

New challenges in assessing students' knowledge: chatbot ChatGPT and real-time deepfakes

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The article reveals challenges to the educational system caused by the new software able to affect the quality of knowledge assessment in educational institutions illustrated by ChatGPT, NVIDIA Eye Contact and Deep Face Live. The first tool generates unique texts on a given topic, the second - helps to simulate eye contact in video conference mode, and third - replaces one person's face with another's face in a video stream in real-time. The threats of these and similar tools for the educational system, in particular knowledge assessment, are analyzed. The author concludes that banning chatbots practice is not an effective way to deal with the threats they pose to student evaluation. The author reveals techniques designed to improve educational tasks that allow unrestricted use of chatbots without impact on assessment results.. We consider promising to use cases generated by the teacher for one-time use (not repeated in other groups), containing casual (not generalized theoretical) questions. Ways of using the mentioned programs as innovations per se are mentioned

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Last month, the new chatbot ChatGPT, available for mass use, was widely discussed in the teaching environment. The core function of the chatbot is to communicate in writing with the user in a human-like manner, generating relevant answers to questions depending on the user's language, words, phrases and the context of the conversation. ChatGPT is a natural language processing tool based on artificial intelligence (AI) and created using a so-called Generative Pre-trained Transformer. The bot has already raised many unanswered questions, particularly regarding the admissibility of its use by students as an auxiliary tool for educational tasks. The possibility of detecting such cases also raises questions. This article aims to analyze the

opportunities and threats of using the mentioned and similar tools, which can distort the student's progress evaluation.

The main feature of ChatGPT is output generation in real-time. Responses will differ each time the chatbot provides answers depending on the context of the conversation. The system considers the progress of communication to improve its replies and can form coherent texts of a large volume on a given topic.

ChatGPT is trained to generate essays, describe historical events, depict famous works of art, provide answers in the field of scientific knowledge, give advice on a wide range of topics, explain existing phenomena and events, generate working programming code, etc. The ChatGPT outputs are similar to those provided by search engines like Google. However, the ChatGPT answers (word order and their combination) are unique, designed to appear human-made. To a large extent, such replies are correct in terms of content and can resemble the comments of an expert in the relevant field [1].

ChatGPT induced many questions, including legal grounds for using program results, ethical precautions of presenting human-generated texts, originality of texts as a creative work feature according to the recently adopted Law of Ukraine "On Copyright and Related Rights" dated 1.12.2022 N2811-IX, etc. We will not dive into the analysis of these questions. Currently, the professional discussion on the mentioned issues is quite extensive. Instead, we focus on the educational aspect of using a chatbot only.

ChatGPT has already been tested regarding generating student answers on some courses. Researchers claim that the results are relatively high-quality for the student to receive a passing grade [2]. Educators debate a set of questions: how to prevent the replacement of a students' work with the texts generated without their creative contribution, how to evaluate the ethical side of such actions, how to examine written texts, how to detect the fact of chatbot usage, etc.

The ChatGPT answer is sufficient for the student to receive the minimum passing grade. Some educators even claim that the chatbot answers somewhat better than the "average" Master of Business Administration [3, 4]. Researchers articulate that ChatGPT successfully passed law

exams in four courses at the University of Minnesota and exam at another business school [5]. They predict that in time to come, such AI systems will become assistants to lawyers.

This problem became public today, although it existed for a long time as an issue within the scope of academic integrity. Therefore, we should ask a broader question: how to deal with written student works and their evaluation in the light of constant improvement of natural language processing systems (for example, but not limited to ChatGPT)?

It is challenging for a teacher to detect the fact of text generated by the program. The quality of the generated texts is sometimes sufficient even to submit the research for publication as a scientific article. Such cases exist [6]. The teacher should do some tricks, such as verbally examine the student to reveal the fact that he/she doesn't know the subject of the submitted text [7].

The work generated by the chatbot is not a plagiarism of other works. It may contain some fragments from other works but mainly comprise text based on massive data in the field. Therefore most likely will not be detected by text-checking systems [8]. Checking works by an expert, taking into consideration the former progress of a student, currently remains almost the only option to speculate and detect the use of a chatbot in work preparation [9].

For many years teachers have dealt with copying texts from the Internet without proper attribution and learned to use anti-plagiarism systems. However, in the case of a Generative Pre-trained Transformer, the situation is more complicated. The generated text is usually a unique compilation and therefore in the direct sense doesn't contain plagiarized extracts from any particular source. It becomes harder to prove that the student didn't write the text. Therefore, some educational institutions have already implemented a policy of banning the use of ChatGPT by limiting access to this system [10]. Some institutions amended their ethical codes [11]. We presume that such precautions will have a limited effect. This can be illustrated by the restriction of ChatGPT use on the territory of Ukraine imposed by Open AI, the company that launched it (due to the aggression of Russia and the international sanctions policy). VPN usage allows bypassing such restrictions without complications.

In our opinion, banning particular technology does not remove the problem because there will always be workarounds. For example, the ban does not restrain students from use of additional sources of information (cheat sheets) on the exams. Students invent new creative ways of using them (mobile gadgets, micro-earphones). The prohibition of plagiarism and information copying without attribution gives rise to paid ghost writers' "services." Students also hack the need to "show one's handwritten workbook on the exam" - they write workbooks for their classmates. We can continue this list. Some creative ways of circumventing existing restrictions were humorously illustrated in the movie "That's Cunning" [12].

We believe that dealing with new technology is better than its prohibition. In the case of ChatGPT, educators already elaborated a set of creative suggestions on how to use it in education. [13, 14].

The author teaches mainly social sciences courses and uses a relatively simple method to deal with most of the mentioned threats to knowledge evaluation. Evidently, our technique is not universal. It includes the elaboration of individual or group tasks based on real situations. The main features of the task are 1) introduction of characters and/or facts not included in this real world situation and 2) specific, individually crafted questions that connect such situation with the facts/characters/actions added by the teacher. At the same time, students are allowed, even encouraged to use additional sources of information that may help them to deal with the task and argue a chosen position.

The information search skills and critical analysis become a "bonus" to the solution of the main problem of the task. Let's explain the last thesis. To evaluate student knowledge teachers often formulate purely theoretical questions (provide a definition, recapitulate a list of features, enumerate the known species or kinds, etc). Of course, the Internet, a textbook, a cheat sheet, and more - ChatGPT will nullify the effectiveness of the such type of questions. As we know, the struggle with student cheat sheets and supplementary materials is only partially effective. It results in disadvantageous and tense relations between the students and teachers. In the case of distance learning, where supervision is limited to the angle of view and resolution of the student's camera, attempts to eliminate cheat sheets can hardly be called effective.

The second common option is to ask a student a question based on a real situation/phenomenon, a case (for ex., to describe an event, its meaning, reveal and explain the facts, substantiate own position, etc.). Since real, well-known events and facts are usually already described/analyzed by scholars and other professionals, such information is available on the Internet. ChatGPT copes with the mentioned type of tasks as long as its database of educational texts already includes this analytics.

In our teaching practice, we overcome above mentioned challenges by composing a case situation based on a real one adding imaginary or real subjects and/or introducing new facts. Another crucial point is to frame a narrowly specialized set of questions that are unlikely to be asked in real world. The teacher needs to design unique questions for this particular task. The unique formula of the questions guarantees that no ready-made answers exist on the Internet. Therefore, only the student's analytical work can result in the correct answer. The uniqueness of the questions removes the problem of typical answers to typical theoretical questions when students copy answers from additional sources without even attempting to understand them. As a rule, we allow the use of supplemental sources of information. So, sources like ChatGPT can be freely available. We presume that the chatbot will not be able to provide and substantiate correct answers to questions that refer to fictional characters in actual situation or questions that contain assumptions.

Let's consider an example to illustrate the approach, one of the greatest human-made disasters - the oil spill in the Gulf of Mexico due to the incident on the Deepwater Horizon platform in 2010. This situation is actual, and therefore demonstrates the practical application of knowledge received in an educational institution. Theoretical questions for the student could be on the responsibility of an abstract subject for an oil spill, the principles of its application, the type of sanctions, etc. But these questions are typical. It is easy to find and copy the answer to these questions from the cheat sheet. The second approach - an analytical question based only on real facts, could be about determining the culprit of a real event, considering the available information. But such a question is also easy to solve with the help of the Internet or ChatGPT, since experts in the field have already analyzed it.

In contrast to the two approaches presented, which are extremes, the teacher can ask students to imagine how an organization for the protection of rare octopuses would act in this situation (the organization is imaginary, and so is the octopus species). The following questions can be asked: what facts must be collected by the organization, how to prove the presence/absence of a causal relationship between the event and damage to the fauna (octopus), taking into account the available evidence; What strong arguments the culprit of the accident, as well as the organization for the protection of octopuses, can use to strengthen their positions? The student should argue the position using the available information, suggest hypothetically available sources to provide additional relevant information (with a description of the sources, possible expenditure of time and resources) and prove its significance for solving the main problem. The student is allowed to search for available information about the event. For instance, the student can scrutinize real arguments made by the operator of the platform, as well as explore the analogy with the damage caused by this incident to turtles and dolphins and think about octopuses.

Naturally, the described presentation of the problem is a mix of real case and abstraction. In the proposed version, we side-step from a purely theoretical generalization. On the other side, we do not allow the student to use ready-made solutions that relate to factual participants and therefore can be found by the ChatGPT. We assume this approach is advantageous since it requires a synthetic combination of knowledge from various course topics and the need to search, filter, clarify, and analyze relevant information to prove one's position. The technique allows the teacher to assess the student's understanding of the concepts and constructs he/she operates. Besides it eliminates the possibility to get a passing grade borrowing and copying the text without proper understanding.

The described task may additionally include a set of conditions depending on the needs of the teacher and the specifics of the course: group work, roleplay, presenting the results to an imaginary initiator of the investigation, simulation of negotiations with the oil production platform operator regarding compensation payments, presenting the platform operator's defense position with further arguments, etc. The task may need to specify the parties'

positions, set up additional facts, etc. We suggest that "what if" questions can also be beneficial as they create a situation the chatbot does not have factual data about (cheating is hardly possible).

Educators may note that we have described the case method. The key difference is that the teacher should supplement the case with additional conditions. The teacher may introduce imaginary participants of the situation or other facts. This move eliminates the possibility of finding ready-made answers using ChatGPT. The disadvantage of the described approach is that the teacher spends a lot of time crafting the task peculiarities and elaborating on new questions every time he uses this case. Without mentioned precautions, student notes with case solutions will appear in free access, and student groups will pass them from one group to another. All the advantages of the approach will disappear.

Additionally, the teacher can establish some limits that can help to increase the effectiveness of the teacher's work. Firstly a teacher may introduce a maximum size limitation for written texts. This condition crystallizes the student's contribution, leaving no room for "water" in the text, saving the time of the review. For skeptics of the possibility of designing a student's creative work in a concise form, among the famous examples, we can mention the exercise of writers to write a story with a completed plot of six words [15] or the Ph.D. dissertation of a Nobel laureate in less than thirty pages [16].

It is not uncommon for teachers to provide students with typical tests with several options to choose. This type of task is relatively easy to solve with the help of supporting materials and therefore with ChatGPT. The teacher can correct the question wording by converting it to a mini-case. For example, instead of the question: "do Ukrainian citizens have the right to buy plots of land for gardening?" (which is a typical theoretical question), you can ask the question: "the wife of the Ukrainian Cossack Sydorenko asked him to buy a plot of land for growing tomatoes. Will the law allow him to satisfy his wife's request? Yes or no and why?" (which is essentially a similar question, albeit less clear, "wrapped" in a situational plot). The answer to the last question will not be available on the Internet. To clarify it, students should correctly highlight the significant clauses of the situation and discard the unnecessary ones. The

emphasis of the student's activity changes from memorization & recollection to analysis and argumentation of the chosen position.

Educators offer a palette of creative ways of ChatGPT use in the educational sphere when instead of banning it, they propose ways to use the technology [17, 18]. In the recent past, the same thing happened with computer gadgets. The initial prohibition and skepticism regarding their use by students transformed into the preparation of multimedia presentations, group work on projects in digital form, providing digital teaching course materials, etc. And, of course, the situation changed even more with the COVID-19 pandemic and the transition to distance learning. A second example of technological change is the prohibition of calculators in class in the past. Currently, mobile gadgets, which perform not only math operations, become companions in teaching and learning. On the other hand, researchers stress that ChatGPT successfully passes MBA exams. Comparing this effect to an example of calculators, they say: "In the same way any automation of the skills taught in our MBA programs could potentially reduce the value of an MBA education" [19]. The third example. The need for handwritten notes and handwriting evaluation gradually changed to the possibility of printing. Printed written works became a standard, while previously only handwritten text was perceived as authentic.

It is possible to predict further wider use of artificial intelligence technologies, specifically in education. For example, Microsoft Corporation has already announced its intention to integrate a system like ChatGPT into its office products Word, Powerpoint, and Outlook [20]. Therefore we are convinced that banning them will not be the best option.

Among the drawbacks, we should note the criticism of ChatGPT since it does not provide references to original data or sources, and the answers are not always relevant to complex and recent situations [21]. The lack of attribution can be a problem given the existing lawsuits regarding the facts when AI systems use the source codes uploaded to GitHub and similar repositories without proper attribution [22].

In this area, we should recall some technologies that "settled down" in education. Nowadays, the standard tool for text editing software for writing texts is grammar and

punctuation checks. Users often translate articles abstracts of articles with automated translation services, which is currently not considered unethical or prohibited. Ready-made Powerpoint presentation templates are also considered ethical, although they were created by another person.

We should take into account, that writing texts with the help of artificial intelligence impoverishes the language, makes it stereotyped, reduces the uniqueness of a person's writing style, interferes with its development, etc. [23].

Summarizing our extensive reflections on AI technology in the field of natural language processing in education, we note that its appearance didn't drastically change the way teachers work. Especially for those educators who were previously concerned with the peculiarities of using Internet resources, social networks, Youtube, etc. For the rest of the teachers, ways to overcome new challenges are already developed.

Ointments with artificial intelligence used for text processing have to be diluted with a fly in it. Apart from the chatbots, we should recollect technologies that can generally be called deep fake or falsification. For now, we mention only two recent developments capable of disrupting evaluation in educational institutions. This month, NVIDIA presented an improved version of the eye contact function for video conferencing [24]. It is a technology that in real-time corrects the video stream of the user who took his eyes off the camera. The viewer gets the impression that his interlocutor is constantly looking at the camera. The realism of the implementation makes it difficult to detect a change of view. For the examination, this means that remote proctoring will face difficulties. So, traditionally, the teacher asks not to use cheat sheets and notices the student's attention diverting to an additional source of information. NVIDIA technology makes such monitoring impossible. The technology will only progress. Teachers will have to coexist with it, not deny its existence. One of the options for overcoming it is the already described method, which allows but does not forbid students to use additional sources of information. Teacher evaluates not the ability to memorize and recollect information, but the skill to analyze, select significant facts, explain, and draw correct conclusions. Of course, we

should admit that the proposed method is not a silver bullet for courses of different types and fields of study.

The third example of technologies capable of distorting the assessment in educational institutions (in this case, a remote one) is software solutions to replace in real time the image of one person with the image of another one. As an example, see [25, 26]. Since changing the voice is not that complicated for quite some time, the combination of changing the voice and the image in the video stream will result in a realistic substitution of an individual. This combination creates a situation when the teacher evaluates the answer not of the target student, whose image is displayed on the screen, but of another person who will use someone else's image. We can compare this situation to writing a work by ghost writer or the usage of hidden earbuds in oral exams. Overcoming this situation seems challenging without changing the form of communication with the student (from distance work to face-to-face conversation, etc.).

What conclusions can we draw from the analysis of technologies influencing the evaluation in educational institutions?

1. Not much has changed for educators who gradually integrate information technologies into their educational activities. Threatening changes that do take place, relate to the potential assessing the knowledge of another person (the student's assistant) instead of the student himself.

2. We consider promising to use cases generated by the teacher for one-time use (not repeated in other groups), containing casual (not generalized theoretical) questions.

3. It is possible to use the described new technologies per se if the context of the course allows this. It can be an evaluation of the linguistic correctness of ChatGPT texts; analysis of reasoning and integrity of ChatGPT's answers by the students; using a chatbot as an opponent in a debate; generating and analyzing a list of features, signs, and characteristics of a given phenomenon; examples generation from the topic by the chatbot and other types of tasks [27].

In our opinion, the considered technologies will become educators' companions in any case - either on the initiative and permission of the teacher or with his prohibition, combined with the desire of students to bypass it. Our task remains simple - not to ignore or ban them, but to find a gainful and convenient application for them in educational activities.

References

1. Hillemann, D., & Zimprich, S. (2022, December 9) ChatGPT - legal challenges, legal opportunities. Retrieved from <https://www.fieldfisher.com/en/insights/chatgpt-legal-challenges-legal-opportunities>
2. Hinkley, E. (2023, January 18) Teach aspiring lawyers to use ChatGPT, says top law prof. Retrieved from <https://www.legalcheek.com/2023/01/teach-aspiring-lawyers-to-use-chatgpt-says-top-law-prof/>
3. Carbone, C. (2022, December 7) How ChatGPT could make it easy to cheat on written tests and homework: 'You can NO LONGER give take-home exams or homework'. Retrieved from <https://www.dailymail.co.uk/sciencetech/article-11513127/ChatGPT-OpenAI-cheat-tests-homework.htm>
4. Terwiesch, C. (2023, January 17) Would Chat GPT3 Get a Wharton MBA? A Prediction Based on Its Performance in the Operations Management Course. Retrieved from <https://mackinstitute.wharton.upenn.edu/2023/would-chat-gpt3-get-a-wharton-mba-new-white-paper-by-christian-terwiesch/>
5. Kelly, S.M. (2023, January 26) ChatGPT passes exams from law and business schools. Retrieved from <https://edition.cnn.com/2023/01/26/tech/chatgpt-passes-exams/>
6. Sloane, T. (2022, July 15) An AI-Created Academic Paper Is Submitted for Review, but Will AI Always Talk Our Language? Retrieved from <https://www.paymentsjournal.com/an-ai-created-academic-paper-is-submitted-for-review-but-will-ai-always-talk-our-language/>
7. Mitchell, A. (2022, December 26) Professor catches student cheating with ChatGPT: 'I feel abject terror'. Retrieved from <https://nypost.com/2022/12/26/students-using-chatgpt-to-cheat-professor-warns/>
8. Else, H. (2023, January 12) Abstracts written by ChatGPT fool scientists. Retrieved from <https://www.nature.com/articles/d41586-023-00056-7>
9. Khatsenkova, S. (2023, January 19) ChatGPT: Is it possible to detect AI-generated text? Retrieved from <https://www.euronews.com/next/2023/01/19/chatgpt-is-it-possible-to-detect-ai-generated-text>
10. Elsen-Rooney, M. (2023, January 3) NYC education department blocks ChatGPT on school devices, networks. Retrieved from <https://ny.chalkbeat.org/2023/1/3/23537987/nyc-schools-ban-chatgpt-writing-artificial-intelligence>

11. Huang, K. (2023, January 16) Alarmed by A.I. Chatbots, Universities Start Revamping How They Teach. Retrieved from <https://www.nytimes.com/2023/01/16/technology/chatgpt-artificial-intelligence-universities.html>
12. Kurashi, R. (2015, September 15) How Japan student cheating (video file). Retrieved from <https://youtu.be/Xhg-c-DpOjU>
13. Stasey, S. (2023, January 8) These teachers think ChatGPT can help them spend less time on writing reports – and more time with their students. Retrieved from <https://www.businessinsider.com/teachers-think-chatgpt-let-them-spend-more-time-actually-teaching-2023-1>
14. Ramin, S. (2022, December 13) 3 Ways teachers can use ChatGPT in the classroom, according to ChatGPT. Retrieved from <https://www.helloteacherylady.com/blog/2022/12/3-ways-teachers-can-use-chatgpt-in-the-classroom-according-to-chatgpt>
15. Wortman, Z. (2016, September 11) Ernest Hemingway's Six-Word Sequels. Retrieved from <https://www.newyorker.com/humor/daily-shouts/ernest-hemingways-six-word-sequels>
16. Nash, J. (1960) Non-cooperative games. Dissertation Ph.D., 28p. Retrieved from https://www.princeton.edu/mudd/news/faq/topics/Non-Cooperative_Games_Nash.pdf
17. Roose, K. (2023, January 12) Don't Ban ChatGPT in Schools. Teach With It. Retrieved from <https://www.nytimes.com/2023/01/12/technology/chatgpt-schools-teachers.html>
18. How to deal with ChatGPT as a teacher? (2023, January 16) Retrieved from <https://vu.nl/en/employee/didactics/how-to-deal-with-chatgpt-as-a-teacher>
19. Biswas, S. (2023, February 7) ChatGPT aces Wharton MBA exam, Professor warns AI will reduce 'value of education'. Retrieved from <https://www.livemint.com/technology/apps/chatgpt-aces-wharton-school-of-business-mba-exam-professor-warns-ai-will-reduce-value-of-education-11674384732367.html>
20. Milmo, D. (2023, January 23) Microsoft confirms multibillion dollar investment in firm behind ChatGPT. Retrieved from <https://www.theguardian.com/technology/2023/jan/23/microsoft-confirms-multibillion-dollar-investment-in-firm-behind-chatgpt>
21. Magas, M. (2023, January 18) Will ChatGPT End The Legal Profession? Don't Fire Your Lawyer Just Yet. Retrieved from <https://www.jdsupra.com/legalnews/will-chatgpt-end-the-legal-profession-9244735/>
22. Losio, R. (2022, November 18) First Open Source Copyright Lawsuit Challenges GitHub Copilot. Retrieved from <https://www.infoq.com/news/2022/11/lawsuit-github-copilot/>
23. Baron, N.S. (2023, January 19) How ChatGPT robs students of motivation to write and think for themselves. Retrieved from <https://theconversation.com/how-chatgpt-robs-students-of-motivation-to-write-and-think-for-themselves-197875>
24. Delgado, G. (2023, January 12) NVIDIA Broadcast 1.4 Adds Eye Contact and Vignette Effects With Virtual Background Enhancements. Retrieved from <https://www.nvidia.com/en-us/geforce/news/jan-2023-nvidia-broadcast-update/>
25. Frantzen, R. (2021, November 18) How to make a real-time Deep Fake. Tutorial (video file). Retrieved from <https://youtu.be/wYSmp-nrJ7M>
26. CodeMiko (2021, November 27) Revealing How CodeMiko Is Made (video file). Retrieved from <https://youtu.be/e818LgnJ9rl>

27. Short, K. (2023, January 8) Introducing ChatGPT to Your Classroom. Retrieved from <https://www.middleweb.com/48319/introducing-chatgpt-to-your-classroom>