Artificial intelligence in education and science: imaginary threats or new opportunities?

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Abstract. This opinion paper, selected by the editorial board, is a translation of a blog post originally published in Ukrainian on the Kryvyi Rih State Pedagogical University website [1]. The author examines the integration of large language models, particularly ChatGPT, into educational and scientific practices, arguing against prevalent concerns about academic integrity violations and the erosion of traditional scholarly methods. Drawing parallels with historical resistance to technological innovations such as calculators and typewriters, the paper contends that artificial intelligence represents a tool for enhancing productivity rather than a threat to intellectual rigour. The author critiques current institutional responses, including AI detection systems and mandatory disclosure requirements, as misguided attempts to regulate what should be recognised as an emerging standard tool in academic work. The paper advocates for the organic integration of AI technologies into education and science, emphasising that these tools augment rather than replace human critical thinking and creativity. Ultimately, the author argues that the academic community should focus on teaching responsible and effective use of AI tools rather than attempting to restrict or stigmatise their application.

Keywords: artificial intelligence, large language models, ChatGPT, academic integrity, educational technology, scientific research, technological innovation in education

The opening of free access by OpenAI at the end of 2022 to the then-latest version of the large language model (LLM) ChatGPT-3.5, capable of generating texts in a form maximally approximating ordinary human language, had consequences that can arguably exert and undoubtedly are already exerting a substantial, and in some respects revolutionary, influence on the further development of education and science. Almost immediately, similar models began to be offered by other developers, including Google (Bard, now Gemini), Anthropic (Claude), Microsoft (Bing Chat), and Meta (LLaMA). Since then, intensive discussions have unfolded regarding the role and place of such systems in the educational process, their significance for scientific activity, and possible challenges in these and other fields arising from their application.

Overall, we must note that the societal reaction to the emergence of cutting-edge technologies for operating with linguistic structures has proved ambiguous: from enthusiasm about new possibilities to alarmist predictions about the "end of writing practices", as supposedly henceforth all texts will be created automatically without human participation. Such sentiments, however, are not new. The history of human culture convincingly demonstrates that the emergence of new technical means has almost always been accompanied by waves of scepticism. Thus, not so long ago, the appearance of calculators was similarly discussed in pedagogical circles: might this not become an "unfair" substitution for a pupil's own efforts? Fears were voiced that children would unlearn how to perform calculations independently, that basic skills would lose their value, and that mathematics itself would cease to be an instrument for developing logical thinking. In various countries, there were even

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heated debates about whether to allow the use of calculators in schools, especially at the initial stages of education. For many educators, the technological novelty seemed a threat to traditional teaching methods and even an undermining of the foundation of mathematical education.

Today, however, it is obvious that these fears were unfounded. The calculator did not eliminate the need for mathematical thinking, nor did it abolish the ability to compose equations or prove theorems. It merely freed us from routine operations—endless calculations on paper that distracted from the main point. Ultimately, calculators were organically integrated into school practice: first, the pupil masters basic operations, and only then, at more complex levels, uses the instrument to accelerate calculations. Thus, technology did not replace knowledge but allowed working with it more efficiently, opening time and space for a deeper understanding of mathematics.[1]

Similar discussions accompanied other technological innovations. Typewriters were considered a threat to "genuine writing", computers—a factor that would supposedly deprive pupils of the habit of performing tasks by hand and systematically practising skills, whilst the internet—a source of easy copying that undermines intellectual honesty. Yet each of these technologies eventually became an integral part of the educational process, opening new possibilities for teaching and research.

The situation is similar with the application of large language models like ChatGPT, which almost immediately acquired the name "artificial intelligence" (not least thanks to the very name of the company OpenAI, which opened the path to life for these systems). The name "artificial intelligence" sounds appealing, but it does not quite correspond to the essence of these systems. For the average user, it creates the impression that we are dealing with genuine thinking or even machine self-awareness. In reality, large language models possess neither intentions nor understanding in the human sense. They work based on statistical patterns identified in data arrays and perform tasks by selecting the most probable linguistic continuations. In other words, we are dealing not with intelligence as such, but with a sophisticated imitation of intellectual acts. Yet this very imitation is often so convincing that it creates the illusion of genuine thought, especially when the user observes how such models imitate human communication style, maintain dialogue, and respond to queries in a way that gives the impression of genuine thinking.[2]

In the case of artificial intelligence, we are dealing not with a thinking being but with a computer programme that can be used as a certain tool. The very term "intelligence" in this name is metaphorical and can be misleading, creating the impression of autonomous rationality. What we are essentially dealing with are software systems capable of generating texts, generalising and classifying data, and imitating dialogue. This is more an algorithmic mechanism than "intelligence" in the human understanding. One can draw a parallel with the metaphor "computer memory": it is not memory in the psychological or biological sense, but merely a technical method of storing information. The question is for which tasks this tool is truly effective and how this tool can and should be used in educational and scientific activity.

Such systems manifest themselves best in cases involving standard text processing. They are capable of quickly creating drafts, selecting examples, forming brief summaries, carrying out translation, or explaining basic concepts. Moreover, artificial intelligence demonstrates significant potential in editing: it helps clean up linguistic flaws, give text greater stylistic fluidity, and adapt it for a specific audience. Such functions free the user from technical routine, allowing them to focus on content,

[1] We are grateful to S.O. Semerikov for the calculator example.

[2] Since disputes about terminology are usually not productive, and the expression "artificial intelligence" itself has already firmly taken root in wide circulation, we shall also use it henceforth—with the appropriate caveat.

argumentation, and the creative component of work.

In this context, the question arises as to how justified is the assertion that using artificial intelligence tools to perform such tasks can be considered a violation of the principles of academic integrity. Let us consider a hypothetical situation from legal practice. Suppose we face the task of composing a statement of claim for court. For this, we engage ChatGPT, providing it with all necessary data regarding our specific case, and which, based on this information, helps organise the structure of the claim, select appropriate formulations, eliminate technical flaws, and prepare the final document in compliance with all legal requirements. Would this mean that we have acted "dishonestly"? The absurdity of such logic becomes obvious if we imagine that the court, having learnt about the use of a language model, refuses to consider the case, as if the document has lost its legal force merely because its initial version was not formed by hand. In such a case, any use of text editors or templates could also be qualified as a violation. Obviously, the technology itself cannot be grounds for doubt about the legitimacy or integrity of a document if its content meets legal requirements. At the same time, responsibility for the submitted document—its legal correctness, completeness, and reliability—in any case lies entirely with us.

Let us consider another, more "physical" example—using an excavator to dig a trench. Let us imagine that we seriously demand to consider the use of construction equipment "dishonest" and insist that true integrity is achieved only when a person digs a trench with a spade. Such an approach, again, appears absurd, as the use of an excavator is not a whim or convenience for comfort's sake, but a necessary condition of technical progress. It is precisely thanks to modern technology that we are able to perform work much faster, achieve higher precision, and ensure quality that cannot be guaranteed with manual execution. In other words, the tool does not diminish the significance of the result but makes it possible at a qualitatively new (higher) level. Construction equipment is precisely a tool that a person uses to achieve a goal more effectively, in this case—construction. Similarly, a computer programme or language model is merely a technical means that helps a person cope with work, significantly increase its productivity and effectiveness, but in no way removes responsibility from the person for the final result.

At the same time, artificial intelligence, despite its stunning capabilities in the sphere of text processing, is not capable of performing genuinely creative scientific tasks. If we turn to it with an "abstract" request to write a full-fledged scientific article for publication in a leading professional journal (and even provide a possible topic for such an article), it will undoubtedly create a structured and formally correct text. It will have all the necessary external attributes of a scientific publication: introduction, literature review, methodological part, results, and conclusions. However, upon closer reading, it will become obvious that such material lacks scientific novelty and original ideas. Artificial intelligence operates with already existing knowledge, generalising, combining, and rephrasing it. It does not create new concepts, does not form hypotheses, and does not conduct empirical research.

For example, if we set the task of preparing an article about the impact of digitalisation on the education system, the language model will quite skilfully reproduce general considerations that have already been voiced more than once in scientific and journalistic literature: the convenience of online tools, possibilities of distance learning, the need for new skills for teachers. However, if we try to obtain from it a fundamentally new approach or original theoretical concept, the result will be, essentially, a repetition of what is already known. The computer programme is not capable of posing a new research question, seeing unexpected connections, or formulating an innovative hypothesis. This is also clearly visible in the example of natural sciences. A language model can create a quite competent text about the properties of a certain

chemical compound or even describe a possible experiment. But it conducts no real experiment, obtains no new data, and does not analyse them. Its "research" is a simulation based on already published knowledge. That is why scientific creativity and genuine breakthrough in knowledge remain the prerogative of the researcher—a person capable of critical thinking, intuitive insights, and the search for fundamentally new solutions. Therefore, artificial intelligence should be considered not as a replacement for the scientist, but as an auxiliary tool that can support research work but can never substitute its essence. For genuine scientific activity, the emergence of large language models not only poses no threat but, on the contrary, opens new possibilities and actively promotes its development.

At the same time, to obtain the desired and truly useful result, it is very important to apply language models according to their purpose and real capabilities. After all, one should not be surprised when an attempt to use an excavator for laying an asphalted road or creating a small flowerbed in the yard gives a result far from expected. The same applies to artificial intelligence: if it is entrusted with tasks for which it is not designed, the system will produce answers that will inevitably appear inappropriate or erroneous. But the problem lies not in the tool, but in the incorrect determination of the limits of its application.

A similar mismatch between task and tool is well illustrated by a case recently described on social media. An editor asked a language model to find Russianisms in her text, deliberately providing for analysis an excerpt in which there were none. In response, the system "detected" Russianisms where no deviations from the norm were observed: the list included perfectly literary Ukrainian words like "settlement", "threshold", "signboard", "foreigner", as well as common expressions like "came to mind" or "casting glances". As a result, a long list of "errors" appeared, which were not actually errors. The poster used this result to accuse ChatGPT of "ignorance" and cast doubt on the possibility of its application for editing texts, whilst, of course, emphasising her own indispensability in this role. However, this example demonstrated not so much the shortcomings of the system itself as the incorrectness of the formulated task. After all, this case perfectly shows: artificial intelligence performs exactly the task that is set for it. If the system receives a request to "find Russianisms", it "finds" them, even if it has to invent them out of thin air. The problem here lies not in the "evil intent" or "incompetence" of the model, but in the incorrectness of the task set. The language model does not have its own linguistic intuition or critical thinking—it merely combines data within given conditions. If the query is formulated too generally or with a biased assumption, then the result will prove absurd. Instead, the correct formulation of the task should sound different, for example: "Analyse whether there are Russianisms in this text, and if so—carefully substantiate each case with reference to the norms of modern Ukrainian literary language". Such a form of query reduces the risk of random invented "findings" and at the same time gives the user the ability to critically assess the quality of explanations. The cited example convincingly demonstrates: the effectiveness of the language model's work directly depends on the accuracy and correctness of task formulation. And responsibility for this result—as always—lies with the person.

In the sphere of education and science, discussions around artificial intelligence often take the form of concern about possible violation of academic integrity norms, which is also nothing new. Almost every innovative technology that enters the educational space is perceived as a potential threat capable of stimulating dishonest behaviour or reducing the level of individual effort. However, the relevance of such fears regarding language models is rather dubious. They rather indicate a misunderstanding of the essence of the tool than a real threat to academic principles—especially when public discussions feature initiatives to prohibit students from using ChatGPT

or to introduce into educational and scientific practice systems for determining "AI texts" using so-called "detectors". However, the practical and conceptual value of such initiatives appears rather problematic. No algorithm can reliably distinguish machine-generated text from human text, and prohibiting the use of tools that are already integrated into everyday practices only creates artificial isolation of the educational process from the modern world and poses unacceptable moral dilemmas to those we teach.

Artificial intelligence is primarily a productivity-enhancing technology that can remove part of the routine burden from the researcher or student. Its use does not eliminate the need for critical thinking, hypothesis formulation, or result evaluation. On the contrary, these competencies come to the fore, as working with a language model requires the ability to clearly formulate tasks, analyse the received response, and be responsible for the final result. Therefore, the very posing of the question about academic integrity in connection with the use of artificial intelligence systems is irrelevant. The use of a tool in itself is not a violation: everything is determined by how exactly it is applied. The violation of integrity lies not in the presence of technology, but in the dishonest attitude towards educational and scientific tasks—a phenomenon that existed long before the appearance of language models.

The correct strategy lies not in rejecting the new tool, but in organically integrating it into educational and scientific practice. The use of large language models should become an integral competency of the modern person. This is not merely about the technical ability to open a programme and obtain a ready answer, but primarily about the ability to set a correct task, critically evaluate the result, and combine algorithmic assistance with one's own intellectual and creative work. After all, any tool is useful to the extent that the user knows how to apply it. If a student formulates a task superficially, they will receive a superficial answer. If the task is clear and thought through, the result can substantially help save time and focus on the main thing: analysis, argumentation, formation of new ideas. In this sense, working with a language model requires greater responsibility from the user than traditional search systems or reference books. Of course, one can always simply "press the button" and mechanically (thoughtlessly) use the generated text. However, the result in such a case will prove superficial and meaningless, and this insufficiency will become obvious to anyone who seeks to familiarise themselves with the text at the level of its real content, rather than merely glancing through it. That is precisely why for an author working with artificial intelligence technologies, the (hermeneutic) ability to interpret and evaluate the text being produced is especially important—to transform it from a formal framework into a meaningful and valuable result.

The history of science and education knows such examples well. Once, students were taught to work with library catalogues, as without this it was impossible to navigate the flow of literature. Subsequently, the key skill became the ability to use electronic databases and computer programmes for information processing. Today, another competency is added to this list: the ability to work with artificial intelligence tools. And to neglect it means to remain aside from how modern science and education function.

Let us briefly dwell on the requirement to obligatorily indicate that a certain text was created using artificial intelligence technologies, which recently can be found even in the guidelines of official academic (educational and scientific) institutions, editorial boards, etc. In our view, such a requirement appears at least inadvisable. We do not accompany scientific articles with a disclaimer about which computer they were written on or which operating system was used. Such clarifications have long lost meaning, as they have become an everyday technical norm. The same will soon happen with artificial intelligence: the use of language models in the process of

text preparation will become so standard that special indication of this will appear anachronistic. To emphasise the fact of using a tool that is gradually becoming universal means not so much protecting academic principles as demonstrating a misunderstanding of elementary techniques of scientific and educational activity.

Therefore, the task of universities and scientific communities lies not in limiting access to new technologies, but on the contrary—in teaching future specialists to use them competently and responsibly. Artificial intelligence does not replace the human researcher but gives them the ability to work faster, more precisely, and more ambitiously. And this is where its true value lies. In conclusion, let us emphasise once more: large language models do not pose a threat to education and science, but on the contrary—should become and are already becoming an effective tool for their further development. The teacher's task at the present stage consists primarily in mastering these technologies as quickly as possible and being able to teach students their responsible and effective use. Like almost every new and truly revolutionary tool, artificial intelligence naturally causes understandable, sometimes semi-conscious resistance at the beginning, but it will eventually prove that it not only does not destroy the fundamental foundations of education and science, but, on the contrary, opens new and exciting perspectives.[3]

References

[1] Shramko, Y., 2025. Shtuchnyi intelekt v osviti ta nautsi: uiavni zahrozy chy novi mozhlyvosti? Available from: https://kdpu.edu.ua/blogs/2025/09/07/shtuchnyj-intelekt-v-osviti-ta-nautsi-uyavni-zagrozy-chy-novi-mozhlyvosti/.

[3] And yes, for complete "transparency": this text was created using the fifth model of *ChatGPT*, typed in the *LibreOffice* text editor on a *MacBook Air 2* computer. One could also add the processor serial number or keyboard colour—but this would hardly make more sense than obligatory marks about the use of artificial intelligence.