



# CHATGPT AND THE WORLD OF EDUCATION: VISUALIZATION OF PUBLICATIONS

SÓS, ESZTER<sup>1</sup>

## ABSTRACT

The emergence of ChatGPT has brought significant challenges in the field of education. The use of ChatGPT for assignments among students spread in no time, which was something that educators were not prepared for. For this reason, the focus has been on learning about the use of ChatGPT from the student side, since in order to detect its use, it is necessary to be aware of the areas and methods of its use and to know the dangers of its use. The large number of studies on this topic suggests that there is interest among educators in the use of ChatGPT in education. The number of publications can be used to show the pace at which the number of papers on ChatGPT and education is growing in the academic world. Furthermore, it would point out that while the use of ChatGPT can be beneficial in many areas, there are some areas where human thinking is essential.

**KEYWORDS** ChatGPT, higher education, cognitive bias, VosViewer

## 1. Introduction

In order to identify the use of ChatGPT in higher education, it is first necessary to describe the areas in which it can be used as a student in higher education. Then I briefly describe how ChatGPT works and its applications in education. This is necessary because, to be able to check the work of students as a lecturer, it is necessary to know the areas in which it can be used. After that, I introduce the cognitive biases in human-machine systems, namely the dangers of decisions made while using ChatGPT.

To give an adequate representation of the extent of interest in the use of ChatGPT in education, I present the number of publications in ScienceDirect, Scopus, and Web Of Science databases for the keywords ChatGPT and education, which I also narrow down to the keyword higher education. Finally, I

<sup>1</sup> Assistant Lecturer at Széchenyi István University, Audi Hungaria Faculty of Vehicle Engineering, Department of Logistics and Forwarding, Győr, Hungary.

represent the difference between the answers given by ChatGPT and a visualization made with VosViewer in terms of research work. Ease of Use.

## 2. What is CHATGPT and how does it work?

ChatGPT (Generative Pre-trained Transformer) is a language model ([OpenAI, n.d.](#)) that can be used to generate texts. You have to write instructions in the window to communicate with it in writing. The instructions issued to ChatGPT are called prompts. Clarifying and rewording the instructions helps the ChatGPT respond more accurately.

In this paper, I have focused on the information related to the free version because I assume that the majority of students and lecturers use this version.

An introduction to the 4 steps ([Juhász & Szekrényi, 2023](#)) related to the operation of ChatGPT is necessary to understand the basis on which it generates the answers. The first 3 steps are referred to by the abbreviation GPT in the name.

Generative, which stands for generating new content. The dataset used for this is based on 45 TB of data, plus unpublished literature ([Meeus & Lehtinen, 2023](#)).

Pre-trained, which means pre-training, ranking, that is, the categorization and filtering of data by humans, which means filtering out biases, takes place in this phase.

Transformer, which means searching for correlations and drawing conclusions ([Shahriar & Hayawi, 2024](#)). In other words, in this phase, it narrows down the 45 TB by different categories, thereby becoming more confident. From here onwards it will give a pretty good answer.

Feedback: reinforcement learning ([Lin, 2024](#)) – i.e. the basic system receives feedback and learns. So, the more “prompts” are used to narrow a topic, the more accurate the ChatGPT will be.

## 3. How to use ChatGPT for learning?

ChatGPT is very popular among students to complete assignments, but teachers also use it to generate new ideas ([Waxman, 2023](#)). Students use it to save time when searching for information and solving assignments ([Wandelt et al., 2023](#)), ChatGPT also performs well in medical question-answering tasks, performing at the level expected of third-year medical students in the primary competency of medical knowledge ([Gilson et al., 2023](#)).

There are also disadvantages associated with the use of ChatGPT. One study found ([Lim et al., 2023](#)) that generative AI tools may be limited to current data (the database never works on the most recent data), and therefore may

intermittently provide false information and misinterpret requests. Another study found that ChatGPT mostly generates content that is written in general descriptive text (Rudolph et al., 2023). The publisher of Nature has communicated that Large Language Models (LLM) tools are not accepted as certified authors: 'This is because any attribution of authorship implies liability for the work, and AI tools cannot assume such liability'. In addition, the need to document the use of LLM and include it in the acknowledgments section (Nature, 2023).

Example of ChatGPT in higher education:

- Writing an assignment to be submitted
- Article summary, with a definable scope
- Title choice
- Explanation of terms
- Changing the terminology of language
- Literature search

## 4. The dangers of using ChatGPT

One of the main dangers of using ChatGPT is that it can be considered plagiarism (Dien, 2023). Therefore, more attention needs to be paid in education to the adaptation of the tasks and teaching materials that are given out. Furthermore, AI detection software can be used for verification (Jungco, 2024) to detect whether AI has been used to create the task.

ChatGPT is also widely used for thesis writing. An anonymous survey of Stanford University graduates in 2023 (Cu & Hochman, 2023), found:

- 17% of students used ChatGPT for their thesis,
- 5% gave a word-for-word version of the essay that ChatGPT published.

A further risk was that, at the time of implementation, the free ChatGPT database contained data until January 2022, so in many cases, the information sought was not available and, because the database was not up to date, it was often incorrect. Nowadays, the free version of ChatGPT 3.5 (Limited access to GPT-4o) works on a trial basis like the subscription version, but the problem is still occurring to a small extent, which means that incorrect data is being received.

In addition, it is often misleading meaning that there are cases where it generates different content than the question was intended for, so answers should be accepted with caution. Due to these dangers, cognitive biases may emerge in human-machine systems (Sós et al., 2023). Cognitive bias is a systematic deviation from rationality, logical thinking, and behaviour (Dobelli, 2014).

One example is Confirmation bias, which means that a person collects data to confirm an opinion he or she holds and tends to ignore information that contradicts it (Sibony, 2020). For example, when asked a question about a specific topic, the answers are re-fined using “prompts” until the ChatGPT gives the exact answer that the user “wants to hear”. Because it gives a very definitive answer, and it is genetically encoded in humans we are more inclined to “accept” a confident answer as true, and therefore often accept the answer without verification (Dobelli, 2013).

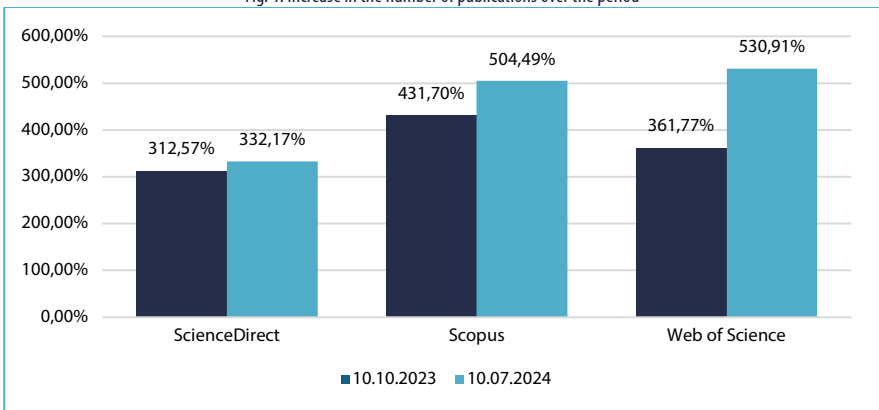
#### 4.1. Results: Number of publications on ChatGPT and education

When I started the research, I screened 3 scientific databases: ScienceDirect, Scopus, and Web Of Science. In all three databases, the keywords chosen were ChatGPT and Education, and ChatGPT and “Higher Education”. Subsequently, 1 month and 9 months (on 10 July 2024) I performed the screening again on the same databases.

Table 1: Results of keyword searches (PCS)

Database	Keywords		10/10/2023	10/11/2023	Increase in the number of publications between 10.10.2023-10.11.2023	10/07/2024	Increase in the number of publications between 10.10.2023-10.07.2024
Science Direct	ChatGPT	Education	708	935	32,06%	2921	312,57%
	ChatGPT	Higher education	11,5	146	26,96%	497	332,17%
Scopus	ChatGPT	Education	2104	2899	37,79%	11187	431,70%
	ChatGPT	Higher Education	668	931	39,37%	4038	504,49%
Web of Science	ChatGPT	Education	463	531	14,69%	2138	361,77%
	ChatGPT	Higher Education	55	69	25,45%	347	530,91%

Fig. 1: Increase in the number of publications over the period



As can be seen from the data in Table 1 and Figure 1, the number of publications for ChatGPT and Education/Higher Education between 10 October 2023 and 10 July 2024 was incredible: the increase in the number of publications was at least 312.57%, while for one of the databases (Web Of Science), it was 530.91%. In other words, there has been a significant increase in the number of publications on the topic in all databases.

The study described in the databases shows that the use of ChatGPT in education is widely discussed in the “research world” and that the number of publications is growing dynamically.

#### 4.2. *Visualization of publications*

I created a visualization on 10 July 2024 from the database of ScienceDirect and Scopus websites, as I was curious to see how this large number of publications in higher education is distributed. VosViewer (van Eck & Waltman, 2023) generates a keyword map based on scientific databases, on which it plots the main keywords by analysing the title and abstract of publications for the keywords and examines the relationships between keywords and the clusters in which the keywords appeared.

Figure 2 shows that the most dominant cluster (red) on ScienceDirect shows keywords mainly related to education and academia: digital transformation, plagiarism, online learning, and technology acceptance model. In the other clusters, a few keywords from other fields appear, for example, more people are researching their use in health and management.

Based on the publications on the Scopus site (Figure 3), the most dominant cluster (red) shows keywords related to general educational tasks: e-learning, learning outcome, AI in education, and grading. However, in the other clusters, in addition to some other educational fields, several keywords related to the study of human behaviour: human, behavioural intention, psychology, and the keyword reliability. This indicates that misinformation in ChatGPT and its effects on humans are of concern to the scientific community, which means that there is a growing recognition that misinformation in ChatGPT can cause cognitive biases (Tamás et al., 2023).

Fig. 2: Visualization by VOSViewer from the research results of ScienceDirect on the 10th of July 2024. Keywords: ChatGPT AND "Higher Education". The minimum number of occurrences of a keyword: 4.

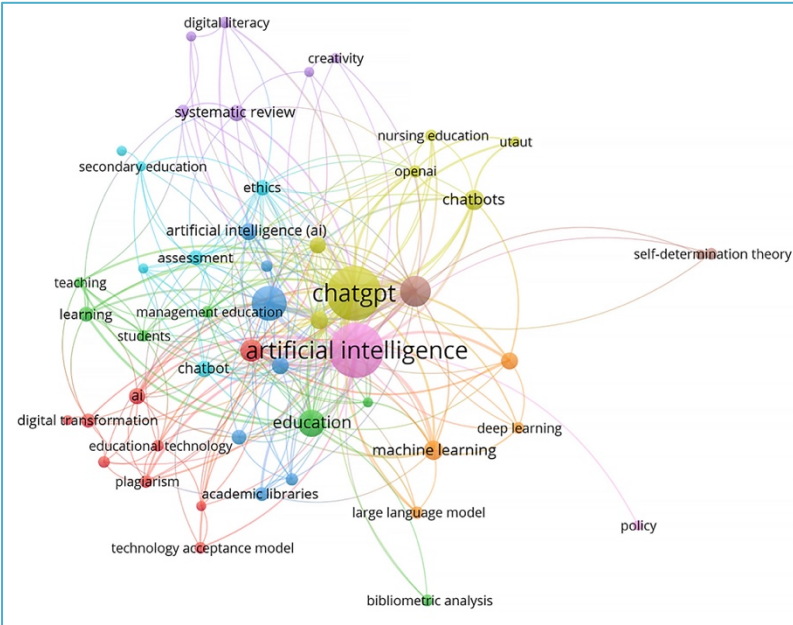
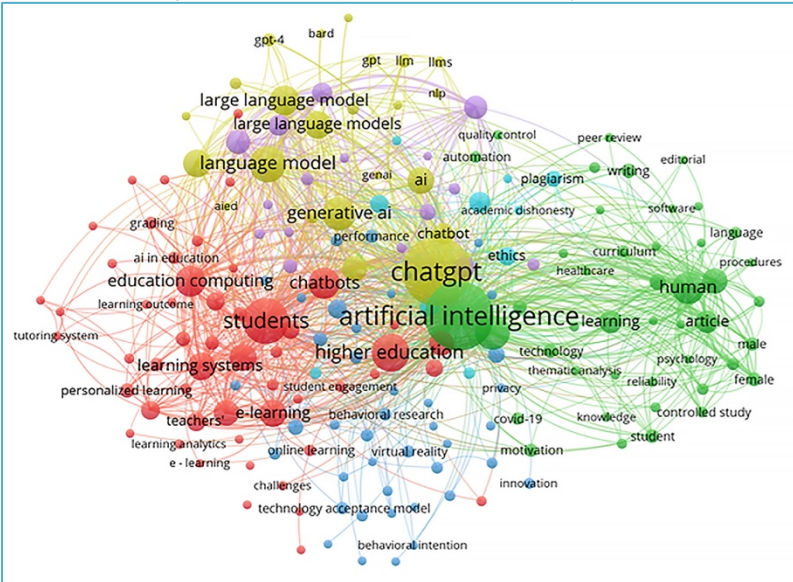


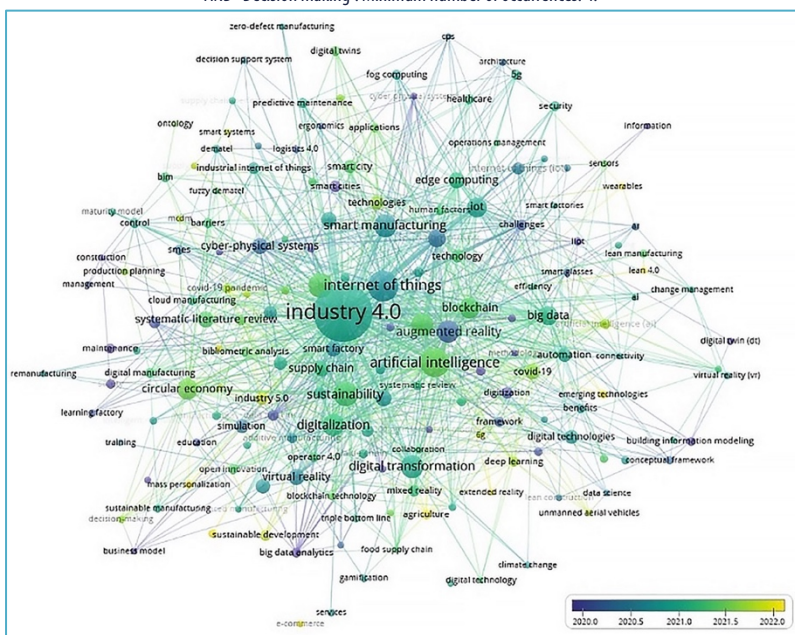
Fig. 3: Visualization by VOSViewer from the research results of Scopus on the 10th of July 2024. Keywords: ChatGPT AND "Higher Education". The minimum number of occurrences of a keyword: 20.



## 5. Comparison of using VosViewer and ChatGPT

The question often arises that if ChatGPT is getting “smarter” and so usable as a “prompt”, why is it not used by researchers in the academic field? My first answer would be that its use is unethical for an academic, but there is much more to it than that. ChatGPT is great for quickly looking up a topic or for brainstorming, but to define a research gap or to do real research, you need to use software(s) that can support the research. To do this, I will give the following example: for a publication, I searched the ScienceDirect database on 11 January 2023 for the keywords Logistics AND “Augmented reality” AND “Decision making”, and then visualized the results using VosViewer (Figure 4). When I did this search, I wanted to see what publications had been written for the keywords provided. VosViewer generates a keyword map based on scientific databases, on which it plots the main keywords by analysing the title and abstract of publications for the keywords, in this case, Logistics AND Augmented reality AND Decision making, and examines the relationships between keywords and the time periods in which the keywords appeared.

Fig. 4: Results of the narrowing on ScienceDirect on 11 January 2023 for the keywords Logistics AND "Augmented reality" AND "Decision making". Minimum number of occurrences: 4.

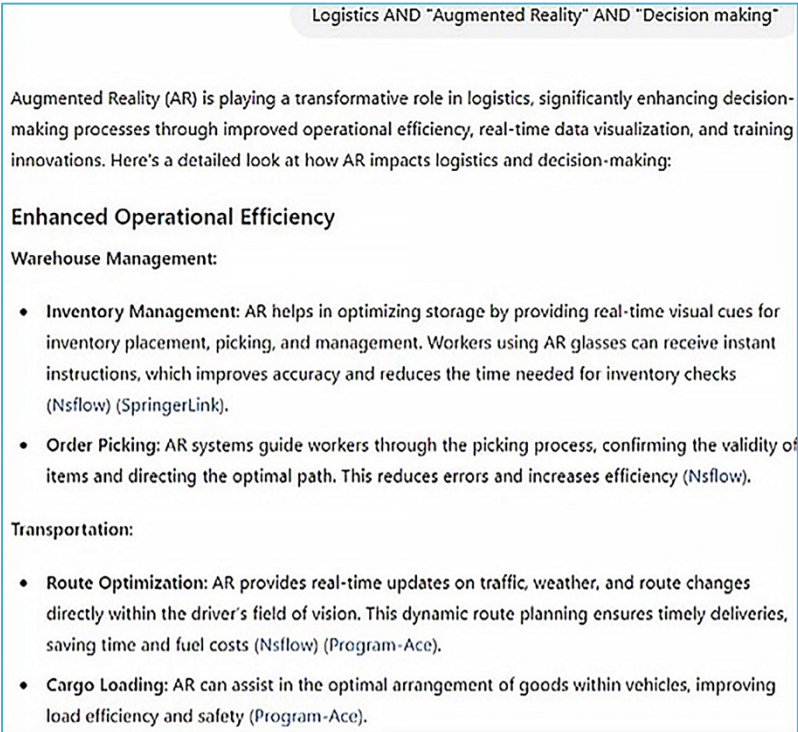




In order to visualize and analyse the relationships shown in Figure 4, some research experience is required, but without it, it is clear what keywords were used to start research on the topic and what “direction” it is currently taking. Furthermore, VosViewer provided a map showing where the concept has “branched off”, what new directions have emerged in the research, and which keywords have become prominent in which period.

As you can see in Figure 5, I also queried ChatGPT using the same keywords. I used several queries, not only this one where I entered the keywords, but also one where I asked for the context of these words in a whole sentence, in this publication I have included only this version.

Fig. 5: ChatGPT on 10/07/2024 Keywords: logistics AND “augmented reality” AND “decision making”



Logistics AND "Augmented Reality" AND "Decision making"

Augmented Reality (AR) is playing a transformative role in logistics, significantly enhancing decision-making processes through improved operational efficiency, real-time data visualization, and training innovations. Here's a detailed look at how AR impacts logistics and decision-making:

### Enhanced Operational Efficiency

**Warehouse Management:**

- **Inventory Management:** AR helps in optimizing storage by providing real-time visual cues for inventory placement, picking, and management. Workers using AR glasses can receive instant instructions, which improves accuracy and reduces the time needed for inventory checks (Nsflow) (SpringerLink).
- **Order Picking:** AR systems guide workers through the picking process, confirming the validity of items and directing the optimal path. This reduces errors and increases efficiency (Nsflow).

**Transportation:**

- **Route Optimization:** AR provides real-time updates on traffic, weather, and route changes directly within the driver's field of vision. This dynamic route planning ensures timely deliveries, saving time and fuel costs (Nsflow) (Program-Ace).
- **Cargo Loading:** AR can assist in the optimal arrangement of goods within vehicles, improving load efficiency and safety (Program-Ace).

The result was the same in all cases: you gave each definition and linked the first one to the others. In other words, the results could have come from any of the websites.

As can be seen after comparing Figures 4 and 5, ChatGPT could not add any real value in terms of research work, but rather could only be used for brainstorming.



Therefore, in the field of research work, critical thinking is needed, that is, human thinking, because we cannot tell from a response from ChatGPT where research started, what direction it is going, what research gaps are there, what interconnections there are between different disciplines.

## 6. Conclusion

The use of ChatGPT in higher education is highly widespread, not only among students but also among teachers. In order to make its usability transparent, I have examined its use as a student in Higher Education and then presented its dangers, covering the cognitive biases in human-machine systems, namely the dangers of decisions made while using ChatGPT. At the beginning of my research, I conducted a scan of the ScienceDirect, Scopus, and Web Of Science databases for the keywords ChatGPT and Education and "Higher Education", which I repeated a month and almost 6 months apart. Based on the results, I found that the research community has shown significant interest in using ChatGPT in education. Finally, I will present a visualization related to the same topic that I created using VosViewer, as well as definitions related to the same keywords that I requested from ChatGPT. Overall, I have found that for ChatGPT, we do not know the "direction" in which the publications written for the keywords started and we cannot see the "direction" in which the research relevant to the topic is going. In other words, with these two visualizations, I represent that for real research work it will not be sufficient to use ChatGPT, it will still be necessary to use human thinking.

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