

Application of Artificial Intelligence in E-Learning

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Abstract: The article examines the control and evaluation of students' knowledge, with the aim of determining and analyzing the mistakes made and their prevention in order to achieve a better education. The role of electronic tests as a preferred and applied means of knowledge assessment is shown. Emphasis is placed on the application of artificial intelligence as an assistant to the learner for the rapid elimination of gaps and assimilation of knowledge, when weaker results are reported on electronic tests in a given academic discipline.

Keywords: *elctronic learning, electronic test, artificial intelligence, learner.*

I. INTRODUCTION

In modern society, an important part and main task is the education of the younger generation. The education of young people plays a key role, since the good future of a country depends on their fruitful and comprehensive development and realization.

Education remains a fundamental activity in society, but with the rapid development of information technology and models, it is also changing and developing [18, 19, 20, 22, 23]. Traditional synchronous school teaching is increasingly using asynchronous and e-learning not only as a support activity for learning the material, but also becoming the main way of learning.

In the learning process, an important factor is the assessment and control of knowledge. They assist in determining the level of knowledge of the students and determining the nature of the mistakes they made with the aim of better education and achieving maximum results [1], [2].

II. MATERIALS AND METHODS

The report describes the digital technologies used and their application methods to achieve better results in

education. Information from the global information environment was used, analyzing and predicting the role of digital tests for assessing students' knowledge and the capabilities of artificial intelligence as an assistant to learners. Various AI chat platforms are explored and presented. An approach to working with the ChatGPT platform was used, which included the preparation of specific questions, analysis of the received information and assessment of its reliability, credibility and relevance. Examples generated by the chat platform ChatGPT are presented.

One of the preferred and applied means of knowledge assessment are electronic tests. They ensure objectivity, reliability and validity of the assessment. Tests serve as a guide and determine the speed of learning and the level of complexity of the material in the further teaching of knowledge [3].

When considering the results of the conducted electronic tests, some of the obtained grades are weaker. Based on the assessment and the errors received, guidelines are outlined for improving the knowledge of the studied subject. In case of lower test results, the student must read and learn a large volume of studied material from a taught discipline in a relatively short time. For the quick removal of gaps and assimilation of knowledge, students can use the possibilities and applications of artificial intelligence.

Artificial intelligence is the intelligence of computers used to solve complex tasks over large volumes of data. The concept of technology and its beginning was put forward in the 50s of the last century by Alan Turing. The operation and functions of artificial intelligence have developed very rapidly in recent years, due to the increase in processor power, the use of new algorithms and the creation of large data sets [21].

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In the modern world, AI is much more than computers, it is present to an ever greater extent and in more areas of our lives. Its applications are in the field of medicine - diagnosis and prediction, transportation - self-driving cars, advertising - personalized advertising campaigns, language assistants, voice translations and others [4], [5]. Undoubtedly, one of the commonly used functions of AI is in the field of learning. Teachers use it to draw up topic plans, create electronic materials, brief summaries of books, while learners use its capabilities to search for information on topics, self-study in various disciplines, help in creating content on a given topic [6], [7].

In case of lower test scores, learners can use some of the AI platforms to improve their knowledge. AI chat platforms with the largest number of users are ChatGPT - a large language model trained for dialogue [8], Bard - a chatbot created by Google, which was renamed Gemini in early 2024. Gemini fixes Bard's shortcomings and is upgraded with additional possibilities [9]. Other widely used chat platforms are Bing Chat - integrates ChatGPT into Bing [10] and Claude - a generative Chatbot at the level of ChatGPT, available for US and UK and via VPN from other countries [11], [12], [13].

The principle of operation and the role of created AI platforms are to work in dialogue. ChatGPT can help student learning in many ways by turning it into a personal assistant.

Identifying knowledge gaps. The AI can analyze the data from the assessments, solved tasks and exercises of the learner and generate a diagnostic assessments of the level of knowledge acquired in a certain subject.

Personalized virtual training. Learners understand and learn material differently, using different working and learning styles and absorbing material at a slower or faster pace. Artificial intelligence has the ability to analyze large amounts of data and build a model for personalized learning of each learner [8], [14], [15], [16], [17].

Help with self-preparation. Learning by asking questions about a specific topic Fig. 1. Questions should be clear and precise.

A sample discussion for C#: <https://chat.openai.com/c/1226b333-1e32-4f74-93ea-ae7a7ad41daa>.

Many additional questions can be asked on the same topic for more details Fig. 2.

Generate practice exercises and assignments on a selected topic. It is best to study material on a given topic by solving practical exercises. ChatGPT can create assignments and exercises by topic. AI can generate task conditions, instructions for solving them and the solution of the set tasks itself [8], [14], [15], [16] Fig. 3.

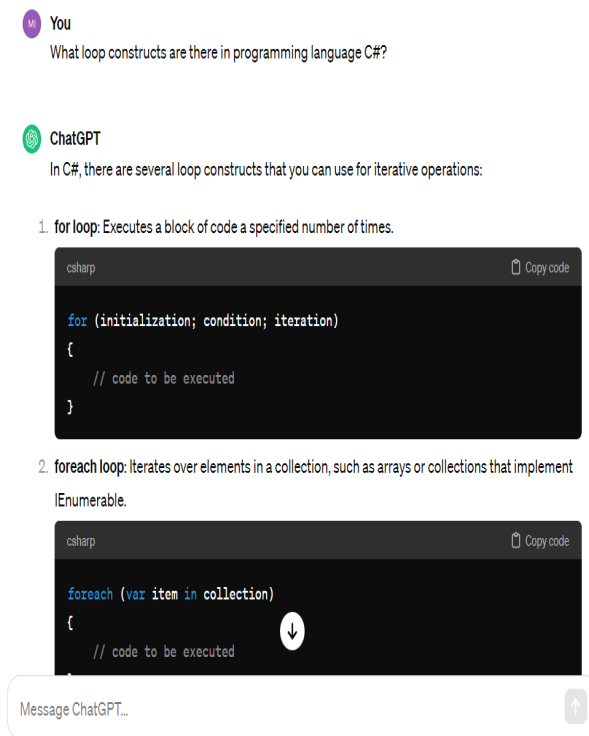


Fig. 1. Questions about a specific topic.

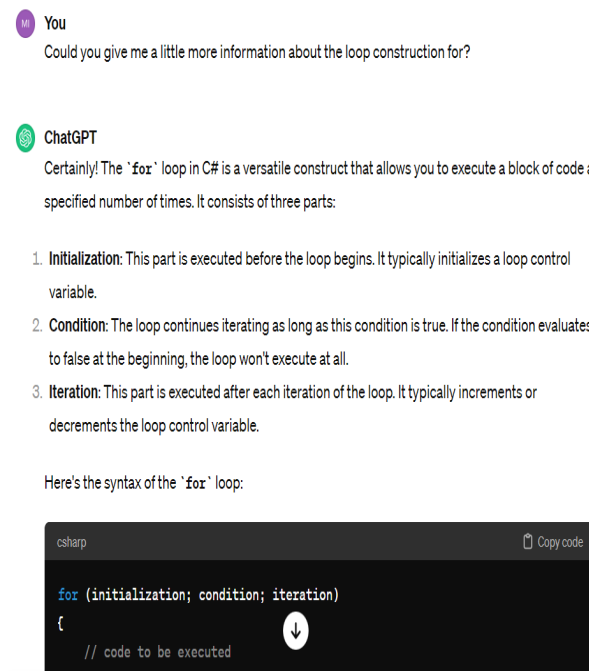


Fig. 2. Additional questions.

ChatGPT

Sure! Here's an example of using a 'for' loop in C# to create a task condition:

```

csharp
using System;

class Program
{
    static void Main(string[] args)
    {
        // Task: Print numbers from 1 to 10
        for (int i = 1; i <= 10; i++)
        {
            Console.WriteLine(i);
        }
    }
}
    
```

Fig. 3. Generated task by GhatGPT.

Test preparation. Self-study assistance by generating a quiz on a given topic or typed content Fig 4.

You

Can you create a sample test for me that includes C# for statement questions?

ChatGPT

Certainly! Here's a sample test that includes questions related to the 'for' statement in C#:

C# 'for' Statement Test

Question 1:

What does the following 'for' loop print?

```

csharp
for (int i = 0; i < 5; i++)
{
    Console.Write(i + " ");
}
    
```

a) 01234

Fig. 4. Quiz on a given topic or typed content.

AI can give directions to solve the test and post the correct answers [8], [16], [17] Fig. 5.

You

Can you give me the answers to the test?

ChatGPT

Sure! Here are the answers to the sample test:

1. Question 1:
Correct answer: a) 0 1 2 3 4
2. Question 2:
Correct answer: c) 55
3. Question 3:
Correct answer: a) 6
4. Question 4:
Correct answer: d) 15
5. Question 5:
Correct answer: a)

```

csharp
for (int i = 0; i < 5; i++)
{
    // code block
}
    
```

Fig. 5. AI to solve the test.

Generating feedback to learners. AI analyzes the learner's work through his achievements and with the help and means of applied machine learning algorithms returns the analyzed result [8], [15], [16], [17].

III. RESULTS AND DISCUSSION

The online test to assess the level of knowledge and the application of ChatGPT AI chat platforms was carried out in 44 Secondary School - Sofia in the 2023/2024 academic year in the 12th grade. Specific questions were prepared, the information received was analyzed and evaluated, and an assessment was made of the relevance and credibility of the material received from ChatGPT.

From the work of the students in AI chat platforms ChatGPT and the observations made, it is concluded that the students learn to ask questions correctly, evaluate the received information accurately and correctly, and have an interest in using the digital environment. Students report that they manage to find accurate and correct information without wasting much time.

IV. CONCLUSIONS

The possibilities for providing help and support to learners through AI are numerous. They can use them purposefully in their learning by asking the right questions and critically and intelligently evaluating the information received.

The ChatGPT platform demonstrates to us the effectiveness of technological innovation in the educational process. AI chat platforms have a clear strategy and potential to be upgraded and offer more opportunities, providing an innovative solution to enhance the learning material in education and maintain its role as a student's assistant.

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REFERENCES

- [1] S. Bacheva, Verification and feedback in training. National Education, Sofia, 1981 (in Bulgarian) (С. Бъчева, Проверката и обратната информация в обучението. Народна просвета, София, 1981)
- [2] P. Rangelova, Plovdiv University "Paisii Hilendarski"[Online]. Available: https://www.researchgate.net/publication/293482891_FORMIRANE_NA_MOTIVI_ZA_UCENE_CREZ_PROVERKA_I_OCENKA_NA_ZNANIATA_I_UMENIATA_NA_UCENICITE [Accessed: Jan. 12, 2024].
- [3] Plovdiv University "Paisii Hilendarski", Internal university standards for testing, control and assessment of knowledge, "Kavangard" EOOD. (in Bulgarian) [Online]. Available: https://uft-plovdiv.bg/site_files/file/Eeducations/Standarti%20new.pdf [Accessed: Jan. 12, 2024].
- [4] 5 applications of artificial intelligence that will amaze you. (in Bulgarian) [Online]. Available: <https://dcfusion.org/5-uses-of-artificial-intelligence-that-will-blow-your-mind> [Accessed: Jan. 17, 2024].
- [5] 10 examples of how artificial intelligence improves education. [Online]. Available: <https://www.kaldata.com/it-%D0%BD%D0%BE%D0%B2%D0%B8%D0%BD%D0%B8/10-%D0%BF%D1%80%D0%B8%D0%BC%D0%B5%D1%80%D0%B0-%D0%B7%D0%B0-%D1%82%D0%BE%D0%B2%D0%B0-%D0%BA%D0%B0%D0%BA-%D0%B8%D0%B7%D0%BA%D1%83%D1%81%D1%82%D0%B2%D0%B5%D0%BD%D0%B8%D1%8F%D1%82-%D0%B8%D0%BD%D1%82%D0%B5-421251.html> [Accessed: Jan. 17, 2024].
- [6] How teachers can use artificial intelligence in school with examples.[Online]. Available: <https://cpcreativity.com/%D0%BA%D0%B0%D0%BA-%D1%83%D1%87%D0%B8%D1%82%D0%B5%D0%BB%D0%B8%D1%82%D0%B5-%D0%BC%D0%BE%D0%B3%D0%B0%D1%82-%D0%B4%D0%B0-%D0%B8%D0%B7%D0%BF%D0%BE%D0%BB%D0%B7%D0%B2%D0%B0%D1%82-%D0%B8%D0%B7%D0%BA%D1%83/> [Accessed: Jan. 23, 2024].
- [7] Artificial intelligence in education. [Online]. Available: <https://bg.khanacademy.org/khan-for-educators/ii-ai-v-obrazovanieto> Accessed: Jan. 23, 2024].
- [8] ChatGPT. [Online]. Available: <https://openai.com/chatgpt> [Accessed: Jan. 23, 2024].
- [9] Genimi (Bard). [Online]. Available: <https://gemini.google.com/> [Accessed: Jan. 23, 2024].
- [10] Bing Chat. [Online]. Available: <https://www.bing.com/chat> [Accessed: Jan. 25, 2024].
- [11] Claude. [Online]. Available: <https://claude.ai/login?returnTo=%2F> [Accessed: Jan. 25, 2024].
- [12] ChatGPT.[Online]. Available: <https://www.techtarget.com/whatis/definition/ChatGPT> [Accessed: Jan. 12, 2024].
- [13] What is artificial intelligence. [Online]. Available: <https://digitalmarketing.bg/what-is-artificial-intelligence> [Accessed: Feb. 7, 2024].
- [14] How Ai is used in Education & 10 Ways You Can Too. [Online]. Available: <https://www.classpoint.io/blog/10-ways-how-ai-is-used-in-education> [Accessed: Feb. 12, 2024].
- [15] 10 examples of how artificial intelligence improves education.[Online]. Available: <https://www.kaldata.com/> [Accessed:Feb. 17, 2024].
- [16] USING CHATGPT FOR EDUCATION AND WORK IN IT: PRACTICAL TIPS BASED ON PERSONAL EXPERIENCE. [Online]. Available: <https://career.softserveinc.com/bg/stories/using-chatgpt-in-education-and-work-in-it-practical-tips-from-our-own-experience> [Accessed:Feb. 17, 2024].
- [17] 100 Best ChatGPT prompts to unleash AI potential. [Online]. Available: <https://www.ranktracker.com/bg/blog/best-chat-gpt-prompts-to-unleash-ai-s-potential/> [Accessed: Feb. 25, 2024]
- [18] P. Boyanov, Educational exploiting the information resources and invading the security mechanisms of the operating system Windows 7 with the exploit Eternalblue and backdoor Doublepulsar, a refereed Journal Scientific and Applied Research (Licensed in EBSCO, USA), Konstantin Preslavsky University Press, ISSN 1314-6289, vol. 14, 2018, pp.34-41.
- [19] P. Boyanov, Construction and simulation of optical local area computer networks for the needs of the academic institutions, International Scientific Online Journal, www.sociobrain.com , Publ.: Smart Ideas - Wise Decisions Ltd, ISSN 2367-5721 (online), Issue 54, February 2019, pp. 89-96.
- [20] R. Iliev, K. Ignatova. Software tools to support collaboration. Collection of reports from the International Scientific Conference "Hemus 2018", II-132 - II-141, Plovdiv, 2018.
- [21] M. Kochankov, R. Iliev. Supporting decision-making in command and control systems by applying artificial intelligence. Collection of reports from the International Scientific Conference "Hemus 2020", pp. 106 - 113, Plovdiv, 2020.
- [22] S. Spasov, International academic programs and training models for combating corruption and their application in the UNSS. Scientific works of UNSS, pp. 69-95, 2022.
- [23] S. R. Marinov, I. P. Ivanov, A. A. Kolev, Modeling of a controllable communication environment, Collection of reports from the Scientific Conference "Modern trends in aviation training", NSU "V. Levski", Faculty of "Aviation" - Dolna Mitropolia, 2017, ISBN 978-954-713-110-1в, (in Bulgarian). [Online]. Available: https://www.af-acad.bg/Documents/conference/archive/Sbornik_FA_2017.pdf [Accessed: Jan. 3, 2024].