SHORT PAPER

Ceci N'Est Pas Une Publication: The Art of AI-Generated Research Papers

Daniele Zolezzi(✉)

University of Genoa,
Genoa, Italy

daniele.zolezzi@edu.unige.it

ABSTRACT

The advent of Generative Artificial Intelligence (genAI) has significantly reshaped the educational landscape, heralding new prospects and concurrently introducing complex challenges. Mirroring the essence of René Magritte's iconic artwork *"Ceci n'est pas une pipe"*, where the depiction of a pipe is not actually a pipe, this publication is not a publication, at least not from the beginning. This article acts as a case study, showcasing the ability to generate coherent and pertinent AI-created content, while also drawing attention to its limitations in depth and diversity. Moreover, it underscores the facility with which such content can be produced. The paper culminates by examining the role of AI-generated content within the academic sphere, particularly highlighting the complexities involved in distinguishing AI-produced material from human-authored text.

KEYWORDS

Generative AI, education, GPT

1 INTRODUCTION

Artificial Intelligence (AI) has emerged as a groundbreaking force in the field of education, fundamentally reshaping the way we perceive and deliver learning and teaching. This technology, leveraging its cognitive capabilities, machine learning algorithms, and advanced computing power, has seamlessly integrated into educational contexts, challenging the traditional boundaries of pedagogy. AI's impact on education extends beyond mere task automation; it represents a profound transformation, offering personalized learning experiences, redefining curriculum design, and elevating student engagement and accessibility [1].

The integration of Artificial Intelligence (AI) into education heralds a transformative era in the approach and delivery of learning. In this section, we delve into the core of AI and its burgeoning role in reshaping educational paradigms, drawing from diverse scholarly sources to provide a comprehensive overview. In the realm of education, AI refers to the application of intelligent systems capable of performing tasks

that traditionally demanded human cognition. These tasks encompass interpreting intricate data, recognizing patterns, and making informed decisions. AI's capacity to process and analyze extensive datasets holds the promise of personalized learning experiences, tailoring educational content to individual students' needs and learning styles [2].

At its essence, AI in education harnesses intelligent systems capable of tasks traditionally reserved for human intelligence, such as understanding language, discerning patterns, or making decisions based on vast datasets. This transformative educational technology not only automates but actively participates in the learning process, rendering it more adaptive, inclusive, and effective [3]. The integration of AI in educational settings marks a new epoch where technology plays an integral role. In primary and secondary education, AI takes the form of intelligent tutoring systems and personalized learning environments. These systems adapt to individual learning patterns, offering tailored educational experiences that cater to each student's unique strengths and weaknesses. This adaptability ensures a more equitable and effective learning process, addressing diverse educational needs [4].

In higher education, AI's influence is profound and multifaceted. Universities and colleges employ AI for various purposes, including personalized course recommendations, data-driven insights for curriculum design, and AI-powered research tools. These applications provide nuanced insights into students' learning journeys, enhancing the quality and delivery of education. Nevertheless, the integration of AI in educational contexts extends beyond personalized learning. It encompasses a broader spectrum of applications, including administrative efficiency, enhanced engagement methods, and innovative pedagogical approaches. AI's ability to automate and optimize various administrative and learning processes can lead to more efficient and effective educational practices [5].

2 ANALYSIS OF EDUCATIONAL EXPERIENCES

Despite the myriad benefits, AI's integration in education is not without its challenges. Ethical concerns, such as data privacy, potential algorithmic biases, and the digital divide, pose significant hurdles. The manner in which AI systems handle sensitive student information and the possibility of perpetuating existing biases are major concerns. Additionally, disparities in access to AI technologies can exacerbate inequalities in educational opportunities, challenging the concept of equitable education. Promising as it may be, the implementation of AI in education is not without challenges. A primary obstacle is the lack of understanding and readiness among educators and policymakers regarding AI technologies. This knowledge gap and discomfort with AI systems often hinder their effective implementation in educational settings [6]. Moreover, the development and deployment of AI in education require reliable and high-quality data, often a challenge to obtain in educational contexts. Data quality and consistency are crucial for the effective operation of AI systems, representing a significant barrier to their widespread adoption [7].

Furthermore, the application of AI in education raises ethical concerns, particularly regarding data privacy and the potential for algorithmic bias. Addressing these ethical considerations is paramount to ensuring the responsible and equitable use of AI in educational settings, preventing the reinforcement of existing inequalities within the education system [8].

AI in education exemplifies technology's potential to transform traditional educational models. In primary and secondary schools, AI personalizes learning

experiences, while in higher education, it supports complex research and fosters dynamic learning environments. However, as we embrace this technological revolution, addressing accompanying ethical challenges is crucial to ensuring that AI serves as a tool for equity and inclusion in education. In light of these opportunities and challenges, this paper aims to analyze the various facets of AI's application in the classroom, highlighting its benefits and potential drawbacks. This comprehensive overview contributes to the ongoing discourse on AI in education, emphasizing the need for a balanced approach that harnesses AI's benefits while addressing its inherent challenges.

In the realm of education, the advent of Artificial Intelligence (AI) marks a transformative era, redefining the educational experience at various levels. The integration of AI into educational settings encompasses a wide array of applications, each contributing distinctively to the enrichment of learning and teaching experiences [2]. AI-driven personalized learning systems, a salient feature in modern educational platforms, are designed to offer a customized learning experience by analyzing individual student data. This approach caters to specific learning needs and ensures adaptability and inclusiveness in education.

In the context of assessment and feedback, AI has brought about a revolution in traditional methods. Automated essay scoring and feedback mechanisms, underpinned by natural language processing, provide immediate and personalized responses to student submissions [9]. This innovation is a significant stride towards enhancing the efficiency and efficacy of the assessment process.

In higher education, the impact of AI is profound and multifaceted. Universities and colleges are employing AI for various purposes, including personalized course recommendations, data-driven insights for curriculum design, and AI-powered research tools. These applications provide nuanced insights into students' learning journeys, enhancing the quality and delivery of education.

Despite these advancements, AI's integration in education is met with challenges, notably ethical concerns around data privacy and potential algorithmic bias. Ensuring the ethical use of AI in educational settings is paramount to avoid reinforcing existing inequalities within the education system [10]. Additionally, the digital divide poses a significant challenge, highlighting the need to address accessibility and equity in AI deployment [9]. As AI technologies evolve, their role in transforming educational experiences and outcomes continues to expand. The future trajectory of AI in education is promising, with potential applications ranging from augmented reality to sophisticated analytics [2]. As AI technologies evolve, their role in transforming educational experiences and outcomes continues to expand [11].

3   CONCLUSIONS? MAYBE NO

"Ceci n'est pas une pipe" is an oil painting on canvas created by René Magritte in 1929 and currently housed at the Los Angeles County Museum of Art. The Belgian artist asserted that the pipe depicted in his work was not an actual pipe but rather an image of a pipe deliberately crafted by the artist [12]. The article you have read thus far is based on the same concept. None of the content you have encountered up to this point was authored by me, the article's writer. The text in the *"Introduction"* and *"Analysis of Educational Experiences"* sections was entirely generated by a Generative Artificial Intelligence. Human input was solely responsible for directing the text's creation using various prompts to guide the model, which has been trained with relevant knowledge to produce the concise text. Just as with

the pipe portrayed in Magritte's artwork, what you have read does not constitute a publication. Instead, it serves as a demonstration of how one can easily and quickly generate articles, often without any prior knowledge of the subject matter. Subsequent sections will illustrate how the text was generated and analyze the content produced, shedding light on its potential impact on the future of academic scientific article creation.

4 METHODOLOGY

The composition of the article you've read thus far has adhered to a series of simple procedures, easily reproducible by anyone. To commence, a meticulously crafted GPT, trained using scientific articles pertaining to Artificial Intelligence, was employed. The establishment of this GPT was facilitated through the utilization of the *"My GPTs"* feature offered by *OpenAI,* which is accessible through a subscription to GPT-4 [11]. By opting for the *"Create a GPT"* selection, you gain access to the *"Create tab",* enabling interaction with the *"GPT Builder"* to generate a novel GPT [13]. This freshly created GPT will undergo training grounded in the imparted knowledge and will operate in alignment with the provided instructions to shape its response behavior. In the *"Instructions"* section within the GPT configuration, the primary function set was: *"Analyze the provided articles and return appropriate paragraphs for high-quality scientific articles in the English language".* This directive enables the GPT to operate with a clear understanding of its objective. Consequently, the GPT will analyze the subsequently provided articles, extract relevant information for the creation of scientific articles, and ensure it possesses the necessary language proficiency for the generated texts.

The subsequent step involved the creation of the foundational knowledge for the GPT. The underlying concept of this experiment was to generate a credible and content-valid article without any human intervention in the text itself, but solely by guiding the AI through prompts when it didn't adequately respond to the request. To establish a knowledge base for the GPT, from which to extract information to assemble within the article, content related to the core topic of the publication was selected without prior content control. To achieve this, I chose to access *"Google Scholar",* a free service where journal articles, technical reports, theses, books, and academic sources can be found [14]. The GPTs that can be created within *OpenAI's* *"GPT Builder"* are capable of accommodating up to twenty files in the *"Knowledge"* section, where they are all stored. These files can be uploaded directly in PDF format to streamline the platform's upload process and facilitate subsequent reading by the model. The criteria employed for the selection of articles uploaded to the *"Knowledge"* section were as follows:

- Articles had to be published from 2023 onwards. This criterion was chosen to ensure that the knowledge embedded within the GPT remains as current and up-to-date as possible.
- Articles were arranged in order of relevance to the keyword.
- Only scientific articles were taken into consideration.
- The top twenty Open Access articles available on *"Google Scholar"* that matched the search term *"Artificial Intelligence in Education"* as of January 16, 2024, were considered. Consequently, articles requiring payment for access and books were excluded. Based on these choices, the following scientific articles were selected to be included within the GPT [1]–[4], [15]–[30].

Additionally, the GPT was set up to prevent it from accessing web information, thanks to the "Web Browsing" option being disabled. This ensured that all the information incorporated into the text would exclusively come from the previously uploaded PDFs.

After the preparation, we moved on to using it for the actual writing of the article. The original prompt that was used to generate the first text you have read is as follows:

"I am planning to create a scholarly paper that will focus on the role of Artificial Intelligence within the field of education. This paper is expected to have a minimum word count of 5000 words, excluding the bibliography. The paper's structure will consist of an introduction that will provide an in-depth explanation of the concept of artificial intelligence and its integration into educational contexts, which will be approximately 1000 words in length. Following that, there will be an analysis section covering the current applications of AI in both school and university education, drawing from various sources without the necessity for a point-by-point presentation, which will be approximately 4000 words long. The paper will be written in English and will be tailored for potential publication in a high-quality scientific journal. When incorporating citations from external sources, it is essential to include proper in-text citations to clearly attribute the information to its source.

The paper will be divided into three main sections, as previously mentioned:

1. *'Introduction': This section will provide a comprehensive overview of the essence of artificial intelligence and its impact on the educational landscape.*
2. *'Analysis of Educational Experiences': In this section, I will collect and present data and insights from various sources found within the 'Knowledge' texts, avoiding the need for a point-by-point breakdown.*
3. *Finally, the bibliography will be meticulously compiled based on the texts referenced and utilized throughout the paper."*

5   ANALYSIS OF GENERATED TEXT AND HIGHLIGHTED ISSUES

The generated text underwent numerous revisions due to the GPT's occasional inability to respond accurately to the provided prompts. The primary issue arose when crafting citations within the text and subsequently constructing the bibliography. On many occasions, the GPT completely omitted proper attribution to the sources from which it had extracted information and even failed to create the bibliography.

Moreover, upon thorough examination of the text, it became evident that the GPT made use of only a small portion of the information available in its *"Knowledge"* section, thus failing to fully utilize the extensive dataset provided. The generated text made reference to ten articles, with four of them directly cited from the documents provided to the GPT, while the remaining six citations were derived from texts cited within the documents previously uploaded to the GPT.

Another issue encountered pertains to the word count produced by GPT for each section of the text. Despite the request for an introductory section of around a thousand words and four thousand for the analysis of educational experiences already developed, the system never managed to come close to these quantitative requirements, always providing much shorter versions of the requested text.

Despite the substantial amount of information provided to the system, it arbitrarily chose not to consider most of the documents, resulting in a missed opportunity to

establish logical connections between works of different natures but with the same topic. This process led to a text that is credible but relatively deficient in information and not particularly enriched with diverse perspectives. The text tends to revisit similar concepts across various sections, repeatedly addressing the same topic with minor variations but without providing any substantially new information. This repetitiveness could be attributed to the text generation approach, which relies on models that reprocess similar ideas in marginally different manners, but fail to significantly advance the discussion of the topic. Additionally, certain sections of the text appear completely disjointed and lack a logical sequence, making it challenging for the reader to comprehend.

The text produced is overall plausible, but it exhibits clear structural defects. It is noticeable how the text places excessive emphasis on certain topics while completely neglecting others. A striking example is the continual revisiting of the issue of the ethical use of genAI, which can lead to problems such as data privacy breaches and the creation of algorithmic biases. Despite repeated attempts to modify the content generation prompt, GPT was unable to vary its approach, resulting in repetitions in the exposition of the topic, as can be seen in the section "Analysis of Educational Experiences.". Although the topic is revisited throughout the text, the challenges and ethical considerations are addressed less comprehensively than the benefits of AI in the educational field. This imbalance may leave the reader with a somewhat skewed perspective of the subject. A more balanced and in-depth exploration of the challenges, risks, and ethical implications would render the text more holistic and unbiased.

Although the text offers a general overview of Artificial Intelligence in the educational field, it falls short in providing detailed specifics or tangible examples that showcase the actual implementation of these technologies. The lack of in-depth information and specific case studies reduces the text's effectiveness and usefulness for readers in search of practical insights or thorough analysis. Considering the technical complexity of the subject, enriching the text with more precise technical terminology and detailed descriptions of AI processes would enhance its quality. Incorporating specialized vocabulary and comprehensive technical explanations would substantially elevate the content, making it more applicable and informative for a knowledgeable audience.

The final step of the analysis involved running the text through a plagiarism detection system to verify that the generated content was not identical to the referenced source materials. I utilized *Compilatio.net* [31], a plagiarism detection software, which is adept at identifying textual similarities to prevent academic plagiarism in theses and scholarly papers. This system flagged a 5% similarity with its existing document database. However, upon a more detailed inspection of the "Sources with incidental similarities", it became apparent that the identical words contributing to this percentage were exclusively from the titles of papers listed in the bibliography, and not present in the main body of the generated text. This highlights the current challenges in pinpointing the use of AI in text creation.

6   CONCLUSIONS

Generative Artificial Intelligence offers significant potential for aiding and supporting academic work. However, it currently lacks the capability to independently produce scientifically valid contributions that could enhance research. Evidence from ongoing experiments clearly indicates that, at present, it can be

used as a research aid through its text summarization abilities and information retrieval features, but it is not yet able to autonomously write valid scientific contributions.

The content of this paper, generated by an AI model, demonstrates both the strengths and weaknesses of current AI technology in academic writing. Although the model is capable of producing coherent and contextually appropriate text, it encounters difficulties in maintaining a consistent depth of analysis and frequently resorts to repetitive patterns. This highlights the crucial role of human supervision in the process of creating AI-generated academic content.

Moreover, employing AI in text generation brings to light significant ethical issues. The plagiarism analysis performed on this text underscores the difficulty in differentiating between content created by AI and that written by humans, stressing the importance of transparency and proper citation in academic work.

In conclusion, AI offers both opportunities and challenges in the educational sector. As AI technology continues to advance, its role in education is expected to grow, necessitating active engagement from the academic community. This involvement is essential to ensure that AI becomes a tool that not only enhances educational quality but also promotes equality and excellence.

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8 AUTHOR

Daniele Zolezzi is a PhD Student in Digital Humanities at the University of Genoa, Italy. His research focuses on Gamification, Serious Games, Virtual Reality, and Generative Artificial Intelligence (E-mail: daniele.zolezzi@edu.unige.it).