

# Enhancing Student Productivity: Leveraging Generative AI for Personalized Task Management and Academic Science

Ryan Errando  
School of Computer Science  
Binus University  
Tangerang Indonesia  
[ryan.errando@binus.ac.id](mailto:ryan.errando@binus.ac.id)

Sonya Rapinta Manalu  
Computer Science Department, School of Computer Science  
Bina Nusantara University  
Tangerang, Indonesia  
[smanalu@binus.edu](mailto:smanalu@binus.edu)

Raeven Villarel  
School of Computer Science  
Binus University  
Tangerang, Indonesia  
[raeven.widjaja@binus.ac.id](mailto:raeven.widjaja@binus.ac.id)

Hafizh Ash Shiddiqi  
Computer Science Department, School of Computer Science  
Bina Nusantara University  
Tangerang, Indonesia  
[hafizh.shiddiqi@binus.edu](mailto:hafizh.shiddiqi@binus.edu)

**Abstract**— In the evolving landscape of education, generative AI emerges as an important tool for enhancing our productivity with personalized feedback. This journal will explore the impact of Generative AI, highlighting its potential in the educational sector. By offering customized support and resources, Generative AI has unconventional methods to improve academic outcomes. Our research employs a mixed-method approach, combining a comprehensive literature review, and empirical data gathered through surveys and experiments with Generative AI itself. This method provides an analysis of Generative AI integration in educational settings. The literature review provides foundational theory of existing technology while the surveys and experiments offer fresh insight from the tools. The integration of Generative AI in the educational sector is not a fresh concept; however, the presence of Generative AI introduces new methods for personalized learning experiences. The capabilities are extraordinary; it can process the language and offer unique engagement through personalized feedback. The journal explores the potential of Generative AI utilization to enhance student's learning experiences. The findings indicate that Generative AI holds a significant role in providing personalized tutoring, task management, and resource allocation. By addressing user needs and preferences, Generative AI can provide a more effective educational experience. This research points out the potential of Generative AI to improve academic outcomes and to nurture a more supportive learning environment. In conclusion, this journal highlights the potential of Generative AI in education and gives various options for enhancing productivity. The insights gathered from our mixed method contribute to the growing knowledge of AI applications.

**Keywords**—Generative AI; Personalized feedback; Academic outcomes; Task management; Learning experiences.

## I. INTRODUCTION

In recent years, the world has faced an intense phase initiated by COVID-19, a virus that targets the respiratory system by showing flu-like symptoms. The rapid spread caused countries to be on high alert. Eventually, governments took precautions by promoting social distancing to maintain human distance from one another. These actions affected every important sector in the world including education. Consequently, people were forced to work from home and transition to online learning.

The shift to online learning was initially challenging, thankfully, it brought improvements in educational sectors. Based on research conducted by Devlin Peck in 2024, students could understand 25 to 60 percent of what they learn, significantly raising the numbers from 5 to 10 percent in the past years [1]. Additionally, a study done by nippon.com shows that half of Japanese university students have used Generative Artificial Intelligence (GAI) for academic purposes [2]. This improvement shows how learning tools and methods combined with technology could revolutionize education. This is where GAI comes in and by integrating such technologies, educators could generate content that is more personal to students, adapting to their learning style, pace, and other preferences.

GAI here refers to artificial intelligence systems with capabilities such as generating text, images, or even videos. It makes use of machine learning well, feeding it huge datasets, which, combined with algorithms and their natural language processing (NLP) could take in inputs and product outputs consisting of day-to-day language used by humans. For example, GAI applications could provide real-time responses to complex concepts being explained in simple terms, also, GAI applications could target specific weaknesses of a student's learning pattern and offer personalized tutoring or task management.

Despite the overflowing advantages, integrating GAI in this sector attracts challenges, particularly regarding the tool's effectiveness and best practices to leverage its capabilities. One significant challenge is the potential for students to rely too heavily on GAI. It is obvious that with GAI's abilities, students would be used to having the tool solve all of their problems without them having to help. This specific problem could go both ways, students with the right mindset to continuously improve themselves will utilize GAI as a tool to skyrocket their learning experience. Meanwhile, some students might utilize GAI wrongly, leading them to lack mandatory skills for professional success such as problem-solving and critical thinking. Another problem to be identified is the lack of publicity for leveraging the abilities of GAI. The scarcity of information makes it hard for potential users to adopt GAI as their main tool, making it unfortunate for humankind because maximizing these advanced technologies with our capabilities could increase

efficiency and effectiveness.

The primary objective of this research is to determine GAI's effectiveness for academic purposes and identify ways to leverage the usability of the tool. By conducting a quantitative analysis and comprehensive literature review of some of the most popular GAI applications such as ChatGPT and Gemini, this study seeks to provide valuable insights into how GAI can be used effectively to support student productivity while still paying attention to the benefits and limitations of the tool. Additionally, the research aims to identify the benefits and challenges regarding this tool with more detail as doing this would allow GAI developers to receive thorough feedback, paving the way for a more effective and efficient educational future.

## II. RELATED WORKS

### A. Generative AI in Education Settings

The implementation of AI in education has proved its potential in elevating student's productivity. Li and Jan examined the impact of AI tools in reducing stress and improving productivity among students, proving that Generative AI can generate personalized task management and provide real-time support, notable to improve academic outcomes [3]. On the other hand, the study by various authors found that the integration of AI provides greater efficiency and engagement in academic tasks, which is important to optimize student performance [4].

### B. Maintaining the Integrity of the Specifications

ChatGPT and Gemini are Generative AI tools that have been slowly implemented in educational context to facilitate students. The work by Michael-Villareal examined the effect of Generative AI on higher education, defining its ability to provide adaptive learning support which enhancing students' learning outcomes [5]. Additionally, the study on student perceptions of this tool proved that tools like chatbots can be effective in idea generation and grammar correction, contributing more effective learning [6].

### C. The Potential of ChatGPT as a Generative AI

ChatGPT, developed by OpenAI has known widely and emerged as a well-known Generative AI tool. Its advanced language processing capabilities offer personalized feedback to users. Research by Cecilia Ka Yuk Chan and Wenjie Hu demonstrated that ChatGPT can be used as supporting tools for personalizing learning by adapting to users' needs and preferences [7]. Moreover, studies have pointed out Generative AI to serve as an interactive learning companion, offering explanations and solutions, answering questions, and helping with task management and assignment which contribute to elevate academic performance [8]

### D. Ethical and Practical Considerations of AI in Education

The ethical inferences and practical challenges of integrating AI into the fields of education are crucial to be concerned. Naqbi examined the ethical challenges correlated with AI integration in educational fields, such as data privacy, security, and potential biases, and provided strategies to mitigate the issue [9]. Furthermore, Chookri Kooli discusses the ethical and practical aspects of AI in education, focusing on the need for ethical AI development and the importance of privacy concerns [10]. Additionally, from another journal by

Marc Alier et al. warned against overreliance on AI in education settings, providing the risk of declining potential of critical thinking and the possibility of degrading learning process. [11]. For the responsible and successful application of AI in education, certain factors must be evaluated.

## III. RESEARCH METHODOLOGY

The research employs a mixed-method approach, combining three different methods literature review, surveys on pupils, and experiment with GAI.

### A. Literature Review

The literature review serves as a foundational component of this study, providing a comprehensive understanding of the previous works on Generative AI to enhance educational productivity. By reviewing prior research, we identify theoretical frameworks, methodologies, and insights to support our objective. Compulsory keywords are needed to find relevant journals. Our literature search included "efficient", "generative AI", "enhance", and "education" which guided our exploration through academic journals, and conference papers to grant information on the application of Generative AI in educational background. There are important keys that are included in the literature review such as:

- *Challenges and Opportunities of Generative AI in Education*

Generative AI brings challenges and opportunities to the educational sector. while revolutionizing learning, there are challenges focused on work ethics. Institutions take an important role in regulating the usage of Generative AI in the educational sector.

- *Potential Benefits of Generative AI for Teaching and Learning*

As a tool to elevate work performance, Generative AI can outstand other tools by automating repetitive tasks, improving processes, and enhancing efficiency. To expand the potential, organizations or institutions must train their workers to treat Generative as a companion in their work process.

### B. Surveys

To grant different insights into students' perceptions and preferences, we conducted customized surveys targeting pupils. The survey was made using Google Forms as an easy-to-access platform for respondents to share their opinions about Generative AI. The question was designed to extract information from students' experiences towards Generative AI integration in the education sector. The purpose of this survey was to collect accurate and relevant data from users, based on real experiences and preferences. This empirical data holds a significant role in validating the theory obtained from the previous works and understanding the implication of GAI integration in the education sector.

The survey contained customized questions as a parameter to measure students' familiarity with Generative AI, students' comfort level, the tool's value in enhancing productivity, and its potential challenges. The survey included certain types of questions to measure:

1. User's familiarity with Generative AI.
2. Users' understanding of Generative AI concepts.
3. User's comfort levels.

4. The perceived value of Generative AI in user productivity.
5. Concerns about potential challenges, such as over-reliance on AI and difficulties in identifying learning styles.
6. The diffusion in using Generative AI due to repetitive outputs and the need for effective prompt writing.

### C. Experiment Through Application

Apart from literature review and surveys, we conducted experiments with specific Generative AI models such as Gemini from Google and ChatGPT from OpenAI. These experiments were designed to evaluate the performance of GAI in providing feedback and task management. By engaging with these AI models, we aimed to demonstrate the capabilities and limitations in real-world scenarios. The focus of these experiments was the importance of prompt writing, as the quality of the given prompts will directly affect the relevance of the responses. Through these experiments, we highlight the potential of GAI to offer customized assistance to support our hypothesis that GAI has the potential to elevate student productivity.

## IV. RESULT

### A. Literature Study

Integration of GAI into educational sectors could act as a two-sided sword by providing humanity with both challenges and opportunities. Some of the primary challenges that we identified include ethical considerations such as bias in generated content and maintenance of academic honesty [12]. On the other hand, the opportunities offered by GAI are like no other. These tools could provide innovative learning patterns, helping students go through the hardships of understanding complex problems or solving complex tasks.

When talking about the potential benefits of GAI for teaching and learning. The sky is the limit for GAI. Whereas GAI has proven that its features significantly improve teaching and learning. Thereby allowing educators or learners to benefit from GAI's ability to provide access to relevant information and help foster an educational environment with more engagement. Here are a few key points that we found surrounding GAI's potential benefits in the education sector [13]:

- Help in repetitive tasks: GAI can be utilized to save time, converting time wasted from doing repetitive tasks into productive work.
- Personalized learning: GAI's outputs could be specified based on user needs. For instance, we can prompt GAI to roleplay what we do professionally, this will help GAI generate more specific outputs.
- Increased relevancy of education materials: GAI could be used to help educators turn large amounts of useless material into relevant ones.
- Improvement in learning outcomes: GAI could act as your partner, providing help whenever you need it.

Based on the topics above, we can learn that GAI could enhance student productivity by helping them organize their study patterns, manage time well, and open access to hard-to-find information. GAI also provides feedback on user

prompts, this helps the student analyze their strengths, weaknesses, and areas of improvement. Additionally, GAI enables students to experience diverse learning styles, this helps students find their learning preferences and make studying more engaging.

### B. Survey

For the survey, we spread out a questionnaire to our university, aiming to gather insights surrounding their understanding of GAI. After successful distribution, we gathered 33 distinct answer sets, consisting of students aged 19 to 21. This approach ensures that the sample used in this research is relevant to the topic.

#### 1) Familiarity

The first section will specifically discuss the results regarding students' familiarity with GAI. Its primary objective is to evaluate how GAI integration has penetrated the sector by exploring its impact on students. For the starting question, we asked our audience if they had ever used GAI for academic purposes, unsurprisingly it came out at 100% yes. This result speaks volumes, telling us that GAI is relevant and is meant to be used in the sector. Next, we asked the audience about their familiarity with GAI to gain insights into students' understanding of GAI.

Level of Familiarity	Count	Percentage
Not Familiar	0	0%
Somewhat Familiar	3	9,1%
Moderately Familiar	11	33,3%
Pretty Familiar	11	33,2%
Very Familiar	8	24,2%

Table I. Students' Familiarity with Generative Artificial Intelligence

The next question's results were pretty positive with none rating their comfortability below 3. Some participants felt moderately comfortable (18,2%), pretty comfortable (42,4%), and the majority were very comfortable (39,4%). The answers tell us that Generative AI's outputs and performance have satisfied most of their users.

Level of Comfort	Count	Percentage
Not Comfort	0	0%
Somewhat Comfort	0	0%
Moderately Comfort	6	18,2%
Pretty Comfort	14	42,4%
Very Comfort	3	39,4%

Table II. Generative Artificial Intelligence Comfortability

None rated GAI's value on enhancing student productivity as a 1 or 2, this is an indication of its proven effectiveness. The survey shows that 5 participants (15,2%) chose 3, suggesting that GAI's benefits have not reached everyone and some even chose to not use the tool at all. Meanwhile, 4 had 16 participants (48,5%) and 12 participants

chose 5 (36,4%), showing us that the majority of users believe that GAI enhances student productivity.

Level of Utility	Count	Percentage
Not Helpful	0	0%
Somewhat Helpful	0	0%
Moderately Helpful	5	15,2%
Pretty Helpful	16	48,5%
Very Helpful	12	36,36%

Table III. Generative Artificial Intelligence Value

When we align the second, third, and fourth questions, we can see that students who identify GAI as an AI that can learn and perform tasks like humans, also feel comfortable and value the tool while using it. This fact suggests that GAI's integration in academic sectors could be taken to the next level, indicating a potential for it to be utilized in education environments in the future.

## 2) Academic Assistance

In this section, we will discuss GAI's impact on educational sectors more thoroughly, diving deeper into how GAI can cater to the unique needs of each student. Here we will address GAI's abilities to provide personalized learning experiences, ultimately enhancing the overall learning effectiveness. We asked the audience to choose an academic activity that GAI could be most helpful in identifying specific areas where the use of GAI could be useful. For the sixth question, we asked the audience to describe how a personalized GAI has helped them overcome a challenge to collect real-world examples of how GAI plays a role in solving their problems. We believe that asking these questions could provide valuable insight for the development process and serve deeper understanding of students need.

From the processed data, the majority of participants (54,5%) chose "All of the above", this result strengthens the fact that GAI's usability is very versatile and recognized well in this sector. Additionally, this finding could be used by developers to explore how GAI can be tailored to address specific user needs, such as developing a topic-specific GAI and dividing it into categories for example.

Here are some key points that we found while traversing the answers to the sixth question:

- Providing step-by-step solutions and explanations for a problem that is considered quite complex, turned simple and efficient
- It functions as a tutor and helps by providing complete effective explanations
- It helps me find new ideas and information that I didn't know before

Based on the key points, we can conclude that students consider GAI to be highly beneficial in several ways:

- Detailed Explanations: GAI's advanced capabilities to generate thorough explanations have benefitted users, especially students. It helps them navigate through the hardships of understanding complex theorems by providing simple, but complete explanations.

- Tutoring: Most students appreciate the way GAI could explain things and consider them as a tutor. We think it is very understandable, as GAI's abilities to generate explanations and interactive content are surreal and make us wait eagerly for continuous advancements of this tool
- New Idea Discoveries: As students ourselves, we can relate how this tool has been very helpful in generating new ideas. This helps us broaden our knowledge and increase our creativity.

Overall, the answers from this section show us proof that GAI's impact is deeply rooted in the education sector despite just coming onto the scene not too long ago. The answers also tell us that students appreciate GAI's advancements as they consider the features to be useful in their academic journey.

## 3) Challenges

In the third section, our main objective is to offer a solution to problems that users face while using the tool. By observing these obstacles, we seek to gain insights that could serve as a foundation for future improvements. We believe that understanding the pain points experienced by users is crucial in the process of software development. Moreover, the results gained will not only facilitate developers but also provide a roadmap for the long-term goal.

Level of Difficulty	Count	Percentage
Not Challenging	0	0%
Somewhat Challenging	4	11,8%
Moderately Challenging	11	32,4%
Pretty Challenging	14	41,2%
Very Challenging	5	14,7%

Table IV. Difficulty of Using Generative Artificial Intelligence

For the first question in this sector, we asked the user to rate the difficulty prompting GAI to generate results that align with their learning style. Based on the data shown, the majority of participants (54,1%) chose 4 and 5. From this result, we can learn that students still find maximizing GAI applications hard while still considering it as a powerful tool. Unfortunately, ways to leverage the tool to its best are rarely sought by frequent users. To address the gap, we believe that it is essential for users to understand the fundamentals of writing effective prompts that could generate relevant responses from GAI applications. Therefore, here are a few points you could learn from the guidelines provided by Baris Sen on textcortex.com [14]:

- Assign a role and provide context: GAI applications require a clear understanding of your prompt to generate the right outputs, otherwise it would just give you general results. For instance, we want the GAI to provide us with a programming solution:

Rather than "Make a website from scratch", you should write "You are a beginner developer and are trying to find out how to make a website with Laravel from

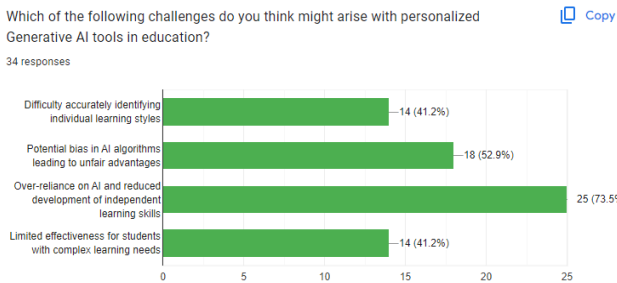
scratch, tell me how you would learn to start developing the project”

The main reason here is that the first prompt doesn’t clear up your need because there exist vast amounts of programming languages out there, so you should specify the prompt even further.

- Be specific: Instead of “Tell me about the text”, you should write “Based on the text given, can you give me the main theme, purpose, and conclusion?”

The problem here is that the first prompt would just generate a long text consisting of useless information. In any case, it would be better to specify what you want from the tool, so it could generate useful information and not waste your time.

Continuing our survey, we asked the audience to address challenges that might arise with GAI in education sectors by choosing between 4 options.



Picture II. Human Challenges from Generative Artificial Intelligence Usage

Based on the answers, the majority “chose over-reliance on AI reduced development of independent learning skills” and we believe the same as well. During the period of their study, students face a lot of tasks and problems, making them crave a solution to ease up their journey, and then comes GAI which is such a powerful tool that provides students with instant gratification. Obviously, students get addicted to using it considering the comfort that the product gives, providing users with lesser effort and better results. However, the continuous use of this tool could lead to the over-reliance mentioned above, causing users’ independent learning skills to fall off, showing the lack of skills when tested without the use of AI. We believe that users’ of GAI apps should be constantly reminded to make use of the tool just enough to be your assistant.

For the last question, we approached the audience and asked for their feedback and what they would want to see in the future regarding GAI. Here are some key takeaways:

- Enhanced developer help: Observing that the majority of current users are developers, we believe that it is crucial to seek improvements in this sector, enabling the GAI to have a larger understanding of the context in this section.
- Solving more complex problems beneficial to humanity: This shows that users are eager to make

use of GAI to solve real-world problems as solving them would open the doors to more opportunities across other industries.

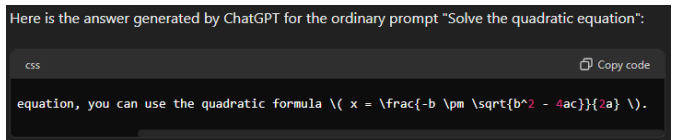
- Higher accuracy for outputs: This result proves that accuracy is still a problem for the current version and there exists a need for it to be resolved. Being such a powerful tool, we need to ensure that it is dependable, safe, and effective.

### C. Experiment Through Application Comparison

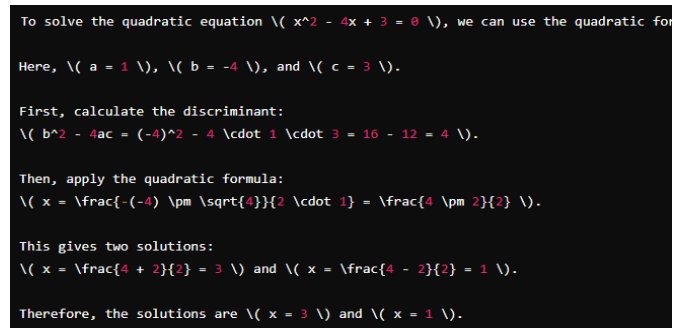
To investigate how the AI works, we conduct an experiment to obtain personalized and accurate responses from generative AI. We use ChatGPT as a model for our experiment. The objective is to grant an exact solution of this question.

$$x^2 - 4x + 3 = 0$$

After asking ChatGPT with different type of prompt writing we got different results. When using “solve the problem” as an ordinary prompt writing. The ordinary prompt resulted in a general explanation of using quadratic formula only without addressing specific equations, leading to moderate clarity and low relevance. In Contrast, by adding detailed needs to the prompt we granted more relevant answer, yielded a step-by-step solution, and clearly explaining each part of the process.



Picture III. Ordinary Prompt’s Answer



Picture IV. Detailed Prompt’s Answer

## V. CONCLUSION

After conducting thorough research, it is proven that the utilization of GAI drastically helps students increase efficiency in finishing their tasks by providing concise and clear explanations of theories they cannot understand on their own. While using this tool, Natural Language Processing (NLP) plays a huge role in generating comfort for users. NLP allows GAI to understand and provide users with daily human language, improving its engagement and interaction with humans. This feature bridges the gap between complex functionalities and user experience, enabling us as users to comfortably write our prompts without being intimidated by the superior knowledge of the computer, while also providing user-friendly outputs that connect with us deeply.

Despite the overflowing benefits, challenges still exist. One of them is the students’ over-reliance on AI and not

believing in their capabilities. We believe that although advanced technologies may exist, humans should still focus on developing essential skills such as independence, critical thinking, and problem-solving. This problem is crucial because, as time goes on, it could create chaos in other sectors by having low-skilled individuals who are lacking in a lot of areas in their environment.

To conclude, it is proven to be very important to socialize the ways to leverage Generative AI's capabilities without being overly dependent on them. Organizations should emphasize the importance of using GAI as a tool to help rather than a tool to finish their jobs. By promoting responsible usage, we could empower humanity to maximize the potential of GAI while still nurturing individual skills, doing this would open endless possibilities of collaboration and would prepare us humans for the uncertain future with technology.

#### REFERENCES

- [1] "Online Learning Statistics: The Ultimate list in 2024 | Devlin Peck." <https://www.devlinpeck.com/content/online-learning-statistics>
- [2] "Half of Japanese university students have used generative AI," *nippon.com*, Apr. 07, 2024. <https://www.nippon.com/en/japan-data/h01946/>
- [3] E. Y. Li and A. Jan, "Impact of artificial intelligence (AI) in enhancing productivity and reducing stress among students," *AIS Electronic Library (AISeL)*. <https://aisel.aisnet.org/iceb2023/33>
- [4] K. Seo, J. Tang, I. Roll, S. Fels, and D. Yoon, "The impact of artificial intelligence on learner–instructor interaction in online learning," *International Journal of Educational Technology in Higher Education*, vol. 18, no. 1, Oct. 2021, doi: 10.1186/s41239-021-00292-9.
- [5] R. Michel-Villarreal, E. Vilalta-Perdomo, D. E. Salinas-Navarro, R. Thierry-Aguilera, and F. S. Gerardou, "Challenges and opportunities of Generative AI for higher Education as explained by ChatGPT," *Education Sciences*, vol. 13, no. 9, p. 856, Aug. 2023, doi: 10.3390/educsci13090856.
- [6] D. L. Taylor, M. Yeung, and A. Z. Bashed, "Personalized and adaptive learning," in *SpringerBriefs in statistics*, 2021, pp. 17–34. doi: 10.1007/978-3-030-58948-6\_2.
- [7] C. K. Y. Chan and W. Hu, "Students' voices on generative AI: perceptions, benefits, and challenges in higher education," *International Journal of Educational Technology in Higher Education*, vol. 20, no. 1, Jul. 2023, doi: 10.1186/s41239-023-00411-8.
- [8] N. Glaser, "Exploring the Potential of ChatGPT as an Educational Technology: An Emerging Technology report," *Technology, Knowledge and Learning*, vol. 28, no. 4, pp. 1945–1952, Aug. 2023, doi: 10.1007/s10758-023-09684-4.
- [9] H. A. Naqbi, Z. Bahroun, and V. Ahmed, "Enhancing Work Productivity through Generative Artificial Intelligence: A Comprehensive Literature Review," *Sustainability*, vol. 16, no. 3, p. 1166, Jan. 2024, doi: 10.3390/su16031166.
- [10] C. Kooli, "Chatbots in Education and Research: A Critical Examination of ethical implications and solutions," *Sustainability*, vol. 15, no. 7, p. 5614, Mar. 2023, doi: 10.3390/su15075614.
- [11] M. Alier, F.-J. García-Peñalvo, and J. D. Camba, "Generative artificial intelligence in Education: From deceptive to disruptive," *International Journal of Interactive Multimedia and Artificial Intelligence*, vol. 8, no. 5, p. 5, Jan. 2024, doi: 10.9781/ijimai.2024.02.011.
- [12] W. Yan, T. Nakajima, and R. Sawada, "Benefits and Challenges of Collaboration between Students and Conversational Generative Artificial Intelligence in Programming Learning: An Empirical Case Study," *Education Sciences*, vol. 14, no. 4, p. 433, Apr. 2024, doi: 10.3390/educsci14040433.
- [13] E. A. Alasadi and C. R. Baiz, "Generative AI in Education and Research: Opportunities, concerns, and solutions," *Journal of Chemical Education*, vol. 100, no. 8, pp. 2965–2971, Jul. 2023, doi: 10.1021/acs.jchemed.3c00323.
- [14] Sen, "ChatGPT Prompt Engineering Techniques," Dec. 14, 2023. <https://textcortex.com/post/chatgpt-prompt-engineering> (accessed May 30, 2022)