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RECEIVED 15 February 2023

ACCEPTED 11 April 2023

PUBLISHED 17 May 2023

## CITATION

Fuchs K (2023) Exploring the opportunities and challenges of NLP models in higher education: is Chat GPT a blessing or a curse? *Front. Educ.* 8:1166682. doi: 10.3389/educ.2023.1166682

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# Exploring the opportunities and challenges of NLP models in higher education: is Chat GPT a blessing or a curse?

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## KEYWORDS

higher education, natural language processing, Chat GPT, technology, pedagogy

## 1. Introduction

The world has changed a lot in the past few decades, and it continues to change. Chat GPT has created tremendous speculation among stakeholders in academia, not the least of whom are researchers and teaching staff (Biswas, 2023). Chat GPT is a Natural Language Processing (NLP) model developed by OpenAI that uses a large dataset to generate text responses to student queries, feedback, and prompts (Gilson et al., 2023). It can simulate conversations with students to provide feedback, answer questions, and provide support (OpenAI, 2023). It has the potential to aid students in staying engaged with the course material and feeling more connected to their learning experience. However, the rapid implementation of these NLP models, like Chat GPT by OpenAI or Bard by Google, also poses several challenges. In this article, I will discuss a range of challenges and opportunities for higher education, as well as conclude with implications that (hopefully) expose gaps in the literature, stimulate research ideas, and, finally, advance the discussion about NLP in higher education.

## 2. Discussion

### 2.1. The emergence of NLP in academia

Natural Language Processing (NLP) models have been in development since the 1950s (Jones, 1994) but it was not until the past decade that they gained significant attention and advancement, particularly with the development of deep learning techniques and large datasets (Kang et al., 2020). NLP models are rapidly becoming relevant to higher education, as they have the potential to transform teaching and learning by enabling personalized learning, on-demand support, and other innovative approaches (Odden et al., 2021). In higher education, NLP models have significant relevance for supporting student learning in multiple ways. These models can be employed to analyze and process vast amounts of textual data, such as academic papers, textbooks, and other course materials, to provide students with personalized recommendations for further study based on their learning requirements and preferences. In addition, NLP models can be used to develop chatbots and virtual assistants that offer on-demand support and guidance to students, enabling them to access help and information as and when they need it.

Chat GPT by OpenAI and Bard (Google's response to Chat GPT) are examples of NLP models that have the potential to transform higher education. These generative language models, i.e., Chat GPT and Google Bard, can generate human-like responses to open-ended prompts, such as questions, statements, or prompts related to academic material. The recent release and increasing popularity (in early 2023) of Chat GPT and Google Bard made its use particularly relevant for supporting student learning in a range of contexts, such as language learning, writing, research, and general academic inquiry. Therefore, the use of NLP models in higher education expands beyond the aforementioned examples, with new applications being developed to aid students in their academic pursuits.

## 2.2. Opportunities for higher education

Personalized learning is an approach to education that aims to tailor instruction to the unique needs, interests, and abilities of individual learners. NLP models can facilitate personalized learning by analyzing students' language patterns, feedback, and performance to create customized learning plans that include content, activities, and assessments tailored to the individual student's needs. Personalized learning can be particularly effective in improving student outcomes. Research has shown that personalized learning can improve academic achievement, engagement, and self-efficacy (Wu, 2017). When students are provided with content relevant to their interests and abilities, they are more likely to engage with the material and develop a deeper understanding of the subject matter. NLP models can provide students with personalized learning experiences by generating content tailored specifically to their individual learning needs.

For example, when a student submits a response to a question, the model can analyze the response and provide feedback customized to the student's understanding of the material. This feedback can help the student identify areas where they might need additional support or where they have demonstrated mastery of the material. Furthermore, the processing models can generate customized learning plans for individual students based on their performance and feedback. These plans may include additional practice activities, assessments, or reading materials designed to support the student's learning goals. By providing students with these customized learning plans, these models have the potential to help students develop self-directed learning skills and take ownership of their learning process.

Moreover, on-demand support is a crucial aspect of effective learning, particularly for students who are working independently or in online learning environments. The NLP models can provide on-demand support by offering real-time assistance to students struggling with a particular concept or problem. The benefits of on-demand support are numerous. It can help students overcome learning obstacles and enhance their understanding of the material. In addition, on-demand support can help build students' confidence and sense of self-efficacy by providing them with the resources and assistance they need to succeed. These models can offer on-demand support by generating responses to student queries and feedback in real time. When a student submits a

question or response, the model can analyze the input and generate a response tailored to the student's needs.

This can be particularly helpful for students working independently or in online learning environments where they might not have immediate access to a teacher or tutor. Furthermore, chatbots can offer support to students at any time and from any location. Students can access the system from their mobile devices, laptops, or desktop computers, enabling them to receive assistance whenever they need it. This flexibility can help accommodate students' busy schedules and provide them with the support they need to succeed. Additionally, NLP models can provide students with on-demand support in a variety of formats, including text-based chat, audio, or video. This can cater to students' individual learning preferences and provide them with the type of support that is most effective for them.

## 2.3. Challenges for higher education

Although there is a wide range of opportunities for NLP models, like Chat GPT and Google Bard, there are also several challenges (or ethical concerns) that should be addressed. The first challenge is the issue of accuracy. The accuracy of the system depends heavily on the quality, diversity, and complexity of the training data, as well as the quality of the input data provided by students. In previous research, Fuchs (2022) alluded to the importance of competence development in higher education and discussed the need for students to acquire higher-order thinking skills (e.g., critical thinking or problem-solving). The system might struggle to understand the nuances and complexities of human language, leading to misunderstandings and incorrect responses. Moreover, a potential source of inaccuracies is related to the quality and diversity of the training data used to develop the NLP model.

If the training data is not adequately diverse or is of low quality, the system might learn incorrect or incomplete patterns, leading to inaccurate responses. The accuracy of NP models might be impacted by the complexity of the input data, particularly when it comes to idiomatic expressions or other forms of linguistic subtlety. Additionally, the model's accuracy might be impacted by the quality of the input data provided by students. If students do not provide clear, concise, and relevant input, the system might struggle to generate an accurate response. This is particularly challenging in cases in which students are not sure what information they need or cannot articulate their queries in a way that the system easily understands.

Another significant challenge that students might face when using NLP models in higher education is the potential risk of over-reliance on technology, which could undermine the development of important critical thinking skills (while critical thinking has been singled out as an exemplary skill, the list of skills is countless and multiple higher-order thinking skills could be further discussed in the context of chatbots). While these models can offer valuable support and personalized learning experiences, students must be careful to not rely too heavily on the system at the expense of developing their own analytical and critical thinking skills. Over-reliance on systems such as Chat GPT and Google Bard could lead to students becoming passive learners who simply accept the

responses generated by the system without questioning or critically evaluating the accuracy or relevance of the information provided. This could lead to a failure to develop important critical thinking skills, such as the ability to evaluate the quality and reliability of sources, make informed judgments, and generate creative and original ideas.

Moreover, over-reliance could reinforce existing biases and perpetuate inequalities in education. For example, if the system is trained on biased or incomplete data, it might generate responses reflecting these biases, thereby leading to a reinforcement of existing inequalities and a failure to challenge and disrupt discriminatory practices in higher education. To address these challenges, institutions must provide clear guidance to students on how to use NLP models as a tool to support their learning rather than as a replacement for critical thinking and independent learning. Institutions must also ensure that students are provided with opportunities to engage in active learning experiences that encourage critical thinking, problem-solving, and independent inquiry.

Another important challenge that should be mentioned is the linguistic aspect of NLP, like Chat GPT and Google Bard. Emerging evidence in the body of knowledge indicates that chatbots have linguistic limitations (Wilkenfeld et al., 2022). For example, a study by Coniam (2014) suggested that chatbots are generally able to provide grammatically acceptable answers. However, at the moment, Chat GPT lacks linguistic diversity and pragmatic versatility (Chaves and Gerosa, 2022). Still, Wilkenfeld et al. (2022) suggested that in some instances, chatbots can gradually converge with people's linguistic styles. While the development of artificial intelligence and natural language processing models like Chat GPT is just the beginning (Molnár and Szüts, 2018), it is not far-fetched to hypothesize that over time the linguistic accuracy of NLP models will improve and more closely mimic the writing style of humans (including expressive writing styles as similarly alluded to by Park et al., 2021).

### 3. Conclusion

In this article, I discussed the challenges and opportunities regarding natural language processing (NLP) models like Chat GPT and Google Bard and how they will transform teaching and learning in higher education. The article highlights the potential benefits of using NLP models for personalized learning and on-demand support, such as providing customized learning plans, generating feedback and support, and offering resources to students

whenever and wherever they need them. However, the article also acknowledges the challenges that NLP models may bring, including the potential loss of human interaction, bias, and ethical implications. To address the highlighted challenges, universities should ensure that NLP models are used as a supplement to, and not as a replacement for, human interaction. Institutions should also develop guidelines and ethical frameworks for the use of NLP models, ensuring that student privacy is protected and that bias is minimized.

Additionally, universities should involve students in the development and implementation of NLP models to address their unique needs and preferences. Finally, universities should invest in training their faculty to use and adapt to the technology, as well as provide resources and support for students to use the models effectively. In summary, universities should consider the opportunities and challenges of using NLP models in higher education while ensuring that they are used ethically and with a focus on enhancing student learning rather than replacing human interaction. Overall, NLP models are a powerful tool for improving the quality of education by providing students with personalized learning experiences and automating administrative tasks, while institutions must tackle the previously mentioned challenges to safeguard high-quality education for their students.

### Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

### Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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### References

- Biswas, S. (2023). ChatGPT and the future of medical writing. *Radiology* 307, 223312. doi: 10.1148/radiol.223312
- Chaves, A. P., and Gerosa, M. A. (2022). "The impact of chatbot linguistic register on user perceptions: a replication study," in *Chatbot Research and Design: 5th International Workshop, CONVERSATIONS 2021, Virtual Event* (Cham: Springer International Publishing) 143–159. doi: 10.1007/978-3-030-94890-0\_9
- Coniam, D. (2014). The linguistic accuracy of chatbots: usability from an ESL perspective. *Text Talk*. 34, 545–567. doi: 10.1515/text-2014-0018
- Fuchs, K. (2022). The importance of competency development in higher education: Letting go of rote learning. *Front. Educ.* 7, 1004876. doi: 10.3389/feduc.2022.1004876
- Gilson, A., Safranek, C. W., Huang, T., Socrates, V., Chi, L., Taylor, R. A., et al. (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 Med. Educ.* 9, e45312. doi: 10.2196/45312
- Jones, K. S. (1994). "Natural language processing: a historical review," in *Current issues in Computational Linguistics* 3–16. doi: 10.1007/978-0-585-35958-8\_1

Kang, Y., Cai, Z., Tan, C. W., Huang, Q., and Liu, H. (2020). Natural language processing (NLP) in management research: A literature review. *J. Manag. Analyt.* 7, 139–172. doi: 10.1080/23270012.2020.1756939

Molnár, G., and Szüts, Z. (2018). “The role of chatbots in formal education,” in *2018 IEEE 16th International Symposium on Intelligent Systems and Informatics (SISY)* (IEEE) 000197–000202. doi: 10.1109/SISY.2018.8524609

Odden, T. O. B., Marin, A., and Rudolph, J. L. (2021). How has Science Education changed over the last 100 years? *An analysis using natural language processing. Sci. Educ.* 105, 653–680. doi: 10.1002/sce.21623

OpenAI (2023). *OpenAI Official Website. Introducing ChatGPT - Learn more.* Available online at: <https://openai.com/blog/chatgpt/> (accessed February 10, 2023).

Park, S., Thieme, A., Han, J., Lee, S., Rhee, W., and Suh, B. (2021). “‘I wrote as if I were telling a story to someone I knew’: Designing Chatbot Interactions for Expressive Writing in Mental Health,” in: *Designing Interactive Systems Conference 2021* 926–941. doi: 10.1145/3461778.3462143

Wilkenfeld, J. N., Yan, B., Huang, J., Luo, G., and Algas, K. (2022). “‘AI love you’: Linguistic convergence in human-chatbot relationship development,” in *Academy of Management Proceedings* (Briarcliff Manor, NY: Academy of Management) 17063. doi: 10.5465/AMBPP.2022.17063abstract

Wu, J. Y. (2017). The indirect relationship of media multitasking self-efficacy on learning performance within the personal learning environment: Implications from the mechanism of perceived attention problems and self-regulation strategies. *Comput. Educ.* 106, 56–72. doi: 10.1016/j.compedu.2016.10.010