

Artificial Intelligence as a Supporting Tool for Basic Computer Programming Learning

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Abstract

The use of artificial intelligence (AI) as a tool to support basic computer programming learning is reviewed in this article, with a particular emphasis on ChatGPT (Generative Pre-Training Transformer), a text-based AI system that enables conversational interaction through text input on application prompts. The most widely used computer programming language is C. The literature study method, which entails a thorough examination of the literature or references, is employed in this study. The initial steps in using ChatGPT are to show the program coding, provide an explanation of the program coding, and show the outcomes of the program running. ChatGPT can quickly and efficiently provide detailed, well-organized responses to all of the inquiries posed by users. so that before the user writes the code on their own, they can clearly see how the program is being coded and what happens when it runs. Since beginning learners are not yet accustomed to using programming languages, especially C, it is envisaged that the research conducted will be able to advise and enlighten users on learning programming languages in depth through the use of AI.

Keywords : Artificial Intelligence, ChatGPT, Programming Language.

1. Introduction

Learning in the twenty-first century is widely acknowledged to be inextricably linked to the use of technology. Learning can be done using multiple sources through technology, allowing learning to focus on the student's part in its execution (Permana & Astawa, 2020). Artificial intelligence technology is one of the most recent developments that has been shown to have a positive impact on education. Experts have highlighted the promise of AI in education, noting its ability to provide assistance that engages pupils and delivers relevant feedback (Abimanto & Mahendro, 2023). The current state of AI technology allows it to function as a standalone co-teacher or educator, performing activities similar to those of educators or instructors. The use of these materials has increased educators' efficiency and effectiveness, resulting in a richer or better quality of instruction. Similarly, artificial intelligence has offered students access to improved learning experiences since AI permits customization of learning resources based on student requirements and skills (Manongga et al., 2022).

Artificial intelligence (AI) is a 'umbrella word' for the modeling of human intelligence and mental processes by machines connected to a vast amount of data and information (Michael Reskiantio Pabubung, 2021). According to Rich and Knight, artificial intelligence is a technology that allows computers to perform tasks that people typically do (Permana & Astawa, 2020). Avron Barr and Edward E. Feigenbaum, on the other hand, define artificial intelligence as the branch of computer science that focuses on the study of intelligent computer systems—that is, systems with human-like thought processes (Luh Putu Ary Sri Tjahyanti et al., 2022). According to a different definition, artificial intelligence (AI) refers to "computer programs, machine learning, hardware, and software" and is a word from Industrial Society 4.0 and Society 5.0. Hardware and software solutions inspired by the reverse engineering of the neuron patterns operating in the human brain are employed in the science of building intelligence (Zahara et al., 2023). According to the definitions given above, artificial intelligence is software that functions similarly to the human brain. It is able to solve a variety of problems and engage in reasoning and analysis because it is endowed with a knowledge base that comprises concepts, ideas, facts, and relationships between them. And the inference motor, which is the capacity to make judgments based on past encounters.

It is widely acknowledged that learning computer programming is essential to developing logical and analytical reasoning skills as well as problem-solving talents (Marimuthu, 2018). Many teachers say that programming is important for students in this era, and this is not surprising since students are exposed to computational thinking during programming learning, which is in line with many aspects of 21st century competencies like creativity, critical thinking, and problem solving (Anistyasari et al., 2020). An essential computer programming language and common machine instruction, C serves as a link between different kinds of application software and operating systems (Anistyasari et al., 2020). Because it combines both high and low language components, the C language can be categorized as a middle-level language. Nearly every computer can speak the C language. Additionally, code written in the C language is adaptable and portable to a wide range of computer systems. Although object-oriented, machines may swiftly present the C language (Harahap, 2022). It is crucial to introduce pupils to programming so they may develop their own logical thinking skills and gain an understanding of the world of programming. In order for them to ultimately be able to enhance their skill set and compete with others in the workforce (Tribethran et al., 2023).

Artificial intelligence (AI) can be used in education through a variety of technologies, including chatbots, augmented reality (AR), virtual reality (VR), machine learning, and more. This technology enhances the overall quality of learning by providing a plethora of new options for learning both inside and outside of the classroom (Fauziyati, 2023). ChatGPT is one of the most widely used technology-based

teaching and learning technologies available today. Generative Pre-trained Transformer, or ChatGPT, is a kind of robot or chatbot that uses artificial intelligence (AI) to communicate with people and help them with different activities. Because ChatGPT learning media makes material easy to access and supports learning across a variety of scientific disciplines, it can boost students' passion for learning (Merentek et al., 2023). An AI tool called ChatGPT can assist students in learning programming. An AI model called ChatGPT is intended to generate text output from a given text input (Mutaqin & Subroto, 2024). This is highly pertinent to the study that will be done on the use of AI, particularly ChatGPT, to enhance learning of fundamental computer programming, which is mostly introduced through pseudocode, a textual arrangement of program code.

In order to bolster this research hypothesis, prior studies are required to bolster claims about the application of ChatGPT in programming education. A portion of the pertinent research for this study was carried out by (Tribethran et al., 2023) demonstrated how to use ChatGPT as an AI chatbot example and related media, which significantly improved students' programming comprehension and provided an introduction to AI. Additional investigation was conducted by (Mutaqin & Subroto, 2024) showed that ChatGPT is used more frequently than programming modules to address issues and foster innovation in programming.

2. Research Method

The literature study method, which entails a thorough examination of the literature or references, is the strategy used in this study. The primary data sources for this study were scientific publications and literature that were pertinent to the topics under investigation (Shamaya et al., 2023). Accessing, reading, analyzing, and documenting different materials from literature and scholarly journals about the research topic is how data collecting is done. After filtering and incorporating it into a theoretical framework, the data serves as the foundation for research arguments and conclusions. This method seeks to give a thorough grasp of how artificial intelligence can be used to assist in learning the fundamentals of computer programming.

3. Result and Discussion

When students use ChatGPT as a learning tool, they can get automatic replies and feedback on their answers, which can help them comprehend the lessons that the faculty members are teaching (Merentek et al., 2023). ChatGPT can be used as an interactive learning module to help students grasp programming ideas and practices in the context of learning programming (Mutaqin & Subroto, 2024). A guide or teacher is necessary for beginners who wish to learn the fundamentals of programming because they

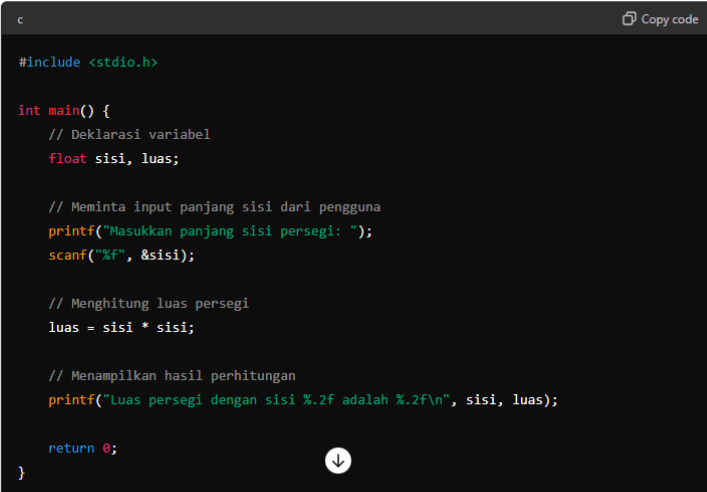
frequently have no idea where to begin or how to begin introducing themselves to the ideas and concepts of programming (Tribethran et al., 2023). Artificial intelligence (AI) teaching systems have the ability to offer students automatic feedback and recommendations, along with extra resources and activities to enhance their comprehension of particular subjects (Fauziyati, 2023).

The following are the steps involved in learning basic programming, namely C language, with the ChatGPT app:

1. Program coding displayed in C language format.

In order to receive the desired answer when learning basic programming, users must provide instructions or prompts. The better the response, the more precise the instruction or query (Saputra & Serdianus, 2023). An instruction, query, or declaration provided to ChatGPT to start or carry on a conversation is called a prompt. Within the domain of computer programs, prompts function as indicators or signals that inform the program on what actions to perform. Using prompts effectively is essential for producing texts or narratives of the highest caliber when using ChatGPT (Merentek et al., 2023). For example, in Fig 1., the command given is "program code to calculate the area of a square in C language."

ChatGPT ▾



```
c Copy code
#include <stdio.h>

int main() {
    // Deklarasi variabel
    float sisi, luas;

    // Meminta input panjang sisi dari pengguna
    printf("Masukkan panjang sisi persegi: ");
    scanf("%f", &sisi);

    // Menghitung luas persegi
    luas = sisi * sisi;

    // Menampilkan hasil perhitungan
    printf("Luas persegi dengan sisi %.2f adalah %.2f\n", sisi, luas);

    return 0;
}
```

Message ChatGPT

Fig 1. Program coding displayed in C language format

Students are typically introduced to basic programming through pseudocode, which is a depiction of techniques used in computer programming that make use of basic structures. When writing any program code, pseudocode is utilized as a clear structure

or framework to ensure that those who view the text structure may understand it (Tribethran et al., 2023). Similar to Fig 1., the C language consists of program text that is organized clearly for student understanding into input, processing, and output. Even for those who haven't tried the program on their own, ChatGPT may clearly illustrate the program code that the user has directed, together with an explanation of the program and the C language programming environment.

2. Show a description of the coding used in programs.

Because it combines both high and low language components, the C language can be categorized as a middle-level language. Nearly every computer can speak the C language. Additionally, code written in the C language is adaptable and portable to a wide range of computer systems (Harahap, 2022). With various instructions like input (scanf, which means receiving or reading user input) and output (printf, which means displaying or publishing a message to the user), C is considered a high-level language since it is close to human language.

ChatGPT ▾

Penjelasan singkat:

1. `#include <stdio.h>`: Mengimpor pustaka standar input-output yang diperlukan untuk fungsi `printf` dan `scanf`.
2. `int main()`: Fungsi utama dari program.
3. `float sisi, luas;`: Mendeklarasikan variabel `sisi` dan `luas` dengan tipe data `float` untuk menyimpan bilangan desimal.
4. `printf("Masukkan panjang sisi persegi: ");`: Menampilkan pesan kepada pengguna untuk memasukkan panjang sisi persegi.
5. `scanf("%f", &sisi);`: Menerima input dari pengguna dan menyimpannya dalam variabel `sisi`.
6. `luas = sisi * sisi;`: Menghitung luas persegi dengan rumus $sisi \times sisi$.
7. `printf("Luas persegi dengan sisi %.2f adalah %.2f\n", sisi, luas);`: Menampilkan hasil perhitungan luas persegi.

⬇
Dengan menjalankan program ini, pengguna akan dapat memasukkan panjang sisi persegi, dan

🗨 Message ChatGPT

Fig 2. Show a description of the coding used in programs.

Because ChatGPT's integrated chatbot model is built on data gathered from up to 300 billion words, it can be used to assist humans in their work anywhere. This makes ChatGPT a particularly valuable chatbot in the field of learning, even for average people (Tribethran et al., 2023). ChatGPT's primary benefit is its ability to deliver information

quickly and in accordance with user preferences. Texting a friend or coworker is akin to interacting with ChatGPT in many aspects (Hasni et al., 2023). Fig 2: ChatGPT provides an explanation of the shown program code. This is like a tutor going over each concept in detail, line by line, for a user who might not grasp it.

3. Outcomes of the program that is currently running, together with an explanation of the program execution results.

When it comes to studying the fundamentals of computer programming, particularly the C language, AI can offer precise and comprehensive answers. In addition to displaying program code, it also explains program coding and displays the output of an executed program, as demonstrated in Fig 3. ChatGPT can respond to every user's inquiry with speed and efficiency, offering comprehensive and well-structured answers. so that users may see exactly how the program is coded and what occurs when it is executed before they write their own code.

ChatGPT ▾

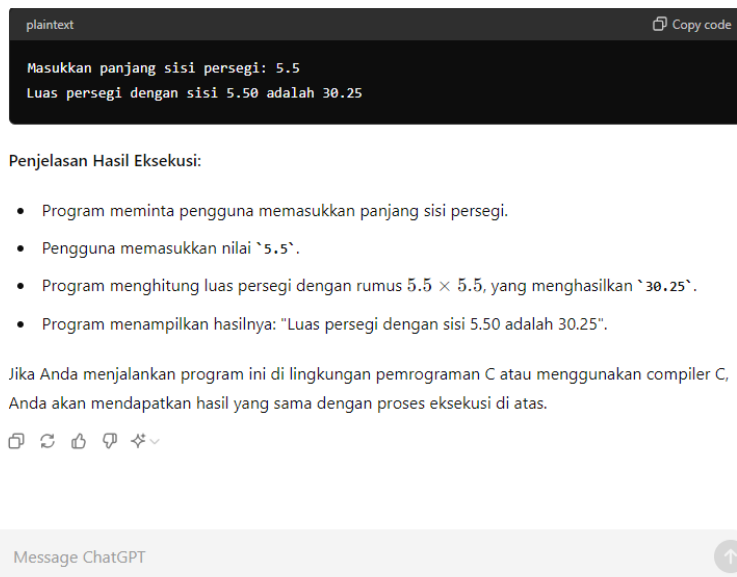


Fig 3. Results and Explanation of Program Execution Displayed

The AI system works as a virtual instructor, available to help students grasp fundamental computer programming principles, respond to their inquiries, and offer advice on how to implement programming techniques. The application of AI has the potential to significantly aid students in their study of programming (Mutaqin & Subroto, 2024).

4. Conclusion

The use of AI brings great potential to increase efficiency and effectiveness in learning basic computer programming. The initial steps in using ChatGPT are to show the program coding, provide an explanation of the program coding, and show the outcomes of the program running. ChatGPT can quickly and efficiently provide detailed, well-organized responses to all of the inquiries posed by users. so that before the user writes the code on their own, they can clearly see how the program is being coded and what happens when it runs. Since beginning learners are not yet accustomed to using programming languages, especially C, it is envisaged that the research conducted will be able to advise and enlighten users on learning programming languages in depth through the use of AI.

Acknowledgements

We would want to express our gratitude to all of the participants in this study, too numerous to list here. I hope we can collaborate once more at a later time.

References

1. Abimanto, D., & Mahendro, I. (2023). Efektivitas Penggunaan Teknologi Dalam Pembelajaran Bahasa Indonesia. *Sinar Dunia: Jurnal Riset Sosial Humaniora Dan Ilmu Pendidikan*, 2(2), 256–266. <https://doi.org/10.55681/armada.v1i2.393>
2. Anistyasari, Y., Ekohariadi, E., & Munoto, M. (2020). Strategi Pembelajaran Untuk Meningkatkan Keterampilan Pemrograman Dan Berpikir Komputasi: Sebuah Studi Literatur. *Journal of Vocational and Technical Education (JVTE)*, 2(2), 37–44. <https://doi.org/10.26740/jvte.v2n2.p37-44>
3. Fauziyati, W. R. (2023). Dampak Penggunaan Artificial Dalam Pembelajaran Pendidikan Agama Islam. *Jurnal Review Pendidikan Dan Pengajaran*, 6, 2180–2187. <http://journal.universitaspahlawan.ac.id/index.php/jrpp/article/view/21623>
4. Harahap, M. (2022). Perancangan Perangkat Lunak Teks Editor Bahasa C Menggunakan Metode Lexical Analyzer. *Buletin Ilmiah Informatika Teknologi*, 1(1), 8–14.
5. Hasni, Batusalu, E., & Kambira, J. (2023). Meningkatkan Kualitas Pembelajaran Dengan Ai Sebagai Asisten Pembelajaran. *Seminar Nasional Teknologi Pendidikan UKI Toraja*, 3(3), 84–96.
6. Luh Putu Ary Sri Tjahyanti, Saputra, P. S., & Gitakarma, M. S. (2022). Peran Artificial Intelligence (AI) untuk Mendukung Pembelajaran di Masa Pandemi Covid-19. *Jurnal Komputer Dan Teknologi Sains (Komteks)*, 1(1), 15–21. <https://doi.org/10.1097/01.ccm.0000474893.34162.5c>
7. Manongga, D., Rahardja, U., Sembiring, I., Lutfiani, N., & Yadila, A. B. (2022). Dampak Kecerdasan Buatan Bagi Pendidikan. *ADI Bisnis Digital Interdisiplin Jurnal*, 3(2), 41–55. <https://doi.org/10.34306/abdi.v3i2.792>

8. Marimuthu, M. (2018). Perceptions of Scratch Programming among Secondary School Students in KwaZulu-Natal , South Africa. *The African Journal of Information and Communication (AJIC)*, 21, 51–80.
9. Merentek, T. C., Usuh, E. J., & Lengkong, J. S. J. (2023). Implementasi Kecerdasan Buatan ChatGPT dalam Pembelajaran. *Jurnal Pendidikan Tambusai*, 7(3), 26862–26869.
10. Michael Reskiantio Pabung. (2021). Epistemologi Kecerdasan Buatan (AI) dan Pentingnya Ilmu Etika dalam Pendidikan Interdisipliner. *Jurnal Filsafat Indonesia*, 4(2), 152–159.
11. Mutaqin, R., & Subroto, E. (2024). Analysis of the Use of Chat Gpt (Ai) and Programming Module on Students' Learning Motivation and Creativity in the Course of Programming in Information Technology Education Program, Bina Bangsa University. *Multi Science Journal*, 22(1), 1–8.
12. Permana, P. T. H., & Astawa, N. L. P. N. S. P. (2020). Artificial Intelligence dalam Pengembangan Media Pembelajaran Bahasa Inggris. *JIIP-Jurnal Ilmiah Ilmu Pendidikan*, 3(3), 687–692. <http://jiip.stkipyapisdmpu.ac.id>
13. Saputra, T., & Serdianus, S. (2023). Peran Artificial Intelligence ChatGPT dalam Perencanaan Pembelajaran di Era Revolusi Industri 4.0. *Jurnal Ilmu Sosial Dan Pendidikan*, 3(1), 1–18.
14. Shamaya, V. P., Ashara, S. N., Sofyan, A., Aprilia, S., Leonica, A., & Ratnawati, T. (2023). Studi Literatur: Artificial Intelligence Dalam Audit. *Jrime: Jurnal Riset Akuntansi Dan Ekonomi*, 1(3), 255–267. <https://doi.org/10.54066/jrime-itb.v1i3.461>
15. Tribethran, S., Daniel, D., Ferdynand, R., Saputra, A., Hansen, H., & Pribadi, M. R. (2023). Pelatihan Pemrograman Dasar Python Dengan Memanfaatkan ChatGPT pada SMK Methodist 2 Palembang. *Jumat Informatika: Jurnal Pengabdian Masyarakat*, 4(2), 71–79.
16. Zahara, S. L., Azkia, Z. U., & Chusni, M. M. (2023). Implementasi Teknologi Artificial Intelligence (AI) dalam Bidang Pendidikan. *JPSP: Jurnal Penelitian Sains Dan Pendidikan*, 3(1), 15–20.