

Final Paper

Title: NLP's and its scope on the future of higher learning,
evaluating ethical concerns,

Track: Decision-Making Under Uncertainty

Authors- Rishit Deravariya, Dr Uma Gunasilan

Email- Rishitderavariya.444@gmail.com

33 commercial street, E11LD

London

Abstract

With the emergence of OpenAI's Generative Pre-trained Transformer(GPT) and other similar large language models, the field of Natural Language Processing(NLP) has witnessed noticeable advancements. As these models demonstrate exceptional language generation capabilities, wider applications in educational contexts are closer in sight. This paper explores the opportunities and challenges of using these technologies in learning while shedding light on ethical and societal considerations. Drawing additional research on peer-reviewed literature, it highlights the benefits for students in improving their reading, writing and critical thinking skills while further supporting research and academic writing. Additionally, it examines implications for personalized adaptive learning and enhancing teaching methodologies. The paper also addresses concerns of academic dishonesty and the limitations of AI detection software, emphasizing the need for best practices and novel approaches in academic institutions. Lastly, a discussion is drawn upon on integrating AI tools in curricula to prepare students for readiness towards the future of work, bridging the skills gap in AI-reliant industries, and contributing to the responsible implementation of language models in education.

Natural Language Processing (NLP) has seen significant advancements in recent years, with the emergence of large language models such as OpenAI's Generative Pre-trained Transformer (GPT). These models have shown an extraordinary ability to generate human-like language and are increasingly being used in educational and assessment contexts. Developments in this field could have wide consequences, concerning the future of learning and Education, and even the roles of teachers and students in a classroom environment. We shall discuss the new opportunities that are arising in improving learning outcomes and assessment practices and critically assess the ethical and societal concerns, that are being considered with developments within this space. Our discussion will draw upon the analysis conducted by peer-reviewed papers that openly discuss the applications of language models.

NLP and GPT are practical tools that allow computers to comprehend and use human words in novel ways. As these technologies evolve, they could completely transform aspects like Chatbot development, machine translation, and natural language understanding, which will have a greater impact in the context of learning and education. Experts in the field are projecting extremely opportunistic views on the implications of the use of this technology in enriching the learning experience of Students while claiming that it could 'revolutionize' teaching and act as a helping hand in teaching processes (Kasneci, Sessler et al,2023).

The academic paper discusses how large language models may benefit students who attend elementary, middle and high school, by having the potential to polish and imbibe reading and writing skills by correcting language syntax and grammar, having exceptional abilities of the model in generating questions that would allow students to gauge at course topics better, and think critically at the subject matter at hand. The language model's unique ability to make accurate predictions would not only aid in generating questions but would also help in creating practice quizzes, and offer step-by-step solutions for better conceptual understanding.

University Students would benefit from the model's ability to create summaries and outlines of large volumes of texts, thus aiding in the research stages of academic writing, allowing them to have a clear outline of the core points of their essay, These models, ChatGPT, in particular, can aid in pointing students in the right direction for accessibility of resources, highlighting information that would ultimately support the development of their research skills. To that extent, In the research paper published in the *Journal of Applied Learning and Teaching*, "*ChatGPT: Bullshit spewer or the end of traditional assessments in higher education*" cites the publication of Dowling and Lucey (2023), claiming that ChatGPT, could aid in the assist with finance research, more specifically in idea generation, literature synthesis and data identification (Jürdon Rudolph et al, 2023). While researchers have pointed out the language models' distinct ability to process vast amounts of textual data, with ease, it can help students master core concepts of a particular subject. The research paper also cited a study (Gilson et al., 2022) which tested ChatGPT's performance to a set of questions within the United States Medical Licensing Examination and discovered that the AI performed very closely to the level of third-year medical students, thus hinting at the use of AI as an educational tool in the field of medicine (Jürdon Rudolph et al, 2023).

The introduction of ChatGPT has created a large impact on Artificial Intelligence, for students especially, giving us a glimpse of what an intelligent tutoring system may look like carrying

forward. Rudolph and the Tans claim in their paper that we are closer to achieving personalized learning systems as more learning models are created to stimulate and accommodate the different learning styles of students. All this while being able to record and interpret a student's emotional state in the different aspects of their learning journey, resulting in what's known as Personalized Adaptive Learning (PAS), according to Peng et al.(2019, Jürgen Rudolph et al, 2023). To add on, an experimental study in which the design of a data analytics course, to create assessment questions using GPT-3, the Generative Pre-trained Transformer-3, an AI language model developed by OpenAI, which unlike ChatGPT has been trained on textual data that surpasses ChatGPT, although it doesn't perform as a chatbot, as humanlike in conversing as ChatGPT, these questions were subject to manual reviews, which were regarded as favorable by human experts, hinting once again its ability as an educational tool for Data Science, according to Bhat et al.(2022, Jürgen Rudolph et al, 2023)

The authors, Rudolph and Tans' find it "ironic" that the recent abilities of interactive AI, ChatGPT, have caused a stir of "Anxieties" in the academic community, highlighting several reasons why this technology may be a boon to teachers and professors alike. This would include the support of personalized learning, tailored to individual students, by analyzing student data to generate personal feedback and solutions and creating interactive and engaging lesson plans. Professors would also be able to tailor courses by adding supplementary course content into the input of the model, for teachers that teach languages, especially English as a foreign language would benefit from its abilities to generate summaries, create translations, use the tools as a supplementary for explanations for grammar and conversational practice. It should be kept in mind that since these models are trained on large amounts of textual data, management and close consideration ought to be made for the language models to create suggestions in other languages, thus the availability of good-quality data is essential, this may have poor consequences regarding bias, thus data ought to be diverse, we shall discuss this further, later in the essay.

Professors could also use the language models in order to use as an automated grading system, for example, if the model is trained for a specific domain that has been trained on the styles of writing, it could highlight the strengths and weaknesses in the student's work, and offer personalized feedback for the same (Jürgen Rudolph et al, 2023). However, in retrospect, this again depends on the quality of the training data since the system may penalize a student for having a different kind of writing style, despite the content being detailed and thought-provoking.

AI language models such as ChatGPT allow professors to stay up to date on the latest developments and teaching methods in their field, providing valuable resources for designing assignments that reduce academic misconduct while encouraging originality and critical thinking. The illustrated prompt(figure 1) can assist professors in evaluating student work for plagiarism and discouraging the use of AI tools for assignment completion, all while assisting students in developing their writing and critical thinking skills. Professors can provide more effective feedback and guidance to their students by incorporating AI language models into their teaching methods, resulting in better academic outcomes.

While we have discussed at great lengths, the various opportunities this might have in regards with additional help provided to teachers and students, Currently, Educational Institutions are faced

with a dilemma, especially in the adoption of AI and recently developed NLP chatbots. With an increasing number of students who are currently using the language model, ChatGPT, Universities are concerned since students are being able to use the chatbot to write their assignments for them, steering towards academic dishonesty. Amongst the growing scepticism, in extreme cases, New York City's department of education decision to ban ChatGPT from its schools networks has been fairly extreme. Universities everywhere are now employing AI detection software such as 'GPTZero', 'AI.CheatCheck' and Turnitin, a widely used plagiarism detector, which is releasing its own version of the AI detection tool out to universities. A deep focus onto such responses against the technology may seem misguided, as we come to explore the issue further.

Restricting the adoption of language models like ChatGPT and relying on AI detection software may not be effective for academic institutions. The detection software employed by Universities and other educational institutions could easily be fooled and bypassed by 'creative' students who would cheat the system. Students can easily work around these measures by altering the text generated by language models or by using alternative platforms that are not monitored by the software. To prove this, I directed ChatGPT to write an introduction for an essay regarding Green Finance and Carbon Accounting(See figures 1 through 4) For which I then used Quillbot, an AI service, expert in paraphrasing and summarizing, Upon copy and pasting the paraphrased introduction, written wholly by ChatGPT onto GPTZero, It was interesting to see how the tool mistook the paragraph to be written "entirely" by a Human.

This purely indicates the high possibility of several workarounds around AI detection tools, which most of the time may not always accurately detect instances of plagiarism or other ethical concerns, leading to potential false positives or negatives. Furthermore, putting too much faith in AI detection software may foster a culture of suspicion and mistrust among students and faculty. Instead of fostering a learning environment that prioritized critical thinking and understanding of core subject topics, it may foster a "catch me if you can" mentality among students and evaluators. This poses a grave limitation since students would now be diverted away from learning and shift their attention towards looking at circumventing the stringent policies and AI detection software employed within academic institutions to write their assignments for them. This presents a learning curve and dilemma within institutions as to how to navigate academic curriculum and testing methodologies for students at the time when one of the abilities of language models such as ChatGPT is generating newer content which could pass AI generated as seemingly human content, unrecognisable by the current detection software. Nonetheless, this challenge has allowed for an industry wide discussion wherein the wide possibilities of the incorporation of language models like ChatGPT into academic institutions are being carefully discussed and investigated, out of which it's use as a tool in academics has been standing out in its abilities to foster and enhance learning. With the recognition that fear often arises from a lack of complete understanding, Institutions have now begun exploring the capabilities of ChatGPT which has led them to work together to develop and implement newer industry standards in the way language models and AI would be used in curriculums, which would form under best practices, in a way to deviate from the traditional approach which was heavily focused in penalizing students and slowly move towards incorporating them, to maximise the learning capabilities of students.

The creation of best practices would potentially mark the age of modern learning as educational industries around the world adopt artificial intelligence and take a step forwards in teaching

students not just best practices that adhere to academic ethical standards but ways in which they can maximise the potential of language models. For Example Indiana University Bloomington recently published an article on the more productive ways AI could be addressed in a classroom environment in a manner that seems less like policing and more towards advocating and focusing on teaching. How? By acknowledging the need for students to be using the AI tools addressing low confidence in the content knowledge and struggles with writing skills, passing it not as a behaviour that highlights laziness or dishonesty, thus have urged teachers to involve students in AI tools to have them analyse responses made by AI and judge for themselves the accuracy of the response for cohesion and flaws in the AI system, which we will discuss in the essay further additionally to eliminate anxieties it is being suggested that students use ChatGPT to create a rough structure or draft for the assignment while limiting the use of traditional assignments to keep students engaged and less relied on the writing tools of AI(Indiana University,2023).

Similarly, Ryan Watkins, a professor of Educational Technology at the George Washington suggested ways in which students can actively engage with AI and then critically review the responses generated by it by using the prompts as a tool to investigate deeply into the subject matters of their field of study during class hours and actively discuss with the students what they thought about the response in terms with cohesion and depth of analysis and thus allow students to pave their own road in terms in reaching the best practices for the use of the AI. It was also suggested that creative forms of assessments in the form of debates, mind maps be included into curricula alternatively allowing them to be transparent in ways in which ChatGPT has been used through sharing Prompts(Watkins,2022).

What's even more fascinating is that while language models like ChatGPT rely on information that it has been trained on, it will still use its capabilities generated from neural networks to create new content, and thus when using that content generated, it wouldn't be retrievable and as it has been highlighted several times of the significance of using language models for research purposes, proving to be an indispensable tool for college assignments, APA and MLA referencing has been adjusted to include a citation for when using content generated exclusively by ChatGPT, highlighting further best practices in ways to cite and acknowledge the content generated by ChatGPT onto assignments and other academic papers, such actions only mean to suggest a change in the outlook of language models and the initiation into the adoption of these tools into academic settings.

Since it has been established that AI and large language models are here to stay, an integral aspect of such models lies in the ability to write clear prompts, which act as instructions for the AI to generate content and hence can also determine the quality of the response that has been generated as well. Due to the AI's ability to interpret human language students are being taught the correct way to communicate with ChatGPT such that it can be able to create precise responses to stated questions and doubts. This is also known as prompt engineering as with any AI it needs a set of simple and highly precise instructions for it to perform any tasks and this form of communication concerning the use of AI in education entails a step-by-step process of creating different inputs that would ultimately determine the output which AI would generate.

When trying to imagine what the future of work would entail we can now envision the influence and the need to work with AI tools in work environments, thus one of the key benefits of academic institutions integrating AI into their curriculum is to enable students to have a concrete understanding of AI and its applications which could potentially prepare them for the job market. Considering that the majority of students who apply to business schools aim to secure hiring positions, the further involvement of AI in the academic curriculum would not only allow for the creation of engaging a personalised learning experience but would help them close the skills gap that currently exists in several industries(Sollosy and McInerney, 2022) as many companies are struggling to find the right people with the necessary skills to support a working environment that has adopted AI technologies. Students would now be able by being provided with the opportunity to learn about and work with such technologies, thus academic institutions can help address these gaps in skills and expertise, and get students prepared in the job market which would rely on Artificial Intelligence and the use of such language models. As students place their trust in business and management schools in hopes of getting job opportunities and upskilling, institutions would need to explore and investigate ways in which incorporating these technologies would make students feel more confident and secure about their future, rather than being in fear of them being replaced by AI, which would mean for them to focus on the opportunities AI would create among the workplace rather than stay in complete fear of displacement, since while additional research is needed onto the extent of job losses the Royal Society in their paper have mentioned the importance of upskilling which may mitigate or downplay the negative consequences(Royal Society and British Academy,2018)

The integration of AI tools and technologies for academic institutions would be brought forth with significant investments to foster a learning environment around these technologies, when we look into exploring what they would entail, one of the immediate investments would seem to be into setting up the necessary hardware and software needed to support AI applications, these would include computing resources of high performance, efficient storage systems. Not to forget, the allocation of resources to IT professionals and data scientists who would be experts in their field creating systems that would ensure students would be able to be trained including the faculty within the institutions, while this may seem what further training of getting students well equipped with further developments and emerging technologies within AI, the initiation in the use of current language models, such as ChatGPT and other accessible AI tools would imply that academic institutions may choose to curate and develop specialised courses and programs that would teach student how to fully utilise the technologies for them to do better at an academic standing.

Several online learning platforms including DataCamp, which aims to teach students the comprehensive skills needed in becoming data scientists, often taught by industry experts and most recently have designed an hour-long course titled “Introduction to ChatGPT”, having access to this learning platform, I chose to study it(see Figures 5 through 7) which introduced me to several topics within ChatGPT, ways to maximise its potential and its limitations, all of which that would prove useful to a student, such as myself who would want to use these tools in a manner that enhances the learning experience, in the best interests. Over 46000 students on Datacamp(see Figure 5) had taken this course which only means to suggest its growing popularity and significance. The course had been designed in a way that explained to students ways in which to harness the most utility from the tool including a framework for best practices. Amongst Academic Institutions, almost all agree on the merits of language models and AI in its ability to generate

research, though its prompt function can generate knowledge and application of course topics, to a greater extent. The language model's ability to scan through vast amounts of and build through its neural networks can enable accurate text summarisations, which to the average student may seem quite beneficial as writing assignments would entail reading and research through countless academic pieces of information which oftentimes would mean reading through pages and pages of complex text. Fortunately, AI can allow students to cut through the time it would take to gather viable pieces of information. To that extent, I declare the use of an AI tool(see Figure 8) to build text summaries of the voluminous pages of research in order to shorten the time duration it took for me to prepare this critical review. I came across the AI tool named Kipper while researching for this paper and it was intriguing to see how accurate its text summarisation tool was, using it as a supplementary tool allowed the clear articulation using academic sources in a shorter period. The AI tool offered other services such as the AI teaching assistant that could allow students to upload their lecture material, which through AI learning models, acted as a personal teaching assistant allowing students to fully grasp the course contents and learning objectives put forth by the professor

It has been established that AI has the potential to revolutionize education, proving to be an invaluable tool that could enhance learning opportunities for students when used as a supplementary tool. Institutions have taken note of its capabilities, slowly introducing it to curricula. Nonetheless, institutions need to continue to discuss the best practices and policies to ensure and uphold ethical standards while educating students on the limitations of these tools. Ultimately, AI should be able to support the teaching and learning process, although it's very unlikely to act as a substitute for human instructors. By integrating AI technologies institutions can better prepare their students for industries that will also be influenced by it, as their skills would be required in high demand who would possess a solid understanding of AI technologies. As language models continue to develop and learn from their mistakes, its limitation would likely decrease over time. As such institutions should continue to have a conversation, and actively evaluate and assess the effectiveness of the AI tools and technologies in education, enabling them to make necessary adjustments to ensure best learning practices are being set allowing for maximum learning experience for students.

Citations

1. Bhat, S., Nguyen, H., Moore, S., Stamper, J., Sakr, M. and Nyberg, E. (2022). Towards Automated Generation and Evaluation of Questions in Educational Domains. *Carnegie Mellon University*, [online] pp.701–704. doi:<https://doi.org/10.5281/zenodo.6853085>.
2. Alshater, M., 2022. Exploring the Role of Artificial Intelligence in Enhancing Academic Performance: A Case Study of ChatGPT (December 26, 2022). *Available at SSRN 4312358*.
3. Liu, R. and Koedinger, K. (2017). *Closing the loop: Automated data-driven cognitive model discoveries lead to improved instruction and learning gains*. [online] Available at: <https://files.eric.ed.gov/fulltext/EJ1155896.pdf> [Accessed 23 Feb. 2023].
4. Caulfield, J. (2023). *ChatGPT Citations | Formats & Examples*. [online] Scribbr.
5. Dowling, M. and Lucey, B. (2023). ChatGPT for (Finance) research: The Bananarama Conjecture. *Finance Research Letters*, p.103662. doi:<https://doi.org/10.1016/j.frl.2023.103662>.
6. Gilson, A., Safranek, C.W., Huang, T., Socrates, V., Chi, L., Taylor, R.A. and Chartash, D. (2023). How Does ChatGPT Perform on the United States Medical Licensing Examination? The Implications of Large Language Models for Medical Education and Knowledge Assessment. *JMIR Medical Education*, [online] 9(36753318), p.e45312. doi:<https://doi.org/10.2196/45312>.
7. Khan, R.A., Jawaid, M., Khan, A.R. and Sajjad, M. (2023). ChatGPT - Reshaping medical education and clinical management. *Pakistan Journal of Medical Sciences*, 39(2). doi:<https://doi.org/10.12669/pjms.39.2.7653>.
8. Kirk, T. (2023). *ChatGPT: opportunities and challenges for education*. [online] University of Cambridge. Available at: <https://www.cam.ac.uk/stories/ChatGPT-and-education>.
9. Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T. and Stadler, M. (2023). *ChatGPT for Good? On Opportunities and Challenges of Large Language Models for Education*. [online] Available at: https://www.edu.sot.tum.de/fileadmin/w00bed/htcl/_my_direct_uploads/ChatGPT_for_Good_.pdf [Accessed 19 Feb. 2023].
10. Peng, H., Ma, S. and Spector, J.M. (2019). Personalized adaptive learning: an emerging pedagogical approach enabled by a smart learning environment. *Smart Learning Environments*, 6(1). doi:<https://doi.org/10.1186/s40561-019-0089-y>.
11. Royal Society and British Academy (2018). *THE IMPACT OF ARTIFICIAL INTELLIGENCE ON WORK An evidence review prepared for the Royal Society and the*

British Academy. [online] Available at: <https://royalsociety.org/-/media/policy/projects/ai-and-work/frontier-review-the-impact-of-AI-on-work.pdf>.

12. Rudolph, J., Tan, S. and Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education? *I*, 6(1). doi:<https://doi.org/10.37074/jalt.2023.6.1.9>.
13. Sollosy, M. and McInerney, M. (2022). Artificial intelligence and business education: What should be taught. *The International Journal of Management Education*, 20(3), p.100720. doi:<https://doi.org/10.1016/j.ijme.2022.100720>.
14. Watkins, R. (2022). *Update Your Course Syllabus for chatGPT*. [online] Medium. Available at: https://medium.com/@rwatkins_7167/updating-your-course-syllabus-for-chatgpt-965f4b57b003.

Appendices

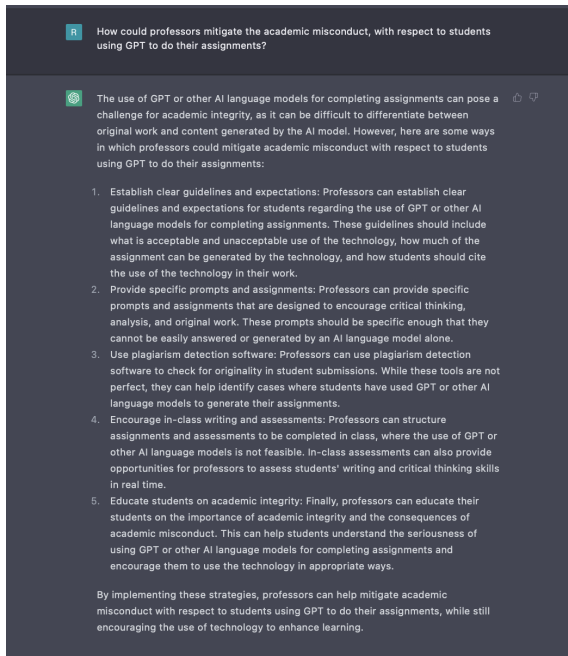


Figure 1 ChatGPT prompt in assisting professors.

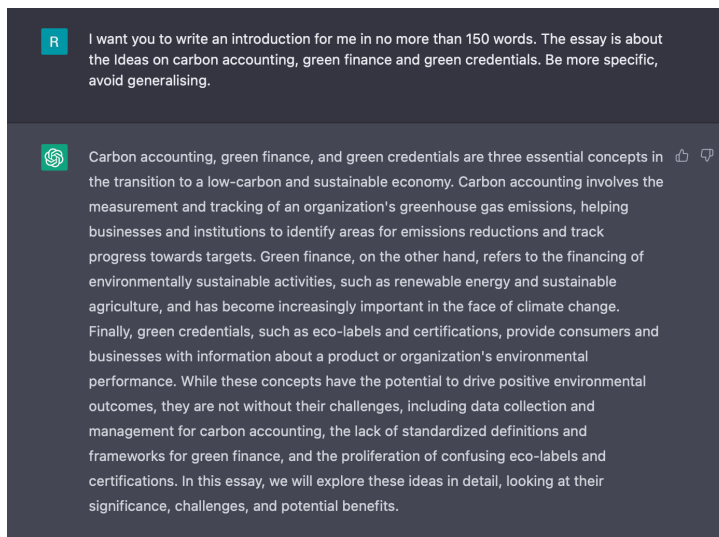


Figure 2 Generating an Introduction for an Essay Topic

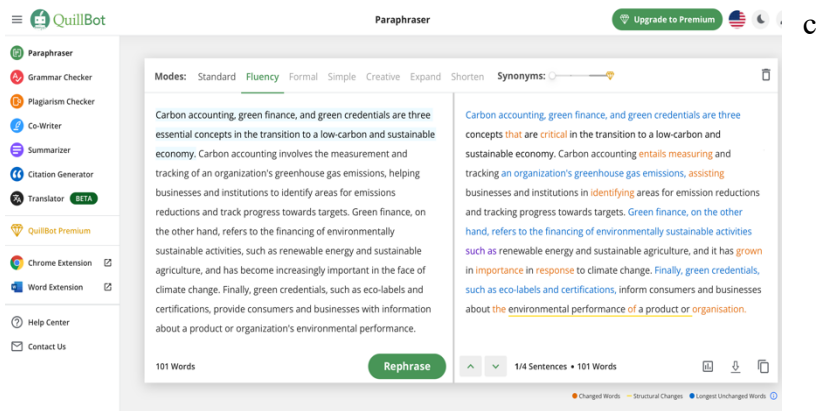


Figure 3 Paraphrasing using Quillbot AI

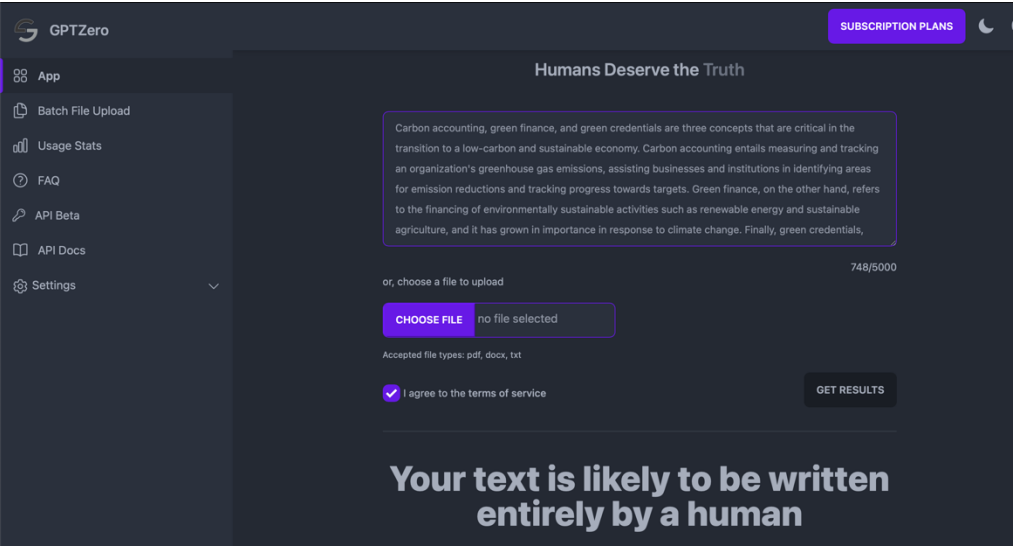


Figure 4 Avoiding AI detection tool.

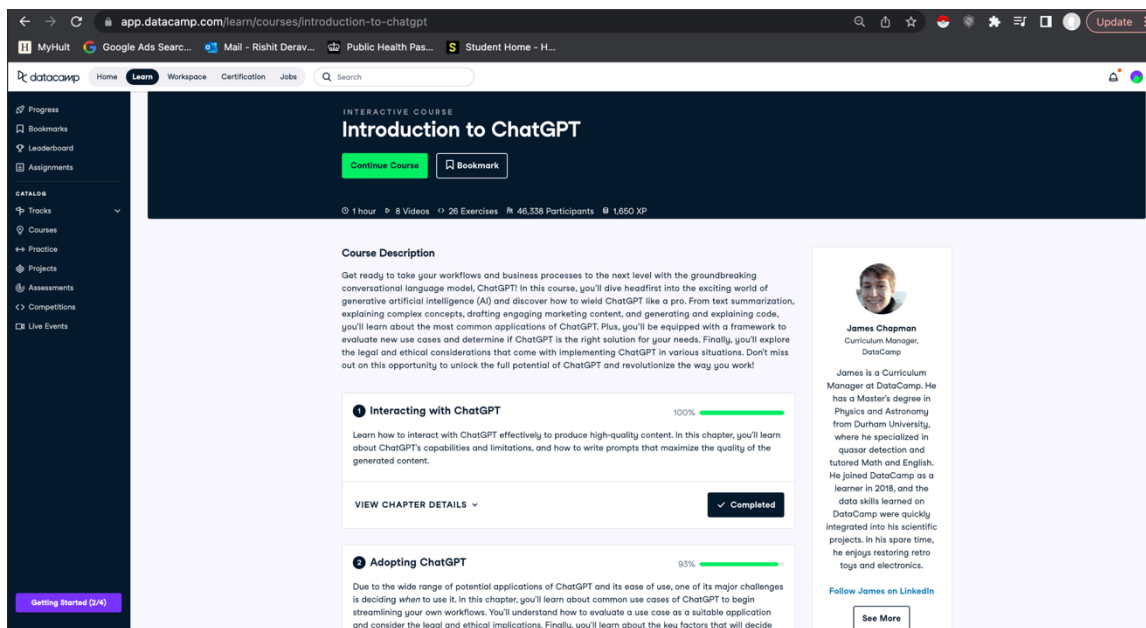


Figure 5 'Introduction to ChatGPT' on DataCamp

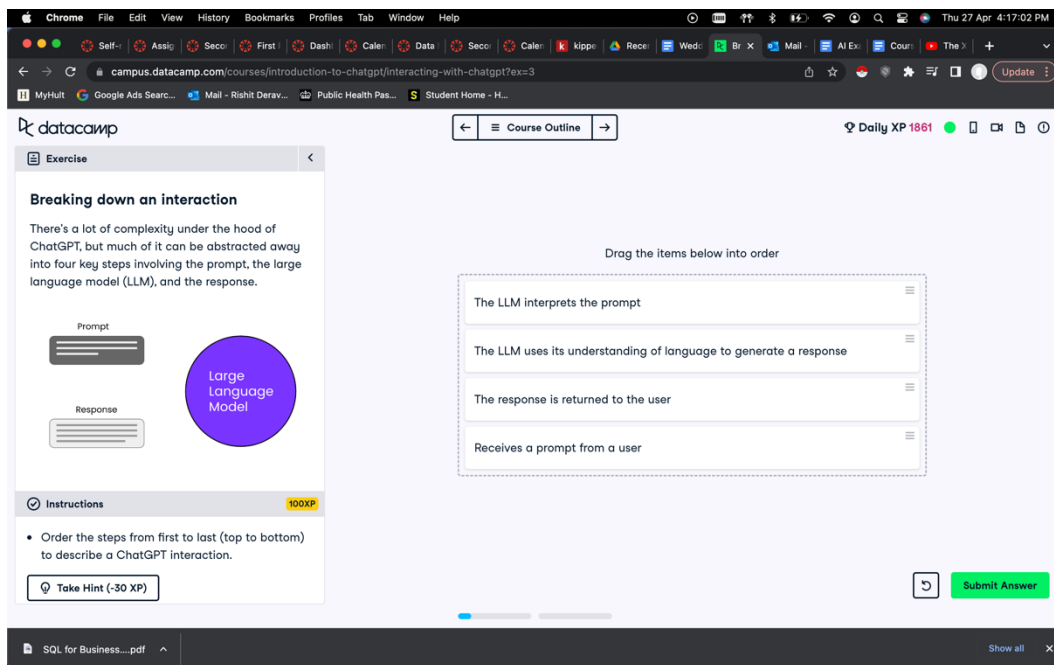
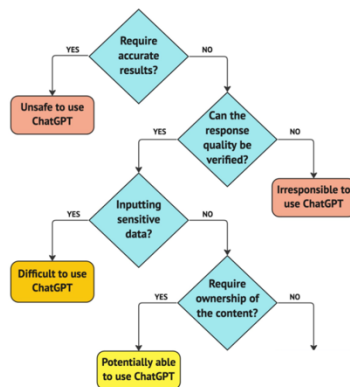


Figure 6 Basic Fundamentals of ChatGPT taught on DataCamp

- Can claim ownership over ChatGPT output
 - Other considerations such as **copyright infringement** may prevent ownership
- Legal and ethics → **Coming up!**



¹ <https://openai.com/policies/terms-of-use>



INTRODUCTION TO CHATGPT



Figure 7 Best practices for ChatGPT, framework for use taught on DataCamp

The screenshot shows the Kipper AI Summarizer web application. On the left is a red sidebar with navigation links: Dashboard, My Essays, Writing (with sub-links for Essay Writer, Summarizer, Text Enhancer, and Citation Finder), Studying (with ChatBot Tutor), Contact Us, My Account, and Walkthrough. The main content area is titled 'Summarizer' and features a 'Webpage URL' input field containing 'https://www.sciencedirect.com/science/article/abs/pii/S'. Below the input are tabs for Text, YouTube, Book, Webpage (selected), and File. A large red button labeled 'Summarizing...' with a loading spinner is present. On the right, a background image shows a woman with curly hair looking at a laptop. At the bottom, a progress bar shows two steps: 'Fetching URL' and 'Analyzing webpage', both marked with green checkmarks.

Figure 8 Generating text summaries of a research paper published in ScienceDirect using Kipper.AI