Analysis of the Use of Blackbox Ai in the Coding Process in Web Development Courses

Karolina Viviliana Tanggo[1] , Maria Magdalena Beatrice Sogen [2] , Fenesia Hoar[3] , Febronia Krista Bene Bay[4]
[1234]Mahasiswa dan Dosen Pendidikan Informatika Fakultas Keguruan dan Ilmu Pendidikan Universitas Citra Bangsa
Email :karolinavivilianatanggo@gmail.com

Abstract
In today's digital context, artificial intelligence-based tools such as Blackbox AI are increasingly being used by students to complete programming assignments, especially in the field of web development. Blackbox AI is one form of AI that is widely used by students. This study aims to uncover concerns about students' dependence on Blackbox AI, which is considered to have a negative impact on their ability to code (do programming) during lectures or when completing assignments. In addition, there is concern that students may experience a decline in critical thinking skills due to frequent reliance on assistance in completing each existing assignment. The purpose of this study was to evaluate the extent to which students depend on Blackbox AI and its impact on critical thinking and coding skills. The method used is a quantitative descriptive approach, with data collected through a questionnaire using a Likert scale from 30 sixth semester students in the Informatics Education Study Program, Citra Bangsa University. The results of the descriptive analysis, most students felt significant benefits from utilizing Blackbox AI with an average of 77.6%, but they also faced a dependence of 63.8% and a negative effect on understanding and independence of 57.1%. Concerns about the decline in coding skills due to reliance on AI were also quite high, reaching 48.9%. This finding highlights the importance of using Blackbox AI wisely and integrated with traditional learning, so as not to hinder the development of critical thinking skills and the basics of programming in students.

Keywords: *Blackbox AI, dependency, benefits, negative impact, programming, web development.*

INTRODUCTION

In the ever-evolving digital era, programming has become one of the most important skills, especially in the field of information technology. However, a number of students, especially in the Informatics Education department, face challenges in understanding basic programming concepts. Sari and Prabowo (2020) stated that a lack of understanding of basic programming concepts can prevent students from improving the coding skills needed to design efficient web applications. This is a significant challenge for students who have to take web development courses.

With the development of technology, assistive devices based on artificial intelligence, such as Blackbox AI, have emerged as an alternative that is considered more practical and faster in generating code for website creation. On the other hand, technology in general can be likened to a double-edged sword, the negative impacts that are likely to arise from the emergence of current AI technology, one of which is dependency. In addition, students' analytical abilities also tend to be eroded when they rely on AI to analyze data and produce answers (Ali et al., as quoted in Firdaus, J. 2025). This dependency can cause students to lose opportunities to develop their critical thinking skills and creativity. Putra and Sari (2022) support this, showing that students who are heavily dependent on AI tools tend to have a poor understanding lack of basic programming concepts.

This study was conducted on sixth semester students in the Informatics Education study program, with the aim of analyzing whether the application of Blackbox.ai in web development courses results in student dependence. According to (John, Smith, and Lee, in Amalia.2024). Artificial intelligence can provide fast and customized feedback, thereby helping students understand the material better and hone their critical thinking skills. In addition, artificial intelligence is also able to create a flexible learning environment, where the learning process is tailored to the needs and abilities of each individual. However, despite the many advantages of using artificial intelligence, there are concerns that excessive dependence on this technology can reduce students' critical thinking skills and creativity, as they may

become too dependent on technology to solve problems rather than thinking independently.

In addition, this study will also investigate how this dependence impacts students' coding and critical thinking skills. Wang and Zhang (2022) revealed that students who utilize AI tools tend to complete assignments faster, but they also show a lower understanding of basic programming concepts. Several previous studies have discussed the effects of using AI-based tools in education. Budi and Setiawan (2020) indicated that while the application of AI in programming teaching can increase efficiency, it may also reduce students' ability to solve problems independently. This study aims to provide a deeper understanding of the extent to which students rely on Blackbox AI and its impact on coding skills.

METHOD

The method applied in this study adopts a quantitative descriptive approach. The quantitative descriptive approach was chosen to describe and evaluate how much students depend on Blackbox AI in programming activities in web development courses. With this approach, researchers can collect data in the form of numbers which will then be analyzed statistically, providing clearer insights into the phenomena being studied. Quantitative descriptive research is a type of research that describes phenomena using numerical data without any changes to the variables being studied. Quantitative research is a research approach that uses data in the form of numbers and exact sciences to answer research hypotheses (Waruwu, as quoted in Firdaus, J. 2025). Participants for this study consisted of sixth semester students from the Informatics Education Study Program at Citra Bangsa University. There were 31 people who participated in this study. The selection of participants was based on their relevance to the use of Blackbox AI in the learning process of programming and web development.

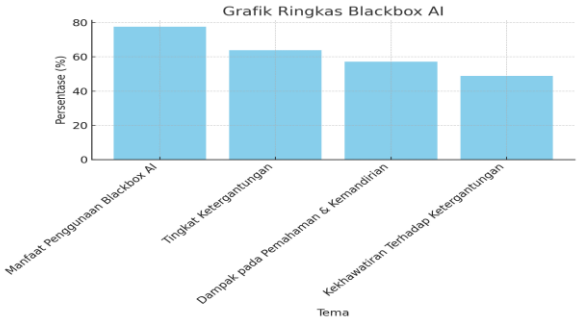
The data for this study were obtained through the use of a questionnaire containing 20 questions. The questionnaire was designed to measure the extent to which students rely on Blackbox AI and its impact on coding and critical thinking skills. Each question used a Likert scale that offered five response options: strongly disagree, disagree, neutral, agree, and strongly agree. The use of a Likert scale allowed researchers to measure respondents' attitudes toward the statements raised.

The collected data were analyzed using descriptive statistics (Sholikhah, A., as quoted in Mutaqin, 2024). This analysis includes calculating frequencies, percentages, averages, and standard deviations which aim to describe the characteristics of respondents and the results obtained. In addition, this analysis will also help identify patterns and relationships between dependence on Blackbox AI and students' coding and critical thinking skills.

RESULTS AND DISCUSSION

Based on data analysis, the average percentage of Agree/Strongly Agree was obtained for the following four main themes:

1 Benefits of Using Blackbox AI: 77.6%
2 Dependency Rate: 63.8%
3 Impact on Understanding and Independence: 57.1%
4 Concerns About Addiction: 48.9%



This finding indicates that the majority of students consider Blackbox AI very useful, especially in accelerating the completion of programming tasks and avoiding errors. This is in line with the results of research by Lasari & Utamajaya (2025) and Wang & Zhang (2022) which highlight the effectiveness of using AI. Basically, before students start learning to program, it is important to understand the type of programming language to be learned and the type of program to be created. Thus, when coding, they will not be confused and will not rely too much on AI assistance. Especially if they want to create a website. Web programming is generally used to design interactive and dynamic site

pages. Web pages are built with HTML, keep in mind that HTML is not a programming language; HTML only provides marking on text so that it can produce a certain format when read by a browser. Therefore, HTML functions statically. Web programming is intended to modify HTML output, so that it can be dynamic. Programming languages used in web programming include ASP, PHP, JSP, VBScript, and JavaScript.

Learning to program is also closely related to understanding the basic structure of programming languages, basic programming logic, algorithms, and so on. All of this must be studied carefully because learning programming is an activity to get used to creating programs, similar to getting used to communicating using language. Mastering a new language requires frequent and intensive practice. In addition to avoiding forgetting, this habituation helps someone to be able to pronounce the words they learn correctly. Furthermore, when learning a new language, someone must be able to construct phrases correctly so that the message they want to convey can be communicated well. This also applies to those who are learning to write lines of code, using a language that suits their needs. In order to be able to use a programming language properly, understanding the right basic structure is very important. The more programming languages you learn, the more structures you need to understand. Each programming language has a different basic structure, but most can be grouped into several categories.

However, the high level of dependency is a focus of attention. As many as 63.8% of students feel unable to complete coding assignments without the help of AI, according to the results of a study by Putra & Sari (2022). Concerns about the decline in coding and critical thinking skills have also arisen (Carr, 2010; Maula et al., 2024). Critical thinking is one of the high-level thinking skills needed in developing abilities (Rahardhian, 2022). Critical thinking skills are vital to improving students' learning processes. Students with good critical thinking skills tend to be able to understand subject matter better, solve problems more efficiently, and make better decisions. On the other hand, creative thinking involves the ability to link previously unrelated ideas or things; and each individual has a different level of creative thinking ability, which depends on routine practice that stimulates creative thinking. Creative thinking skills are essential for humans to face various global challenges in the rapidly developing 21st century (Fitriyah and Ramadani, 2021). However, in everyday reality, technological advances such as AI have changed the way students think, especially in terms of creativity and critical thinking. This finding emphasizes the significance of the blended learning approach: combining AI with manual practice and understanding of basic concepts so that students not only become AI users, but also have independence and solid programming logic skills.

Thus, dependence on Blacbox AI is a major factor that has a significant influence on the emergence of negative effects in the use of Blacbox AI in programming, such as a lack of critical thinking where dependence on AI can reduce students' ability to think independently, as expressed by (Carr, 2010 as quoted in Amalia.2024), where excessive dependence on technology can hinder the development of critical thinking skills. In addition, the quality of information provided by AI is not always guaranteed, which emphasizes the importance of strong digital literacy skills so that students can assess the validity of information. Excessive use of AI can also reduce social interaction between students, which has an impact on their social and emotional skills. Finally, there are concerns regarding data privacy, which requires a clear and transparent privacy policy to protect users.

CONCLUSION

Based on the data analysis conducted in a quantitative descriptive manner, it was found that most students Agree/Strongly Agree with the statement regarding the benefits of Blackbox AI (77.6%). This shows that students see Blackbox AI as a useful tool to help them complete programming assignments, especially in minimizing errors and speeding up the work process.

However, the high level of dependence on AI (63.8%) indicates that students tend to rely on AI disproportionately. Smaller percentages on the themes of "Impact on Understanding and

Independence" (57.1%) and "Concerns about Dependence" (48.9%) further emphasize the assumption that the use of AI without control can affect students' critical thinking skills and independence in learning.

These results are in line with several previous studies that emphasize the risk of decreasing critical thinking capacity due to dependence on technology (Carr, 2010; Putra and Sari, 2022; Maula et al., 2024). Students who rely too much on AI may face difficulties in understanding basic programming principles, constructing logic, and solving problems independently. On the other hand, critical thinking skills and creativity are essential in programming learning and developing competencies in the 21st century.

Therefore, based on the findings of this study, it is suggested that the use of AI such as Blackbox AI needs to be balanced with strengthening the understanding of basic programming concepts and manual logical thinking exercises. In other words, AI should function as a tool, not as a substitute for the learning process itself. This is important so that students continue to have independence in learning, critical thinking skills, and strong digital literacy to face future technological challenges.

SUGGESTION

It is recommended to increase the number of participants so that the findings can be more generalized. Adopt mixed methods to gain deeper insights in both qualitative and quantitative terms. In addition, it is recommended not to rely entirely on artificial intelligence, but to use AI as a tool in the learning process.

ACKNOWLEDGEMENT

The author would like to thank Citra Bangsa University and the lecturers in charge of the Research Methodology course for the guidance and opportunities provided and all parties who have provided input and suggestions.

BIBLIOGRAPHY

Ali, H., et al. (2023). AI and critical thinking in higher education. Journal of Educational Computing Research, 61 (4), 901–919.

Amalia, P., Majid, H. A., & As Sahrah, I. A. (2024). Peran teknologi AI dalam pengembangan kemampuan berpikir kritis mahasiswa. Dalam Prosiding Seminar Nasional Fakultas Tarbiyah dan Ilmu Keguruan IAIM Sinjai (Vol. 3).

Budi, S., & Setiawan, R. (2020). Efektivitas penggunaan AI dalam pembelajaran pemrograman: Studi kasus di perguruan tinggi. Jurnal Sistem Informasi dan Teknologi, 9 (4), 89–97.

Carr, N. (2010). The shallows: What the Internet is doing to our brains . W. W. Norton & Company.

Firdaus, J. A., Ummah, R. I., Aprialini, R. R., Fithriyyah, A., Mahsusi, M., & Faizin, A. (2025). Ketergantungan penggunaan kecerdasan buatan (AI) pada tugas akademik mahasiswa terhadap kemampuan berpikir kritis dan kreatif. Didaktika: Jurnal Kependidikan, 14 (1), 1203–1214.

Fitriyah, A., & Ramadani, S. D. (2021). Pengaruh pembelajaran STEAM berbasis PJBL (Project-Based Learning) terhadap keterampilan berpikir kreatif dan berpikir kritis. Journal of Education, 3 (1), 7. https://doi.org/10.26737/jpmi.v1i1.76

Lasari, I., & Utamajaya, J. N. (2025). Evaluasi efektivitas Blackbox.ai dalam perkembangan website menggunakan metode systematic literature review. Jurnal Ilmiah Sains Teknologi dan Informasi, 3 (2), 47–56.

Maula, S. R., Aprillian, S. D., Rachman, A. W., & Azman, M. N. M. (2024). Ketergantungan mahasiswa Universitas Jember terhadap artificial intelligence (AI). ALADALAH: Jurnal Politik, Sosial, Hukum dan Humaniora, 2 (1), 1–14.

Mutaqin, R., Subroto, D. E., & Warman, C. (2024). Analisis penggunaan Chat GPT (AI) dan modul pemrograman terhadap

motivasi belajar dan kreativitas mahasiswa dalam mata kuliah pemrograman pada program studi Pendidikan Teknologi Informasi, Universitas Bina Bangsa. Jurnal Saintifik (Multi Science Journal), 22 (1), 1–8.

Nasution, M. K., et al. (2022). Black-box AI in coding education: Benefits and risks. Journal of Educational Technology, 15 (2), 121–130.

Putra, M., & Sari, D. (2022). Ketergantungan mahasiswa terhadap alat bantu AI dalam pembelajaran pemrograman. Jurnal Ilmiah Komputer dan Informatika, 8 (3), 201–210.

Rahardhian, R. (2022). Keterampilan berpikir kritis dalam pembelajaran. Jurnal Pendidikan Indonesia, 13 (2), 113–120.

Sari, R., & Prabowo, H. (2020). Analisis pemahaman dasar pemrograman mahasiswa dalam pengembangan aplikasi web. Jurnal Pendidikan Informatika, 5 (2), 123–130.

Sarker, A., et al. (2023). Generative AI in higher education. Computers & Education: Artificial Intelligence, 4 , 100123.

Wang, L., & Zhang, Y. (2022). AI-assisted web development education: Balancing efficiency and understanding. Computers & Education, 178, 104115.