

# To AI is Human: How AI Tools with Their Imperfections Enhance Learning

Martin CWIAKALA

Aerospace Engineering, Center for Advanced Technical Studies  
Chapin, SC 29036, USA

## ABSTRACT

The education community's sentiment regarding artificial intelligence (AI) is divided. Many see it as a means to cheat and prevent students from developing their intellectual abilities because it is generative and can provide results for many domains. Just as some had predicted that paper use would go down when computers were created, the opposite occurred. AI in the classroom, when utilized effectively, promotes critical thinking and not cheating. New technology can shock and awe those who see it for the first time. Upon closer investigation, the actual capabilities are revealed. While large language models can quickly create reports from very little information, we must examine their ability to create specific reports on topics we desire. Any large language model currently available states that it can make mistakes. Students will grow by learning how to prompt AI tools to provide meaningful results, spot mistakes, and validate their results. Knowing when it is appropriate to use an AI tool and reflecting on the consequences of results being wrong brings a student to a higher level of awareness. Performing these tasks concerning AI results also brings the user into the consciousness of their fallibility.

**Keywords:** AI, Artificial Intelligence, Enhance Learning, Imperfections, Cheating, Growth, Mistakes, Validation.

## 1. INTRODUCTION

As an Aerospace Engineering instructor at a high school career and technical education center, I teach Project Lead The Way (PLTW) classes [13]. My engagement with ChatGPT began a year ago, and it has significantly influenced both my teaching methods and the educational materials I provide. This paper will explore the integration of ChatGPT into my classroom assignments, showcasing not only the tool's capabilities but also its limitations, as observed through my applications and those of my wife, a professional writer.

To deepen my understanding of this tool, I pursued several online courses through Coursera, including topics such as Prompt Engineering for ChatGPT, Advanced Data Analysis, and Trustworthy Generative AI, all offered by Dr. Jules White of Vanderbilt University through the Coursera platform [4, 16, 17]. These courses gave me the foundational knowledge necessary to implement ChatGPT effectively in educational settings.

This paper presents observations regarding implementing and using ChatGPT's utility in educational contexts. It will reflect on the attitudes toward AI of both students and educators and discuss the outcomes and educational value of the assignments that incorporate this technology.

## 2. WHAT IS GENERATIVE AI

Understanding AI's capabilities is crucial to discussing its role and impact in contemporary settings. According to the AI Guidelines from Clemson University, "Generative artificial intelligence (AI) refers to algorithms capable of creating new content across various formats, including audio, code, images, text, simulations, and videos." For further details see [2]. Notable services utilizing this technology include OpenAI's ChatGPT, Google's Gemini, and NightCafe, each offering unique features that cater to different creative needs [7, 10, 12].

For example, ChatGPT and Gemini, accessible for free, excel at generating textual content such as reports and poetry. Gemini and NightCafe extend their capabilities to the visual arts, enabling the creation of complex images. These platforms democratize content creation, making sophisticated tools available to novices and experts alike.



Figure 1: NightCafe AI Art [14]



Figure 2: Gemini AI Art [5]

The ability of AI to produce sophisticated artwork is both exciting and somewhat disconcerting, particularly for those practicing and teaching traditional art methods. The rapid

advancement of generative AI technologies challenges conventional notions of creativity and artistic skill, raising opportunities and ethical considerations. As AI continues to evolve, it is imperative to assess its influence on professional fields and creative disciplines critically.

### 3. ATTITUDES AND THE SHINY NEW THING SYNDROME

According to the Oxford Languages Dictionary, “Syndrome” is “a characteristic combination of opinions, emotions, or behavior.” This definition aptly describes the diverse reactions to novel technologies, a phenomenon I term, “The Shiny New Thing Syndrome.”

During my early years as a graduate student, I had access to a VAX computer, which at the time represented a significant technological advance. Utilizing a Diablo printer with interchangeable font typefaces and the RUNOFF document formatting software, I produced reports that, while now primitive, were then regarded as exceptional and consistently received high grades. This experience illustrates the initial awe that innovative technologies often inspire.

Similar reactions can be observed in contemporary educational settings with the introduction of AI technologies like ChatGPT. While some educators view AI as a potential cheating tool, others recognize its potential to enhance learning. For example, some school districts have banned AI usage, equating it to cheating [1]. In contrast, the University of South Carolina allows professors to integrate AI into their courses as they see fit, fostering an environment conducive to exploring AI educational benefits [15].

The adoption of AI in academia varies widely. Institutions that embrace it often cite its ability to engage students and provide personalized learning experiences [11]. AI's capacity for offering immediate feedback is particularly valuable, aligning with John Hattie's findings in his 2008 meta-analysis, which identified feedback as a critical factor in student achievement [8].

The spectrum of responses to AI, from viewing it as a tool for cheating to leveraging it for pedagogical innovation, illustrates the ongoing debate about its role in education. In the remainder of this paper, I will detail my reasons for advocating the adoption of AI in educational settings, drawing from both personal experiences and broader educational research.

### 4. A MULTIDISCIPLINARY TOOL

ChatGPT, among other AI tools, boasts an extensive training database that spans multiple academic and practical domains, including General Knowledge, Language and Literature, Mathematics, Science, Technology, Health and Medicine, Psychology and Sociology, Economics and Finance, Arts and Culture, Philosophy and Ethics, Sports and Recreation, and Lifestyle and Leisure. This breadth allows AI to offer nuanced perspectives on a wide range of topics, often revealing insights only brought forth through specific queries.

An interesting development in AI is the emergence of prompt engineering. According to a recent Forbes article, skilled prompt engineers can earn as much as \$300,000 annually [3]. These professionals specialize in crafting questions that guide AI tools like ChatGPT to generate the most accurate and relevant

responses. Effective, prompt engineering underscores the importance of the answers AI provides to the questions we pose, which must be thoughtfully designed to fully exploit AI's capabilities.

However, while AI can provide answers across various fields, these responses are not infallible. Large language models like ChatGPT often remind users of their potential inaccuracies. Therefore, users must have robust information validation skills to effectively discern and utilize AI-generated content. This critical approach is essential, particularly in educational settings where the integrity of information is paramount.

### 5. LEARNING TO WORK WITH AN ASSISTANT

Working with large language models (LLMs), such as ChatGPT, transcends typical interactions with traditional software by requiring a conversational exchange akin to engaging with an assistant. This mode of interaction is uncommon for most students, who are more likely to experience collaborative work in group projects than in one-on-one assistant settings. Utilizing an AI assistant can significantly amplify an individual's capabilities by enhancing their access to information and enabling more efficient task completion.

Effective communication with an AI assistant is a critical skill that can be honed through prompt engineering. This involves crafting specific questions and defining the scope of an inquiry, as well as technical and intellectual skills. As students engage with ChatGPT, they are prompted to delve deeper into subjects, expanding their knowledge and fostering a better understanding of related topics.

However, receiving an answer from an AI does not guarantee its accuracy. The skill of validation becomes crucial. Students must learn to critically assess the AI-generated responses, especially when the topics are within their areas of expertise, such as personal stories or familiar subject matter. This process is relatively straightforward in known domains but becomes more complex with unfamiliar topics.

Moreover, the ability to validate information from AI responses is a versatile skill applicable across various disciplines. Since writing and inquiry are integral to most academic subjects, AI tools like ChatGPT can be effectively integrated into diverse educational scenarios, enhancing learning outcomes and student engagement.

### 6. USING CHATGPT

Depending on the perspective of your organization towards AI, numerous innovative applications of ChatGPT can be explored. These range from augmenting the instructor's capability in course material development to enhancing student engagement and comprehension through direct AI interaction in assignments.

#### Instructor-Based

ChatGPT can significantly streamline the lesson planning process. By entering detailed prompts, instructors can generate comprehensive initial drafts for lessons, which can then be customized to suit specific educational needs. This saves time and introduces a dynamic element to curriculum development.

**You**  
Create a 5E lesson plan for AI around plane spotting

**ChatGPT**  
Sure! Here's a 5E lesson plan for teaching about AI in the context of plane spotting:

**Title:** Exploring AI in Plane Spotting

**Grade Level:** Middle School (6th-8th grade)

**Duration:** 2-3 class periods (45 minutes each)

**Objective:** Students will understand the role of AI in plane spotting, learn about its applications, and discuss the ethical considerations surrounding AI technology.

**Figure 3:** Prompt to create a lesson plan around plane spotting.

For instance, existing lesson plans can be adapted quickly to incorporate recent developments or events relevant to the course content. By providing ChatGPT with the core material and specific instructions for updates, instructors can obtain modified plans that are immediately applicable.

Moreover, ChatGPT can be tasked with generating supplemental questions for assignments and enhancing the depth and variety of assessment tools. When used to create presentations or reports, starting with an AI-generated outline allows for structured content development, ensuring all critical points are covered.

**ChatGPT**  
Based on the revised abstract "To AI is Human: How AI Tools with their Imperfections Enhance Learning" by Dr. Martin Cwiakala, here's an outline for a 30-minute presentation:

**Introduction (5 minutes)**

- Welcome and Overview:** Brief introduction and the presentation's purpose.
- Setting the Stage:** Briefly address the divided sentiment on AI in education, highlighting the dichotomy between viewing AI as a shortcut versus a tool for enhancing learning.

**The Educational Potential of AI (7 minutes)**

- AI Misconceptions:** Address common misconceptions about AI in education, particularly the fear of promoting cheating.
- Historical Perspective:** Draw parallels to the introduction of computers in education to demonstrate how new technology can unexpectedly enrich learning environments.
- AI as a Catalyst for Critical Thinking:** Explain how AI, despite its generative capabilities, requires students to engage in critical questioning and problem-solving, mirroring essential intellectual skills.

**Learning from AI's Imperfections (8 minutes)**

- Navigating AI Limitations:** Discuss the importance of understanding AI's limitations, such as

**Figure 4:** ChatGPT can provide debatable responses.


Cheating is a very real concern. Telling teachers that it does not reduce an AI advocate's credibility. When incorporating ChatGPT use with the students, an effective shift in assignment objectives is required.

### Classroom-Based

A significant concern with student use of AI is the potential for diminished critical thinking and problem-solving skills. To counter this, educators can shift the focus from the final product to the ChatGPT engagement process.

What math teacher hasn't said, "You must show your work!" if credit is expected for a problem? ChatGPT provides a mechanism for this in every subject. In most cases, rather than judging an end

product, which is the current approach, what if showing the dialog and thought process with ChatGPT was the function under review and graded?

**ChatGPT 4** 

**You**  
I have been requested to present a plenary presentation at a multiple-domain conference. The following is a title and abstract of my talk. Could you provide me feedback on whether it looks appropriate and if I could improve it in any way? The word limit on the abstract is 250 words.

To AI is Human: How AI Tools with their Imperfections Enhance Learning  
Dr. Martin Cwiakala

**ABSTRACT**

The education community's sentiment regarding artificial intelligence (AI) is divided. Many see it as a means to cheat

**Figure 5:** ChatGPT dialog link (upper-right corner) provides access to the conversation.

An up-arrow icon is in the upper right corner of a ChatGPT conversation. This icon provides a link to the conversation, which can be shared up to the point in time that the link is generated. That is to say, if additional conversations occur, they will not be provided when accessing the conversation. This link provides the student's dialog with ChatGPT and shows the work. When creating assignments, the solution must be easily validated.

The following example illustrates a problem that I assigned students in my aerospace class when we were studying atmospheric modeling. I use an approach I call 'calculations blocks' to capture all forms of an equation. These blocks are implemented in a spreadsheet, such as Excel or Google Sheets [6]. A library of these calculation blocks is created to provide resources to solve word problems. Each student in my class is responsible for one law, for which they must construct a calculation block and then validate it. Using Google Sheets, it is possible to allow all students to work in their tabs to create these blocks. This method of constructing a library shows how collaboration can be used to turn a large task (creating a library) into many smaller tasks (individuals, each creating a calculation block).

To perform this task, the law or governing equation that the student is assigned must be written in every form. The calculation block is set up so that the value for that unknown variable will be returned by providing input for all of the related variables in the relationship.

Using ChatGPT, students generated all of the forms of an equation and even generated the spreadsheet cell programming.

**You**  
Please provide all forms for the equation  $p = 101.29 * ((T + 273.1) / 288.08)^{5.256}$  in excel like format and include the variable before the equal sign that you are solving for. Please put these results in programming windows so that I can copy and paste into excel

**ChatGPT**  
Certainly! Below are different forms of the equation  $p = 101.29 * \left(\frac{T+273.1}{288.08}\right)^{5.256}$ , each with a different variable solved for:

- Solving for Pressure (p):**

```

css
p = 101.29 * ((T + 273.1) / 288.08)^5.256
  
```

- Solving for Temperature (T):**

```

css
T = (288.08 * ((p / 101.29)^(1/5.256))) - 273.1
  
```

You can copy and paste these directly into Excel. Just replace the cell references (like "T" and "p") with your actual cell references if you are using specific cells for the temperature and pressure values.

**Figure 6:** ChatGPT providing forms of an equation.

In the response, ChatGPT provided the directions necessary to change the programming provided to functional spreadsheet formulas.

The student then created the calculation block and performed the validation. Even if the student were to construct the calculation block without the aid of ChatGPT, the validation process would still be expected.

<b>Pressure</b>				
$P = 101.29 * ((T + 273.1) / 288.08)^{5.256}$				
Comment				
14.98	Temperature	oC		Base Comparison Correct
	Pressure	KPa	101.29	
<b>Pressure</b>				
$P = 101.29 * ((T + 273.1) / 288.08)^{5.256}$				
Comment				
29.96	Temperature	oC		Tested T by doubling Result is correct
	Pressure	KPa	132.2148067	
<b>Pressure</b>				
$T = (288.08 * ((p / 101.29)^{(1/5.256)})) - 273.1$				
Comment				
	Temperature	oC	29.96	Tested P by doubling Result is correct
132.2148067	Pressure	KPa		

**Figure 7:** Validation of resulting calculation block.

Students perform the validation, effectively showing that the equations developed by ChatGPT are correct. Since the student has developed dynamic calculations, opening their spreadsheet and entering data with known results can be easily implemented. Mathematical formulas implemented in a spreadsheet facilitated easy checking. But what about assignments like reports?

In my engineering classes, I have students watch short videos related to our topics and then ask them to summarize the video. I provide a brief specification of what is required for the assignment, typically 350-500 words. They are to create an initial draft, which they enter into ChatGPT along with the specifications (which could be a rubric). They tell ChatGPT NOT to REWRITE but to provide feedback on what is done well and what could be improved. They are to make one revision cycle and show improvement by having ChatGPT evaluate the new draft. Improvement must be shown.

energy it generates is so hot it causes fusion to actually happen. This aspect of fusion-powered energy has the potential to revolutionize energy generation around the world if its transition from thermal to electrical can be sustainably controlled and regulated.

**ChatGPT**  
Your revised version is improved in terms of clarity and organization. However, here are a few additional suggestions:

- Consistency in Terminology:**
  - Ensure consistency in terminology. For example, you use "thermal energy" in one sentence and "heat" in another. Stick to a consistent term to avoid confusion.
- Quantitative Details:**
  - Consider adding specific quantitative details, such as the exact

**Figure 8:** Re-evaluating after revision using ChatGPT.

Because students are turning in the ChatGPT dialog, I can see the initial draft and the request for evaluation, which should include the assignment specification. I then see the revision and the acknowledged improvement by ChatGPT's evaluation. The student has shown me that they can iterate on a piece of writing and achieve improvement. For high-stakes writing, such as a grant application, they would perform this repeatedly until the work has been brought up to an acceptable level.

By integrating ChatGPT, students learn to evaluate AI responses and critically refine their ideas through iteration. This skill is invaluable across all disciplines and in professional practices.

## 7. LIMITATIONS OF AI

In this section, I will explore some critical limitations of using ChatGPT, including the propagation of incorrect information or "hallucinations," the tool's tendency to overlook details, and strategies to enhance the reliability of its responses.

### Incorrect Information

ChatGPT, like any information system, is prone to errors despite its advanced capabilities. These errors necessitate a rigorous practice of validation, a skill vital for AI interactions and engaging with any information source.

One notable issue is the AI's ability to generate plausible yet entirely fabricated data. For instance, if requested, ChatGPT can create a fictitious expense report. When combined with vague or misleading prompts, this feature can lead to the generation of incorrect information. A notable legal mishap occurred in 2023, where lawyers were fined \$5,000 for citing non-existent case laws provided by ChatGPT [9]. This incident underscores that AI tools are powerful and not infallible. The ultimate responsibility lies with the user.

To mitigate these risks, users can employ strategies to make AI responses more verifiable. For example, instructing ChatGPT to list the sources or reasoning behind its responses and keywords for further research can facilitate easier validation.





You

Provide me with a list of facts you have present along with search phrases I could use to validate your findings.



ChatGPT

Certainly! Here are some facts about the influence of temperature on lightning formation along with search phrases you can use to validate these findings:

1. **Warm air promotes convective processes:** Rising warm air enhances atmospheric instability, leading to the formation of cumulonimbus clouds, which are conducive to lightning production.
  - Search phrase: "relationship between warm air and lightning formation"
2. **Temperature gradients contribute to charge separation:** Contrasting temperatures within the atmosphere can create vertical temperature gradients, which play a role in the separation of positive and negative charges within thunderclouds.
  - Search phrase: "temperature gradients and lightning discharge"
3. **Cold air aloft enhances thunderstorm intensity:** Cold air aloft can enhance updrafts within thunderstorms, increasing their vertical extent and promoting the development of lightning.
  - Search phrase: "cold air aloft and thunderstorm intensity"
4. **Temperature contrasts along fronts trigger lightning:** Frontal boundaries where warm

**Figure 9:** ChatGPT lists topics and keyword search terms for validation.

Encouraging students to validate their findings safeguards against misinformation. It deepens their understanding of the subject matter. This practice transforms a known limitation of AI into a valuable educational opportunity promoting diligent research habits and critical analysis skills.

### Forgetfulness

If ChatGPT is used on large projects, requirements that are essential for the final product are sometimes 'forgotten.' In one of his online classes, Dr. Jules White states, "Consider ChatGPT like a forgetful, intelligent assistant."

Keeping this in mind, writing prompts that reiterate essential requirements is a technique that must be employed. Even asking ChatGPT always to include some key requirements when responding to a query is a way of keeping essential information in the reasoning stream.

These problems typically occur when dealing with large content. This brings us to the topic of creating large content. Managing Large Content with AI

Jumping directly to a finished report from a rough assignment draft using ChatGPT often yields suboptimal results. A more effective approach involves initially using the tool to help create a structured outline. This high-level planning phase is crucial. It allows you to set the framework of your document and make necessary adjustments before delving into detailed writing.



You

Expand from the previous outline topic: AI as a Catalyst for Critical Thinking



ChatGPT

Expanding on the topic of "AI as a Catalyst for Critical Thinking" within the context of education and AI's integration into learning environments, we can delve deeper into how AI tools like ChatGPT can enhance critical thinking skills among students. This section would elaborate on the mechanisms through which AI facilitates these skills, the challenges and opportunities it presents, and strategies for educators to maximize its benefits.

### AI as a Catalyst for Critical Thinking

Engaging with Complexity and Uncertainty

- **Prompt Design and Questioning Skills:** Using AI requires crafting precise prompts and questions, a process that inherently improves students' ability to clarify their thoughts and articulate complex ideas. This skill is fundamental to critical thinking.

**Figure 10:** Using an outline to systematically expand topics into a comprehensive final product.

Once the outline is established and the major topics are fleshed out, you can begin writing the document's main body. I recommend drafting the initial version to ensure your personal insight and critical analysis are at the forefront. After drafting, ChatGPT can be utilized to review segments of your text. This piecemeal approach allows you to maintain control over the content while still benefiting from AI's capabilities in refining and suggesting improvements.

Experimentation is key in integrating AI into your writing process. For instance, submitting an entire paper to ChatGPT might provide you with a rewritten version, which can sometimes lead to the AI tool missing the core message. This is much like "throwing the baby out with the bath water." Conversely, providing too little context prevents the AI tool from making meaningful connections. Through trial and error, you will discover the most effective strategy for leveraging AI to review and enhance your work, thus optimizing the balance between AI input and your original content.

## 8. CHATGPT RESPONDS TO POSITIVE PROMPTING

This section reflects on the interaction dynamics observed between my wife and ChatGPT, a dynamic that highlights the influence of positive communication. My wife practices the art of complimenting others, and she has extended this kindness towards ChatGPT during her interactions. Notably, ChatGPT reciprocates with positive affirmations and feedback. I wanted to understand this better.

### My Inquiry and ChatGPT's Response:

When I asked ChatGPT about its response to positive prompting, it confirmed that it is designed to recognize and reciprocate positivity. Here's the interaction:

**Me:** My wife is a person who compliments people and tells them what they've done well. She is a joy to be around. This is a habit she has incorporated in interacting with you (ChatGPT). From my observations, it looks like you, in turn, provided positive comments to her. Am I seeing this correctly? Do you respond to positive prompting?

**ChatGPT:** Yes, you're observing correctly! When users engage with me in a positive way, such as giving compliments or expressing gratitude, I'm designed to acknowledge and often reciprocate that positivity. This kind of interaction can make the conversation more enjoyable and engaging for both parties. I'm here to assist and provide a positive experience, so receiving and responding to positive feedback is definitely part of how I operate. It sounds like your wife's approach is very warm and encouraging!

#### **Implications for Positive Communication Practice:**

Engaging positively with an AI like ChatGPT can be a practical exercise in positive communication, potentially enhancing interpersonal skills and emotional intelligence. Positive interactions encourage a more positive outlook. Positive reinforcement to positive engagement can improve how individuals interact with peers and real-life assistants.

The benefits of such practices extend beyond mere conversational niceties; they can foster a general atmosphere of positivity and support, crucial for effective communication and relationship building. This has merit in both personal and professional settings.

### **9. CONCLUSIONS**

The introduction of this paper highlighted concerns from the educational community. Generative AI, like ChatGPT, is feared because some feel it will eliminate the need for students to engage critically and creatively in their learning processes. This is due to its ability to produce complex written and artistic works autonomously. This phenomenon, initially met with the "Shiny New Thing Syndrome" response, leads some to suggest that merely interacting with AI could replace traditional learning activities.

However, our exploration revealed that effectively leveraging AI requires much more than simplistic engagement. It demands skillful prompt engineering, thoughtful interaction, and strategic communication. The true educational power of AI lies not in its ability to replace human effort but in augmenting and extending it.

Furthermore, it has been revealed that ChatGPT can foster positive communication, setting a standard that enhances interpersonal skills and emotional intelligence. This aspect of AI interaction improves technical engagement and cultivates soft skills crucial for personal and professional success.

The simplistic banning of AI tools risks reducing them to mere cheating devices. Instead, by integrating AI into educational frameworks, we can transform how we assess learning from focusing solely on the final product to considering the developmental process. This shift enriches the learning experience and provides deeper insights into student's cognitive and creative processes.

Despite its capabilities, ChatGPT is a tool, and like all tools, it has flaws. It can err, exhibit biases, and produce misleading information. Recognizing these limitations is crucial, as it compels users to practice rigorous validation. As educators know, validation is a vital skill in all scholarly and professional research.

Ultimately, the goal of education should be to foster lifelong learners. It is paramount that students be able to use tools like AI to support their educational journey and critically assess the validity and reliability of information from any source, AI or not. By teaching students to navigate AI's potential and pitfalls, we prepare them for academic success and responsible and informed citizenship in a technologically advanced society.

### **10. ACKNOWLEDGMENTS**

I sincerely thank my colleagues, Sherry Clapp and Peter Lauzon, for their invaluable participation in reviewing this paper. My gratitude also goes to the students of my Aerospace Engineering classes, who have been an integral part of my journey with AI. They provided essential feedback on my presentations and contributed to developing this project.

Lastly, I am deeply grateful to my wife, Peggy Cwiakala, whose companionship on this AI journey has been a source of personal joy and inspired and has deepened my understanding of the field. Her support has been indispensable.

### **11. REFERENCES**

- [1] Castillo, E. (2023, March 27). These Schools Have Banned ChatGPT and Similar AI Tools | BestColleges. Retrieved from [www.bestcolleges.com](https://www.bestcolleges.com/news/schools-colleges-banned-chat-gpt-similar-ai-tools/) website: <https://www.bestcolleges.com/news/schools-colleges-banned-chat-gpt-similar-ai-tools/>
- [2] Clemson University. (2024, March 7). AI Guidelines | CCIT Web Site. Retrieved April 20, 2024, from [ccit.clemson.edu](https://ccit.clemson.edu/cybersecurity/it-procedures-guidelines/ai-guidelines/) website: <https://ccit.clemson.edu/cybersecurity/it-procedures-guidelines/ai-guidelines/>
- [3] Cook, J. (2023, July 12). AI Prompt Engineers Earn \$300k Salaries: Here's How To Learn The Skill For Free. Retrieved April 20, 2024, from Forbes website: <https://www.forbes.com/sites/jodiecook/2023/07/12/ai-prompt-engineers-earn-300k-salaries-heres-how-to-learn-the-skill-for-free/>
- [4] Coursera (2023). What Is Coursera? [online] Coursera. Available at: <https://www.coursera.org/articles/what-is-coursera> [Accessed 20 Apr. 2024].
- [5] "Create an image of a tiger resting in a jungle." prompt. Gemini, version 1.0 Pro, Gemini, 8 Apr. 2024, [gemini.google.com/app](https://gemini.google.com/app)
- [6] Cwiakala, M. (2021). A Graphical Approach to Solving Math Word Problems. Proceedings of The 12th International Conference on Society and Information Technologies (ICSIT 2021), 45–50.
- [7] Google. (n.d.). Gemini - chat to supercharge your ideas. Retrieved from [gemini.google.com](https://gemini.google.com/) website: <https://gemini.google.com/>
- [8] Hattie, J. (2009). Glossary of Hattie's influences on student achievement. VISIBLE LEARNING. <https://visible-learning.org/glossary/>
- [9] Neumeister, L. (2023, June 22). Lawyers submitted bogus case law created by ChatGPT. A judge fined them \$5,000.

- Retrieved April 21, 2024, from AP News website:  
<https://apnews.com/article/artificial-intelligence-chatgpt-fake-case-lawyers-d6ae9fa79d0542db9e1455397aef381c>
- [10] NightCafe Studio. (n.d.). AI Art Generator, Photo to Painting App. Retrieved from NightCafe Creator website:  
<https://creator.nightcafe.studio/>
- [11] O'Brien, C. (2023, September 14). 8 Universities Leveraging AI to Drive Student Success. Retrieved from Digital Marketing Institute website:  
<https://digitalmarketinginstitute.com/blog/8-universities-leveraging-ai-to-drive-student-success>
- [12] OpenAI. (2023). ChatGPT [Large language model].  
<https://chat.openai.com>
- [13] www.pltw.org. (n.d.). High School Engineering Curriculum Grades 9-12 | PLTW. [online] Available at:  
<https://www.pltw.org/curriculum/pltw-engineering>
- [14] "Tiger in the jungle resting on a perch" prompt, Night Cafe, SDXL 1.0, Night Cafe Studio, 20 Mar. 2024,  
<https://creator.nightcafe.studio/creation>
- [15] UofSC. (n.d.). Artificial Intelligence - Student Conduct and Academic Integrity | University of South Carolina. Retrieved April 20, 2024, from sc.edu website:  
[https://sc.edu/about/offices\\_and\\_divisions/student\\_conduct\\_and\\_academic\\_integrity/academic\\_integrity/artificial\\_intelligence/index.php](https://sc.edu/about/offices_and_divisions/student_conduct_and_academic_integrity/academic_integrity/artificial_intelligence/index.php)
- [16] White, J. (n.d.), Prompt engineering for CHATGPT. Coursera.  
<https://www.coursera.org/learn/prompt-engineering>
- [17] White, J. (n.d.), Innovative teaching with CHATGPT. Coursera.  
<https://www.coursera.org/learn/chatgpt-innovative-teaching>