization of these technologies. This work constitutes a pivotal advancement in bridging the research gap in this domain and provides a scientific basis for subsequent investigations focused on enhancing educational practices amid the digital revolution.

6. Practical Implications

1. Curriculum Development: Higher education institutions should embed generative AI tools into teaching and learning processes to enhance creativity, critical thinking, and innovation.
2. Faculty and Student Training: Targeted training programs must be provided to equip both students and educators with the skills needed to utilize AI tools effectively and ethically.
3. Policy and Governance: Clear ethical guidelines and institutional frameworks should be established to manage the responsible use of AI technologies in education.
4. Learning Personalization: AI systems can be used to support adaptive learning models that respond to individual student needs, fostering engagement and improved academic outcomes.

7. Limitations

1. 1. The study sample was limited to male postgraduate students from a single institution, which may constrain the generalizability of the findings.
2. The research relied on self-reported data, which may be subject to social desirability bias.

3. The cross-sectional design does not account for long-term impacts or causal relationships.

8. Future Research Suggestions

1. Conduct longitudinal studies to explore the sustained effects of generative AI on creativity and design thinking over time.
2. Expand participant demographics to include diverse academic institutions, disciplines, genders, and cultural contexts.
3. Investigate the ethical dimensions and cognitive risks associated with overreliance on generative AI in academic environments.
4. Explore the integration of AI with emerging technologies such as virtual reality or gamification to enhance interactive learning.

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