Sakarya University Journal of Education

ISSN : 2146-7455
Publisher : Sakarya University

Vol. 14, No.Special Issue, 142-158, 2024
DOI: https://doi.org/10.19126/suje.1426980

Research Article

Understanding University Students' Intentions to Use Chatbots in Computer Programming Education: A Quantitative Study

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Received: 28.01.2024
Accepted: 14.05.2024
Available Online: 24.07.2024

Abstract: Recently, the use of artificial intelligence in education is one of the more frequently discussed issues by researchers. Especially the use of artificial intelligence applications called chatbots or artificial intelligence language models in education is increasing day by day. Although the use of chatbots in education is possible for every course, it is observed that students intend to use chatbots as an assistant, an instructor, or a guide, especially in computer programming courses, which are difficult to learn and have complex structures. In this context, the aim of this study is to examine the intention of university students taking computer programming courses to use chatbots in their education. The participants consisted of 413 university students studying at a state university and taking a "computer programming" course in the 2023-2024 academic year. Descriptive statistics, independent sample t-test and one-way analysis of variance (ANOVA) were used to analyse the data. Results have shown that university students indeed possess intentions to use chatbots in computer programming education and this intention is mostly motivated by the performance expectation towards the course. In addition, for the purposes of using chatbots in computer programming education; conceptual understanding, identifying errors in program code and looking up for correct syntactical rules were among the most prominent reasons. In terms of independent variables, while there was no difference in terms of department, income status, device using chatbots, and the role attributed to chatbot by the student, a significant difference was found in terms of gender, grade level, use experience and frequency of chatbots use. According to the study, university students studying programming plan to use chatbots powered by artificial intelligence, and the usage of chatbots in programming education is expected to grow over time in tandem with the advancement of AI technology.

Keywords: Artificial Intelligence, AI, Chatbot, Higher Education, Survey Research

1. Introduction

Today, with the rapid advancement of technology, digital transformations are expected in the field of education. Recently, one of the most important elements of this transformation is the use of artificial intelligence-based systems in education and the integration of artificial intelligence language model supported chatbots into educational processes (Verleger & Pembridge, 2018; Yildiz-Durak, 2023). Artificial intelligence integration in education is increasingly manifesting through various applications (Raffaghelli et al., 2022; Rahman & Watanobe, 2023). Dialogue education systems, chatbots, data mining in education, article analysis of students, experiential education, education for children with special needs, intelligent agents, child and robot interaction, artificial intelligence-based assessment systems, automatic test creation systems can be given as examples of these applications (Holmes et al., 2023). On November 30, 2022, Open AI released ChatGPT, an artificial intelligence language model with functionality in a few areas, including education, coding, creative writing, information research, and general conversation (Gill & Kaur, 2023). In addition, with this artificial intelligence language model, tasks such as answering questions, providing information, producing creative content, and explaining complex concepts have started to be fulfilled in a very short time. ChatGPT, which is the most interesting and increasingly used chatbot application of recent times, has more than one million users as of today (Keles, 2023).

A chatbot is a software program that can communicate with humans through natural language. This term, created by combining the words "chat" and "robot", describes artificial intelligence systems designed to assist humans, usually through text-based or voice dialogues (Luo et al., 2022). Chatbots are

Cite as (APA 7): Gezgin, D. M., Mert, S., Kesici, A. İ., & Yıldırım, S. (2024). Understanding university students' intentions to use chatbots in computer programming education: A quantitative study. *Sakarya University Journal of Education,* 14(Special Issue), 142-158. https://doi.org/10.19126/suje.1426980

applications that have the potential to help students better understand the subjects they do not understand by providing an interactive learning experience. Chatbots also provide students with personalised and interactive learning experiences by using artificial intelligence sub-disciplines such as natural language processing and machine learning (Kerlyl et al., 2006). In particular, the rising trend of technology in the field of education, the integration of artificial intelligence and chatbot technologies into teaching methodologies opens new horizons for educators and students, especially in challenging courses. In courses such as computer programming, chatbots have been claimed to support students with teaching, mentoring, and assisting roles (Moon et al., 2023). Programming or coding courses can be quite challenging for students with their complex, abstract and dynamic concepts (McCracken et al., 2001; Qian & Lehman, 2017). In this context, it is argued that integrating artificial intelligence into the classroom can be useful in helping students learn abstract ideas such as programming and algorithmic thinking. In parallel with the idea that the use of artificial intelligence in overall educational efforts will reduce the cognitive load of students (Fryer et al., 2020), it is also thought that the use of such applications in programming education might also help students reduce the high cognitive load encountered by students in programming courses. In a study by Okonkwo and Ade-Ibijola (2020), a chatbot system called Python-Bot was presented to novice programmers. As a result of the use of this system, it was stated that most students taking Python programming courses and students who had previously completed a Python programming course agreed that this tool was user-friendly, simplified the task of internalizing programming logic and improved Python programming skills overall. Biswas (2023) emphasised that ChatGPT offers a wide range of capabilities for computer programming, including code completion, correction, prediction, error correction, optimisation, document generation, chatbot development, text-to-code conversion and increases the productivity of programmers. Similarly, Surameery and Shakor (2023) mention the capabilities of ChatGPT in providing debugging assistance, error prediction and error explanation to help solve programming problems. As can be seen from the related literature, the benefits of using chatbots in programming education and the capabilities of chatbots are discussed. However, in addition to the benefits that chatbots use can bring to education, students' intentions, and acceptance for the use of new technologies such as chatbots in education gain importance.

The use of technology in education, especially in the case of new tools such as chatbots, has been studied using various theoretical models to understand how individuals' approach and adopt these technologies. These models have an important role in elucidating users' behaviours and expectations towards these behaviours, especially the influence of personal factors. For example, the Unified Theory of Acceptance and Use of Technology (UTAUT), which was developed by Venkatesh et al. (2003), identifies four main elements and four moderating factors to explain how individuals accept and use new technologies. These are (a) performance expectancy, (b) effort expectancy, (c) social influence and (d) facilitating conditions. Age, gender, experience, and education are considered as moderators. Each of these factors can change the effect of the four main factors mentioned above. The UTAUT model has been frequently used to analyse technology acceptance in a wide range of fields (Dwivedi et al., 2011), especially in the field of education. The results of the study by Raffaghelli et al. (2022) showed that the UTAUT model is a valid and widely used model for analysing technology acceptance in many fields, including education. Recent studies have found that the UTAUT model is also effective in evaluating the acceptance of technologies such as chatbots (Williams et al. 2015; Kim et al., 2019).

The rapid progress of technological developments necessitates the adaptation of individuals to rapid changes to commence as smoothly as possible. As Teo et al. (2019) emphasized, individuals' intentions to accept technology play a critical role in successfully integrating these developments into society. Based on this information, it can be said that one of the prerequisites for university students to encourage the use of new technologies such as chatbots is technology acceptance and intention. This is

especially true in a difficult domain such as computer programming education, which comprise a high demand technical skill that holds promise for both individuals and for nations when learned properly. Under these circumstances, the acceptance and intention of university students towards use of AI chatbots in education gain greater importance. In a developing country like Turkey, it is essential to determine the moderator variables that affect technology acceptance in education, understand students' intentions to use chatbots, and create scenarios for integrating chatbots into education. This study aims to contribute to the literature by examining university students' intentions regarding the use of artificial intelligence in education. Specifically, it aims to examine the intention of university students taking computer programming courses to use chatbots in education. The study seeks answers to the following research questions:

1. What is the level of chatbot use intention of university students taking computer programming courses?

2. For what purposes do university students taking programming education courses use chatbots in their education?

3. Do the intention of university students taking computer programming courses towards using chatbots in education vary according to the following independent variables?

a. Gender,

b. Department,

c. Grade level,

d. Parental income status,

e. Chatbot use experience,

f. Device used for chatbot access,

g. Frequency of chatbot use,

h. Role attributed to chatbot by the student.

2. Methodology

In this study, which was conducted to examine the intention of university students taking computer programming courses to use chatbots in education in terms of various variables, a quantitative descriptive method was used. Descriptive methods are used in studies in which the views of the participants on a subject or event or their interests, skills, abilities, attitudes, etc. are determined, and which are generally conducted on larger samples than other studies (Buyukozturk et al., 2008). In this study, the quantitative descriptive method was used to determine the intention of university students taking computer programming courses to use chatbots in education and to determine whether this intention differs according to certain variables.

2.1. Participants

The participants of the study consisted of 413 university students taking computer programming courses in Computer Engineering, Mechanical Engineering and Econometrics departments at a state university during the 2023-2024 academic year. It was determined that 121 (29.3%) of the participants were female and 292 (70.7%) were male students. The average age of the university students was found to be M=20.30. Table 1 shows all demographic information of the participants.

Table 1

Frequency-Percentage Data of the Participants

Variables		**N**	**%**
Gender			
	Female	121	29.3
	Male	292	70.7
Department			
	Computer Engineering	238	57.6
	Mechanical Engineering	140	33.9
	Econometrics	35	8.5
Grade level			
	1st grade	163	39.5
	2nd grade	128	31.0
	3rd grade	64	15.5
	4th grade	58	14.0
Parental Income status			
	11.000- 20.000 TL	132	32.0
	21.000- 30.000 TL	127	30.8
	31.000- 40.000 TL	84	20.3
	40.000 TL and above	70	16.9
Prior Chatbot Use Experience			
	Yes	295	71.4
	No	118	28.6
Chatbot Type Used			
	Chat GPT	270	65.4
	Copilot	12	2.9
	Google Bard	11	2.7
	Tabnine Al	2	0.4
	Not using	118	28.6
Device Used for Chatbot Access			
	Smartphone	94	22.8
	Computer	201	48.7
	Not using	118	28.6
Frequency of Chatbot Use (Weekly)			
	1-10 times	177	42.9
	11-20 times	70	16.9
	21-30 times	48	11.6
	Not using	118	28.6
Role Attributed to Chatbot			
	Assisting	190	46.0
	Learning	128	31.0
	Mentoring	95	23.0
Total Participants		413	100.0

2.2. Data collection tools

A survey form was developed by the researchers as a data collection tool in the study. The research form consists of two parts. The first part includes demographic data (gender, age, department, grade level, and income status etc.) and information about chatbots usage (prior chatbots use experience, type

of chatbots used, frequency of chatbots use, device used for chatbot access, and role attributed to chatbots etc.) and the second part includes the intention to use chatbots in education scale.

Behavioural Intention Scale for Using and Learning Chatbot in Education. The adaptation of the "Behavioural Intention to Use and Learn Chatbot Scale" developed by Mokmin and Ibrahim (2021) into Turkish was conducted by Yildiz Durak and Onan (2023). The scale adapted to Turkish consists of 24 items and 8 sub-dimensions. The scale is 7-point Likert type. Cronbach α internal consistency coefficient of the scale was calculated as 0.96. Cronbach α internal consistency coefficient for performance expectancy factor was 0.91, 0.92 for effort expectancy, 0.91 for attitude towards improving learning, 0.86 for social influence, 0.84 for facilitating conditions, 0.90 for self-efficacy, 0.89 for anxiety, 0.92 for behavioural intention to use/learn **chatbots**. Finally, the fit indices of the scale **were** [$\chi 2(224) = 871.50$, $\chi 2/df = 3.89$, RMSEA= 0.063, GFI= 0.91, NFI= 0.99, NNFI=0.99, CFI=0.99, IFI=0.99]. In this study, the Cronbach α internal consistency coefficient of the behavioural intention to use/learn chatbots factor was calculated as 0.89.

2.3. Data collection and analysis process

In the study, the data collection process lasted for one month during January in the autumn term of the 2023-2024 academic year. Before starting the data collection process, ethics committee approval was obtained with the decision numbered 01/23 taken at the meeting of Trakya University Social and Human Sciences Research Ethics Committee dated 24.01.2024 (Number: E-29563864-050.04-589075). Data were collected both online and face-to-face by the researchers. It took approximately 10 minutes to fill out a research form. Firstly, the participants were informed about the research, and it was explained that participation in the research was voluntary. Before analysing the data, normality assumption was tested. According to the results of the Kolmogorov-Smirnov test, it was determined that the data were normally distributed (p=.07). In addition, Levene's test was performed to check the homogeneity assumption. As a result of the test, it was seen that the homogeneity assumption was met in terms of department, grade level, parental income status and frequency of chatbots use variables (p>.05). For this reason, parametric tests were used to analyse the data. In this respect, descriptive statistics, independent sample t-test and one-way analysis of variance (ANOVA) were used in the study. The effect size of the analysis results was also calculated in the study using the eta square coefficient.

3. Findings

In the study, the findings are explained in the order of the research questions and by giving direct research questions.

3.1. What is the level of chatbots use intention of university students taking computer programming course?

In this quantitative study examining the intention to use chatbots in education of university students taking computer programming course, the average score obtained from the intention to use/learn chatbots in education was M=5.47. When the mean scores of the other sub-factors of the scale were examined, performance expectation as M=5.29, effort expectation as M=5.10, attitude towards improving learning as M=4.83, social influence as M=3.42, facilitating conditions as M=4.44, self-efficacy as M=4.73, anxiety as M=2.45 were determined. Table 2 shows the descriptive statistics of the scale and its sub-factors.

Table 2

Descriptive Statistics of the Scale and Its Sub-Factors

Scale and Sub Dimensions	N	Min	Max	Mean	Std. Dev.
1.Performance expectation	413	1.00	7.00	5.29	1.240
2.Effort expectation	413	1.00	7.00	5.10	1.308
3.Attiude towards improving learning	413	1.00	7.00	4.83	1.326
4.Social Influence	413	1.00	7.00	3.42	1.605
5.Faciliating conditions	413	1.00	7.00	4.44	1.292
6.Self-efficacy	413	1.00	7.00	4.73	1.610
7.Anxiety	413	1.00	7.00	2.45	1.340
8.Behaviorual intention to use/learn chatbot	413	1.00	7.00	5.47	1.322

When Table 2 is examined, it is seen that the behavioural intention and performance expectation levels of university students towards using/learning chatbots in education are at a high level, their intention to use chatbots in education in terms of anxiety and social influence factors is at a low level, and other factors are at a medium level. As a result of these findings, it can be concluded that university students intend to use chatbots in computer programming education.

3.2. What are the purposes of using chatbots in programming education of university students taking computer programming course?

When the purposes of using chatbots in the education of university students taking programming courses were examined, it was seen that there were basically 6 purposes of their use. It was observed that 290 (98.3%) of the students who used chatbots in programming education used chatbots to learn the subject related to programming. Following this, 282 (95.6%) of the students use chatbots to find and debug code errors in programming. Table 3 shows the purposes of using chatbots in programming education of university students.

Table 3

Scenarios of Chatbots Usage Purposes in Computer Programming Education

Purpose of Using Chatbots in Programming Education*	N	%
Conceptual learning about programming	290	98.3
Code error detection and debugging (Debug)	282	95.6
Reference material about syntactical rules (Syntax)	255	86.4
Analysing the codes of homework and in-class exercises	247	83.7
Preparing for programming exams	161	54.6
Creating another programming examples without exercise in course	146	49.5

* The number of university students using chatbots in Computer Programming education was determined as 295 (100%). However, since more than one option can be selected for the purpose of

using chatbots in education in the research form created to collect data in the study, this number exceeds 295. In this respect, the total number of university students is not included in the table.

When Table 3 is examined, it is seen that university students primarily use chatbots in programming education to learn certain conceptual topics and to find errors in code writing. This result shows that chatbots support students in learning at their own pace and provide advantages in terms of personalised learning. Following this, it was also found that students used chatbots as a reference material for the syntax of programming language codes. Thus, it is seen as valuable in terms of time that students can quickly access information in terms of programming from anywhere at any time. Finally, it was revealed that students used chatbots to analyse the program codes they did in the lessons or assigned homework, but they used chatbots less frequently to prepare for exams or to produce new programming research. These findings suggest some positive effects or concerns in terms of deep or surface learning approaches in programming education for university students.

3.3. Do the chatbots usage intentions of university students taking programming courses vary according to gender?

An independent sample t-test was conducted to determine whether there is a difference in terms of gender in the intention to use Chatbot in education of university students taking computer programming courses. As a result of the test, there was a significant difference between male and female university students in terms of their intention to use chatbots in education (p=.04). According to finding, Male's intention to use chatbots in education is higher than female. Table 4 shows the results of the independent sample t-test analysis.

Table 4

Independent Sample T-Test According to Gender

Gender	N	Mean	Std. Dev.	df	t	p	Effect size
Female	121	5.27	1.323	411	-2.016	.04*	.01
Male	292	5.56	1.314				

** Significance at .05 level*

3.4. Do the chatbots usage intentions of university students taking computer programming course vary according to the department?

One-way analysis of variance (ANOVA) was performed to determine whether there is a significant difference in the Chatbot usage intentions of university students taking computer programming courses according to the department of study. As a result of the ANOVA test, no significant difference was found between the student groups in terms of the department of education (p=.13). The results of the analysis are shown in Table 5.

Table 5

ANOVA Analysis Results According to the Department

	Sum of squares	df	Mean of squares	F	p
Between groups	7.223	2	3.611	2.077	.13
Within groups	713.058	410	1.739		
Total	720.281	412			

3.5. Do the chatbots usage intentions of university students taking computer programming education vary according to the grade level?

ANOVA analysis was performed to examine whether the chatbots usage intentions of university students taking Computer Programming courses vary significantly according to the grade level. As a result of ANOVA analysis, a significant difference was found between student groups in terms of class level (p=.00). Tukey which is one of the post-hoc test was used to investigate the differences between groups. According to findings, 1st grade students' intention to use chatbots in education(M=5.69) is higher than 2nd (M=5.26) and 3rd (M=5.17) grade students. The results of the analysis are shown in Table 6.

Table 6

ANOVA Analysis Results According to Grade Level

Grade level	N	Mean	Std. Dev.	df	F	p	Difference	Effect size
1st grade	163	5.69	1.223	3 409	4.238	.00**	1>2, 1>3	.03
2nd grade	128	5.26	1.335					
3rd grade	64	5.17	1.364					
4th grade	58	5.67	1.402					

*** Significance at .01 level*

3.6. Do the chatbots usage intentions of university students taking computer programming courses vary according to income status?

ANOVA analysis was performed to examine whether the chatbots usage intentions of university students taking Computer Programming courses differ according to income status. As a result of the analysis, no significant difference was found between the student groups in terms of income status (p=.97). The results of the analysis are shown in Table 7.

Table 7

ANOVA Analysis Results According to Income Status

	Sum of squares	df	Mean of squares	F	p
Between groups	.146	3	.049	.028	.97
Within groups	720.136	409	1.761		
Total	720.281	412			

3.7. Do the chatbots usage intentions of university students taking computer programming course vary according to their chatbots use experience in education?

Independent sample t-test was conducted to test whether the Chatbot usage intentions of university students taking Computer Programming course vary according to the experience of using chatbots in education. According to the results of the independent sample t-test, a significant difference was found between the student groups (p=.00). It was concluded that the significant difference obtained was in favour of university students (M=5.58) who had previous experience of using Chatbot in education. Table 8 shows the results of the analysis.

Table 8

Independent Sample T-Test According to Prior Chatbots Use Experience

Chatbot use experience	N	Mean	Std. Dev.	df	t	p	Effect Size
Yes	295	5.58	1.272	411	2.668	.00**	.02
No	118	5.20	1.410				

*** Significance at .01 level*

3.8. Do the chatbots usage intentions of university students taking computer programming course vary according to their device used for chatbots?

Independent sample t-test was conducted to test whether the Chatbot usage intentions of university students taking Computer Programming course vary according to the device using chatbots in education. According to the results of the independent sample t-test, a significant difference was not found between the student groups (p=.71). Table 9 shows the results of the analysis.

Table 9

Independent Sample T-Test According to Device Used for Chatbots

Chatbot use experience	N	Mean	Std. Dev.	df	t	p
Smartphone	94	5.53	1.378	293	-.378	.71
Computer	201	5.58	1.227			

*** Significance at .01 level*

3.9. Do the chatbots usage intentions of university students taking computer programming courses differ according to the frequency of chatbots use?

In order to examine whether the chatbots usage intentions of university students taking Computer Programming courses vary according to the frequency of chatbots usage, ANOVA analysis was performed on the sample of university students who had previous chatbots usage experience. As a result of the analysis, a significant difference was found between the student groups in terms of the frequency of chatbots use in education (F (2, 292) =11.767; p=.00). Tukey HSD test, one of the post-hoc tests, was applied to test between which groups the significant difference was between. According to the results of the test, the intention to use chatbots in computer programming education is significantly lower among university students who use chatbots 1-10 times (M=5.34) a week for computer programming education than those who use chatbots 21-30 times (M=6.31). In addition, the intention to use chatbots in education of university students who use chatbots 11-20 times (M=5.63) weekly for computer programming education is significantly lower than those who use chatbots 21-30 times (M=6.31). The results of the analyses are shown in Table 10.

Table 10

ANOVA Analysis Results According to the Frequency of Chatbots Use

Frequency of chatbots use (Weekly)	N	Mean	Std. Dev.	df	F	p	Difference	Effect size
1-10 times	177	5.34	1.317	2 292	11.767	.00**	3>1, 3>2	.06
11-20 times	70	5.63	1.215					
21-30 times	48	6.31	.870					

*** Significance at .01 level*

3.10. Do the Chatbot usage intentions of university students taking computer programming courses vary according to role using chatbots?

ANOVA analysis was performed to examine whether the chatbots usage intentions of university students taking Computer Programming courses differ according to role using chatbots. As a result of the analysis, no significant difference was found between the student groups in terms of the role using chatbots (p=.73). The results of the analysis are shown in Table 11.

Table 11

ANOVA Analysis Results According to Role Attributed to Chatbot by the Student

	Sum of squares	df	Mean of squares	F	p
Between groups	1.091	2	.546	.311	.73
Within groups	719.190	410	1.754		
Total	720.281	412			

4. Discussion and Conclusions

This study was conducted to examine the intention of university students taking programming courses to use chatbots in education in terms of certain variables. When the mean scores of the sub-factors of the intention to use chatbots in education scale of university students were examined, it was found that the performance expectation had a mean score of 5.29, the effort expectation had a mean score of 5.10, and the behavioural intention to use/learn chatbots had a mean score of 5.47. As a result of the findings, it was seen that university students' behavioural intentions towards using/learning chatbots in computer programming education were positive. In addition, it was also observed that university students were not highly concerned about the use of chatbots in education. This finding supports the behavioural intention of university students in terms of chatbots use in education. Supporting the findings of the study, in a study conducted in Hong Kong with the participation of 399 undergraduate and graduate students from various disciplines, it was stated that there was a generally positive attitude towards the use of ChatGPT in teaching and learning. In addition, students also expressed concerns about accuracy, privacy, ethical issues, and the impact on personal development, career prospects, and social values in terms of their intentions to use chatbots in education (Chan & Hu, 2023). In a study conducted by Topal et al. (2021), it was stated that students expressed positive opinions about chatbots in terms of use in education because they received feedback from the chatbots they used in education and subjectively saw them as exciting and fun learning objects. In another study conducted by Aktay et al. (2023), it was revealed that students' attitudes towards the use of ChatGPT in science education were high and they found the use of ChatGPT in science education fun. In conclusion, in line with the relevant literature and the findings of this study, it can be said that students' intentions to use chatbots in education in different courses and in different educational roles are positive.

When the purposes of using chatbots in the education of university students taking programming courses were examined, it was seen that there were basically six purposes of use. It was observed that students who used chatbots in computer programming education mostly used chatbots to learn the subject related to programming by gaining conceptual understanding. Following this, it was observed that students used chatbots to find errors in program codes, to access reference material for proper syntax rules, to do exercises and homework assignments in the classroom, to prepare for exams and to develop questions for practice. In one of the rare recent studies that examined this relatively new phenomenon, the opinions of university students on the use of ChatGPT in programming education were examined. According to student opinions, it was stated that ChatGPT was used in programming education in terms of providing fast and mostly correct answers to questions, improving thinking skills, facilitating debugging, and increasing self-confidence (Yilmaz & Yilmaz, 2023). In another study, it was

stated that ChatGPT in programming education provides assistance in debugging errors in codes and can also play a role in solving programming errors by providing error prediction and error explanation (Surameery & Shakor, 2023). Another study investigating the use of ChatGPT in Python programming language education similarly shows that ChatGPT assisted students as an assistant and that using ChatGPT as a programming aid yielded better results than working without any external assistance. Furthermore, the help provided by ChatGPT increased students' coding proficiency, improved the quality of their explanations, and deepened their understanding of standard solution methods (Vukojičić & Krstić, 2023). As a result of the findings obtained, it is thought that the use of chatbots in computer programming education will become widespread in programming over time due to the potential of using chatbots in computer programming education and the large number of training scenarios.

The study revealed that the chatbots usage intentions of university students in computer programming education differed according to the gender variable. According to the finding, it was determined that male students have significantly higher chatbots usage intentions in programming education than female students. Supportingly, in UNESCO's report in 2019, it was stated that there is a difference between genders in the adoption of new technologies and that men are generally interested in new technologies earlier than women (West et al., 2019). In the report, this situation was attributed to factors such as self-efficacy and educational differences in technological disciplines. In parallel to this, in this study, this situation can be attributed to the higher self-efficacy and interest of male students in a course such as programming education, which includes complex and difficult dynamics, and programming skills. Another study focused on the use of chatbots by men and women four months after the release of ChatGPT. The results of this study similarly show that women are less likely to use chatbots than men in terms of technology use and acceptance in terms of gender (Draxler et al., 2023). In addition to these findings, it is possible to come across studies in which there is no difference in intention between men and women in terms of chatbots use in programming education (Malik et al., 2022).

The analysis indicated that the chatbot usage intentions of university students in computer programming education did not differ according to the department variable. In the study, there are Computer Engineering, Mechanical Engineering and Econometrics departments. While programming courses are available almost every semester in the Computer Engineering department, there is only one semester of C programming course in the Mechanical Engineering and Econometrics departments. This means that students in Mechanical Engineering and Econometrics are more novice in programming. However, since it is thought that novices have a higher cognitive load in a programming course, that is, they have greater difficulty in learning, it is thought that their intention to use chatbots would be higher. In support of this, Okonkwo and Ade-Ibijola (2020) showed that a chatbots containing the basic syntactic structures and semantics of Python programming language helped novice programmers to learn python programming language. Similarly, in another study, it was stated that chatbots support students in learning programming in terms of course information, course-specific resources, explanation of basic programming concepts and answers to programming-related questions (Verleger & Pembridge, 2018). In addition, it is an expected result that computer engineering students have a higher level of desire and obligation to follow advanced technologies and technological developments compared to other departments. Therefore, the fact that there is no difference according to the department in the study is an explainable result. In future studies, studies on why students in different departments use chatbots according to their approaches such as surface and deep learning will reveal the basis of the intention to use chatbots in education.

The study found that the chatbot usage intentions of university students in computer programming education differed according to the grade variable. First grade university students' intention to use chatbots in programming education is significantly higher. In addition, although no significant difference

was obtained, it is seen that the average scores of the students studying in the fourth grade from the scale of intention to use chatbots in education are high. As a result of the findings, it can be said that first and fourth grade students have higher intention to use chatbots in programming education. In the study, it is an expected result that first graders have high intention to use chatbots in education. Because it is known that students who are new to computer programming have difficulties in subjects such as programming topics, syntax and problem solving (Iqbal et. al, 2021; Malik et al., 2022). It is already expected that university students who have a high cognitive load in programming education (Şişman & Küçük, 2018) will tend to use assistive technologies, even for purposes such as passing the programming course or learning programming. However, the high intention of fourth grade university students to use chatbots in education can be attributed to the fact that all fourth graders are from the computer engineering department. Because the fourth-year students in the computer engineering department are in a rush to finish school, their desire to finish school with a higher score, their more experienced in education and programming, and their desire for deep learning in order to show that they are sufficient in terms of programming in job applications have the potential to cause this.

It was found that the chatbot usage intentions of university students in computer programming education did not differ according to income status. In the related literature, there is no study in which the income status variable is used, but it is thought that the free versions of chatbots and the ease of access of students to these versions are factors in obtaining this finding. However, in future studies, differences between student groups in terms of lack of internet and technological devices in terms of access to chatbots and differences between student groups using free and paid versions of chatbots used in education can be examined.

The findings showed that the chatbot usage intentions of university students in computer programming education differed according to the experience of using chatbots in education. According to the finding, the intentions and acceptance of university students who have previous experience of using chatbots in education are higher than those who do not use chatbots. This is the expected result in the study. Because technology usage intention and acceptance are among the primary conditions of use (Teo et al., 2019).

The study indicated that the chatbot usage intentions of university students in computer programming education did not differ according to the device used in chatbots education. Since smartphones are widely used among university students, it was expected that there would be a difference in favour of smartphones in terms of chatbots use in programming education. However, it is thought that computers, which have a larger screen than smartphones in terms of long lines of programming language codes and detection of errors, will also play a role in the intention to use chatbots in education. For this reason, the need to repeat future studies on this variable in terms of chatbots usage intention has emerged. It is also thought that the intention and acceptance levels of university students to use chatbots in education will increase, especially with the introduction of chatbots as mobile applications on smartphones.

It was determined that university students' intentions to use chatbots in computer programming education differ according to the frequency of chatbots use in education. It has been determined that university students who use chatbots in education 21-30 times a week have significantly higher chatbots usage intentions than those who use 1-10 times and 11-20 times. The finding revealed an expected result. Because high intention contributes to the use of technology and the increase in this use. Finally, it is thought that the intention to use and duration of use of educational chatbots will increase over time, as chatbots are integrated into teaching environments and teaching approaches in the most appropriate way, courses that will optimize interaction with chatbots, which are artificial intelligence language models, are added to the curriculum and chatbots develop day by day.

The analysis revealed that the chatbots usage intentions of university students in computer programming education did not differ according to the roles attributed to chatbots in programming education. As a result of the finding, it is thought that the use of chatbots for mentoring, assisting, and learning purposes in programming education is of similar importance for university students. In a supportive study, chatbots were used by more than 700 students for one year in terms of mentoring and promising results emerged in terms of the usability of digital mentoring support for students (Neumann et al., 2021). Singh (2018) and Clark (2018), Intelligent tutoring systems for learning, teaching assistant and mentoring processes are within the scope of the roles that chatbots, which are artificial intelligence language models, can play in teaching/learning processes. For this reason, when it is considered that chatbots can undertake all three roles in programming education in the study, the fact that there is no difference shows that students intend to use chatbots in terms of all roles. In addition, it is thought that chatbots can enter all educational roles with the effect of easier for use, user friendly (Colace et al., 2018) and humane artificial intelligence than previous technology-supported applications and learning approaches in terms of providing learning at their own pace and supporting the learning experience outside of school. However, studies in the related field are needed to support this.

In conclusion, it is thought that the intention of university students to accept the use of chatbots in computer programming education is at a good level and this intention will increase day by day. Because, as it was determined in the study, the chatbots that university students intensively prefer in education is the ChatGPT application, which is widely used nowadays. With the development and popularisation of chatbots to be used in other educational fields, the integration of chatbots into educational environments and curricula will be even faster. ChatGPT, which already has a robust language model, is attracting great interest as a possible way to improve the educational experience of university students (Huallpa, 2023). Although not very long, in the coming years, Prompt engineering courses, which involve using specific inputs or "prompts" to influence chatbots such as ChatGPT, will be added to the curricula, enabling students to effectively create and use prompts and increase their interaction with artificial intelligence. In this way, the use of artificial intelligence in education will become widespread among university students whose interaction with artificial intelligence increases. In addition, it is thought that the effect of chatbots such as "copilot", the artificial intelligence language model of Microsoft company, and "codex" produced by Open AI company on the computer programming education as the main subject of the study will increase day by day. However, in future studies, it is suggested that studies should be conducted to understand the effects of using these tools in computer programming education (Philbin, 2023) and to reveal the factors affecting students' chatbots intentions (Ragneb et al., 2022), especially including students' concerns about the misuse of chatbots in education. Finally, it is important to provide appropriate training to instructors through in-service training to teach them how to use artificial intelligence applications as a teaching method that meets the needs of each student (Ragneb et al., 2022).

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Article Information Form

Authors Notes: A part of the study was presented as an abstract paper at the 10th International Social Sciences Congress held in Kırklareli on 06-07 January 2024.

Authors Contributions: All authors contributed equally to the writing of this paper. All authors read and approved the final manuscript.

Conflict of Interest Disclosure: No potential conflict of interest was declared by authors.

Supporting/Supporting Organizations: No grants were received from any public, private or non-profit organizations for this research.

Ethical Approval: It is declared that during the preparation process of this study, scientific and ethical principles were followed and all the studies benefited from are stated in the bibliography.

Plagiarism Statement: This article has been scanned by iThenticate.