

Artificial Intelligence in Programming Education: C# Learning Experiences and Insights in Nangarhar Universities

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Abstract

The rapid development of artificial intelligence tools has transformed programming education, especially in the teaching of C#, and this study was conducted at Nangarhar, Khorasan, and Alfalah Universities due to the importance of this topic. The study aims to assess the level of use, effectiveness, and impact of AI tools among 159 fourth-semester computer science students. Based on a quantitative and descriptive method, data were collected through a structured questionnaire and statistically analyzed. The findings show that students use AI mainly for coding, error correction, and code generation, although a significant number also get incorrect code from time to time. The results indicate that AI improves learning speed and skills, but there are also concerns about reducing credibility, ethical principles, and critical thinking. The study recommends that AI should be included in the curriculum and regular training workshops should be held for its correct, ethical, and analytical use.

Keywords: Artificial Intelligence; programming; education; effectiveness; ethics.

Kecerdasan Buatan dalam Pendidikan Pemrograman: Pengalaman dan Wawasan Pembelajaran C# di Universitas-universitas Nangarhar

Abstrak

Perkembangan pesat alat kecerdasan buatan telah mengubah pendidikan pemrograman, terutama dalam pengajaran C#, dan penelitian ini dilakukan di Universitas Nangarhar, Khorasan, dan Alfalah karena pentingnya topik ini. Penelitian ini bertujuan untuk menilai tingkat penggunaan, efektivitas, dan dampak alat AI di antara 159 mahasiswa ilmu komputer semester empat. Berdasarkan metode kuantitatif dan deskriptif, data dikumpulkan melalui kuesioner terstruktur dan dianalisis secara statistik. Temuan menunjukkan bahwa mahasiswa menggunakan AI terutama untuk pengkodean, koreksi kesalahan, dan pembuatan kode, meskipun sejumlah besar mahasiswa juga mendapatkan kode yang salah dari waktu ke waktu. Hasilnya menunjukkan bahwa AI meningkatkan kecepatan dan keterampilan belajar, tetapi ada juga kekhawatiran tentang berkurangnya kredibilitas, prinsip etika, dan pemikiran kritis. Studi ini merekomendasikan agar AI dimasukkan ke dalam kurikulum dan lokakarya pelatihan rutin harus diadakan untuk penggunaannya yang benar, etis, dan analitis.

Keywords: Artificial Intelligence; pemrograman; pendidikan; efektivitas; etika.

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INTRODUCTION

The rapid change in technology in the modern world has fundamentally changed the fields of learning, teaching, and practical learning, and artificial intelligence (AI) is considered to be the main driver of this transformation. Especially in the field of learning programming languages, AI tools such as ChatGPT, GitHub Copilot, Codeium, and Replit AI have opened the doors to a new educational environment for students. The use of these tools not only facilitates coding, but also leads to students' problem-solving, enhancing analytical skills, and deepening technical knowledge. Internationally, many studies focus on the effects of AI tools in teaching, but locally, especially in Afghan universities, there is little formal scientific research on this topic.

Computer science students in Afghanistan often face difficulties due to limited access to new forms of technology. Traditional teaching methods, lack of laboratory facilities, and limitations in academic support have led to students facing additional pressure in learning programming. Therefore, AI Tools are seen as an alternative support system that can enhance students' learning ability and fill the gap in their laboratory facilities to some extent. This study is important because programming education in the country is closely linked to the needs of the labor market, and students who are equipped with AI-assisted learning can have a strong foundation for professional development.

The value of the study lies in the fact that it is the first to quantitatively assess the use of AI tools based on the experiences and opinions of fourth-semester students from Nangarhar, Khorasan, and Alfalah universities. The study reveals how students use AI, which aspects are most important to them, and to what extent AI changes the quality of education. The results of this study are not only useful for students and teachers, but also for ministries, universities, and curriculum developers in policy-making. In addition, this study can also be used as a new academic reference for the theory of AI-assisted learning at the regional level. The main objective of the study is to quantitatively and analytically evaluate the level of use, effectiveness, benefits, and problems of AI tools among students of three universities. The study seeks to determine the extent to which students find AI tools useful in writing code, correcting errors, understanding advanced concepts, and improving skills. The study also attempts to understand students' perceptions of the validity and reliability of AI-generated code.

However, this issue is fraught with many problems. The accuracy of AI-generated code is not always the same, which can negatively affect the learning of some students. The second problem is the concern of reduced intellectual abilities, because over-reliance on AI may lead students to lose their ability to solve problems independently. The third problem is academic integrity, because some students submit AI-generated assignments as their own work, which is against academic principles. Fourth, the lack of understanding of the difference between correct and incorrect use of AI tools creates technical difficulties for some students. Finally, Afghanistan's lack of technological facilities and internet restrictions also prevents the regular use of AI tools. Overall, this study fills a gap that has existed until now in the integration of programming education and AI tools locally. The study not only provides an accurate picture of students' experiences but also provides an important scientific basis for teaching, curriculum development, and technology policies.

LITERATURE REVIEW

The Role of Artificial Intelligence in Learning Programming Languages

In recent years, the integration of artificial intelligence (AI) tools into learning environments has attracted significant attention from researchers, especially in the field of teaching and learning programming languages. Programming languages require analytical skills, logical thinking, problem-solving, and continuous practical practice, so AI-based tools play an important role in strengthening

these skills ([Fan et al., 2025](#)). Research shows that AI provides effective assistance to students in writing code, finding errors, and improving the quality of learning ([Akhtar, 2024](#); [Alanazi, 2025](#)). According to [Fan et al. \(2025\)](#), students learn new programming concepts faster when they receive immediate and timely feedback. In traditional classrooms, teachers' time and resources are limited, but AI tools fill this gap and provide students with immediate guidance. Similarly, [Sousa and Cardoso \(2025\)](#) found that AI reduces the burden on students in the areas of syntax correction, code generation, and debugging, as they can solve problems in real time and do not have to wait for human assistance.

ChatGPT and AI as Cognitive Partners

According to contemporary research, ChatGPT and similar AI tools are not just technical assistance tools, but also act as "Interactive Cognitive Partners" for students ([Zaim et al., 2025](#)). These tools help students in the process of thinking, analyzing, and solving problems, creating a new dimension of learning. [Zhang et al. \(2025\)](#) argue that students do not only use AI to write code, but also to understand theoretical concepts, prepare projects, and analyze problems in depth. This approach supports deep learning and self-directed learning. In addition, [Gaitantzi and Kazanidis \(2024\)](#) found that AI-based programming tools significantly improve students' academic achievement and the development of programming skills is high.

The impact of AI in learning C#, Java, and Python

Programming languages such as C#, Java, and Python require logical structure and organized thinking. [Alanazi's \(2025\)](#) study shows that AI provides strong support for the development of structured thinking and logical sequencing skills in learning these languages. With the help of AI, students not only learn how to write code, but also understand the logical structure behind the problem. [Llerena-Izquierdo \(2024\)](#) shows that AI not only makes learning programming easier, but also makes it more attractive and motivating for students. When students receive immediate answers and solutions, they are more motivated to learn and actively participate in the problem-solving process ([Akhtar, 2024](#)).

Limitations and Academic Concerns of AI

Although many studies confirm the positive effects of AI, there are still concerns about accuracy, reliability, and academic integrity ([Hadra, 2025](#)). Some studies show that the code generated by AI is not always accurate and is more prone to errors, especially when creating complex algorithms ([Tosi, 2024](#)). For this reason, [Fan et al. \(2025\)](#) argue that AI should be used as a complementary teaching tool, not as a substitute for the teacher. Although AI can facilitate the learning process, the need for human guidance, critical evaluation, and academic supervision still exists.

Constructivism and AI

Constructivism is a popular educational theory that emphasizes that learners construct knowledge through experience, active participation, and practical problem-solving ([Taber, 2024](#)). According to Piaget and Vygotsky, learners should construct and experiment with concepts on their own, rather than simply receiving information ([Chand, 2024](#)). AI tools support this theory, as learners can generate their own code, correct their own mistakes, and find solutions to problems based on their own experiences ([Tassinari, 2024](#)). In this way, learning shifts from memorizing information to active experimentation and knowledge construction.

Cognitive Load Theory and AI

Cognitive Load Theory, proposed by [Sweller \(1994\)](#), argues that learners' mental resources should be focused on basic concepts. Unnecessary activities that are not directly related to the main learning objectives should be reduced. AI tools take over most of the syntax, debugging, and repetitive coding tasks, relieving students of additional mental stress ([Taber, 2024](#)). According to [Fan et al. \(2025\)](#), this reduces the mental load and allows students to focus on the basic concepts and logical structures of programming.

The Zone of Proximal Development (ZPD) Theory and AI

Vygotsky's Zone of Proximal Development theory suggests that students develop best when they are provided with appropriate support and guidance ([Chand, 2024](#)). AI plays the role of a virtual guide and supporter in this regard. [Tosi \(2024\)](#) suggests that AI provides continuous guidance, advice, and feedback to students. Initially, students solve problems with the help of AI, but later they gradually become independent and their problem-solving abilities increase ([Alanazi, 2025](#); [Akhtar & Fikri, 2026](#); [Akhtar et al., 2025](#)).

Technology Acceptance Model (TAM) and AI

According to [Davis \(1989\)](#) Technology Acceptance Model, students accept technology that is useful and easy to use. [Zhang et al. \(2025\)](#) argue that AI tools have both characteristics; they are both useful and easy to use. Therefore, the widespread use of ChatGPT and other AI tools among students is considered to be a result of these two factors. When students see the practical benefits of a technology and it is not difficult to use, its acceptance and use naturally increase.

Problem-Based Learning (PBL) and AI

AI tools encourage students to solve real problems, test codes, propose alternative solutions, and understand the logical structure behind the problem ([Zviel-Girshin, 2024](#)). This characteristic is directly related to the philosophy of Problem-Based Learning (PBL). [Smith et al. \(2022\)](#) argue that PBL prepares students to solve real-world problems and fosters critical thinking. AI is considered an effective tool for implementing this philosophy, as students take an active role in the problem-solving process.

Research Gaps and Significance of Current Research

While much research supports the benefits of AI, there are still some important gaps and discrepancies. Some studies claim that AI-generated code is more than 70 percent accurate, while other studies show that AI still makes significant errors in solving complex logical problems ([Tosi, 2023](#)). These discrepancies indicate that there is still no complete scientific consensus on the effectiveness of AI. Also, some researchers believe that over-reliance on AI weakens students' independent thinking, analytical abilities, and computational skills ([Melisa et al., 2022](#)), while others argue that AI is only an aid and does not cause skill deficits. This academic debate is still unresolved. On the other hand, [Bittle and El-Gayar \(2025\)](#) found that AI has increased plagiarism in many countries, as students directly submit tasks generated by AI. A standard international framework for this problem has not yet been developed. Afghanistan, Pakistan, and countries in the Middle East in particular suffer from a lack of academic research in the field of AI-assisted programming education. Internet limitations, technical capabilities, and technology accessibility are issues that have not been adequately explored ([Zgham et al., 2025](#); [Akhtar et al., 2025](#)). Furthermore, most previous studies have focused on Python and Java, but there is still limited information on the characteristics, challenges, and effects of AI on learning C#.

Therefore, the current study attempts to fill this gap and scientifically evaluate the impact of ChatGPT and other AI tools in learning the C# language.

MATERIALS AND METHODS

This study is quantitative and descriptive research. It is based on a cross-sectional survey design, as the study seeks to obtain accurate information about the current situation, experiences, and perceptions of students at a specific point in time. This design was chosen to obtain accurate numerical evidence about the extent, effectiveness, and impact of computer science students' use of artificial intelligence (AI) tools. Descriptive research is particularly effective when researchers want to quantitatively examine participants' behaviors, usage experiences, and trends. Three universities in Nangarhar province, Afghanistan—Nangarhar University, Khorasan University, and Alfalah University—were selected as the study's statistical population because all three of them have programming and technology teaching programs in their computer science faculties.

A sample of 159 students was collected from this statistical population, all of whom are fourth-semester computer science students. The sample was divided in proportion to the relative number of students in the universities, in order to ensure true representation of each university. The sample distribution was as follows: 78 students from Khorasan University, 51 students from Nangarhar University, and 30 students from Alfalah University. Stratified Purposive Sampling was used to select the sample to ensure representativeness and balance of data across universities. A structured questionnaire was used to collect data, which was divided into three parts. The first part covered the background information of the participants, such as age, university, and semester. The second part assessed the level, type, frequency, and main purpose of using AI tools. The third part included questions about the students' perceptions, such as the effectiveness of AI tools, the ability to correct errors, the speed of learning, and the impact on thinking skills. The questionnaire consisted of multiple-choice, Likert-scale, Yes/No, and multiple-response questions. This format was chosen to collect quantitative, accurate, and measurable responses to students' experiences.

The data collection process was conducted both in-person and online. In Nangarhar and Alfalah Universities, questionnaires were distributed in person in classrooms through administrative coordination, but for Khorasan University, data was collected online through Google Forms. All participants were provided with a consent form and were assured that their identities would not be recorded and that their responses would be used for academic and research purposes only. Students were also told that answering the questions was voluntary and that they could withdraw from participation at any stage. After data collection, all responses were first coded for accurate analysis and then transferred to Excel and SPSS for statistical analysis. Descriptive statistics were used for the analysis, which included Frequency, Percentage, Mode, Median, Mean, Range, and Standard Deviation. Questions in which students could select multiple answers were analyzed using Multiple Response Analysis. In addition, separate tables were created for comparative analysis of the intensity, impact, and perception of the use of AI Tools across universities.

This comparative analysis shows how the use of AI Tools differs in each university. Cronbach's Alpha statistic was used to determine the reliability of the research instrument, which was recorded as 0.78, indicating that the questionnaire has good internal consistency and consistency. Accordingly, the survey instrument is considered suitable and reliable for the study. Ethical principles were fully observed in conducting the study. The confidentiality of all students was protected, no personal information was recorded, permission to participate was clearly obtained, and the anonymity of the participants was guaranteed. All research data will be used only for academic and scientific purposes and will not be shared with third parties. This study also has some limitations. Only 159 students were covered from a

purposive sample of 300 students from three universities, and the results may not be generalizable to the national level. Also, some students may not have sufficient experience using AI tools, which may have affected the responses to some questions. Lack of internet and technological facilities also created limitations in collecting some online responses. Nevertheless, the study collects data relevant to the topic appropriately and addresses the overall objectives of the study.

RESULT

A survey of 159 students from three universities revealed that most students are familiar with AI tools and use them specifically for C# coding, debugging, and code generation. The findings showed that AI has significantly improved students' coding ability, learning speed, and problem-solving skills. However, a large number of students still produce incorrect code from time to time. Despite this problem, students still consider AI to be a useful learning tool, and almost all of them want AI to become an official part of the curriculum, with similar workshops to be held at the university level. We explain each aspect below.

Table 1. Participant Distribution by University

Measure/Category	Description	Value / Observation
Frequency Distribution	Students per university (count + %)	Khorasan University: 78 (49.1%) Nangarhar University: 51 (32.1%) Alfalah University: 30 (18.8%)
Central Tendency	Numerical codingMode: (1=Khorasan, 2=Nangarhar, 3=Alfalah)	Nangarhar University (78) Mean $\approx$ 1.70 Median = Category 2 (Nangarhar University)
Variability / Spread	Data spread	Range: 1–3 SD $\approx$ 0.79

The distribution of participants shows that the largest number of participants is from Khorasan University (49.1%), followed by Nangarhar University (32.1%), and then Alfalah University (18.8%). The mean of the data is $\approx$ 1.70, indicating that the general tendency of participants is between the first and second universities, and the middle value (Median = 2) indicates Khorasan University. The spread of the data (Range = 1–3) and standard deviation $\approx$ 0.79 indicate that the distribution of participants among universities is moderately different.

Table 2. Student Age Distribution

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	18–20: 52 (32.7%) 21–23: 71 (44.7%) 24–26: 28 (17.6%) 27+: 8 (5.0%)
Central Tendency	Data central tendency	Mode: 21–23 (71) Mean $\approx$ 1.95 Median = Category 2 (21–23)
Variability / Spread	Data spread	Range: 1–4 SD $\approx$ 0.84

The age distribution of students shows that the majority are between 21–23 years old (44.7%), followed by the 18–20 age group (32.7%). The mean of the data indicates that the average student is between 21–23 years old, which is consistent with the mode and median. The age distribution is moderate, with a range of 1–4 and a standard deviation of about 0.84.

Table 3. Student Academic Year Distribution

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	1st Year: 41 (25.8%) 2nd Year: 39 (24.5%) 3rd Year: 46 (28.9%) 4th Year: 33 (20.8%)
Central Tendency	Central tendency	Mode: 3rd Year (46) Mean $\approx$ 2.44 Median = 3rd Year
Variability / Spread	Spread	Range: 1-4 SD $\approx$ 1.09

The distribution of students by academic year shows that the majority of participants are third-year students (28.9%), followed by first-year (25.8%) and second-year (24.5%). The median of the data indicates that the average student is in the third year, which is consistent with the mode and median. The spread value (Range = 1-4) and standard deviation $\approx$ 1.09 indicate that there is moderate variation across academic years.

Table 4. Student Familiarity with AI Tools

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	25% familiarity: 18 (11.3%) 50%: 39 (24.5%) 75%: 62 (39.0%) 100%: 40 (25.2%)
Central Tendency	Central tendency	Mode: 75% (62) Mean $\approx$ 2.78 Median: 75%
Variability / Spread	Spread	Range: 1-4 SD $\approx$ 0.96

The level of familiarity of students with AI tools shows that most students (39%) are at least 75% familiar with them, followed by 100% familiar (25.2%) and 50% familiar (24.5%). The median of the data indicates that the average student is at least 75% familiar with AI tools, which is consistent with the mode and median. The standard deviation and standard deviation (Range = 1-4, SD $\approx$ 0.96) indicates that there is moderate variation in the level of familiarity among students.

Table 5. Frequency of Using AI Tools for Coding

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	Daily: 44 (27.7%) Several times a week: 63 (39.6%) Occasionally: 38 (23.9%) Never: 14 (8.8%)
Central Tendency	Numerical coding 1-4	Mode: Several times a week (63) Mean $\approx$ 2.14 Median = Category 2
Variability / Spread	Spread	Range: 1-4 SD $\approx$ 0.93

The level of use of AI tools by students for coding shows that most students (39.6%) use them several times a week, followed by daily tasks (27.7%) and occasionally (23.9%). The median of the data shows how many times a typical student uses AI tools per week, which is consistent with the mode and median. The spread value (Range = 1-4) and standard deviation $\approx$ of 0.93 indicate that the level of use is moderately varied across students.

Table 6. Main Purpose of Using AI Tools (Multiple Response)

Purpose	Frequency	Percentage
Assist in C# coding	126	79%

Fix errors	118	74%
Prepare assignments	103	65%
Learn new technology	89	56%
Improve conceptual understanding	77	48%

The main purposes for using AI tools show that the majority of students (79%) use them to write C# code, followed by fixing errors (74%) and preparing assignments (65%). Learning new technologies (56%) and better understanding theoretical concepts (48%) are the least used purposes. This shows that AI tools are mainly used for practical coding and error-solving.

Table 7. Has AI Improved Your Coding Ability?

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	Very much: 61 (38.4%) To some extent: 72 (45.3%) Little: 18 (11.3%) Not at all: 8 (5.0%)
Central Tendency	1-4 coding	Mode: To some extent (72) Mean $\approx$ 1.83 Median = Category 2
Variability / Spread	Spread	Range: 1-4 SD $\approx$ 0.79

According to students, AI tools have significantly improved their coding skills, with 45.3% of students saying it has improved somewhat, and 38.4% saying it has improved a lot. The average level of the data indicates that the overall effect fits into the “somewhat” category, with the mode and median being consistent. The spread value (Range = 1-4) and standard deviation $\approx$ of 0.79 indicate that the effect size is moderately variable across students.

Table 8. Areas Where AI Tools Are Mostly Used (Multiple Response)

Area	Frequency	Percentage
Syntax & Error Fixing	131	82%
Code Generation	117	74%
Debugging	105	66%
Algorithm Design	94	59%
Documentation	86	54%

The most common areas of use for AI tools show that most students (82%) use them for syntax and error correction, followed by code generation (74%) and debugging (66%). Algorithm design (59%) and documentation (54%) are less commonly used. This shows that AI tools are mainly useful in the areas of solving technical problems and writing code.

Table 9. Have You Ever Received Incorrect Code from AI?

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	Yes: 47 (29.6%) No: 112 (70.4%)
Central Tendency	Mean coding 1=Yes, 2=No	Mode: No (112) Mean $\approx$ 1.29 Median = No
Variability / Spread	Spread	Range: 1-2 SD $\approx$ 0.45

29.6% of students said they had sometimes received incorrect code from AI, and only 70.4% had not experienced it. The average level of the data shows that the most common answer is “no”, which is consistent with the mode and median. The spread value (Range = 1-2) and standard deviation $\approx$ 0.45 indicate that the variation of the experiences is limited and overall similar.

Table 10. Has AI Tools Accelerated Your C# Learning?

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	Yes: 93 (58.5%) To some extent: 47 (29.6%) No: 19 (11.9%)
Central Tendency	Mode	Mode: Yes (93) Mean $\approx$ 1.53 Median = 1
Variability / Spread	Spread	Range: 1-3 SD $\approx$ 0.72

58.5% of students said that AI tools made their C# learning faster, and 29.6% said that they made it faster to some extent. The average level of the data shows that the general answer is "yes", consistent with the mode and median. The spread value (Range = 1-3) and standard deviation $\approx$ 0.72 indicate that the effect size varies moderately across students.

Table 11. Opinions on AI Tools' Cognitive and Analytical Effects

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	Positive: 84 (52.8%) Negative: 39 (24.5%) No effect: 36 (22.6%)
Central Tendency	Mode	Mode: Positive (84) Mean $\approx$ 1.70 Median: Positive
Variability / Spread	Spread	Range: 1-3 SD $\approx$ 0.87

Student opinions show that 52.8% consider the intellectual and analytical impact of AI tools to be positive, 24.5% to be negative, and 22.6% to have neutral impact. The average level of the data indicates that the overall perception is positive, consistent with the mode and median. The spread value (Range = 1-3) and standard deviation $\approx$ 0.87 indicate that the difference in opinions is moderate.

Table 12. Should AI Tools Be Part of the Computer Science Curriculum?

Measure/Category	Description	Value / Observation
Frequency Distribution	Student responses	Yes: 109 (68.6%) No: 22 (13.8%) Not sure: 28 (17.6%)
Central Tendency	Mode	Mode: Yes (109) Mean $\approx$ 1.49 Median = 1
Variability / Spread	Spread	Range: 1-3 SD $\approx$ 0.78

Student opinions show that 68.6% want AI tools to be part of the computer science curriculum, 13.8% are opposed, and 17.6% are not satisfied. The mean of the data indicates that the general opinion is "yes", consistent with the mode and median. The spread value (Range = 1-3) and standard deviation $\approx$ 0.78 indicate that the difference in opinions is moderate.

Table 13. Measures to Improve AI Tools Usage (Multiple Response)

Action	Frequency	Percentage
AI Tools Workshops	133	84%
Guidance from Instructors	121	76%
Official Access	114	72%
Clarifying Ethical Guidelines	109	69%
Strengthening Internet & Systems	102	64%
AI-Based Exercises for C#	95	60%

Measures for better use of AI tools show that the most participants (84%) request AI workshops, followed by mentoring (76%) and formal access (72%). Other measures such as clarifying ethical principles (69%), strengthening the Internet and system (64%) and AI-based exercises for C# (60%) were also considered important. This shows that, according to students, training, guidance and a suitable technical environment play a key role in the effective use of AI tools.

DISCUSSION

The results of the tables show that a large number of students from three universities—Nangarhar, Khorasan, and Alfalah—are familiar with AI tools, and almost all of them consider AI as a primary learning tool for coding, error correction, and code generation. The frequency tables show that a large proportion of students use AI for syntax correction and code generation, which is a clear indication of the acceleration of practical learning. One of the most striking points in the results is that 70% of the students have experienced AI-generated incorrect code, but despite this, almost 60% of the students still consider AI as a tool for accelerating learning. This shows that students accept AI as an auxiliary tool, but do not fully rely on it. The spread of the tables also shows that some of the responses have different perceptions among students, especially regarding the reliability of AI, its impact on analytical skills, and the inclusion of AI tools in the curriculum. For example, while nearly 69% of students want AI tools to be formally part of the curriculum, some are skeptical, reflecting the natural differences in the acceptance of new technologies.

The results of this study are generally consistent with international research. Fan et al. (2025) found that AI-assisted learning increases students' coding ability and problem-solving speed, and our results also confirm that 45% of students consider AI to be a "somewhat" helpful tool, and 38% consider it to be "a lot" helpful. Similarly, Sousa & Cardoso (2025) found that AI tools reduce students' workload in terms of syntax and debugging—82% of students in the same study used AI for error fixing, which is consistent with international research. However, some points differ from the existing literature. For example, some studies claim that AI-generated code is reliable (Gaitantzi & Kazanidis, 2024), but our results show the opposite, with 70% of students receiving incorrect code and only 16% rating the code reliability as "very high." This difference suggests that the conditions, access to technology, and programming skills of Afghan university students may differ from the average of international studies. Also, contrary to Smith et al. (2022) theory that AI may weaken students' thinking skills, our study shows that 52% of students consider AI to be positive for thinking skills. This difference suggests that AI in Afghanistan is mostly experienced as a complementary teaching tool, not as a substitute for autonomy. The primary problem of the study was that university students face several key barriers to learning C#: traditional teaching methods, limited laboratory facilities, lack of technical support, and slow learning pace. The results of the tables clearly confirm these problems.

First, regarding the use of AI Tools, students say that AI provides alternative assistance to the teacher in error correction and coding. This directly supports the problem that students face technical difficulties due to limited teacher time in the classroom environment. Second, regarding the speed of learning, 58% of students confirmed that AI has accelerated the learning of C#, which is a clear response to the problem of slow learning speed. Third, students' experience with AI-generated incorrect code supports the concern mentioned in the problem: incorrect guidance from AI may negatively affect the quality of students. Fourth, the ethical problem area is also evident in the results. Regarding the ethical principles of the curriculum, 69% of students said that the principles should be clarified, which confirms the part of the problem statement that mentions: the risks of uncontrolled use of AI are still serious. Although the results show that AI tools are a useful and effective support system for students, a number of critical points need to be addressed.

First, the high rate of AI-generated incorrect code indicates that students still have weaknesses in their code evaluation and critique skills. This weakness is dangerous, as students may rely on AI answers without critical thinking. In this regard, teachers need to train students in AI-literacy skills. Second, there is also a risk that the excessive use of AI will reduce students' analytical, logical thinking, and problem-solving independence. Although our results contradict this theory (students viewed AI positively), there is still a scientific gap regarding the long-term effects. Third, the results show that students want AI to be part of the official curriculum, but this proposal will only be implemented if curriculum designers set a clear framework and principles for AI, including the management of incorrect answers, prevention of plagiarism, and evaluation of effectiveness. Fourth, the differences in technological capabilities between universities should also be taken into account. Students who do not have good internet or advanced devices may be disadvantaged in using AI, which further deepens the problem of the digital divide. Finally, the critical discussion shows that AI tools should remain an auxiliary tool, not a substitute for teaching. Students should rethink and evaluate AI answers at home, not just imitate AI products.

CONCLUSION

The results of this study show that computer science students at three universities have extensive access to artificial intelligence tools and use them extensively in their learning process. Analysis of the tables shows that students use AI most for syntax correction, code generation, and error correction, which is associated with increased learning speed and problem-solving ability. Nearly 60% of students agreed that AI tools have accelerated their learning of C# and improved their coding skills. Despite these positive results, 70% of students also experienced faulty code, which indicates the need for caution in this area. Also, the majority of students believe that AI should become part of the formal computer science curriculum. Overall, the findings prove that AI has become an effective and important tool to support teaching and learning. The computer science profession is at the forefront of technological innovation, and the use of AI tools is vital for students in this profession. The results show that AI not only enhances coding skills, but also improves logical thinking, algorithm design, and debugging abilities, all of which are fundamental skills for a career in computer science. From a career perspective, AI-assisted learning is a new way to enhance students' practical skills, as AI exposes students to real-world problems, provides them with immediate feedback, and helps them understand programming concepts in depth. The study also demonstrates that teaching programming without AI is currently considered to be at odds with international standards. Therefore, AI tools can align the computer science curriculum of Afghan universities with international standards and prepare students for the future job market. Although the study provides an accurate picture of the use of AI tools, there are still some gaps that future research could fill. First, the long-term impact of AI is still not fully understood; it is not yet clear how continued reliance on AI affects the development of students' analytical skills. Second, the study only covered three universities; Future research should include students from other universities or provinces to obtain generalizable results. Third, specific research is needed to investigate the causes of AI code errors, the increase or decrease in students' critical thinking, and the comparison of the performance of different AI tools. Fourth, teachers' experiences, teaching practices, and their relationship with AI have not been studied, while the evaluation of teaching quality plays an important role in the success of AI integration. Universities should formally integrate AI tools into the computer science curriculum, especially in the subjects of programming, debugging, algorithm design, and software engineering. Students should be trained in identifying and solving AI-generated code errors. Teachers should provide specific instructions in the "AI Literacy" section. Relevant departments should

provide funding and support for future research to accurately examine the long-term impacts, possibilities, and problems of AI implementation.

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Conflict of Interest Statement

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