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Investigating the Usage of ChatGPT in Enhancing Student's Creativity at Higher Level

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ABSTRACT

This study investigated the role of ChatGPT in enhancing creativity, problem-solving skills, divergent thinking, and self-directed learning among higher education students. A mixed-method design was adopted, integrating quantitative data from 357 survey respondents with qualitative insights from 10 interview participants. Self-constructed questionnaire was employed for the quantitative strand, while a structured interview schedule guided the qualitative strand. Both data collection tools were assessed for validity and reliability prior to administration. Findings indicated that ChatGPT is broadly regarded as a valuable academic tool, particularly in nurturing creative thought and cognitive flexibility. Participants noted that ChatGPT supports the development of novel solutions, helps overcome creative blocks, and contributes to improved academic performance. Interview responses emphasized ChatGPT's role as a "digital brainstorming partner," enabling interdisciplinary thinking and the generation of original concepts. The research concludes that ChatGPT offers considerable potential for advancing higher-order thinking skills in university settings when employed with critical awareness and responsibility. These results highlight the importance of structured guidance to maximize learning gains while upholding academic integrity.

Keywords: ChatGpt, Artificial Intelligence in Education, Creativity Enhancement, Problem-Solving Skills, Self-Directed Learning, Higher Education, Thinking, Personalized Learning

Introduction

The emergence of Artificial Intelligence (AI) has opened up a range of possibilities for educational research, allowing for the development of personalized and self-directed learning experiences within higher education (Alam, 2021). AI has been increasingly incorporated into the educational sector, utilizing Chat GPT and other intelligent systems to facilitate teaching

and l earning. Chat GPT has become particularly popular due to its language processing capabilities and ability to generate human-like responses. Over the past few years, language models have benefited greatly from the rapid development of Artificial Intelligence (AI) and Natural Language Processing (NLP), making them more accurate, flexible, and useful than ever before (Thorp, 2023). Chat GPT (Generative Pre-Trained Transformer) by Microsoft-backed Open AI is an Artificial Intelligence text-generating tool that has taken the whole world of AI by storm. It was launched on 30th November, 2022, and has unexpectedly 1 million user's subscribers within 5 days of it being launched compared to other famous applications.

Chat GPT is a large language model that can generate text, translate language, write different content, answer questions, generate new ideas, and generate human-like responses to natural language. This innovation towards artificial intelligence provides innovative opportunities to educators, learners, and people from all walks of life (Shidiq, 2023). OpenAI launched different learning language models. GPT-3.5 is one of the most recent popular models, which is a fine-tuned version of GPT-3 using reinforcement learning from human feedback. GPT-3.5 is a prominent large language model. It can instantly generate text based on the vast knowledge acquired from web data and textbooks. It supports multiple languages and is characterized by its conversational skills, making interactions feel like one is speaking to a human (Nakajima, Fujimori & Furuya, 2024).

Creativity has roots in the Latin word "creare," which means to produce something. creativity is a kind of creation by which one produces something new and different from known, which includes an individual way of problem solving, discovery of the unknown (Gaspar & Mabic, 2015). Creativity ideation refers to the cognitive process of generating novel and effective ideas. Creative thinking is described as divergent thinking and the ability to produce a variety of approaches to a specific problem. creative abilities are personality traits enabling to production of results that are original and new.

Chat GPT can be a creative tool because it can generate different types of text, when learners interact with Chat GPT, it acts as a brain strong partner that can help spark new ideas and creativity, Chat GPT help students during study, Chat GPT can be used to encourage ideas, bring out creativity in students and stimulate their thinking. Students explore different ideas related to their area. Chat GPT enhances creativity skills among students, and creativity helps 2 develop critical thinking abilities, which enable them to examine data, find solutions to issues, and come to well-informed conclusions (Toma, Yanez &Perez, 2024).

Statement of the Problem

In today's digital environment, people regularly employ various AI-powered applications such as Claude AI, Copy AI, Perplexity AI, and ChatGPT. Among these, ChatGPT is frequently used to generate novel concepts, strengthen problem-solving capabilities, and enhance imaginative thinking. Creativity involves the ability to develop original solutions to various challenges. Although students often struggle to nurture their creative thinking abilities through conventional approaches, the recent emergence of AI-driven technologies like ChatGPT helps support student creativity. This research seeks to investigate how ChatGPT can be leveraged to develop creativity among advanced learners, thereby increasing awareness of its capacity to stimulate innovative thinking, idea generation, and complex problem-solving strategies.

Significance of the Study

Examining ChatGPT can boost advanced creativity matters for a variety of people. For educators and academic professionals, this research could be especially useful—it might offer solid evidence that AI really can help enhance creative thinking, which could open up new possibilities for teaching and future innovations in the workplace.

Objectives of the Study

The following research objectives guided this study:

1. To explore the usage of ChatGPT in promoting Creativity among higher-level students
2. To determine the usage of ChatGPT in enhancing problem-solving skills among higher-level students
3. To examine the usage of ChatGPT in enhancing Divergent thinking among higher-level students
4. To investigate the usage of ChatGPT in enhancing Self-directed learning among higher education students

Research Questions of the Study

The following research questions guided this study:

1. What is the usage of ChatGPT in promoting Creativity among higher-level students?

2. How effective is ChatGPT in improving students' problem-solving skills at a higher level?
3. What specific features of ChatGPT contribute to enhanced divergent thinking among higher-level students?
4. To what extent does the use of ChatGPT enhance self-directed learning among higher-level students?

Review of Related Literature

The origins of AI and chatbots can be traced back to the 1950s when scientists first began exploring artificial intelligence (Almelhes, 2023). AI originally emerged as a tool to 7 simulate and mechanize human thought processes (Jara etal,. 2023). OpenAI is a research laboratory founded in 2015. This laboratory has made rapid progress in the development of AI technologies and has released several machine learning products for the general public, including DALL-E and ChatGPT (Devlin, 2018). The language model for Chat GPT, an OpenAI chatbot that debuted in November 2022, was created in 2018, making it the fastest-growing consumer application of this decade (Hu & Zhang, 2023). The model is based on a deep learning architecture known as Generative Pre-Trained Transformer (GPT). The word "Generative" or "G" in the acronym GPT speaks for the tool's capacity to produce text. Pre-training or "P" is the deployment of a model from one ML job to train another model, much as individuals utilize prior knowledge to learn new things.

Chat GPT offers a substantial amount of text to pre-train on (Haleem, Javaid & Singh, 2022). Chat GPT can produce texts that sound like human speech in an informal setting and perform basic tasks. Chat GPT aims to create a cooperative AI system that can produce helpful language, engaging, and contextually relevant (Alshurafat, 2023). Chat GPT, a generative pre-trained transformer, is now attracting so much interest. (Street & Wilck, 2023). The revolutionary models GPT-2, GPT-3 and ultimately Chat GPT were developed by Open AI which has been at the cutting edge of AI innovation. The impact of Chat GPT on academia has also been a topic of significant interest to various scholars and researchers. Its application in the educational field has 13 begun to flourish, as students across different levels of education all over the world use this technology to assist with their academic homework.

As a result, the program has been subjected to exams in fields such as law, pharmacy, medicine, and language education, and overall has received scores better than that of an average student (Choi et al., 2021). The use of Chat GPT in education during the digital era is a topic that has gained significant attention in recent times. As an AI-powered chat bot, Chat GPT has the potential to revolutionize the way students and educators interact and learn. However, to fully understand its impact, it is crucial to study the perspectives of

educators and students on implementing Chat GPT in education (Shahriar & Hayawi, 2023). Students engaging with ill-defined problem-solving tasks in educational settings demonstrate enhanced abilities to transfer knowledge across domains, apply academic insights beyond conventional contexts, and generate novel ideas and innovations (Walker & Leary, 2009). These diverse, ill-defined problem-solving tasks not only foster critical-thinking skills (Liu & Pasztor, 2022). But also play a pivotal role in motivating students to learn by presenting authentic and engaging challenges (Demirel & Dagyar, 2016).

SDL is defined as a process "in which people take the primary initiative for planning, carrying out, and evaluating their own learning experiences (Merriam 2001).Its powers in natural language processing have made it a useful tool in education, with the ability to enhance teaching methods, increase student. engagement and personalize learning experiences (Castro, 2023). The advancement of AI technology is continuously improving, resulting in enhanced accessibility, use, and effectiveness of tools such as Chat GPT. This intelligent computer program can generate written content in a manner that closely resembles human writing, provided with a certain subject or prompt (Zhou et al., 2022).

Chat GPT is equipped with a sequence model that is specifically designed for generating text-based outputs such as question-and-answer pairs, text summaries, and machine translations (Bibi & Atta, 2024). Chat GPT translates English concepts into programming languages and detects any potential flaws in human programmers' language (Wiredu, 2023). Today humans live in an era of generating highly accurate knowledge (Hill-Yardin, 2023). Chat GPT is able to provide useful responses in many different languages. Some media articles note that it supports nearly 100 languages, and a research study evaluated the chat bot's performance in 37 languages (Lai et al., 2023). There are several potential benefits of Chat GPT (Generative Pre-Trained Transformer). Chat GPT and similar models will likely play a growing role in education, medicine, and also in art (Vincent, 2022). Chat GPT is a powerful and versatile tool which improves language skills.

Students can enhance their language skills to have extensive knowledge about vocabulary spelling mistakes like grammar check and refine their writing skills which are provided by ChatGPT (Wang, 2023). Students use Chat GPT during presentations and assignments. They make their assignments in less time. This discussion is the negative implications of GPT Chat for students using this system to do assignments especially in doing assignments related to creative writing and different skills (Hutson, 2024). Creativity is a capacity of the human mind (Jara et al,. 2023). The value of creativity has been increasingly acknowledged during the last few decades. We are living in a creative period, when creativity has emerged as a key motivator. The capacity to intentionally imagine an original product, to accomplish something differently than anybody else, and to generate fresh ideas are all examples of creativity (Bereczki & Karpati, 2018).

Another way to describe creativity is as a trait that presents itself in uncommon thoughts, unique actions, and products (Rubenstein, Ridgley, Callan, Karami & Ehlinger, 2018). The use of Chat GPT also raised numerous ethical issues (Zhuo et al.,2023). One of the potential issues with generative AI is the risk of trust and dependency (Benuyenah, 2023). One content issue challenge while using Chat GPT is ensuring accuracy and relevance, as it may generate outdated or incorrect information (Dwivedi et al,.2024). Chat GPT faces several barriers to enhancing creativity, including a lack of human experience, contextual understanding, and a lack of Clarity and biased responses. Here are some barriers of Chat GPT (Kumar, 2024).

Research Methodology

This study employed a mixed-method approach to investigate how ChatGPT enhances student creativity at the higher education level. A triangulation convergent design was adopted, giving equal weight to both qualitative and quantitative methodologies. This design was appropriate because it aligned well with the study's research objectives. The researcher adopted a pragmatist research paradigm, integrating both qualitative and quantitative methods to address the research questions, allowing for a more complete understanding of the phenomenon. A convergent parallel design was used, enabling simultaneous collection of qualitative and quantitative data with the goal of merging and integrating findings for a richer comprehension of the subject. In this QUAN-QUAL model (triangulation mixed methods design), both data types were equally weighted and gathered concurrently within the same study, rather than in separate phases or distinct studies.

The target population refers to the specific group a researcher wishes to study. For this research, the target population comprised all BS departments at GOVT. Graduate College for Women Satellite Town GRW, with 50,481 students who had used ChatGPT. The accessible population was the BS-level students at the same institution, totaling 5,481 individuals. For quantitative data collection, the sample size was determined using Morgan's table, resulting in 357 physical responses recorded. A convenient sampling technique was used to select participants for both qualitative and quantitative data collection, ensuring the researcher could easily reach participants and complete the process in a timely manner.

For the quantitative component, a structured questionnaire was developed by the researcher, aligned with the study's objectives. For the qualitative component, semi-structured

interviews were conducted with BS-level students. Quantitative data came from the structured questionnaire. For qualitative analysis, interview data were collected. Fourteen participants initially agreed to take part in interviews; ten were ultimately included—five from BS Education and five from BS English. Face-to-face interviews were conducted by visiting classes and arranging personal meetings with respondents.

Quantitative data were analyzed using statistical methods to detect patterns, correlations, and significant differences, providing meaningful insights into how ChatGPT enhances student creativity. The close-ended format produced focused responses, which were subsequently analyzed to identify recurring themes and patterns. This approach yielded rich, detailed insights into how ChatGPT enhances creativity at the higher education level, contributing to a nuanced understanding of the research problem. Before full data collection, the questionnaire was distributed to 20 students as a pilot study to assess the tool's validity and reliability. After complete data collection, data were entered into SPSS (version 26.0) to measure reliability across all scales. Cronbach's alpha coefficients and inter-item mean values were calculated using SPSS. Data from 30 respondents via the questionnaire were used to verify the reliability of the study results.

Data Analysis and Interpretation

This section presents a descriptive analysis of statements grouped into four factors: usage of ChatGPT, divergent thinking, problem-solving skills, and self-directed learning. Descriptive statistics, specifically mean and standard deviation, offer valuable insights into central tendency.

Table 4.2

Mean and Standard deviation of factor Usage of ChatGPT

Sr no.	Statements	Mean	SD
1	I use ChatGPT to explore creative solutions.	4.15	.823
2	I rely on ChatGPT to generate fresh ideas.	3.85	.945
3	I feel inspired after interacting with ChatGPT.	3.87	1.07

Sr no.	Statements	Mean	SD
4	I use ChatGPT to clarify my creative thoughts.	3.93	.759
5	I seek new perspectives through ChatGPT.	3.73	.855
6	I apply ideas suggested by ChatGPT in my projects.	3.89	.942
7	I explore alternatives with the help of ChatGPT.	3.78	.840
8	I adapt ChatGPT suggestions to my needs.	3.80	.985
9	I feel supported while using ChatGPT.	4.25	.840
10	I improve my creativity by interacting with ChatGPT.	3.99	.703

Looking at the ten statements about ChatGPT and creativity, the results were consistently positive. On a five-point scale, average scores ranged from 3.73 to 4.25, showing that most respondents agreed with the statements. The highest score came from "I feel supported while using ChatGPT" (average 4.25, with some variation at 0.840), which suggests students see ChatGPT as a helpful companion for creative work. The lowest score was "I seek new perspectives through ChatGPT" (average 3.73, variation 0.855), but even that still reflects a favorable response. The variation in answers ranged from 0.703 to 1.07, showing a moderate spread in opinions. Overall, these findings indicate that students actively turn to ChatGPT to explore creative solutions, generate ideas, and boost their creative thinking—with the strongest agreement centered on how supportive the tool feels.

Table 4.3

Mean and Standard deviation of factor Divergent thinking

Sr no	Statements	Mean	SD
1	ChatGPT helps me to generate multiple ideas.	3.84	.996
2	ChatGPT sharpened my divergent thinking skills.	3.66	.987
3	ChatGPT encourages me to express my creative thoughts more freely.	4.10	.695

Sr no	Statements	Mean	SD
4	I can learn new concepts with the help of ChatGPT.	4.19	.891
5	I combine unrelated concepts to create new ideas.	3.89	.936

Analysis of the five statements about ChatGPT and divergent thinking, the average scores ranged from 3.66 to 4.19, showing that respondents generally agreed with them. The highest score was for "I can learn new concepts with the help of ChatGPT" (average 4.19, with a variation of 0.891), which suggests students really see ChatGPT as a helpful learning tool. Coming in second was "ChatGPT encourages me to express my creative thoughts more freely" (average 4.10, variation 0.695), indicating it helps reduce hesitation around being creative. The lowest score was for "ChatGPT sharpened my divergent thinking skills" (average 3.66, variation 0.987)—still positive, but not as strong as the others. The spread of answers ranged from 0.695 to 0.996, showing a moderate range in opinions. Overall, students view ChatGPT as a useful resource for generating ideas, picking up new concepts, and feeling more comfortable expressing their creativity—especially when it comes to learning.

Table 4.4

Mean and Standard deviation of factor Problem solving skills

Sr.no	Statements	Mean	SD
1	ChatGPT helps me improve my study habits.	3.98	.956
2	It is easier to understand concepts by using ChatGPT.	3.85	.945
3	ChatGPT enables me to write grammatically.	3.87	1.078
4	ChatGPT helps in improving academic skills.	3.93	.759
5	ChatGPT enhances my decision-making skills.	3.72	.863

When we looked at the five statements about how ChatGPT affects academic skills, the average scores fell between 3.72 and 3.98, showing that students generally agreed with them. The statement that scored highest was "ChatGPT helps me improve my study habits" (average 3.98, with some variation at 0.956), followed closely by "ChatGPT helps in improving academic skills" (average 3.93, variation 0.759). The lowest score was for

"ChatGPT enhances my decision-making skills" (average 3.72, variation 0.863). The spread of answers ranged from 0.759 to 1.078, which suggests a moderate range in opinions. Overall, students see ChatGPT as a handy tool for building better study habits, grasping concepts, polishing grammar, and sharpening their academic abilities.

Table 4.5

Mean and Standard deviation of factor Self-directed learning

Sr no.	Statements	Mean	SD
1	ChatGPT allows me to finish my work quicker.	3.91	.974
2	ChatGPT makes me capable of independent learning.	3.70	.958
3	ChatGPT enables me to enhance my learning environment.	4.07	.769
4	My engagement with ChatGPT sparks new interests.	4.14	.874
5	I find myself more motivated to create after using ChatGPT	3.88	.924

Analasing the five statements about how ChatGPT affects learning and motivation, the average scores ranged from 3.70 to 4.14, showing that students generally agreed with them. The highest score went to "My engagement with ChatGPT sparks new interests" (average 4.14, with a variation of 0.874), followed closely by "ChatGPT enables me to enhance my learning environment" (average 4.07, variation 0.769). The lowest was "ChatGPT makes me capable of independent learning" (average 3.70, variation 0.958). The spread of answers ranged from 0.769 to 0.974, showing a moderate range in opinions. Overall, students feel ChatGPT is pretty good at sparking new interests and making their learning environment better, though they were a bit less convinced when it came to helping them learn on their own.

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Table 4.6

Analysis of Variance (ANOVA) Based on Department

Factors	Departments	Mean	SD	p	F	Sequence of difference
Usage of ChatGPT	Education	3.92	.47	.007	.993	---
	IT	3.92	.47	.012	.911	
	English	3.93	.44	.002	.962	
Divergent Thinking	Education	3.92	.62	.172	.842	---
	IT	3.92	.62	.278	.598	
	English	3.96	.59	.065	.798	
Problem-Solving Skills	Education	3.88	.64	.042	.959	---
	IT	3.89	.63	.083	.774	
	English	3.90	.61	.001	.981	
Self-Directed Learning	Education	3.89	.61	.004	.996	---
	IT	3.89	.61	.002	.966	
	English	3.88	.59	.005	.941	

When comparing how students from Education, IT, and English departments rated the four factors, their average scores were almost identical—ranging from 3.88 to 3.96—and the spread of answers was similar too. The statistical tests showed no meaningful differences between departments, meaning that whether a student studied Education, IT, or English didn't really affect their views on using ChatGPT, divergent thinking, problem-solving, or self-directed learning. In short, students across all three departments felt pretty much the same way.

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Table 4.7

Analysis of Variance (ANOVA) Based on the semester

Factor	Semester	Mean	SD	P	F	Sequence of
Usage of Chat GPT	2	3.80	0.41	.001	5.210	4>2>3>1
	4	3.85	0.52	.005	5.110	
	6	3.82	0.41	.001	5.305	
	8	4.25	0.49	.001	8.967	
Divergent Thinking	2	3.70	0.56	.012	3.456	4>3>2>1
	4	3.75	0.68	.008	3.789	
	6	3.78	0.55	.005	4.112	
	8	4.30	0.64	.001	9.422	
Problem-Solving Skills	2	3.75	0.58	.004	4.225	4>2>3>1
	4	3.80	0.68	.003	4.500	
	6	3.78	0.58	.002	4.876	
	8	4.20	0.66	.001	10.280	
Self-directed Learning	2	3.60	0.55	.004	5.670	4>2>3>1
	4	3.70	0.66	.001	5.890	
	6	3.65	0.56	.001	6.112	
	8	4.15	0.63	.008	12.280	

The analysis revealed clear differences across semesters for all four factors ($p < 0.05$). Semester 8 students had the highest average scores (Usage: 4.25; Divergent Thinking: 4.30; Problem-Solving: 4.20; Self-Directed Learning: 4.15), followed by semesters 4 or 6, while semester 2 students scored the lowest. Simply put, the further along students were in their studies—especially by semester 8—the more they felt ChatGPT helped them, suggesting its positive impact grows as students progress academically.

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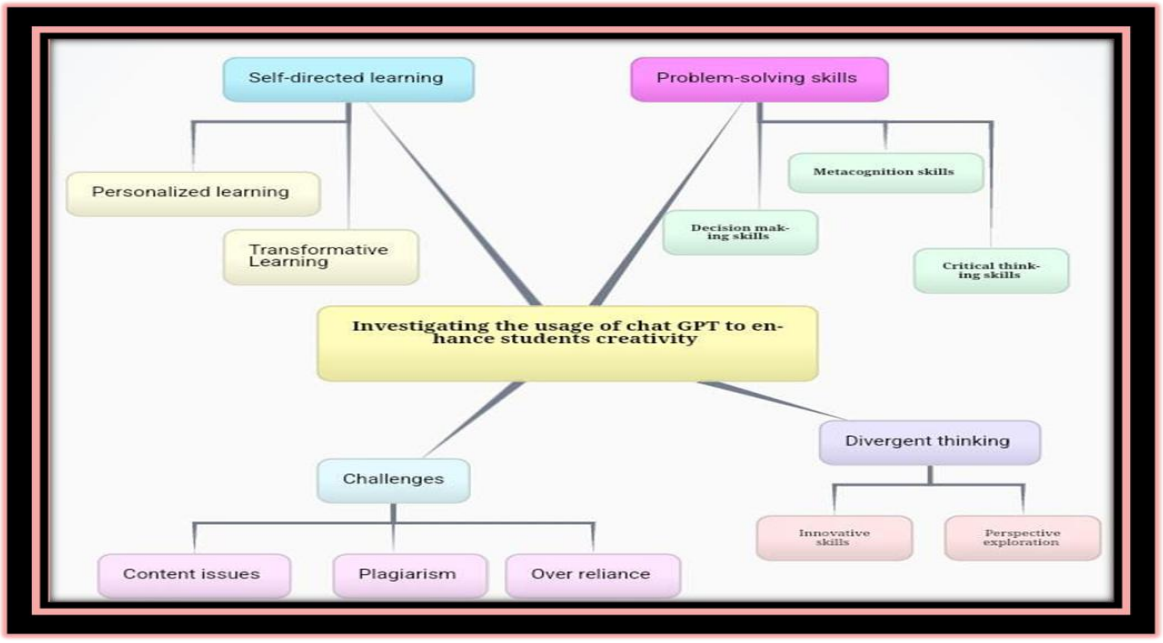
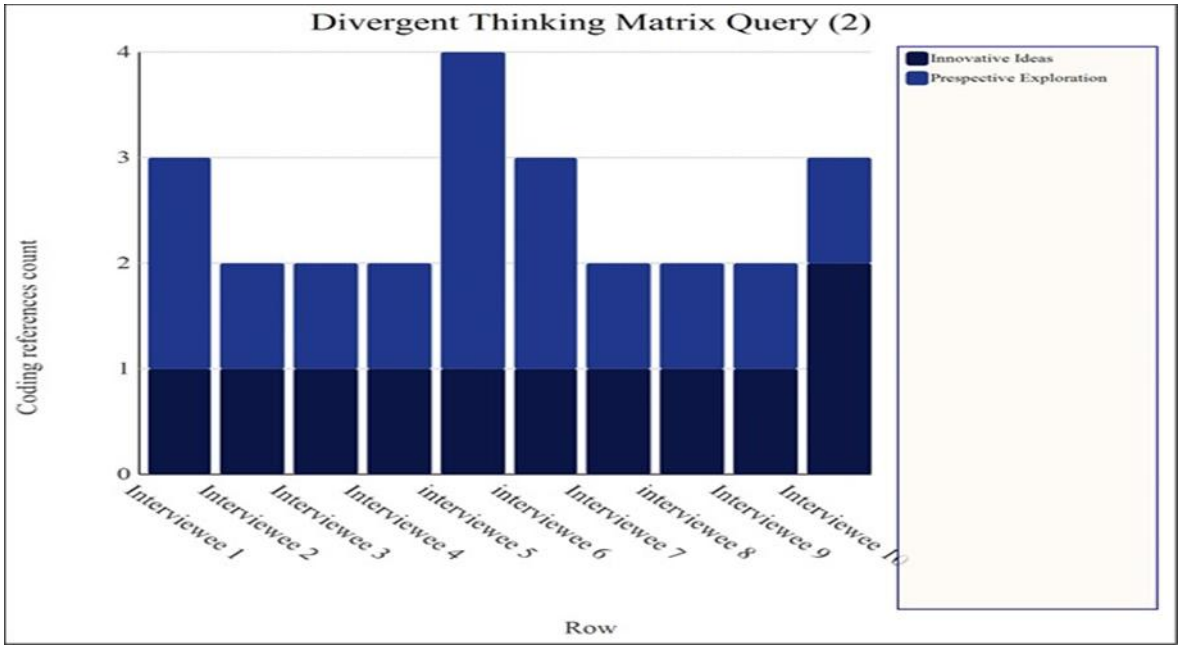
Qualitative Data Analysis



Divergent Thinking



These responses illustrate ChatGPT's value as a brainstorming partner, helping participants explore new ideas, make creative connections, and think more deeply. It sparked innovation

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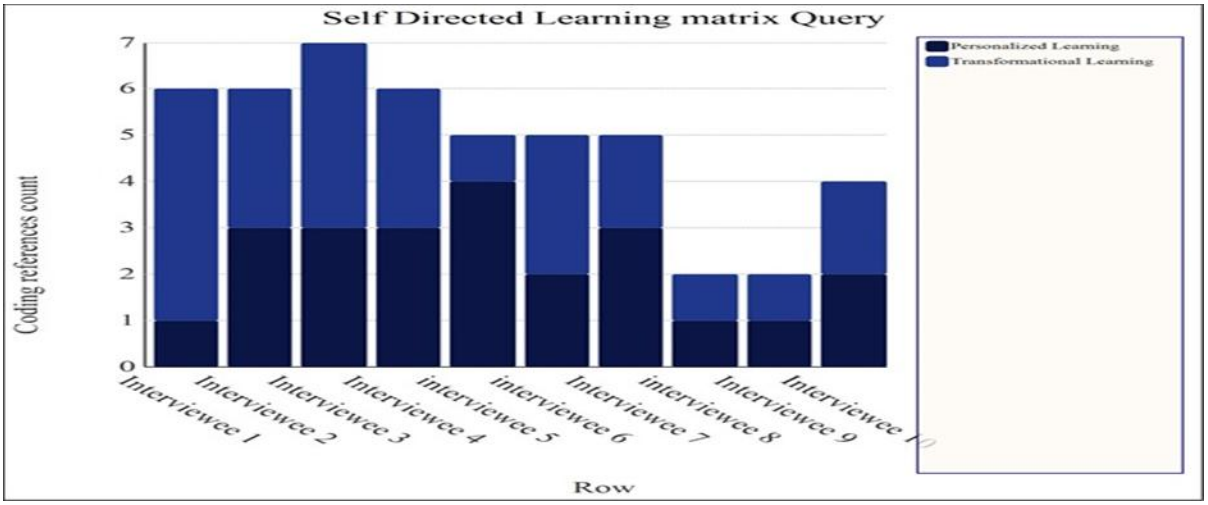
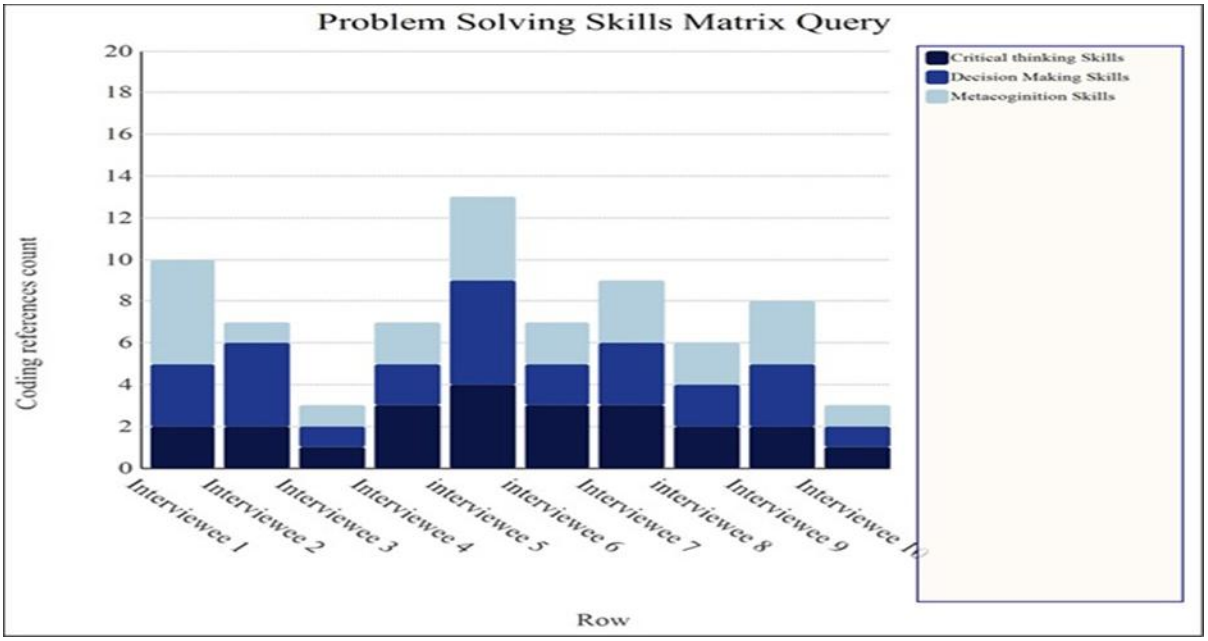
by offering fresh perspectives and highlighting research gaps. It served as a tool to broaden thinking and refine ideas.

Self-Directed Learning



These responses reported that ChatGPT helps learners explore topics deeply, structure their studies, and practice at their own pace. It acts like a personal tutor, offering explanations, resources, and feedback to boost understanding. Encouraging curiosity and self-directed learning makes education more interactive and effective.

Problem-Solving Skills



These responses stated that metacognitive skills help us think about our thinking and learn better. Relying too much on ChatGPT can weaken these skills, making it harder to solve problems independently. The key is to use ChatGPT as a tool while still reflecting and thinking for ourselves.

Findings

This research found that ChatGPT has a real positive impact on student learning, creativity, and problem-solving. The numbers back it up: students strongly agreed that ChatGPT helped them learn new concepts in fresh ways (average 4.25) and boosted their creativity (average 4.25, with some variation at 0.84). They also found it useful for self-directed learning (average 4.14) and problem-solving (average 3.72). Students from the English department tended to use it a bit more and scored higher in problem-solving (average 3.90) and self-learning (average 3.88), while eighth-semester students got the most out of it overall (averages ranging from 4.15 to4.30).

The open-ended responses backed this up too. Students described ChatGPT as a go-to tool for brainstorming, generating ideas, personalizing their learning, and working through problems step by step. But they also pointed out some downsides: over-reliance, getting inaccurate information, feeling like it could actually reduce their own creativity, and worries about plagiarism. In the end, the study concluded that ChatGPT works well as a supportive learning tool—but only if you use it carefully, think critically, and double-check the facts.

Conclusion

This study showed that ChatGPT really helps students boost their creativity, solve problems, and learn on their own. Students found it useful for coming up with ideas, picking up new knowledge, and getting quick academic help. But there's a catch - relying on it too much can hurt originality, and sometimes it churns out low-quality information. So the takeaway is simple: ChatGPT works best as a helpful sidekick in learning, as long as students use it thoughtfully, think critically, and trust their own judgment.

Recommendations

They should build structured training programs that help both students and educators get the most out of ChatGPT for creativity and learning. Students need to learn prompt engineering—how to ask better questions to get better answers. It's also important to sharpen their critical thinking so they can properly evaluate what ChatGPT produces. Teachers should thoughtfully bring ChatGPT into the classroom as a supplementary tool for brainstorming, problem-solving, and idea generation, without replacing traditional teaching methods. Assignments shouldn't just ask students to use ChatGPT—they should also require them to show how they've refined, personalized, and built on the AI's output, proving their own original thinking. Finally, we need a balanced approach: combine ChatGPT with classic collaborative methods like group discussions and peer reviews, so human interaction stays central to the learning process.

References

Alam, A. (2021, November). Possibilities and apprehensions in the landscape of artificial intelligence in education. In 2021 International Conference on Computational Intelligence and Computing Applications (ICCICA) (pp. 1-8). IEEE.

Almelhes, S. A. (2023). A review of artificial intelligence adoption in second-language learning. Theory and Practice in Language Studies, 13(5), 1259-1269.

Alshurafat, H. (2023). The usefulness and challenges of chatbots for accounting professionals: Application on ChatGPT. Available at SSRN 4345921.

Benuyenah, V. (2023). Commentary: ChatGPT use in higher education assessment: Prospects and epistemic threats. Journal of Research in Innovative Teaching & Learning, 16(1), 134-135.

Bereczki, E. O., & Karpati, A. (2018). Teachers' beliefs about creativity and its nurture: A systematic review of the recent research literature. Educational research review, 23, 25-56.

Castro, C. A. (2023). A Discussion about the impact of ChatGPT in Education. Journal of Business Theory and Practice, 34.

Demirel, M., & Dağyar, M. (2016). Effects of problem-based learning on attitude: A meta-analysis study. Eurasia Journal of Mathematics, Science and Technology Education, 12(8), 2115- 2137.

Devlin, J. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.

Dwivedi, R., & Elluri, L. (2024). Exploring Generative Artificial Intelligence Research: A Bibliometric Analysis Approach. IEEE Access.

Gaspar, D., & Mabic, M. (2015). Creativity in Higher Education. Universal Journal of Educational Research, 3(9), 598-605.

Haleem, A., Javaid, M., & Singh, R. P. (2022). An era of ChatGPT as a significant futuristic support tool: A study on features, abilities, and challenges. BenchCouncil transactions on benchmarks, standards and evaluations, 2(4), 100089.

Hill-Yardin, E. L., Hutchinson, M. R., Laycock, R., & Spencer, S. J. (2023). A Chat (GPT) about the future of scientific publishing. Brain, behavior, and immunity, 110, 152-154.

Hu, H., Li, R., & Zhang, L. (2023). Financial development and resources curse hypothesis: China's COVID-19 perspective of natural resources extraction. Resources Policy, 85, 103965.

Hutson, J. (Ed.). (2024). The Rise of AI in Academic Inquiry. IGI Global.

Jara, M. I. D. V. Y., Martínez, O. L., Navarro, V. N., & Cuéllar, F. (2023). Escritura, creatividad e inteligencia artificial. ChatGPT en el contexto universitario. Comunicar: Revista científica iberoamericana de comunicación y educación, (77), 4-4.

Kumar, H. (2024). Enablers for digital transformation of services to harness new business opportunities. IEEE Transactions on Engineering Management.

Lai, V. D., Ngo, N. T., Veyseh, A. P. B., Man, H., Dernoncourt, F., Bui, T., & Nguyen, T. H. (2023). Chatgpt beyond english: Towards a comprehensive evaluation of large language models in multilingual learning. arXiv preprint arXiv:2304.05613.

Merriam, S. B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. New directions for adult and continuing education, 2001(89), 3.

Nakajima, N., Fujimori, T., Furuya, M., Kanie, Y., Imai, H., Kita, K., ... & Okada, S. (2024).A Comparison Between GPT-3.5, GPT-4, and GPT-4V: Can the Larg

Language Model (ChatGPT) Pass the Japanese Board of Orthopaedic Surgery Examination?. Cureus, 16(3).

Rubenstein, L. D., Ridgley, L. M., Callan, G. L., Karami, S., & Ehlinger, J. (2018). How teachers perceive factors that influence creativity development: Applying a Social Cognitive Theory perspective. Teaching and Teacher Education, 70, 100-110.

Shahriar, S., & Hayawi, K. (2023). Let's have a chat! A Conversation with ChatGPT: Technology, Applications, and Limitations. arXiv preprint arXiv:2302.13817.

Shidiq, M. (2023, May). The use of artificial intelligence-based chat-gpt and its challenges for the world of education; from the viewpoint of the development of creative writing skills. In Proceeding of international conference on education, society and humanity (Vol. 1, No. 1, pp. 353-357).

Thorp, H. H. (2023). ChatGPT is fun, but not an author. Science, 379(6630), 313-313. Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. Smart learning environments, 10(1), 15.

Toma, R. B., & Yánez-Pérez, I. (2024). Effects of ChatGPT use on undergraduate students' creativity: a threat to creative thinking? Discover Artificial Intelligence, 4(1), 74.

Vincent, J. (2022). ChatGPT proves AI is finally mainstream–and things are only going to get weirder. The Verge.

Walker, A., & Leary, H. (2009). A problem-based learning meta-analysis: Differences across problem types, implementation types, disciplines, and assessment levels. Interdisciplinary journal of problem-based learning, 3(1), 6.

Wang, H., Fu, T., Du, Y., Gao, W., Huang, K., Liu, Z., ... & Zitnik, M. (2023). Scientific discovery in the age of artificial intelligence. Nature, 620(7972), 47-60.

Wiredu, J. (2023). An investigation on the characteristics, abilities, constraints, and functions of artificial intelligence (ai): The age of chatgpt as an essential. Information and Management, 108(3), 62614-62620.

Zhou, C., Qiu, C., Liang, L., & Acuna, D. E. (2022). Paraphrase identification with deep learning: A review of datasets and methods. arXiv preprint arXiv:2212.06933.