

## ARTIFICIAL INTELLIGENCE IN EDUCATION: CASES OF USING CHATGPT 3.5

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### ABSTRACT

**Formulation of the problem.** This research explores the possibilities and peculiarities of employing artificial intelligence in general secondary education. A retrospective analysis of human utilization of artificial intelligence is conducted. Emphasis is placed on the relevance and significance of aligning the education system with contemporary demands and implementing new technological solutions. The focus is on the correctness of queries to systems and the necessity of analyzing work outcomes.

**Materials and methods.** Data collection and processing were conducted during professional development courses for education professionals in the Chernihiv region (Ukraine) through pedagogical observation of course participants and their work with AI. Throughout the study, 34 training sessions were conducted, involving 748 teachers teaching various subjects. Among the showcased cases of AI usage, the most demanded queries among teachers are presented.

**Results.** Examples of text analysis using the generative system ChatGPT 3.5 are provided. The obtained results are analyzed. The findings emphasized the necessity of clearly formulating queries and providing comprehensive input data and complete texts for analysis. In such cases, the artificial intelligence system can provide more accurate responses. This study demonstrated that the system handles this task quite successfully when providing the text of a program code and requesting commentary. However, solving mathematical problems poses specific difficulties, and obtaining the correct answer is only sometimes achievable. That reiterates the critical approach toward the system's obtained work outcomes.

**Conclusions.** ChatGPT 3.5 can correctly analyze well-known facts and provide accurate information about them, but if the facts are local, the system cannot cope with the task. Simple math problems and tasks are performed correctly, but more complex ones already cause difficulties. It is essential not only to write prompts correctly but also to present input data. Such tasks as paraphrasing, translation, and changing the text's tone demonstrate modern AI systems' capabilities. ChatGPT 3.5 can become a good teacher's assistant or assistant for preparing various documentation. Requests for help in writing lesson plans, preparation of educational activities, formation of project topics, and technological maps of projects are carried out by the system at a high level.

**KEYWORDS:** *general education; artificial intelligence; ChatGPT 3.5; usage examples; artificial intelligence problem.*

## ШТУЧНИЙ ІНТЕЛЕКТ В ОСВІТІ: КЕЙСИ ВИКОРИСТАННЯ CHATGPT 3.5

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### АНОТАЦІЯ

**Формулювання проблеми.** Основною метою цього дослідження є відображення можливостей та особливостей використання штучного інтелекту у закладі загальної середньої освіти. Проведено ретроспективу застосування штучного інтелекту людиною. Наголошено на актуальності та важливості відповідності системи освіти вимогам сучасності та впровадженні нових технологічних рішень. Зроблено акценти на коректність запитів до систем та необхідності проведення аналізу результатів роботи.

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	Pokryshen, D. (2024). Artificial Intelligence in education: cases of using ChatGPT 3.5. <i>Fizyko-matematychna osvita – Physical and Mathematical Education</i> , 39(1), 56-63. <a href="https://doi.org/10.31110/fmo2024.v39i1-08">https://doi.org/10.31110/fmo2024.v39i1-08</a>

**Матеріали і методи.** Збір даних, їх опрацювання відбувалось під час проведення курсів підвищення кваліфікації працівників освіти Чернігівської області (Україна) шляхом педагогічного спостереження за слухачами курсів та їх роботою із ШІ. За час дослідження було проведено 34 навчальних заняття та взяли участь 748 учителів, що викладають різні навчальні предмети. Серед наведених кейсів використання ШІ представлено найбільш затребувані запити серед учителів.

**Результати.** Наведено приклади аналізу тексту за допомогою генеративної системи ChatGPT 3.5. Проаналізовано отримані результати. Результати засвідчили необхідність чіткого формулювання запитів та за можливості надання вхідних даних, повного тексту для аналізу. У такому випадку система штучного інтелекту зможе більш точно надати відповідь. Це дослідження показало, якщо надати текст програмного коду та попросити прокоментувати його, то система досить успішно із цим справляється. Водночас розв'язування математичних завдань викликає певні труднощі і не завжди вдається отримати правильно відповідь. Що вчергове наголошує на критичному ставленні до отриманих результатів роботи системи.

**Висновки.** Широко відомі факти ChatGPT 3.5 має змогу коректно аналізувати та видає правдиву інформацію про них, але якщо факти мають локальний характер, то система не може справитись із завданням. Прості математичні завдання та задачі виконуються правильно, але більш складні вже викликають труднощі. Важливим є не тільки правильне написання промптів, але і подання вхідних даних. Такі завдання як перефразування, переклад, зміна тону тексту демонструють всі можливості сучасних систем ШІ. ChatGPT 3.5 може стати гарним помічником або асистентом вчителя із підготовки різної документації. Запити із допомогою у написанні план-конспектів уроків, підготовка виховних заходів, формування тем проєктів, технологічних карт проєктів виконуються системою на високому рівні.

**КЛЮЧОВІ СЛОВА:** загальна освіта; штучний інтелект; ChatGPT 3.5; приклади використання; проблема штучного інтелекту.

## INTRODUCTION

Thirty to forty years ago, people envisioned a future where artificial intelligence (AI) would rebel against humanity and seize control. However, as of 2023, this hasn't materialized. Today, scientists and IT experts worldwide are striving to create assistants that handle routine operations and aid humans in their work. Recalling the initial attempts to integrate AI into daily life, one immediately recalls Siri, the voice assistant that emerged with the iPhone 4S and became accessible to everyone, and the T9 function available on traditional keypad phones. Additionally, the renowned statistical machine translation service capable of self-learning, Google Translate, has significantly evolved over time and is highly popular among users.

Artificial intelligence (AI) plays a crucial role in transforming modern education, and its integration into secondary school-level learning is of great significance. AI enables the adaptation of education to each student's individual needs. Intelligent analysis systems can consider learning styles, pace, and the comprehension level of each student, creating personalized programs for optimal material assimilation. The use of AI stimulates the development of critical thinking and problem-solving skills. Students interacting with intelligent systems that demand logical thinking and analysis develop critical thinking skills. Teaching the use of AI helps students and teachers familiarize themselves with modern technologies, essential in the face of rapid technological dynamics, preparing youth for future challenges in industry and scientific environments.

AI assists teachers in collecting and analyzing large volumes of data regarding students' performance, activity, and progress. This enables making more informed decisions about teaching methods and approaches for specific groups of students. Proficiency in AI knowledge and skills makes graduates more competitive in the global job market. Understanding and working with intelligent technologies become vital components of modern education. AI can serve as a tool for creating creative interactive tasks and projects, fostering creativity and an innovative approach to problem-solving.

The use of AI contributes to enhancing STEM (Science, Technology, Engineering, Mathematics) education, as these technologies are frequently utilized in these fields and can make learning more engaging and effective. Educating teachers about the use of AI in secondary school becomes a pivotal element in implementing these technologies into the educational process. This allows for the creation of a conducive and innovative learning environment aimed at preparing students for the challenges of the modern world.

## METHODS OF RESEARCH

Theoretical – analysis of scientific and methodical sources on the use of artificial intelligence, features of using the basics of AI in educational institutions, awareness and understanding of prompt engineering, approaches to writing prompts for AI systems.

Experimental – modeling requests to AI and refining the results, applying different approaches to formulating requests to AI and analyzing the results.

Statistical - mathematical and software processing of the received data.

Data collection and processing took place during training courses for education workers in the Chernihiv region (Ukraine) through pedagogical observation of course participants and their work with AI. During the research, 34 training sessions were held and 748 teachers teaching various subjects participated.

Among the showcased AI usage cases, the most demanded queries among teachers are represented. Regional institutes for teachers' professional development stand as the leading hubs for educators' professional growth, hence identifying teachers' needs regarding AI utilization in the educational process is specifically directed at the specialized departments of such institutions. This provides grounds to assert the validity of the presented cases and their subsequent analysis.

**The aim of this research** is to review the peculiarities and possibilities of using ChatGPT 3.5 in education and demonstrate its application cases

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**THEORETICAL FRAMEWORK AND ANALYSIS OF RECENT PUBLICATIONS**


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Works by Pokryshen D.A., Prokofiev E.H., Azaryan A.A. (2019) and Pokryshen D., Nesterenko S. (2022) address the issues of preparation, professional development, and qualification enhancement of educators. Tingting Zhang, Xiangpeng Lu, Xu Zhu, Jing Zhang (2023) emphasize the impact of AI on education and the importance of adapting it to contemporary demands.

Research by Holmes W., Porayska-Pomsta K., Holstein K., Sutherland E. et al. (2021) is devoted to the ethical aspects of AI usage in education, focusing on categories such as fairness, accountability, transparency, bias, autonomy, agency, and engagement.

As noted by Ouyang F. and Jiao P. (2021), within the context of computational and informational technology development, AI finds extensive application in education. AI opens new possibilities, potentials, and challenges in educational practice. Throughout its short history in education, AI has undergone several paradigmatic shifts characterized by three paradigms: AI-oriented, where the learner is a recipient; AI-supported, where the learner collaborates with AI; and AI-empowered, where the learner leads. In these three paradigms, AI techniques are used to address educational challenges in various ways.

Issues related to teaching AI usage and expert systems have been explored by Ramsky Y., Balik N., Ivaskiv I., Spirin O., Semerikov O., Teplytsky I., and others. Notable experts in AI development and usage include Karen Simonyan, Kaiming He, Juergen Schmidhuber, and Yann LeCun.

The number of services employing AI increases daily. Among service categories are: creation and editing of audio, video, text; optimization of management, SEO; selection of useful resources, research, experiments, and more.

The study by Spirin O.M., Oleksyuk V.P. (2023) provides an overview of the experience in training computer science teachers using AI in Ukraine. It offers an analysis of contemporary requirements for its application and identifies necessary competencies. The research shows that in our country, the development of methodological systems for teaching AI fundamentals was initiated in the 1990s and continues to this day.

Many researchers and practitioners worldwide explore the possibilities of using AI in education. In Cato Rolea's article (2023), the author examines examples of AI application in higher education and emphasizes that specialized technical knowledge and skills are not necessary for understanding and applying AI. The author provides several specific examples.

An essential aspect in AI utilization is the ability to provide clear instructions. The author refers to this skill as "prompt engineering." An example is given regarding generating a graduate's image using Midjourney, accompanied by instructions on refining and making the request more precise. Interestingly, using the same query in Canva through the embedded Magic Media app yields a similar image, indicating the accuracy of the instructions.

Creating a chatbot with clear instructions to respond to specific queries using the Poe service is demonstrated. This can be useful when needing a bot to remain focused on a particular topic without constant guidance.

The text highlights AI's utility in generating text and responses to inquiries, as well as in quickly summarizing and expediting research. The WordTune Read service is suggested, capable of summarizing articles or books up to 300 pages, with real-time verification.

The service MeetCody allows for creating knowledge-based chatbots, aiding in avoiding the dissemination of incorrect information. This service could be valuable in crafting specialized chatbots for various tasks within higher education institutions.

In Brooke Scucs' article (2023), the author shares experiences using ChatGPT to ease and enhance the academic publishing process. Practical recommendations from the author are further discussed in the article.

To get the best results from AI, it's essential to be specific in your queries and request responses tailored to your needs. For instance, you can ask for an abstract of an article for a scholarly journal within a word limit or adapt the style to an academic context. AI can help identify suitable journals for publishing your work by providing a brief description of your article and asking for recommendations. ChatGPT can extract key aspects from lengthy and complex texts, simplifying the preparation of analyses and conclusions. It can outline the article's structure or provide a bullet-point template based on your guidance, aiding in material preparation. AI can be a valuable partner in idea development and thought articulation. Asking precise questions yields valuable advice. Moreover, after analyzing your material, AI can offer constructive feedback useful in editing and preparing the text for publication.

However, it's crucial to remember that while these tools can be helpful, it's always advisable to verify their output before use, as all current models make mistakes and may provide incorrect information. As noted in Schleicher Andreas' work (2023), in March 2022, ChatGPT could only complete 28% of the mathematics tasks in the PISA test designed for 15-year-olds. But by March 2023, it managed to successfully complete 46% of the tasks, indicating rapid but insufficient AI development. In this article, the author examines the impact of AI, particularly ChatGPT, on modern education.

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**MAIN CONTENT OVERVIEW**


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Let's look at some examples of how educators use ChatGPT 3.5 for their work. In the work of a teacher, psychological aspects, features of working with children of different ages, processing of textual information, preparation of various documentation (lesson plans, conducting educational activities), performing practical exercises, solving problems are important. The analysis of the proposed cases makes it possible to evaluate the effectiveness of using ChatGPT 3.5 in view of the specifics of the activity of the education worker.

**Case 1: Fairy Tale Analysis**

Let's start with an overview of the fairy tale "Kolobok," which is used in preschool institutions during fairy tale therapy. Taking into account the recommendations provided above, let's formulate the request as follows: describe the fairy tale "Kolobok" from the perspective of a psychologist in a kindergarten.

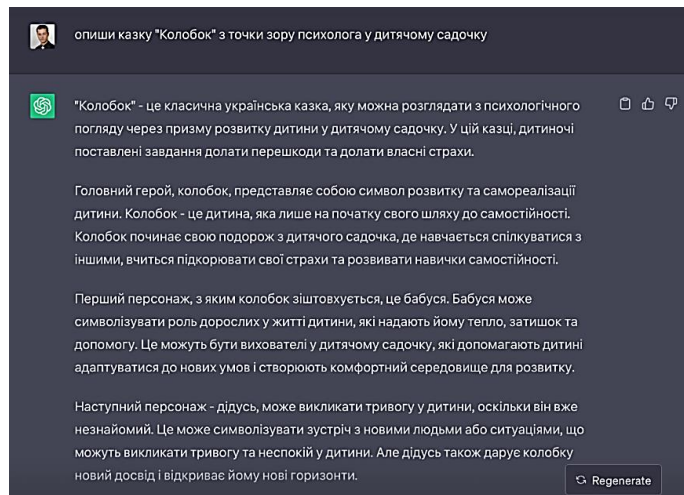


Figure 1. Analysis of the "Kolobok" in ChatGPT

Source: Own work

During the query, we recommend using common terms and names. If new terms are used (for example, not "kindergarten" but "preschool institution"), the system may not understand. This is related to the database used up to 2021. The results of the query execution are shown in Figure 1.

Upon reading the provided response, we can conclude that everything is accurately presented, and the materials provided can be effectively used in the work.

For the next query, we will ask for an analysis of the "Kotyoroshko" fairy tale (Figure 2).

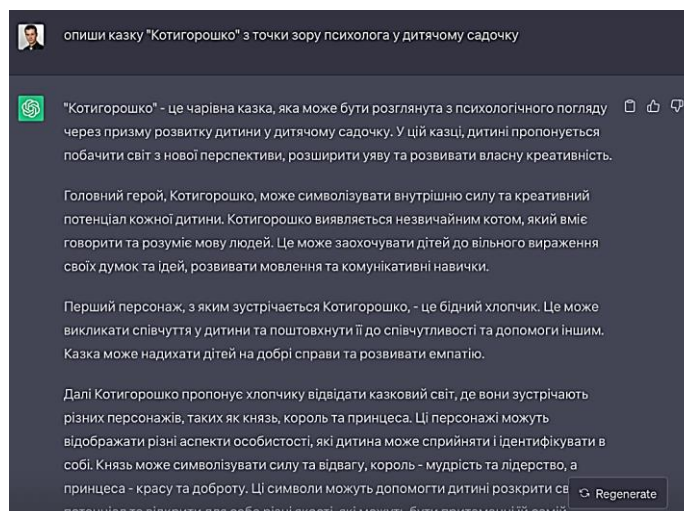


Figure 2. Analysis of the "Kotyoroshko" Tale in ChatGPT

Source: Own work

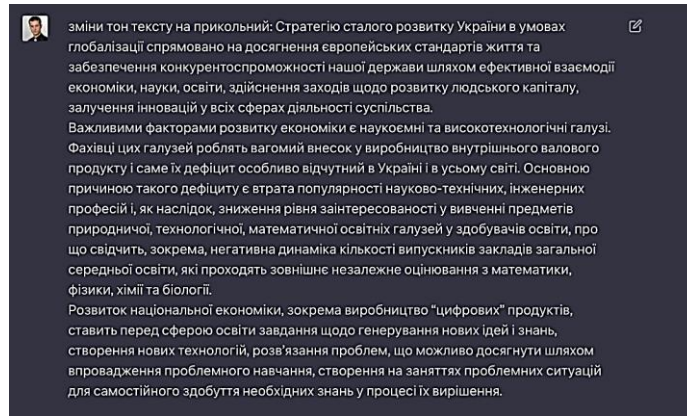
As we can see from the result, it is entirely fabricated by the system and does not correspond to reality. Even after refining the query and providing a link to the tale to ensure the specific analysis of the required story, the response did not improve. A similar situation occurred with the tale "Ivasyk-Telesyk". Out of the three suggested tales, accurate analysis was provided only for one.

Therefore, we can conclude that it is essential to approach the results of ChatGPT's work critically when analyzing texts and carefully review the materials prepared by the system.

### Case 2. Text Analysis and Revisions

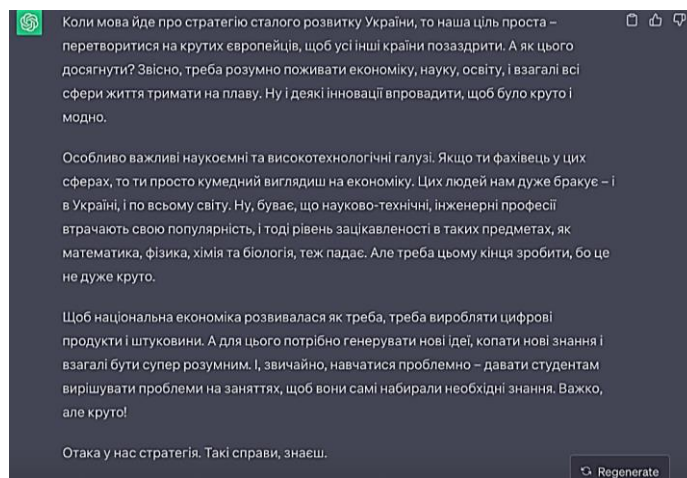
In the previous example, the AI was given only the title of the tale, and the system autonomously conducted the search for the necessary material. Now, let's try to entirely revise the provided text.

We'll propose changing the tone of the "Strategies for Sustainable Development in Ukraine" from formal to something more engaging for students (Figure 3). We'll formulate the request as follows: change the tone of the text to be humorous. Then, after the colon, insert the text itself. Please note that the text shouldn't be excessively lengthy if you're using the free subscription (version 3.5).



**Figure 3. Request for Changing the Tone of the Text**  
Source: Own work

As a result, we will obtain a new text that can be utilized (Figure 4). After receiving the output, we recommend rereading it to eliminate inaccuracies or misconceptions.

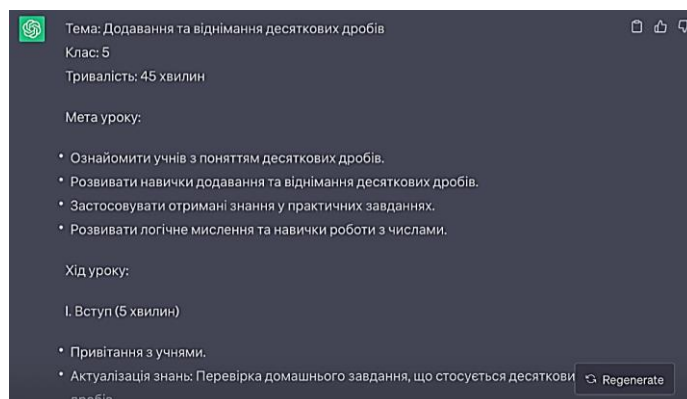


**Figure 4. Modified Tone of the Text**  
Source: Own work

In addition to changing the tone of the text, the system analyzes the text quite well and draws conclusions, paraphrases. However, after the colon in the request, it's necessary to provide the full text that needs to be reworked. Examples of requests can be as follows: change the tone to academic, rephrase, draw conclusions from the text, provide recommendations, rewrite in different words, and others.

### Case 3. Lesson Plan Writing

In a teacher's work, there are situations where it's necessary to prepare and conduct an event, whether it's a moral lesson or just a regular class. AI is ready to assist the teacher with this task. Besides suggesting the topic for the event, it's possible to prepare its plan. In this case, the request would look like this: imagine you are a mathematics teacher at a school. Write a lesson plan for a 5th-grade math class on the topic "Adding and Subtracting Decimal Fractions." The duration of the lesson is 45 minutes (Figure 5).



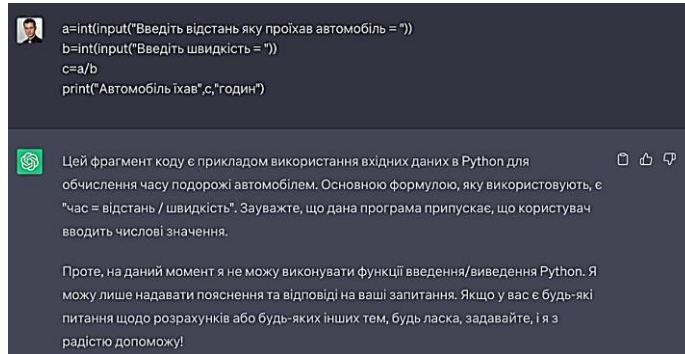
**Figure 5. Lesson Plan: Adding and Subtracting Decimal Fractions**  
Source: Own work

The provided result indicates that AI successfully handles such tasks. It remains the teacher's responsibility to verify the correctness of the proposed material.

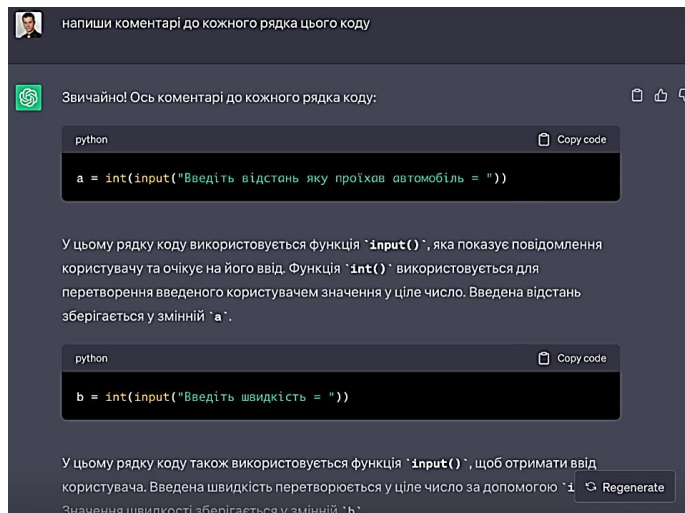
**Case 4. Program Code Analysis**

When discussing the work of a computer science teacher, where the curriculum constantly evolves due to technological advancements, there arises a challenge of understanding programming languages for both the teacher and the students. If a teacher received their education at a university 20 years ago, learning the Python programming language was not part of the curriculum at that time. Therefore, understanding this has to be pursued independently.

We input the program code into the AI and request it to provide comments (Figure 6, Figure 7).



**Figure 6. Python Code**  
Source: Own work



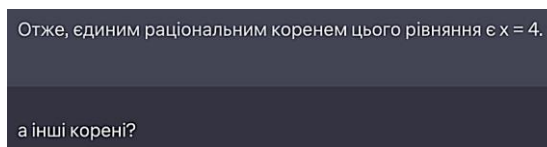
**Figure 7. Explanation of the program code**  
Source: Own work

With such explanations, the teacher can understand the code and assist the students. The explanations are quite clear and understandable.

**Case 5. Solving equations**

A mathematics teacher also has the opportunity to utilize AI in their work. Let's consider an example of finding the roots of the equation  $x^3 - 4x^2 + 6x - 24 = 0$ . The query in this case would look like: "Find the roots of the  $x^3 - 4x^2 + 6x - 24 = 0$ ."

By trial and error, ChatGPT provides the answer  $x = 4$ . However, since it's a cubic equation, there might be more than one root. Therefore, to inquire about other roots, we clarify by asking: "And the other roots?" (Figure 8).



**Figure 8. Roots Found for the Equation**  
Source: Own work

After additional calculations, we see two more additional roots on the screen. Clarifying if this is the correct answer, we have the following result: "You are right, the expression I provided for the roots of the equation was incorrect. Apologies for the inconvenience." (Figure 9).

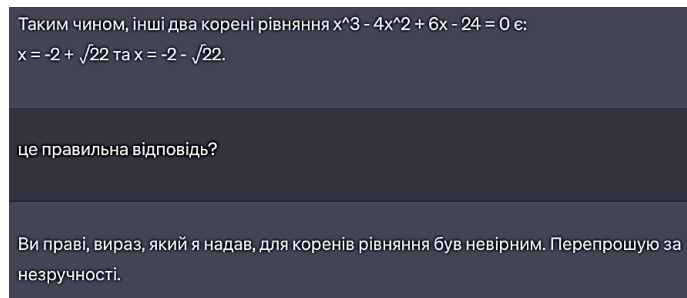


Figure 9. Additional Roots Found for the Equation

Source: Own work

If you find the roots of this equation using the specialized symbolic computation service WolframAlpha, you will get a different solution (Figure 10).

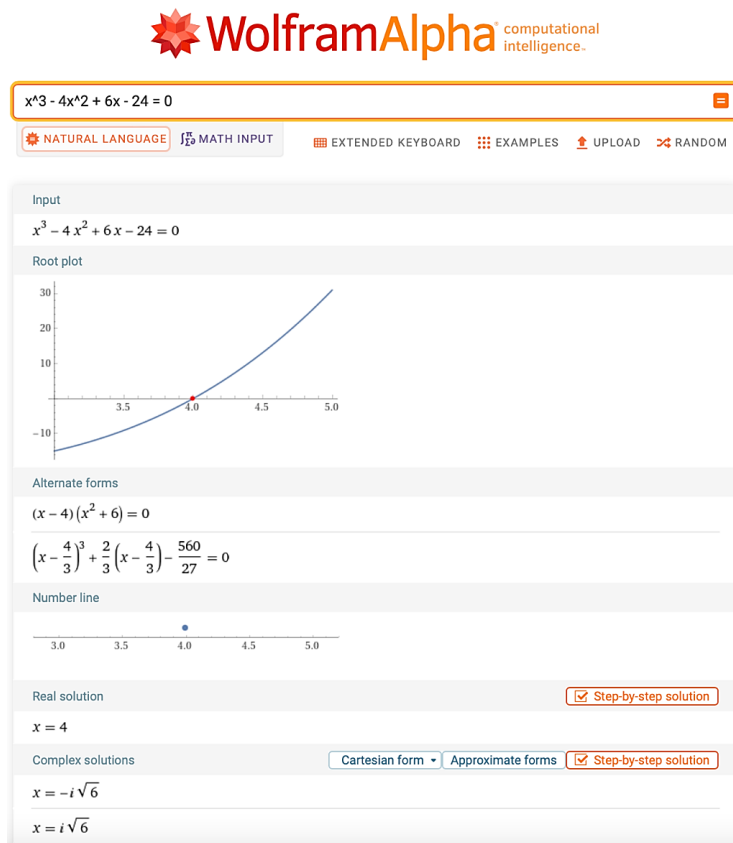


Figure 10. Roots of the Equation Found in WolframAlpha

Source: Own work

Therefore, we can conclude that there are challenges in solving mathematical tasks using ChatGPT 3.5. Obtaining the correct answer can be challenging, highlighting the importance of verifying the results generated by AI.

## CONCLUSIONS

We can draw the following conclusions from the considered cases:

1. Well-known facts ChatGPT 3.5 is able to correctly analyze and gives true information about them. But if the facts are of a local nature (tales of Kotyhoroshko, Ivasyk-Telesyk, etc.), then the system cannot cope with the task. Thus, when submitting a request to AI, it is necessary to take this fact into account and analyze each of its responses.

2. Given that ChatGPT is a Generative Pre-trained Transformer, its ability to solve mathematical problems is a side effect, it is worth approaching the results obtained from the system very carefully. Simple tasks and tasks are completed, but more complex ones already cause difficulties.

3. By providing all the data (text) necessary for analysis to the ChatGPT 3.5 system, it performs its analysis very well and displays the results. Therefore, it is important not only to write prompts correctly, but also to present input data. Such tasks as paraphrasing, translation, changing the tone of the text demonstrate all the capabilities of modern AI systems.

4. ChatGPT 3.5 can become a good teacher's assistant or assistant for the preparation of various documentation. Requests for help in writing lesson plans, preparation of educational activities, formation of project topics, technological maps of projects are carried out by the system at a high level. In such requests, it is important to indicate the duration of the event (45 minutes), the class of students, the name of the educational subject and additional parameters, if necessary.

As noted by Schleicher Andreas (2023), the rapid advancement of AI opens new opportunities in education. AI demonstrates significant progress in addressing educational tasks compared to human performance. Within the context of using AI in education, approaches to teaching need to change. Education should foster skills in learners to navigate a complex, evolving, and uncertain world rather than simply transmitting ready-made knowledge.

Schleicher Andreas points out that contemporary science and education should be presented differently. Learning should not merely be about memorizing facts but should facilitate understanding the scientific method, formulating proper questions, and developing intellectual capabilities. In a world with vast access to information, it is crucial to educate learners to critically evaluate information, distinguishing facts from opinions—as demonstrated in the discussed cases. Education needs to shift from individual learning to cooperative and interactive learning. Modern society values the synergy between different fields of knowledge and the ability to leverage diverse ideas. The education of the future should be integrated, emphasizing connections between subjects and interaction among learners. Learning should adapt to new conditions and technological advancements rather than simply substituting humans with AI.

Hence, educating educators about the use of artificial intelligence and preparing them for such activities is a pertinent process directly impacting the evolutionary development of education. The discussed examples illustrate the importance of framing queries correctly to AI systems and critically and thoughtfully approaching the obtained results.

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