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Generative AI as a New Paradigm in Education and in Life

In recent years, we have seen revolutionary advances in the world of generative artificial intelligence (GenAI) models. These models, such as ChatGPT, are changing our perception of what AI can do. They are also changing the way we interact with computers. However, with these growing capabilities come a number of challenges and issues that concern both the economy and the education system.

In this paper, we focus on the impact of GenAI on different areas, from business to education. Our aim was to analyse how this technology can be integrated into everyday life and the education system. Based on a review of various sources and the reflections of different authors, we present the views on GenAI that have emerged up to 20 October 2023.

In reviewing the available sources, a qualitative descriptive method was used to describe the situation, and a compilation method to summarise the results of foreign scientific studies. A desktop research technique was used to systematically collect and analyse secondary sources. The relevant sources selected for the article are those which best cover the subject area. A list of best practices was compiled using an inductive method, which enabled us to recommend individual practices for general use. The survey ran from March to October 2023, and as the field is evolving extremely rapidly, most of the sources used were published close to the last survey date.

Gartner (2023) states that GenAI has the potential to fundamentally change the existing economy and society. It compares it to the emergence of the Internet and, even earlier, the invention of electricity. GenAI could become a competitive advantage and a differentiator. It can automate repetitive and tedious tasks and generate new insights, ideas and innovations. A look at the Google hits (Figure 1) shows that interest is very high. The growing interest in artificial intelligence coincides with a rising interest in generative AI. The interest in AI has risen in parallel with interest in GenAI, and the rise continues, indicating that the technology is spreading. The report “What's New in Artificial Intelligence from the 2023 Gartner Hype Cycle” (Gartner, 2023) states that GenAI has reached the peak of expectations and will be followed by a downward trend characterised by the limitations of GenAI. The report also sees two paths leading to an even stronger AI; one through innovation driven by GenAI, and the other being the innovation that extends the capabilities of GenAI.

In reviewing the sources, we narrowed our focus to two fields of GenAI impact: the area of daily life and the area of education. As the area of daily life covers the entire life cycle, we have focused our investigation on the impact on the industry. Consequently, its effect in this area has implications in all sectors.

Based on text commands and optionally added files or entered web links, GenAI generates text, images and graphs for a variety of requirements, although it is less capable than a human being. It already achieves human-level performance in many areas. OpenAI (2023a) has conducted tests with a variety of publicly available academic and professional texts. In a simulated bar exam, for example, ChatGPT-4 was in the top 10% of exam takers. Figure 3 shows the progress by the generation of GPT models. The accuracy of 100% means that the answers match the ideal human answers. The most controversial area is hallucination, where GenAI can produce a text that looks plausible and reads well, but is factually incorrect. This property of GenAI

models makes it necessary to check the results – the answers – and it is essential to be familiar with the domains in which GenAI is used.

At the time of the above survey, McKinsey & Company (2023) conducted a global survey (n = 1,684) on the use of GenAI in various vertical industries

(Figure 5). The results of this survey show that a third of all respondents stated that their organisations already use GenAI regularly for at least one function. A total of 40% of the respondents stated that they will invest more in GenAI. The most common business functions where generative AI is used are the same ones where the use of AI is most prevalent overall: marketing and sales, product and service development, customer care and back-office support. This indicates that companies are using new tools in the areas where they will bring the greatest benefit. In addition, 79% of the respondents said that they had come into contact with AI at least once, either at work or outside work. A total of 22% confirmed that they regularly use GenAI in their work.

We have summarised several sources on the impact of GenAI on different business areas: edX (2023), GB Advisors (2023), Guedes (2023), Mccullough (2023), Senica (2023), and Statista (2023), all of which highlight areas of the GenAI impact. To highlight the edX (2023) survey, the managers stated that by 2025, 49% of the skills of today's workforce will be inadequate and that their organisations will lose 56% of entry-level skills in the next 5 years. The majority, or 79% of managers, also believe that they will be unprepared for their future roles if they do not learn how to use AI.

We specifically analysed the impact on education. We have observed that, despite the digital transformation and Industry 4.0, education is still based on basic learning technologies in the form of lectures supported by multimedia tools. Today, GenAI represents an opportunity to change the entire learning process. The impacts on the education system are many, ranging from supporting lecturers to taking on the role of a personal tutor for students. Due to the scale of the impact, we have paid attention to two areas: plagiarism and recommendations for the school system.

In the area of plagiarism, ethical issues arise as well, such as the bias of GenAI and the authorship of the generated text. GenAI-generated texts should not be used as our own work and cannot be cited as a source because the texts are not generated by GenAI itself, but are created in response to our input (prompt). At the International Conference on Machine Learning ICML (ICML, 2023), a guideline for the use of GenAI-generated text was announced: "Papers that include text generated by a large-scale language model (LLM) such as ChatGPT are prohibited unless the generated text is presented as part of the experimental analysis of the paper." However, no program for detecting AI plagiarism is 100% reliable, although at least according to the providers' own statements they have come very close to this figure. The number of AI-generated texts will increase over time, and it will become increasingly difficult to distinguish text written by AI from text written by humans. The fact that software detection of AI plagiarism does not work 100% was established by Sankar Sadasivan et al. (2023). In a large-scale study with practical examples, they have discovered that even state-of-the-art AI plagiarism detection software cannot detect AI-generated text in practical scenarios, as it can quickly be fooled by paraphrasing the text. They point out that it is necessary to balance detection. A high proportion of false positives leads to innocents being blamed and reduces the credibility of recognition programs.

However, teachers are not completely powerless to recognise AI plagiarism.

Even today, it is possible to recognise suspicious AI-generated texts based on the following criteria:

- The candidate's writing style suddenly changes.
- The text has a higher quality level than would be expected from the candidate.
- The content is not relevant because the candidate has not checked the facts. It is a typical hallucination of the generative AI models.
- The sources are non-existent or do not summarise the text.
- The text perplexity is lower in AI-generated texts.
- Sentence variability (burstiness) is lower in AI-generated texts.

With regard to recommendations for the school system, we have systematically compiled various recommendations in Table 2, ranging from rejection and prohibition of GenAI to acceptance and inclusion. The developments have shown that there is an urgent need to adapt the pedagogical process at universities to the new reality of GenAI. Based on the presentations and discussions at the ENAI Academic Integrity PhD Summer School 2023 (ENAI, 2023), the Faculty of Economics and Informatics of the University of Novo mesto has developed a baseline for the ethical use of GenAI by students (Table 3). We have defined the ethical and unethical use for different types of GenAI tools: text enhancers, compilers, text transformers and generators, and non-text transformers and generators. We have published a document and informed our students about it.

The field of generative AI models has exploded since November 2022, when free access to ChatGPT was announced. There is a competition among companies not only for market share and prepaid users, but also for dominance in the search engine space, where Google still has the upper hand. The drawback of our literature research is that we have not found a broad, systematic and scientific overview of the field, as the technology is simply too new. For further research, we recommend a review of the field and in particular, identifying good practices in the implementation of GenAI in education. Primary research in the form of surveys will, over time, be able to give a true picture of the impact of GenAI.

The aim of this paper has been to highlight the potential impact of GenAI on everyday life, through its impact on industry and on education. Examining the impact on industry, we have addressed many potential areas that have been covered by various authors. Our study mainly focuses on education. We present a number of concerns and considerations from authors who have questioned the relevance of homework and seminar assignments. AI plagiarism detection does not currently provide 100% accurate answers and therefore the question is whether this will ever be possible as plagiarism detection programs lag behind the development of the GenAI models. In this study, we present several suggestions from various authors as to what approaches should be used in education given the rapid development of the GenAI models. At the time of writing this study, there is no universally accepted tactic, and in fact various approaches are being tested.

The benefits of GenAI are enormous and, if used correctly, it can greatly increase our efficiency in everyday tasks as well as in education. Undoubtedly, it will also be used for cheating, but that can be minimised through various approaches. When asked whether GenAI should be used, we can answer that GenAI is here and it is a new tool. The scrapping and banning considerations seem to be short-sighted. We need to take advantage of this technology. The sooner it is used in the education process and in our daily lives, the better. Nevertheless, we must never forget Aristotle's dictum that education consists not only of absorbing information, but above all of developing the ability to think.



GenAI makes us much faster at absorbing information, but it does not make us smarter since it does not develop our ability to think. We should bear in mind that only these two abilities combined have a great potential for progress in all areas.