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Connection, motivation, insight, or how to think about artificial intelligence

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Abstract
The integration of Artificial Intelligence (AI) into formal education opens up new dimensions in individualising learning, optimising educational processes and supporting data-driven educational policy-making. AI-based educational technologies such as adaptive learning systems, intelligent tutors and automatic assessment algorithms offer the potential to identify learners' needs in real time, personalise learning pathways and improve teachers' effectiveness. At the same time, the application of AI in education raises a number of challenges, including algorithmic bias, transparency and data protection, which require a multidisciplinary approach to ensure ethical and responsible implementation of the technology. In this paper, we attempt to define Artificial Intelligence through a literature review, and present its impact on everyday life, work and learning, the hopes and fears associated with it, and the main findings of the study on its impact on lifelong learning and motivation to learn.
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Artificial intelligence – definitions

This paper explores the impact of AI on our everyday lives, especially on learning, but to really get to the heart of the matter, it is worth attempting a brief definition.

The history of AI, if we look for its roots, can probably go back a very long time, even centuries, but many believe that its real beginnings date back to 1950, namely Alan Turing's paper Computing Machinery and Intelligence (1950), in which he argued that machines could perform tasks autonomously, simulating humans. That the machine may be capable of intelligent behaviour comparable to human behaviour. However, the term Artificial Intelligence was first used only 6 years later, at a workshop at Ivy League University (Buda 2024).

The related definitions can be characterised along two main categories, following Russel & Norvig (2005).

One of these deals with definitional possibilities in terms of thought processes and inference, and the other with behaviour. In the spirit of this division, human thinking systems and rational thinking systems are known, as well as human acting and rational acting systems.

As an example of acting in a human way, the authors cite the Turing test approach, mentioned earlier and considered by many to be the defining root of artificial intelligence, which was intended to provide a working definition of intelligence in order to create a more concrete method rather than a debatable list of qualities that characterise intelligence. Turing's test is based on indistinguishability from a human, which a computer can pass if, after asking a few written questions, the human cannot decide whether the answer to the question is machine or human. A computer, by Turing's definition, must have the capability of natural language processing, knowledge representation, automated reasoning and machine learning. However, to meet the full Turing test, machine vision is required to detect single objects and robotics to move objects (Russel & Norvig 2005).

Human way of thinking is usually defined by cognitive modelling. In order to identify human ways of thinking, it is essential to identify the typical ways people think. This can be done through self-analysis on the one hand and psychological experiments on the other. When the time comes that we have a sufficiently detailed theory of the human mind, it will be possible to express it in a computer program. If the inputs and outputs of a given program and its timing match human behaviour, it may provide evidence that elements of the program are present in humans. Newell and Simon (1961), the developers of General Problem Solver, were not satisfied with their work, and thought that it was not enough to develop this program, it was more important to compare its inference steps with those of a human performing the same task.

The attempt to define rational thinking is usually described by the law of reasoning, which has its roots in ancient Greek philosophy, Aristotle, the Greek philosopher who first attempted to define "right thinking", the law of irrefutable, logical conclusions. The prevailing logicist tradition within AI is confident in its ability to create systems based on such a foundation.

The definition of a rational agent is usually based on rationality, by which we mean the ability of a program to act under autonomous control, to perceive the environment and adapt to change, and to take on the goals of others (Russel & Norvig 2005).

Artificial Intelligence in everyday life

It is well known that with the progress of globalization, all those higher education institutions that are able to offer some kind of special knowledge, special educational content, are increasingly becoming partners of multinational companies, while "yesterday" only elite institutions had a chance to do so (Inzelt – Csonka 2018).Now the knowledge base is available to everyone, so those who were market leaders not so long ago have lost their former competitive advantage (Simai 2018; Dietz 2020) It is also well known that many workplaces are facing serious labour shortages, for which Artificial Intelligence could be a solution, but currently many (potential) employees see it not as a help but rather as a threat to their career.

Their fear is sometimes almost paranoid: they fear that the machine will take control of the entire planet instead of humans. Many people are almost utopian, others dystopian, imagining these effects in the distant future, but these applications are part of our everyday lives, whether they are smart assistants (e.g. WAZE, which aims to avoid traffic jams, we ask SIRI questions or it does our bank loan assessment).

Many people try to sell their products and services with AI or with human work trying to imitate it as a measure of success, but it has also emerged as a means of attack, as it can be used to hack utilities, military defence systems, and it can be a concern to continuously monitor human activity and to influence individuals by processing this critical data for economic, political and military gain, and possibly even to steal their identity (Dietz 2020).

At present, the scientific world, colloquially, only speaks of applied artificial intelligence, which is machine learning (e.g. deep learning), machine reasoning (e.g. machine search, machine reasoning), in which it finds relationships between similar and dissimilar data in a data set of sufficient size, and also processes, for example, sound, images, or possibly creates. There are games (chess, go, poker) in which it beats humans in online games (Dietz 2020).

Advances in artificial intelligence (AI), machine learning (ML) and deep learning (DL) could boost several industries. This includes, among others, the automotive industry (e.g. through self-driving cars), which could fundamentally change the way people drive and have a strong impact on society (Pakusch – Stevens – Boden & Bossauer 2018), Nissan, Audi, General Motors, BMW, Ford, Honda, Toyota, Mercedes, Volkswagen, Apple, Samsung and others have made self-driving cars a key area of their work, while the Baidu Institute for Deep Learning in South Korea, which has established the automotive networking business, is working on similar innovations (Gupta – Anpalagan – Guan & Khwaja 2021).

Artificial Intelligence in the labour market and the workplace

Machine learning (ML) is a subset of artificial intelligence, which as mentioned earlier, is the ability to model the experiential "learning" associated with human intelligence, and the ability to learn and improve its analyses through computational algorithms. These algorithms use large amounts of data inputs and outputs for pattern recognition and efficient learning, in order to enable the machine to make autonomous decisions (Helm et al. 2020).

This apparent advantage can also be defined as a downside, as it can take over professional tasks that were previously done exclusively by humans, thus fundamentally changing the labour market.

Deep learning is currently one of the most prominent areas of research in artificial intelligence, with widespread applications in both image processing and natural language understanding. Deep neural networks are more complex versions of these models, using hierarchical levels to isolate and manage the final output. The machine studies a given phenomenon at multiple levels, and the existing al-

gorithm can refine itself based on new data (Helm et al. 2020). Despite the success of deep learning, research is increasingly reflecting on the transparency of algorithms, energy requirements and ethical handling of data. Other challenges include overfitting, limitations of generalisation ability and the reproduction of biases in data sets. Addressing these challenges requires the integration of deep learning with other approaches such as symbolic AI or causal learning. Research in the near future is also expected to take steps towards Artificial General Intelligence (AGI) through improved models of deep learning, while increasing emphasis will be placed on the study of ethical and social implications.

The question arises: what does this mean in practice and how much should the "average" worker fear? Is there a real fear of "automation anxiety", i.e. the fear of workers that AI will soon put them out of work?

There were also surveys that showed that the level of this concern exceeds even anxiety about terrorism and climate change. It should be noted, however, that the number of polyhistorians is gradually decreasing and the number of specialists is increasing as people's knowledge of the community increases (Dietz 2020).

According to Dietz (2020), AI should not be seen as an end in itself, but rather as an aid and certainly not as a substitute for humans, but rather as a kind of complement to humans that can increase their work efficiency. Just as machines have made physical work easier in recent centuries, artificial intelligence can make mental work easier.

Like all tools, we need to use them consciously and to use them effectively, we need to be aware of the advantages and disadvantages of the machine and the human work.

Humans are sentient, thinking physical beings, capable of leading others, inspiring confidence, leading by example, motivating, making friends and managing conflict, but we must also remember that all these human characteristics can also carry with them the risk of fatigue and even burnout (Eagleman 2017), whereas AI is predictable, continuous, and can work smoothly with large data sets, without fatigue, with good tolerance for monotony, and is easily replicable, networkable, teachable with new software, without having to be paid a wage and without fear of going on strike. A key finding of a 2019 survey by Oracle and Future Workplace is that a human boss is better at personal development, understanding emotions and building a workplace culture, while a robot is better at providing objective - not biased or biased - data, meeting deadlines, solving problems and planning costs (Fábián 2019; Dietz 2020).

The impact of Artificial Intelligence on motivation to learn

Dietz (2020) sees a need for an increasing focus on e-learning (computer based), which is more independent in time and space, but where the learning process can be monitored, as opposed to 'traditional' education, e-learning 2. 0 (web based training), which now also integrates the network into the learning-learning process (social networking sites, chat, video conferencing) or e-learning 3.0, where per-

sonalised learning takes place, but where continuous moderation of the learning material is essential. As a special type of e-learning 3.0, he also mentions embedded e-learning (embedded instruction or assistance), telementoring (mentoring knowledge and experience) and online coaching (a kind of online consultancy) (Dietz 2020), referring also to the role of m-learning, which is the integration of digital tools in the education of young people, which is a permanent feature of e-learning in 2020, and the role of autonomy and self-direction (Kovács 2011).

In contrast, artificial intelligence-based education is extremely advantageous because it is flexible (students can take exams and learn anywhere, anytime, depending on their own biorhythms). It can build a virtual network of like-minded and like-minded students, who can deepen their knowledge and encourage them to engage in research by motivating each other. The learning material is not only audible but also visualised (e.g. through AR, VR, smart glasses), thus engaging multiple senses, interactive, not forcing the student into a passive receptive role, and sustaining attention and facilitating learning.

It is also particularly useful for students with disabilities (visually impaired, deaf), as it broadens their learning opportunities through AI dictation, reading, video subtitling, image and sound analysis, machine translation. In this way, it supports the teacher as a virtual assistant rather than excluding him/her from the classroom. It can also play a role in assessment (image and text analysis of student work). All this can increase the teacher's efficiency, make it easier for students to work at their own pace and develop a commitment to continuous improvement in the spirit of the concept of lifelong learning.

However, it is of course the teacher's task to motivate the learner to move out into real life and to use the time regained through the use of MI for recreation (e.g. sports, arts, leisure) (Dietz 2020).

International best practices for the use of Artificial Intelligence in schools

In September 2020, the European Parliament set up a committee called AIDA (Artificial Intelligence in a Digital Age) to explore the impact of the use of artificial intelligence in the European Union, but although 11 working papers have been produced, education-related documents are not included, This may be due to the lack of priority given to education in general, which is not a productive sector, but it is now essential to address its application in education, as the integration of AI in education is already underway in several directions (Buda 2024).

Baker, Smith & Anissa (2019) see the emergence of AI as essential in supporting learning and self-assessment for learners and in supporting teaching for teachers. They also believe that it can have a place in the governance of educational institutions. Similar views are expressed by Marr (2022), who argues that it can be used to ease the administrative burden on teachers and their assessment tasks, and can also play a role in monitoring student progress, thus contributing to the

personalised development of students and the development of individual development programmes. It also sees it as essential that AI-based applications can be used to create global classrooms accessible to all. He clearly argues that teachers need not worry about the role of AI in education, and what's more, they can benefit from it.

Several promising good practices have been developed to introduce children to AI-based programmes from a very early age. In China, such content is already being included in local secondary school curricula, and a targeted innovation in teacher training, "AI Boosts Teachers' Team Development", has also been introduced.

In the US, the Montour School District in Pennsylvania teaches children AI coding. In Singapore, humanoid robots are being used in kindergartens to help educators teach children about coding and STEM subjects. In the UK and Kenya, the *Teens in AI* initiative was created to inspire young people to become the next generation of AI researchers, entrepreneurs and leaders. Through a combination of hackathons, accelerators, boot camps and mentoring, young people will learn about the socially aware application of artificial intelligence. In Finland, an AI application called Headai has been developed in collaboration with Helsinki Metropolitan University of Applied Sciences to monitor and analyse job advertisements and university curricula. These are used to create competency maps comparing the supply and demand of AI skills, allowing the university to quickly adapt to market needs when designing courses (Miao et al. 2021).

The use of AI in higher education, academia and writing

As Szűts (2024) points out, it is a common phenomenon among university students to use online spaces first as a communication platform and then increasingly as an information-gathering platform for learning purposes. This phenomenon can be seen as a key to the success of AI applications, as nowadays it is not only possible to search for information, but also to process personalised information using ChatGPT, Google Bard - now Gemini - Snapchat MY AI, which are also highly applicable in education.

The Chat PDF3 application can also be used to draw conclusions. In higher education, students are also given the opportunity to use ChatGPT, but there are also many students who write their essays with ChatGPT without any particular thought or consideration, which Szűts (2024) warns against, suggesting instead that students - in preparation for similar applications in the labour market - should parameterise and use it when learning.

Scientific writing is key in both education and research. It can be aimed at presenting and explaining research results, analysing, critiquing and reviewing literary works. Scientific writing involves communicating a great deal of information, complex ideas, theories, empirical data in a way that is understandable, sometimes to a wider audience, and requires not only the ability to present ideas and results in a structured way, but also the ability to make them "consumable" for the read-

er. Accuracy, credible support for results and a logical structure are essential in such work, and proper referencing and citation are key, but some may find it too time-consuming.

Another feature of academic life may be the 'publication imperative', i.e. the need for researchers to constantly come up with new topics and new studies, while balancing informativeness and keeping the reader engaged, and the need for creativity and originality. They are often under tight deadlines, so achieving all this can be stressful (Khalifa & Albadawy 2024).

Structural coherence is essential in academic writing, especially for long documents such as theses or dissertations. The need for coherence must also be balanced with effective time management, as researchers often have other commitments (Eggman et al. 2023).

The scientific writing process often involves revision based on feedback from peers and advisers. This requires openness to criticism and the ability to integrate feedback effectively. When engaging in interdisciplinary research, writers are faced with combining different methodologies, terminologies and concepts from different fields, which makes their work more complex (Švab et al. 2023).

Given these challenges, AI has now become, as Szűts (2024) has pointed out, an essential tool for scientific writing.

It can assist in the production of scientific work in terms of grammar, structure, correctness of citations and adherence to the forms of citation relevant to the discipline.

These tools are not only useful but also play a central role in improving the efficiency and quality of scientific writing. They allow writers to focus on critical and innovative aspects of their research (Meyer et al. 2023).

Therefore, although scientific writing can be challenging, AI-based tools can significantly support the work and increase the efficiency of researchers' work (Khalifa & Albadawy 2024)

Artificial intelligence in academia is nowadays mostly used for searching, analysing and synthesising literature, but AI tools for writing them are also of interest.

A few years ago, we had to manually search PubMed using Boolean operators, rank searches, tag terms, search for synonyms and word chunks for truncation, and set up search fields. Now, however, artificial intelligence algorithms do it all for us.

The latest AI-based tools for finding relevant and authoritative articles can not only search for articles by analysing metadata; they use citation information as well as natural language processing and machine learning algorithms to analyse articles and rank articles based on their relevance and scientific impact for a given query.

They are also able to visually represent the links between linked/cited articles or cited statements or topics (e.g. Semantic Scholar, Connected Papers, Research Rabbit, Litmaps), and generate accurate cross-text citations and bibliographies using integrated reference management tools (Švab et al. 2023).

Artificial intelligence-based literature search, analysis and synthesis tools (Elicit, Scolarcy, ChatGPT, Bing AI) can support authors' work.

In the past, authors spent days sorting through articles to gather the most relevant results, but now, by automatically analysing and summarising data, AI tools can also generate summaries of articles and present them in readable tables (e.g. Writefull, Scolarcy, Abstract Generator).

Plagiarism detection tools help editors and authors by checking the degree of similarity between the central manuscript and other publications. Authors can also refine their manuscripts linguistically before submitting to the selected journal, as AI-based writing tools can help authors with grammar, spelling and formatting issues, suggest changes to vocabulary and punctuation, select more precise and appropriate words and phrases, or paraphrase the text.

In the past, authors had to rely on online dictionaries and paid proofreaders, while today computer tools (Grammarly, Writefull) allow authors to improve their English while writing, not only based on the semantics and syntax of the language, but also on the word usage statistics in a large collection of texts.

With the launch of ChatGPT 2022 in November, the potential of artificial intelligence has become even more apparent. Instead of having to search through document links to find the information they need, authors can now get the information they need in their native language and clarify the answers by talking to a chatbot. The model easily analyses and synthesises our natural language. A large language model can only be used as a personal assistant and its suggestions should always be checked, as they are not always reliable. They can easily mislead the author and the reader, as the model is known to make factual errors, generate non-existent references, and stubbornly and persuasively defend possibly false claims. It is also crucial that it is used ethically and for the benefit of humanity (Švab et al. 2023).

Its role in lifelong learning is, in his view, partly due to evolution, as the human mind cannot keep up with the pace of technological development, and partly due to the importance of lifelong learning, as according to the European Union documents, one of the eight competences required for lifelong learning is digital competence, which includes the conscious use of artificial intelligence (Szűts 2024).

Conclusion

Although, as we have seen, AI-based programmes can play a significant role in all aspects of life, and are not only indirectly present in the world of education - currently primarily in higher education and research - through labour market needs, but also directly, their potential is not yet sufficiently exploited by institutions. However, this is only partly due to a lack of resources. Another factor is that there is as yet no well-developed practice for identifying and thus targeting the effects of AI in education - in motivating students - and that teachers have only speculated on its use in their work (Buda 2024). In any case, it is clear that AI-based applications, when optimally applied, fit into the world of educational-research-scientific writing, do not replace it but support its multiple mechanisms, and fit into the concept of digital competence for lifelong learning.

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