

# GENERATIVE ARTIFICIAL INTELLIGENCE – A THREAT TO THE EDUCATION SYSTEM?

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## **ABSTRACT: Generative artificial intelligence - a threat to the education system?**

This article addresses the use of artificial intelligence in education. Although the concept of artificial intelligence is not new, concerns about the implications of this topic have intensified with the advent of conversational models, also called generative artificial intelligence, capable of processing a large volume of information available on the internet and generating human-like answers to questions the user poses. The emergence of these systems has raised questions among teachers who are no longer certain that the work required of students is either written by them or obtained through artificial intelligence, and with these questions have also come calls for a ban on the use of chatbot systems by students. In the paper we look at the possible benefits of using AI in education, but also the challenges that artificial intelligence brings. In a world where the sheer volume of information available in any field exceeds the human capacity for assimilation or analysis, artificial intelligence can help us in synthesizing this information, in providing a starting point in the study of a particular topic. It is essential that starting with this information, the students seek further information, deepen the analysis, and write the research paper. It is natural that these systems that have recently emerged in public life and in the educational sphere should create unease and uncertainty among teachers but banning them is not the solution. The conclusion that must be drawn is that the only wise and effective response of teachers to the use of artificial intelligence is to introduce students to both its benefits and limitations, to encourage critical thinking, evaluation, and processing by the human user of any information provided by the chatbot.

**Keywords:** *artificial intelligence, generative artificial intelligence, chatbot, ethics, education.*

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## Introduction

Although the concept of artificial intelligence (AI) has only relatively recently come to the attention of the public (particularly with the advent of conversational models), the term itself seems to have been used as far back as 1955 by John McCarthy, assistant professor at Dartmouth College, who defined AI as “making a machine behave in ways that would be called intelligent if a human were so behaving.”<sup>1</sup>

During the recent years the artificial intelligence (AI) advanced very much. This progress impacted our entire life and also the educational system, particularly through the emergence of conversational models, also called generative artificial intelligence (GAI), capable of processing the large volume of information available on the Internet and generating human-like answers to the questions the user asks. The emergence of these systems has raised questions among teachers, who are no longer certain that the work required of students is either their own or is derived from artificial intelligence. This is even more so as younger generations are adapting much more readily to advances in AI than some of their teachers are. Even if the chatbots are spectacular for the large public, we must be aware the possibilities to use the AI in education are much wider. We will review other possible uses and their implications throughout the paper.

The ethical aspects of using AI in education creates concerns and debates and most educators are preoccupied on how to detect or block the using of this technique in research papers. In what follows, we aim to explore the possibilities of using artificial intelligence in educations taking into account the dangers as well as the opportunities.

## Explaining artificial intelligence

Artificial intelligence is represented by the theories, methods, approaches that assist machines and particularly computers in analyzing, simulating, exploiting and exploring human thought processes and behaviors<sup>2</sup>. Since

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1 J. McCarthy, M.L. Minsky, N. Rochester, C.E. Shannon, *A proposal for the Dartmouth summer research project on artificial intelligence*, available at <http://jmc.stanford.edu/articles/dartmouth/dartmouth.pdf> (accessed at 10.05.2023).

2 Yang Lu, “Artificial intelligence: A survey on evolution, models, applications and future trends”, in *Journal of Management Analytics*, 6(1)/ 2019, DOI: 10.1080/23270012.2019.15703.

time immemorial, human beings have tried to discover possibilities to make their work easier, first physically and then intellectually. Such machines evolved from performing simple repetitive operations to solving problems, understand human language, in other words imitating human intelligence very closely. The huge growth in the volume of information in all fields, which exceeds the capacity of the human brain to assimilate, process and synthesize it, also increase interest for this area.

It is not the purpose of this paper to present the technical details of AI development. Rather, we want to understand the impact it has on our lives and especially on teachers and students in the educational process.

Artificial intelligence has long been pervasive in our lives, but the interest of the public and education stakeholders has grown with the development of ChatGPT-like conversational models capable of answering incoming questions in a similar (sometimes superior) way to a human being. Some of the ChatGPT features are already used in search engines, translation software or customer services of various companies. But we used them with the feeling that we understood how it worked and that these activities remained within well-defined and controllable limits. Conversational models go beyond these limits, and it is to some extent normal to create concern and suspicion.

What does ChatGPT bring to the table compared to previous forms of artificial intelligence? Chatbots use natural language processing techniques (NLP), which allow them to understand and interpret questions asked by human users<sup>3</sup>. Its availability to the large public and its surprising performance has led ChatCGT registering more than one million unique users only in its first week of use<sup>4</sup>. While users were initially fascinated by the way ChatGPT can answer simple questions, including understanding some subtleties of language, they later discovered that it can also perform more advanced tasks, including writing essays on given topics in a professional language. From initial essays of a few hundred words, much more extensive work can be achieved by breaking down the main topic into

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3 Brady D. Lund, Ting Wang, Nishith Reddy Mannuru, Bing Nie, Somipam Shimray, Ziang Wang, "ChatGPT and a new academic reality: Artificial Intelligence-written research papers and the ethics of the large language models in scholarly publishing", in *Journal of the Association for Information and Technology*, 71 (5)/2023, 570-581, <https://doi.org/10.1002/asi.24750>.

4 Idem.

smaller topics and putting together all the "essays" written by ChatGPT on the required topics.

### **Does GAI jeopardies the quality of the education process?**

From the beginning we must realize that, whatever objective or subjective answer we give to the above question, the development of AI will not be stopped and neither will its influence on the education system.

Chatbots have created unrest especially because of their ability to generate answers to users' questions that are very close to human language. Who can guarantee the originality of research papers written by students and, why not, even by researchers? While the problems raised by the use of artificial intelligence in scientific research are beyond the scope of this article, we will focus on the its use by students.

Manufacturers of plagiarism detection software will no doubt be busy developing solutions to meet this demand, but the solutions will not be perfect and will be expensive. More effective might be to adapt the requirements of teachers to the challenges posed by AI.

First, we can use the opportunities that AI offers. In a world where the volume of information is growing exponentially, and our physical and intellectual limitations do not allow us to encompass all the knowledge produced in a field, why not use AI's ability to synthesize information that already exists in the virtual environment? A chatbot such as ChatGPT can help to compile a preliminary bibliographic list on a given topic or even a *literature review*. What we need to develop in our students is critical thinking - the ability to analyze, evaluate, check the information received to decide whether it is trustworthy. The starting point of a research paper may be the information provided by the chatbot (which most students will call on, whether we allow them to or not) but it is essential that the information is verified, processed, developed.

Both teachers and students need to be trained on the functioning and limitations of a chatbot. ChatGPT, for example, uses, according to the description on the main page, information up to the year 2021, which can create inaccuracies with the information provided on certain topics.

The veracity of the information cannot be guaranteed, as there are cases where various errors have been detected. Even less can we guarantee that the information provided on a particular subject is complete. For this

reason, it is essential that the researcher analyze the information, complete it and search for all relevant bibliographic sources on a given subject. As the texts generated by chatbots are based on existing information in the online environment, and this information is not always correct, in the absence of a careful human analysis there is a possibility of misinformation being disseminated.

Another limitation of chatbots is that they cannot generate new information but can only synthesize existing information. This means that we cannot use these systems to conduct authentic research. At the same time, we cannot neglect the help and time savings we can get to synthesize what is already known on the subject.

Asking for an essay on a particular topic is very likely to produce a paper without bibliographic references, as can be seen in Annex 1, where we asked ChatGPT to "write an essay on the impact of religious freedom on economic development". As it can be noticed, the result does not contain bibliographic references, and that is a serious issue in terms of academic ethic. The other request to write an "essay on the impact of religious freedom on economic development with bibliographic references" produced a result with bibliographic references (Annex 2), but these references need to be checked and supplemented with others if necessary. Studies of ChatGPT performance have identified instances where references were inaccurate or even made up<sup>5</sup>, requiring careful checking of the sources provided. While checking the accuracy of the bibliographic sources provided is relatively straightforward, it is more complicated to identify sources when they are not mentioned, and we have no clue about the starting point. Since ChatGPT only processes existing information, it is clear that it is not original, and the mention of sources is necessary. Even stating "this text was generated using artificial intelligence" or using ChatGPT as a bibliographic source, although necessary, does not solve the problem of correctly and accurately indicating the bibliographic material used.

Students also need to be made aware of the possible errors of chatbots in solving tasks. Although ChatGPT "skills" include solving math problems, Appendix 3 shows such a completely erroneous solving of a 7th

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5 David Baidoo-Anu, Leticia Owusu Ansah, "Education in the Era of Generative Artificial Intelligence: Understanding the Potential Benefits of ChatGPT in Promoting Teaching and Learning", 2023. Available at SSRN: <https://ssrn.com/abstract=4337484> or <http://dx.doi.org/10.2139/ssrn.4337484> (accessed on 12.06.2023)

grade geometry problem. Although the solution provided uses correct theorems and mathematical formula, creating the appearance of a correct answer, in reality, careful analysis of the solution quickly identifies errors. It is a great gain if we manage to convince our students of the need to critically analyze the information provided by the chatbot and use it only as a starting point in solving the tasks set by the teacher.

## Benefits and challenges of using GAI in education

Chatbots such as ChatGPT can assist students and researchers in translating their work or in the editing process, without violating ethical rules. Depending on the request, ChatGPT can, for example, correct a text and rewrite it in a more appropriate way (without interfering with the content) or even provide explanations for the changes made, helping the author of the request to improve their editing or foreign language skills.

For teachers, such apps can save time in the assessment process by creating tests or marking them. Hwang and Chen present examples of the use of ChatGPT in the development of essay grading rubrics and illustrate the importance of appropriately formulating prompts to achieve the best results<sup>6</sup>. Chatbots can also be used by teachers as a starting point for lesson plans or for adapting lesson plans for students with special educational needs. These students, in turn, can benefit from the chatbots to get additional support outside the classroom for a better understanding of the subjects.

In China, AI has been used in some schools to monitor how attentive students are in class through facial recognition technology, which analyzes every student movement recorded by three cameras above the blackboard<sup>7</sup>. Obviously, such uses also involve ethical considerations that need to be considered and regulated.

Luckin et al. summarize in a 2016 article<sup>8</sup> three areas of application

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6 Gwo-Jen Hwang, Nian-Shing Chen, "Editorial Position Paper: Exploring the Potential of Generative Artificial Intelligence in Education: Applications, Challenges, and Future Research Directions", in *Educational Technology & Society*, 26(2)/ 2023, [https://doi.org/10.30191/ETS.202304\\_26\(2\).0014](https://doi.org/10.30191/ETS.202304_26(2).0014) (accessed on 17.05.2023).

7 Wayne Holmes, Maya Bialik, Charles Fadel, *Artificial Intelligence in Education. Promises and Implications for Teaching and Learning*, Boston, The Center for Curriculum Redesign, 2019.

8 Rosemary Luckin, Wayne Holmes, Mark Griffiths, Laurie B. Forcier, *Intelligence un-*

of artificial intelligence in education: personalized mentoring, intelligent support for collaborative learning, and intelligent virtual reality. One-to-one mentoring is extremely useful in education and involves knowing each student's individual journey and guiding them accordingly. Artificial intelligence can synthesize a larger volume of data and is less expensive than human mentoring. There is no doubt, however, that human interaction cannot be replaced by a computerized system, but it has undoubted advantages, especially for schools and universities with very large numbers of students, to whom they cannot provide individual support. In terms of collaborative learning, AI can be particularly useful in online environments, by facilitating and synthesizing discussions between participants. As for intelligent virtual reality, it can be very useful in the training process by providing a similar experience to the real one. Virtual labs can also be carried out, various techniques can be practiced with much lower costs and risks than in the real environment.

From an administrative point of view, AI can be used to reduce staff costs in the student admissions process, in secretarial work or in library services. The major disadvantage remains the lack or reduction of human interaction, but in the case of large numbers of students, the efficiency gains may outweigh this disadvantage.

An important challenge remains the development of clear ethical rules that prevent the use of chatbot-generated texts as original work by students or researchers. Another ethical challenge is unequal access to the benefits that AI brings. Like online schooling during the COVID 19 pandemic, AI involves access to the internet, to technology, and creates inequalities that have to be analyzed and solved. The recent debates create hopes that in the near future we will have clearer rules on these issues. For example, in 2018 the University of Buckingham founded The Institute for Ethical AI in Education with the purpose to develop an ethical framework for the use of AI in education. This Institute produced a set of principles connected with this purpose, principles that focus on the students' best interest, on equity, on respecting privacy as well as human diversity, on the necessity to understand how AI works before using in in educational contexts<sup>9</sup>.

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*leashed - an argument for AI in education*, London, Pierson, 2016.

9 The Institute for Ethical AI in Education, *The Ethical Framework for AI in Education*, available at: <https://www.buckingham.ac.uk/wp-content/uploads/2021/03/The-Insti->



Such an ethical framework is an important starting point especially in raising awareness of the complexity of the implications of AI, but there is still much to be done to put these principles into practice and to ensure that AI is used for the benefit and not against the beneficiaries of education.

## Conclusions

There will certainly always be two categories of users of ChatGPT-like conversational models - those who will use them to minimize their own effort in ways that will violate ethical rules, and those who will use them to increase the quality of their work, to identify additional bibliographic resources, to refine their writing style, to get more guidance in topics they do not fully understand. An important role in this respect is played by teachers who should guide and motivate students in the correct use of these applications.

The reason I addressed this topic up in the context of a religious freedom conference is because there is quite a lot of talk today about banning the use of chatbot systems by students or researchers. I think such an approach is wrong, similar to the banning of Bible reading in the Middle Ages or the opposition to scientific knowledge in certain historical periods. Young people are attracted to technology, and we will not be able to effectively restrict their access to it. Moreover, we cannot stop the progress of artificial intelligence and it is not right to limit users' access to the benefits it brings. Until recently, when students wanted basic information on a lesser-known subject, they went to Wikipedia. We have never banned this, but we have clearly explained its limitations. They will probably now access ChatGPT, which will give them more information than Wikipedia. We cannot ban access to knowledge, which is a right of every individual. But we need to train students in the use of these tools. We must show them their limitations, the possibility of receiving erroneous or incomplete information, teach them to critically analyze the information they receive, design tasks that force them to make their own effort, to study individually, and check how they have internalized the correct information obtained through artificial intelligence. We need to recognize that contemporary generations have both the privilege and the challenge of navigating a huge



volume of information. AI can facilitate this navigation, and our task is to provide them with the principles necessary to make this navigation safe and lead to genuine results. It is also our task as teachers to identify effective ways of checking how our students have mastered and can use the information we provide or that they obtain through AI.

It is also very important that they become aware of the need to form their own system of thinking and to understand their interest area in order to act correctly and effectively. For example, GAI has definite benefits in the medical field, but in order to treat a patient correctly and effectively it will never be enough to request the ChatGPT treatment scheme, because it lacks complex medical knowledge and the ability to corroborate all the information about the medical condition of a patient. The same is true in all areas that do not only involve performing standard tasks but must take into account the complexity and particularities of each individual situation.

The use of AI/GAI, like uncontrolled internet surfing, can produce negative effects - reduced capacity for effort, superficiality, reduced ability to analyze a subject in detail, etc. We have no other solution to avoid these negative effects than to motivate and guide our students properly in a world that is becoming increasingly digitized, without any of us being able to stop this process. Within the education system, in a society where technology is increasingly replacing human intervention, the need for guidance and mentoring from teachers to help students cope with the challenges that technology brings to their lives is increasing. At the same time there is a need to conduct research into the effects of AI on student performance and to further identify and test effective ways of using AI in education.

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write an essay on the impact of religious freedom on economic development



Title: The Impact of Religious Freedom on Economic Development



#### Introduction:

Religious freedom is a fundamental human right that allows individuals to practice and express their beliefs freely. It serves as a cornerstone of democratic societies and has far-reaching implications, including its impact on economic development. This essay explores the intricate relationship between religious freedom and economic growth, highlighting how the presence of religious freedom fosters social harmony, encourages innovation, promotes entrepreneurship, and attracts foreign investment. By examining various case studies and theoretical perspectives, it becomes evident that religious freedom plays a crucial role in stimulating economic development.

their faith without fear of persecution or discrimination, a sense of inclusiveness and cooperation prevails. This social cohesion provides a stable foundation for economic development, as it reduces conflicts and fosters peaceful coexistence. In such environments, businesses can flourish, investors feel secure, and consumers have confidence in the market, all of which contribute to sustained economic growth.

#### Encouraging Innovation and Creativity:

Religious freedom encourages innovation and creativity by fostering an environment where individuals are free to think independently and pursue new ideas. The open exchange of diverse religious beliefs and philosophical perspectives can inspire intellectual curiosity and breakthrough discoveries. Scholars argue that religious freedom nurtures a culture of critical thinking and intellectual freedom, which are essential for scientific advancements and technological progress. Countries that protect religious freedoms often exhibit higher levels of innovation, which, in turn, drives economic development through the creation of new industries and the improvement of existing ones.

principles of successful entrepreneurship. Moreover, religious communities frequently provide social networks and support systems that facilitate business development and create opportunities for economic growth. Entrepreneurial ventures, in turn, generate employment opportunities, enhance productivity, and contribute to overall economic prosperity.

**Attracting Foreign Investment:**

Religious freedom serves as an attractive factor for foreign investors seeking stable and prosperous markets. Countries that protect religious freedom are more likely to foster an inclusive and tolerant society, which appeals to global businesses. Investors often consider social stability, respect for human rights, and the absence of discrimination when deciding where to invest their capital. Nations that prioritize religious freedom signal a commitment to a pluralistic and open society, thereby attracting foreign direct investment (FDI) and encouraging economic growth.

**Case Studies and Empirical Evidence:**

Several case studies and empirical evidence support the positive correlation between religious freedom and economic development. For instance, the United States, known for its robust protection of religious freedom, has witnessed substantial economic growth throughout its history. Similarly, countries like Canada, Australia, and many European nations have leveraged their commitment to religious freedom to build prosperous economies.

Conversely, countries with restrictive religious policies often experience social unrest, economic stagnation, and limited foreign investment.

**Conclusion:**

Religious freedom is not only a fundamental human right but also a catalyst for economic development. The ability to freely practice and express religious beliefs contributes to social harmony, encourages innovation and creativity, promotes entrepreneurship, and attracts foreign investment. Nations that protect religious freedom create an environment that fosters stability, encourages intellectual pursuits, and stimulates economic activity. As governments and societies continue to recognize the importance of religious freedom, its positive impact on economic development is likely to grow, leading to a brighter future for nations embracing this fundamental value.

## ANNEXES

### Annex 1

ChatGPT result when asked to write an essay on the impact of religious freedom on economic development.



write an essay on the impact of the religious freedom on the economic development with bibliographic references



Title: The Impact of Religious Freedom on Economic Development



#### Introduction:

Religious freedom, the right to practice and express one's religious beliefs without interference, is a fundamental aspect of human rights. While religious freedom holds significant social and cultural implications, it also has a profound impact on economic development. This essay explores the relationship between religious freedom and economic development, highlighting the various ways in which religious freedom positively influences economic growth, entrepreneurship, social cohesion, and overall societal well-being.

#### 1. Religious Freedom and Economic Growth:

Numerous studies have shown a positive correlation between religious freedom and economic growth. A comprehensive analysis by Barro and McCleary (2003) found that countries with higher levels of religious freedom experienced more robust economic growth rates. This correlation is attributed to several factors, including the promotion of social stability, respect for property rights, and the fostering of trust and cooperation within communities.

#### 2. Entrepreneurship and Innovation:

Religious freedom plays a vital role in fostering entrepreneurship and innovation. A study by Rupasingha and Chilton (2013) indicated that religious freedom positively affects self-employment rates, which, in turn, contribute to economic development. Religious beliefs often promote values such as diligence, thrift, and honesty, which are conducive to entrepreneurial activities. Moreover, religious networks and institutions provide a supportive environment for business startups and encourage philanthropic endeavors, further enhancing economic growth.

#### 3. Social Cohesion and Trust:

Religious freedom also plays a significant role in promoting social cohesion and trust within societies. Research by Grim and Finke (2010) suggests that societies with greater religious freedom experience lower levels of corruption, higher levels of trust among citizens, and stronger social capital. This social cohesion translates into economic benefits by fostering cooperation, reducing transaction costs, and facilitating trade and investment.

#### 4. Human Capital and Education:

Religious freedom can positively impact human capital development and education. Studies have shown that religious schools and institutions often play a crucial role in providing quality education, especially in developing countries. A report by Toft et al. (2011) highlights the positive correlation between religious freedom and educational outcomes, as religious institutions often fill gaps in educational provision and promote literacy and skills development. This, in turn, leads to a more productive and educated workforce, driving economic growth.

Regenerate response



## 5. Tourism and Cultural Heritage:

Religious freedom can also have a direct impact on tourism and cultural heritage, thereby contributing to economic development. Countries with diverse religious sites and traditions often attract tourists, generating revenue and creating employment opportunities. The preservation and promotion of religious freedom encourage the conservation of historical sites, traditions, and cultural practices, making them significant economic assets.

## Conclusion:

Religious freedom is not only a fundamental human right but also a catalyst for economic development. It promotes social stability, trust, and cooperation, fostering entrepreneurship, innovation, and economic growth. Additionally, religious freedom contributes to the development of human capital, enhances educational outcomes, and supports tourism and cultural heritage. Understanding the positive relationship between religious freedom and economic development can aid policymakers in formulating strategies that promote both individual liberties and economic prosperity.

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## Annex 2

ChatGPT result when asked to write an essay on the impact of religious freedom on economic development with references.

Let ABC be the triangle with angle  $A=135^\circ$  and points D,E on side BC such that AD is perpendicular to BC,  $CD=6$  cm,  $CE=8$  cm and  $AE=4$  cm. a) Prove that triangle AEC is right angled. b) Calculate the length of segment BE

To prove that triangle AEC is right-angled, we need to show that the square of the length of the longest side (the hypotenuse) is equal to the sum of the squares of the other two sides. Let's proceed with the proof.

a) Proving triangle AEC is right-angled:  
We have triangle ABC with angle  $A = 135^\circ$ . Since AD is perpendicular to BC, triangle ADB is also right-angled at D. Now, let's consider triangle ADE.

In right-angled triangle ADE:  
 $AD^2 + DE^2 = AE^2$  (by the Pythagorean theorem)

Substituting the given values:  
 $AD^2 + DE^2 = 4^2$   
 $AD^2 + DE^2 = 16$

We know that  $AD = CD = 6$  cm. So,  $AD^2 = CD^2 = 6^2 = 36$ .

Substituting these values:

$$36 + DE^2 = 16$$

Rearranging the equation:

$$DE^2 = 16 - 36$$

$$DE^2 = -20$$

However, we cannot have a negative value for a squared length, so this equation has no real solutions. This implies that the given triangle AEC cannot exist, and therefore, triangle AEC cannot be right-angled.

b) Since triangle AEC cannot exist, we cannot calculate the length of segment BE.

Please double-check the given information and ensure its accuracy.