


# Creative challenge to stimulate student engagement in natural science education in distance learning

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## ABSTRACT

This article describes a study conducted in the discipline of “science education in nature”, offered 100% in the distance learning mode, for undergraduate students in biological sciences and pedagogy. The aim was to develop a challenge that would stimulate students creativity and engagement. Through the virtual learning platform, students exchanged information and collaborated with each other. The challenge resulted in a significant increase in student engagement and facilitated the connection between theory and practice. The findings highlight the importance of strategies that promote engagement in distance learning, especially in the discipline in which it was applied. The challenge-based approach stimulates creativity, critical thinking, and the development of essential skills for teacher education in this field.

**Keywords:** science education, challenge, creativity, discussion forums, ChatGPT

## UNVEILING THE POTENTIAL OF ChatGPT AS AN ASSISTANT IN DISTANCE EDUCATION: A NEW HORIZON OF LEARNING

In the current context, technology plays an increasingly important role in education. According to Basilaia and Kvavadze (2020) and Kuhail et al. (2023), the incorporation of technological resources in classrooms has the potential to improve the quality of teaching, making it more dynamic, engaging, and personalized. However, it is essential for educators to fully understand and take advantage of the possibilities offered by educational technology in order to maximize its benefits and minimize potential challenges (Naidu & Sevnarayan, 2023). As stated by Lo (2023), investing in teacher training and development is necessary so that educators can effectively use technological resources, including ChatGPT, in their pedagogical practices, adapting them to the needs of students and promoting an effective and inspiring learning environment.

Furthermore, Gill et al. (2023) affirms, it is crucial to establish clear guidelines on the ethical and responsible use of technology to ensure students safety and protect their privacy. By adopting a balanced approach and carefully considering the benefits and challenges of educational technology, we can transform education and better prepare students for the constantly evolving modern world (Lo, 2023; Gill et al., 2023).

According to Naidu and Sevnarayan (2023), distance education (DE) has played a fundamental role in democratizing access to education, enabling students from diverse locations to acquire knowledge in a flexible and tailored manner according to their individual needs. The authors also indicate that with the advent of artificial intelligence (AI) technologies, new possibilities arise to enhance the learning experience in this context. In this sense, ChatGPT, a large-scale language model developed by OpenAI (2021), emerges as a promising tool to assist both students and educators.

ChatGPT is an AI-based virtual assistant capable of generating human-like responses, providing an interactive experience for users. Its ability to understand and produce text coherently and contextually relevant makes it an ideal tool to support the teaching and learning process in DE.

One of the main advantages of using ChatGPT in distance learning is its ability to provide individualized support to students. As students interact with the virtual assistant, they can receive immediate answers to their questions without having to wait for feedback from the teacher or other classmates. This fosters student autonomy and empowerment, encouraging them to seek knowledge independently (Naidu & Sevnarayan, 2023).

According to Chen (2023), ChatGPT can function as a virtual tutor, offering detailed and elucidative explanations on complex concepts. With the capacity to adapt its discourse to the students comprehension level, the virtual assistant can provide additional

examples, analogies, and practical exercises to reinforce learning. This personalized and adaptive approach allows each student to progress at their own pace, maximizing content retention (Naidu & Sevnarayan, 2023).

Chen (2023) infers that students can access the virtual assistant at their convenience, without time restrictions. This temporal flexibility is especially valuable for working students or those with other responsibilities, enabling them to organize their study time more efficiently.

Lastly, ChatGPT can play a significant role in stimulating student engagement. Through an intuitive and interactive interface, students can ask questions, participate in simulations, and receive immediate feedback. This interaction fosters interest and active participation, creating a dynamic and motivating learning environment.

## **INVESTIGATING THE POTENTIAL OF ChatGPT AS AN EDUCATIONAL RESOURCE: METHODOLOGICAL APPROACH**

The methodological approach of this research followed a qualitative method, aiming to understand students' perceptions and experiences regarding the use of ChatGPT as an educational resource. Data collection, analysis, and interpretation procedures were adopted to address the research questions proposed.

Some of the questions formulated for this article are, as follows:

1. What is the impact of using ChatGPT as an educational resource in the discipline of natural science education (NSE) offered in distance learning mode?
2. How do students perceive the challenge presented through ChatGPT in terms of creativity and engagement?
3. What are the students' perspectives on the use of ChatGPT as an educational tool?
4. How can ChatGPT be utilized to stimulate students' interest in technology and enhance learning in the field of NSE?

To answer these questions, a brief literature review was initially conducted on the use and potential of ChatGPT as an educational tool. Articles were searched on Google Scholar, and the review was limited to works published in 2023, considering that ChatGPT was developed in late 2020 (OpenAI, 2021). Using the descriptor "use of ChatGPT in education," no research was found in 2019, 2020, 2021, and 2022. However, in 2023, 48 studies related to its use in education were found, including 10 literature reviews discussing not only ChatGPT but also the impact of AI in education.

Next, a pedagogical intervention was planned and implemented, utilizing ChatGPT as a challenge in NSE discipline. The activity was conducted in a virtual learning environment, where students had access to the tool and were guided on how to use it.

After completing the challenge, students' responses were collected through interactions in specific discussion rooms dedicated to practical activities. These interactions served as a means to construct the results, capturing students' perceptions, experiences, and opinions regarding the use of ChatGPT. The responses were qualitatively analyzed, seeking to identify emerging themes, patterns, and divergences, according to Yin (2016),

The data analysis involved identifying the responses, analyzing them, and developing descriptions and interpretations of the results to address the research questions and explore potential implications for educational practice, in accordance with Martins (2010).

Lastly, the results were discussed in light of relevant literature, comparing them with other studies and existing theories. This discussion allowed a deeper understanding of the findings, contextualizing them, and contributing to the field of using generative AI in DE.

In summary, the methodological approach of this research included a literature review, planning, and implementation of a pedagogical intervention, data collection, qualitative analysis, and discussion of the results. This approach provided insights into students' experiences with ChatGPT and generated relevant knowledge for the field of education and technology.

The students were identified as student 1 (E1), student 2 (E2), student 3 (E3), student 4 (E4), student 5 (E5), and student 6 (E6).

## **STRATEGY OF USING ChatGPT TO CHALLENGE DISTANCE EDUCATION STUDENTS AND PROMOTE ENGAGEMENT**

Based on ideas generated by ChatGPT itself in response to the prompt "Develop a strategy for using ChatGPT as a challenge for DE students to encourage more engaged participation in the proposed activities" (OpenAI, 2021), the following strategies were formulated:

1. Establish weekly challenges: Create weekly challenges related to the topics covered in the classes. Students will be invited to formulate complex questions or challenging problems for ChatGPT. These challenges can encompass various study areas such as mathematics, sciences, languages, or even interdisciplinary questions.
2. Encourage additional research: After receiving a response from ChatGPT, students should be encouraged to conduct further research to verify and deepen their understanding. This promotes autonomy and individual exploration of the studied topics, as well as the development of research skills.

3. Foster collaboration among students: Encourage students to share the proposed challenges and ChatGPTs responses in forums or online learning platforms. This creates a collaborative environment, where students can discuss different approaches, debate answers, and build collective knowledge.
4. Facilitate guided discussions: Organize online discussion sessions, where students can present the questions or problems proposed to ChatGPT and share their own reflections and interpretations. These discussions will provide additional insights and promote a deeper understanding of the topics.
5. Challenge creativity: In addition to conventional questions and problems, encourage students to explore creativity and come up with more challenging questions that may require innovative and unconventional answers. This will stimulate students critical and creative thinking, encouraging them to go beyond the boundaries of traditional knowledge.
6. Recognize and reward engagement: Establish a system to recognize and reward the most engaged students who present interesting challenges and contribute significantly to the discussions. This may include certificates of excellence, honorable mentions, or symbolic prizes.
7. Continuous feedback: Provide continuous feedback to students on their questions, proposed problems, and participation in discussions. This demonstrates recognition and encouragement while guiding the improvement of question-formulation and problem-solving skills.
8. Evaluate the impact: Conduct surveys or interviews with students to assess the impact of the ChatGPT challenge strategy on their engagement and learning. These insights will help adapt and enhance the approach for future implementations.

Thus, an adapted strategy was implemented to challenge DE students to actively engage in the proposed activities, exploring concepts more deeply, and developing essential skills such as critical thinking, research, and collaboration.

In the present study, a challenge was developed in the discipline of NSE to stimulate creativity and engagement among students. This discipline is offered entirely through DE for students in biological sciences and pedagogy degree programs.

The initial activity was related to the development of a lesson plan aimed at debunking the false information that the Earth is flat. The lesson plan was inspired by the following quote [the quote is not provided in the text]:

“Science should be taught as a historical and provisional knowledge, aiming to engage students in the process of constructing scientific knowledge with their doubts and uncertainties. This also requires them to approach learning as a constructive process of seeking meaning and interpretation, rather than reducing it to repetitive or rote memorization of pre-cooked knowledge ready for consumption” (Pozo & Crespo, 2009, p. 21).

Along with the activity, the following challenge was launched:

1. Use ChatGPT to act as a teacher.
2. Go to the website <https://chat.openai.com/>
3. Enter the prompt (question).
4. List 10 ways to explain that the Earth is not flat.
5. Choose one of the ways indicated by ChatGPT and build a lesson from it.
6. Post your response, indicating that you used ChatGPT to enhance your lesson.

From there, the students began to elaborate on the proposed activity, and feedback was requested regarding their perceptions of ChatGPT as an auxiliary resource.

In this excerpt, the students perceptions of AI as an educational didactic resource for lesson planning will be analyzed and discussed.

## **EXPLORING STUDENTS PERCEPTIONS OF USING ChatGPT AS AN EDUCATIONAL RESOURCE: POTENTIALS AND CHALLENGES IN THE CLASSROOM**

A student was asked about their thoughts on the challenge. The response was quite interesting:

“Very good! However, I noticed that it does not recognize some terms, and its writing becomes somewhat heavy or rather robotic, but its a great tool that can be used in the classroom to introduce the world of technology to young students, even encouraging them to want to learn more” (E1).

Another student responded,

“Found it very interesting since I was not familiar with the resource” (E2).

In another perception, student 3 stated,

“... I loved the tool, I did not know it before, and I showed it to my colleagues at work” (E3).

Another student commented,

“Hi teacher, I had already done the activity when I read the ChatGPT challenge message, but I did the research there again to see if it would show what I had already researched. It was very interesting; more options came up besides my research, and most of the items I found did not appear! Haha. I had never used the tool, now I will use it a lot in future activities and get the hang of it. I had a question, how do I handle the theoretical reference? How do I cite ChatGPT in my research?” (E4).

Regarding the reference, it was explained to this student,

“I asked ChatGPT about how to make the reference, and the response was: If you want to reference ChatGPT in an academic work or any other source, you can use the following information: Author: OpenAI; Model: GPT-3.5; Release date: 2021; Version: ChatGPT; Available at: <https://openai.com>. For example, in APA format, the reference would look like this: OpenAI (2021). GPT-3.5 [language model]. ChatGPT. Retrieved from <https://openai.com>. Remember to adjust the reference style according to your institutions guidelines or the reference style you are using” OpenAI (2021).

Another student responded,

“I found it a very interesting research tool, but a bit scary, haha. I could see the interaction with the system when I searched for the keyword: horizon; it was formulating and searching for coherent information for the research. However, in the other searches, it formulated quickly and continuously. I believe ChatGPT has a lot to add, but there is no scientific proof or evidence that the information it provides is real. As for the activity, I found the topic fascinating, and I am excited to put it into practice. A rich exchange of experiences and research” (E5).

It was explained to this student that ChatGPT (and other generative AIs) is a huge compilation of databases with various types of knowledge. This AI will search for what was requested in these databases, whether they are websites or scientific articles. Therefore, in general, they are reliable data and knowledge.

Another student (E6) went further and thought of using Discord to create images to generate debates about whether the Earth is flat or not.

From the identified results, it is possible to observe different perceptions and reactions of the students regarding the use of ChatGPT as an educational tool. Student 1's response shows a positive view of the challenge, acknowledging the utility of the tool but highlighting the need for improvements in understanding certain terms and the fluency of ChatGPT's generated writing. However, the student emphasizes the potential of ChatGPT to introduce the world of technology to students and encourage interest in learning.

Student 2 reveals that they were not familiar with the resource before, indicating its novelty and the opportunity to explore an innovative tool in the classroom. This discovery may spark students interest and enrich their learning experiences.

Student 3, by showing the tool to their work colleagues, highlights the dissemination of knowledge and the potential for sharing resources among educators. This underscores the importance of sharing experiences and collaborative work in adopting new technological

According to Naidu and Sevnarayan (2023), ChatGPT represents a significant development in the field of online assessment, with the potential to disrupt traditional approaches and transform the way we teach and evaluate. In accordance with Bojanova et al. (2023) the emerging technologies typically lead to disruptive innovation and catalyze transformation in the way businesses compete, society evolves, and people live. They emphasize the importance of adapting to changing technologies and incorporating them into assessment practices while maintaining academic integrity.

Both educators and students need to be aware of the potential of ChatGPT and other language models promoted by generative AI to automate tasks traditionally performed by humans and encourage their responsible use. Future considerations for using ChatGPT in education will involve finding a balance between harnessing its potential to provide accessible, personalized, and affordable education while also ensuring academic integrity is not compromised. DE institutions will need to adapt their rules and guide their students on the appropriate use of AI tools like ChatGPT. As technology continues to advance, we can expect further disruptions in this field, leading to more accessible teaching, learning, and effective assessment methods. Ultimately, the development and integration of ChatGPT in assessment present exciting opportunities and challenges for teachers and students.

Although ChatGPT has demonstrated its potential as an auxiliary tool in DE, it is important to recognize and discuss some challenges and limitations associated with its use. Below, relevant points will be highlighted based on the research of Firaina and Sulisworo (2023) and Naidu and Sevnarayan (2023).

Firaina and Sulisworo (2023) infer that, even though ChatGPT can generate coherent responses, its understanding of context is limited. In situations that require specialized or specific knowledge from a particular field, the virtual assistant may not provide accurate or appropriate answers. Educators must monitor and complement the information provided by ChatGPT to ensure the accuracy of the content conveyed.

Naidu and Sevnarayan, (2023) highlight another unfavorable aspect, the lack of real human interaction. Although ChatGPT can simulate human conversation, it is still an AI-based language model, and interaction with a virtual assistant may not offer the same experience of interaction and engagement as in a traditional classroom setting. The presence of the teacher and interaction among students are essential elements of the educational process that may be difficult to completely replicate through the use of ChatGPT.

Chen (2023) emphasize that ChatGPT may face challenges regarding less common languages or languages with complex grammatical structures. Additionally, it may not be fully adapted to different cultures and social contexts, leading to responses

that are not culturally sensitive or relevant. These limitations can affect the effectiveness of ChatGPT in serving a wide range of students in different educational settings.

The use of ChatGPT requires stable internet access and appropriate devices, such as computers or smartphones. This may pose a challenge for students who do not have adequate technological resources or have limited internet access. Relying on these resources may exclude certain groups of students, exacerbating educational inequalities (Naidu & Sevnarayan, 2023).

Constant concern about privacy and data security is also important. When interacting with a virtual assistant like ChatGPT, students may share personal and academic information. The security and privacy of this data are crucial issues that need to be considered. Educational institutions must adopt appropriate measures to protect students information and ensure compliance with data protection regulations (Naidu & Sevnarayan, 2023).

Although ChatGPT is capable of adapting to the students level of understanding, its personalization mechanism may still be limited. Each student has their own learning style and specific needs, and ChatGPT may not be able to provide complete personalized support to meet all these individual needs (Naidu & Sevnarayan, 2023).

In summary, although ChatGPT offers benefits and potentials in DE, it is necessary to consider the challenges and limitations associated with its use. Educators should be aware of these issues and use ChatGPT in a responsible and thoughtful manner.

## CHALLENGES AND PERSPECTIVES OF USING ChatGPT AS AN EDUCATIONAL RESOURCE: LESSONS LEARNED IN DISTANCE EDUCATION

DE has become increasingly popular as a flexible and accessible alternative for teaching and learning. With the advancement of technologies, new tools and educational resources like ChatGPT emerge, which can offer significant benefits in the educational environment. However, recent research has revealed that the interviewed students had no prior knowledge of ChatGPT and its possibilities as an educational resource, raising concerns about its underutilized potential in DE.

The research found that most interviewed students were unaware of the existence of ChatGPT or its capabilities as an AI-based virtual assistant. This indicates a lack of promotion and awareness about this innovative technology in the educational context. The absence of adequate information about ChatGPT may limit the adoption of this tool by educators and students, hindering the full utilization of its benefits in DE.

In addition to the lack of knowledge, students showed a limited perception of the possibilities of ChatGPT as an educational resource. Many mistakenly associated the virtual assistant only with common chatbots, without understanding its ability to generate human-like responses naturally and adapt to individual learning needs. This limited perception may lead to the underutilization of ChatGPT as an effective auxiliary tool in DE.

The lack of knowledge and perception about ChatGPT as an educational resource can have negative impacts on students learning experience in DE. By being unaware of the existence and benefits of this tool, students miss the opportunity to benefit from its ability to provide personalized support, detailed explanations of complex concepts, and adaptive interaction. These features can enhance student engagement, understanding, and autonomy, but they are neglected due to the lack of knowledge.

In the context of DE, the lack of knowledge and perception about ChatGPT as an educational resource highlights the need for additional efforts to promote dissemination and awareness of this technology. Educational institutions and educators play a crucial role in familiarizing students with available tools, including ChatGPT, and exploring its potential as learning resources.

It is essential to provide clear information about ChatGPT, its capabilities, and benefits to students, emphasizing how this tool can enhance their educational experience and develop essential skills for the current world. Additionally, conducting training and workshops to empower educators in devising strategies that enable the appropriation of generative AI as didactic and pedagogical resources is necessary.

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