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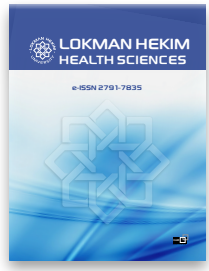

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ORIGINAL ARTICLE

Use of Artificial Intelligence–Based Chatbots and Self-Efficacy Among Students Taking a Surgical Nursing Course

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Abstract

Introduction: Nursing students use chatbots, and the frequency of their usage correlates with students' intent to engage with and learn from these tools. However, the impact of this intent on academic self-efficacy remains unclear. This study aims to (1) investigate the use of chatbots by students in a surgical nursing course and (2) examine how usage intention influences academic self-efficacy levels.

Methods: This cross-sectional study was conducted in Türkiye from March 20 to April 20, 2025. The sample consisted of 144 students enrolled in a surgical nursing course. Data were collected through an online survey, which included the Individual Identification Form, the Academic Self-Efficacy Scale, and the Behavioral Intention to Use and Learn Chatbot in Education Scale. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0. Descriptive statistics (including count, percentage, mean, and standard deviation), Pearson correlation analysis, and hierarchical regression were employed for data analysis.

Results: The mean age of students in the surgical nursing course was 21.45±3.46 years, with 84.7% being female. A majority of students (77.1%) regularly used chatbots, and 73.6% utilized ChatGPT as their chatbot. Pearson correlation analysis revealed a weak but statistically significant positive relationship between the total score and five sub-dimensions of the Behavioral Intention to Use and Learn Chatbot in Education Scale and academic self-efficacy ($p<0.05$). Hierarchical regression analysis showed that chatbot usage in education and behavioral intention toward learning explained 10% of the variance in academic self-efficacy.

Discussion and Conclusion: The study demonstrated that the use of chatbots in education, along with students' motivation to learn, positively affected academic self-efficacy. The results emphasized the importance of integrating chatbots into nursing education to enhance academic self-efficacy. In this context, it is crucial to advance nursing education through the implementation of artificial intelligence applications.

Keywords: Chatbot; Education; Self-efficacy; Perioperative nursing

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Self-efficacy is a theory proposed by Bandura and is defined as "an individual's self-judgment about his/her capacity to organize and successfully perform the activities necessary to achieve a certain performance". The theory pertains to individuals' assessments of their capacities to plan and implement the actions necessary to achieve specified outcomes. In educational environments, academic self-efficacy (ASE) denotes students' confidence in their capacity to effectively complete academic tasks, manage their learning processes, and attain professional proficiency.[1–4] In nursing education, ASE is essential, since it affects academic success, clinical performance, problem-solving skills, and professional dedication. Consequently, ASE is a significant theory in nursing education. Enhancing nursing students' self-efficacy is crucial for augmenting their knowledge, clinical competencies, professional commitment, and problem-solving abilities. The primary method for assessing ASE is to analyze the factors that affect its development.[5]

Virtual learning environments have become widespread during the 20th century.[6] Machine Learning (ML) and specifically, Natural Language Processing (NLP) systems have attained global prominence in the past decade.[7] The literature suggests that AIT has been extensively adopted across various domains; yet, its incorporation into medical systems is somewhat restricted. Consequently, it is imperative to enhance interdisciplinary collaboration. Moreover, Artificial Intelligence Technologies (AIT) have integrated into education.[8] Chatbots are the most common of these technologies. Chatbots offer immediate feedback, engaging conversation, and chances for repeated cognitive practice. From a social cognitive standpoint, these elements may serve as organized mastering experiences, allowing students to evaluate their knowledge, rectify misconceptions, and enhance clinical reasoning in a low-risk setting. In surgical nursing education, characterized by elevated cognitive load, technical knowledge, and clinical decision-making requirements, chatbots may function as cognitive scaffolding tools that augment perceived competence. Consequently, the utilization of chatbots may transcend mere technological ease and directly enhance the cultivation of academic self-efficacy.[8,9] Moreover, chatbots offer numerous advantages in education: a platform for students to ask questions,[10,11] a student-centric learning atmosphere,[12] an independent learning environment, assistance in medical research for health science students, enhancement of comprehension regarding intricate medical topics and clinical decision-making abilities,[13–15] and the implementation of innovative pedagogical strategies.[15,16] Conversely, chatbots provide numerous issues, including ethical dilemmas, information reliability, diminished student-teacher interaction, and data privacy concerns.[8,17] Consequently, it is essential to analyze students' behavioral intentions about technology utilization. The primary objective of this research is to investigate the chatbots utilized or disregarded by surgical nursing students and the frequency of their usage.

Students' involvement with chatbots is primarily contingent upon their purpose for utilizing such technologies. The purpose to utilize technology is elucidated by multiple theories. The Unified Theory of Acceptance and Use of Technology (UTAUT) is a prominent framework for explaining the intention to use chatbots.[17,18] UTAUT states that the use of technology depends on four main predictors: "performance expectancy, effort expectancy, social influence, and facilitating conditions."[18] Although extensive research in higher education indicates that these factors positively influence the intention to adopt artificial intelligence technology, the majority of studies predominantly focus on adoption outcomes rather than the educational-psychological implications. In summary, while UTAUT explains the reasons behind students' intentions to utilize technology, it fails to specify whether this intention results in enhancements in academic self-efficacy.[19,20] Consequently, behavioral intention may serve as a mediating mechanism that links technological acceptability characteristics to educational outcomes. Although this pathway is theoretically plausible, actual research examining the correlation between surgical nursing students' behavioral intention to use chatbots and their academic self-efficacy is limited. The second objective of this study was to investigate the impact of surgical nursing students' behavioral intention to use chatbots on their academic self-efficacy levels.

Materials and Methods

Study Place and Design of the Study

The study was a cross-sectional descriptive-analytical study. We adhered to the recommended guidelines of the Reporting of Observational Studies in Epidemiology (STROBE).

The study was conducted in the Department of Nursing at the Faculty of Health Sciences at a university, from March 20 to April 20, 2025.

This study addressed the following questions:

1. What is the level of academic self-efficacy among students enrolled in a surgical nursing course?
2. What is the level of chatbot use among students enrolled in a surgical nursing course?

3. Does the utilization of chatbots affect academic self-efficacy?

The study was conducted in accordance with the Declaration of Helsinki.

Population and Sample of Study

The study population comprised 186 students, aged 18 and older, enrolled in a surgical nursing course at the Department of Nursing, Faculty of Health Sciences at a university. The study sample consisted of students aged 18 and older, enrolled in the surgical nursing course, who voluntarily participated in the study. The sample size was determined using the established sample size for the population. The calculation was conducted online using the URL https://www.calculator.net/sample-size-calculator.html. This computation used a confidence level of 95%, a margin of error of 5%, a population proportion of 71%,[17] and a population size of 186. The calculated sample size was determined to be 118. Taking into account a 20% data attrition rate in descriptive studies, the research was conducted with 144 voluntary participants.

Data Collection Tools

Research data were collected between March 20 and April 20, 2025. Data collection occurred online. The initial step involved creating an online form using Google Forms. Students participating in a surgical nursing course were notified through a WhatsApp group about the volunteer opportunities for the research and instructed to convene in class. They were then interviewed in person within the classroom to explain the research's goal and expected benefits. Students were informed that a link to the online data collection form would be shared through the WhatsApp group and that the link would include the sentence, "I have been informed about the research, and I have volunteered to participate." Volunteers were required to validate this statement and respond to the survey questions. The link was subsequently shared over the WhatsApp group. The study used three data collection instruments: (1) Individual Identification Form, (2) Academic Self-Efficacy Scale (ASES), and (3) Behavioral Intention to Use and Learn Chatbot in Education Scale (BIULCES).

Individual Identification Form

The researchers developed the form based on a literature review. The form includes inquiries regarding the socio-economic status and educational background of nursing students. It contains questions about age, gender, academic attainment level, daily chatbot usage, duration of chatbot usage, and the specific chatbots utilized.

Academic Self-Efficacy Scale (ASES)

The scale was developed by Owen and Froman in 1988 to evaluate students' proficiency in note-taking, responding to inquiries, writing, adapting to classroom norms, and utilizing a computer. In 2012, Ekici et al.[3] conducted the Turkish validation and reliability assessment of the scale. The scale consists of three dimensions: social status, cognitive engagement, and technical proficiency. It includes 33 items, which are organized according to a four-point Likert scale. The aggregate scores for the overall scale and its sub-dimensions are calculated by computing the arithmetic means of the scores assigned to the items on a scale from 1 to 5. The scale's internal consistency coefficient is 0.90. The internal consistency coefficient in this study was 0.96.

Behavioral Intention to Use and Learn Chatbot in Education Scale (BIULCES)

The scale was developed by Mokmin and Ibrahim in 2021. It consists of 24 items, with a 7-point Likert scale. The sub-dimensions included in the scale are: "Performance Expectation, Effort Expectation, Attitude Towards Improving Education, Social Impact, Facilitating Conditions, Self-Efficacy, Anxiety, Behavioral Intention to Use/Learn Chatbot." The Turkish validity and reliability of the scale were assessed by Yıldız Durak and Onan in 2023. The Turkish validity Cronbach's alpha coefficient is 0.96. The Cronbach's alpha coefficient in this study is 0.97.

Ethical Considerations

Prior to the study, written permission was obtained from this study was approved by the Pamukkale University (Date: 05.03.2025, Decision no: E-60116787-020-664885).

Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) for Windows Statistics 22.0 software (Armonk, NY, USA). Descriptive data were presented as numerical values, percentages, and means. The Pearson correlation coefficient was used to examine the association between the intention to use a chatbot and academic self-efficacy. In Pearson correlation analysis, an r value of 0.1 indicates a small effect size, 0.3 signifies a medium effect size, and 0.5 represents a large effect size. In hierarchical regression analysis, the skewness-kurtosis coefficient, Q-Q plot, and Kolmogorov-Smirnov tests were used to assess the normal distribution of the dependent variable (academic self-efficacy). The skewness-kurtosis value for the dependent variable was

within the ±2 range,[21] the distribution in the Q-Q plot was around the curve, there were no outliers, and the p-value according to the Kolmogorov-Smirnov test was greater than 0.05 (p=0.200). The assumptions of regression analysis were evaluated based on (1) skewness and kurtosis, (2) the presence of outliers in the histogram graph, (3) the correlation coefficients of the independent variables, (4) the presence of autocorrelation according to the DW score, and (5) multicollinearity (Tolerance and VIF).

Results

Socio-Demographic Characteristics of Nursing Students

The study comprised 144 students participating in a surgical nursing course. The mean age of the participants was 21.45±3.46 years, with 84.7% of the students being female. Eighty-nine point six percent (99.6%) had an average academic grade point of 2.50 or higher. A majority (77.1%) utilized chatbots in their daily routines. The primary purpose of utilizing chatbots was to acquire general information (50.0%). ChatGPT was the most utilized chatbot, accounting for 73.6% of usage. Chatbots facilitated daily life to a moderate extent (5.76±2.67). The mean daily duration of chatbot usage was 1.09±0.46 hours (Table 1).

Table 1. Sociodemographic variables of surgical nursing students

Variables	n (%)
Age, Mean±SD	21.45±3.46
Academic grade point average	
<2.49	15 (10.4)
>2.50	129 (89.6)
Gender	
Female	122 (84.7)
Male	22 (15.3)
Knowledge about chatbots	
Yes	120 (83.3)
No	24 (16.7)
Daily use of chatbots	
Yes	111 (77.1)
No	33 (22.9)
Chatbots make daily life easier	
Yes	113 (78.5)
No	31 (21.5)
Getting training on chatbots	
Yes	5 (3.5)
No	139 (96.5)
Reasons for using chatbots	
General information	60 (50.0)
Completing homework	19 (15.8)
Solving cases	3 (2.5)
Reinforcing course concepts	13 (10.8)
Exam preparation	5 (4.2)
Previous chat usage	1 (0.8)
Content generation	3 (2.5)
Types of chatbots	
Apple Siri	11 (7.6)
ChatGPT	106 (73.6)
Gemini	6 (4.2)
Microsoft copilot	4 (2.8)
Other	17 (11.8)

SD: Standard deviation.

Nursing Students' Behavioral Intention to Use and Learn Chatbot in Education

The mean score of students enrolled in a surgical nursing course on the BIULCES was 96.98±34.40, with a range of 24 to 147. This score, which is above the average, signifies that students possess a strong behavioral intention to utilize chatbots in education. Table 2 displays the mean scores for the sub-dimensions. The anxiety subscale score (8.63±4.54) is below the mean score. The ratings for the remaining subscales are at a moderate level. The average scores suggest moderate utilization of chatbots concerning Performance Expectancy, Effort Expectancy, Attitude Towards Enhancing Education, Social Influence, Facilitating Conditions, and Self-Efficacy. The study revealed that the total scores of students in the surgical nursing course on the BIULCES did not vary based on the independent factors of gender (t=1.027, p=0.306) and overall grade point average (t=1.009, p=0.314). Acquiring information on chatbots (t=3.331, p=0.002), their utilization in daily life (t=5.505, p=0.001), and the belief that chatbots mitigate daily errors (t=5.810, p=0.001) were significant predictors for BIULCES.

Level of Academic Self-Efficacy of Nursing Students

The mean score on the academic self-efficacy measure was 105.80±25.71 (range: 33-165). This score indicated that nursing students possessed a high degree of academic self-efficacy. The mean scores for the sub-dimensions were as follows: 29.11±8.57 for "Social Status," 63.76±15.29 for "Cognitive Practice," and 12.93±3.65 for "Technical

Table 2. Means of the scales' score among nursing students

Scale sub-dimensions	Mean±SD (Min–Max)
Performance expectation	13.64±5.19 (3-21)
Effort expectation	13.70±5.15 (3-21)
Attitude towards improving education	13.39±5.06 (3-21)
Social impact	11.30±5.45 (3-21)
Facilitating conditions	12.19±4.75 (3-21)
Self-efficacy	12.84±5.51(3-21)
Anxiety	8.63±4.54 (3-21)
behavioural intention to use/learn chatbot	12.36±5.29 (3-21)
BIULCES total score	96.98±34.40 (24-147)
Social status	29.11±8.57 (10-50)
Cognitive practice	63.76±15.29 (19-95)
Technical skills	12.93±3.65 (4-20)
ASES total score	105.80±25.71 (33-165)

SD: Standard deviation; ASES: Academic Self-Efficacy Scale; BIULCES: Behavioural Intention to Use and Learn Chatbot in Education Scale.

Skills." The results indicated that nursing students had a satisfactory level of "Social Status" and "Technical Skills," along with a high degree of "Cognitive Practice." In the study, the academic self-efficacy levels of students enrolled in a surgical nursing course were not statistically correlated with other independent variables (p>0.05): gender (t=0.002, p=0.927), overall grade point average (t=-0.987, p=0.325), receipt of information regarding chatbots (t=0.124, p=0.901), utilization of chatbots in daily life (t=0.960, p=0.338), and the perception that chatbots contribute to daily errors (t=-0.403, p=0.666).

The Relationship Between Nursing Students' Behavioral Intention to Use and Learn Chatbot in Education and Academic Self-Efficacy

The statistical analysis of the study revealed a low-level positive correlation between students' academic self-efficacy scores and the total BIULCES score (r=0.190, p=0.011). This finding, although modest, indicates that a positive enhancement in the intention to utilize chatbots correspondingly elevated academic self-efficacy. The academic self-efficacy exhibited correlations with the sub-dimensions of the BIULCES, specifically: performance expectancy (r=0.171, p=0.020), effort expectancy (r=0.147, p=0.040), attitude towards learning development (r=0.193, p=0.010), social influence (r=0.154, p=0.033), facilitating conditions (r=0.252, p=0.001), and behavioral intention to use/learn chatbot (r=0.280, p=0.001) (Table 3). The sub-dimensions—Performance Expectation, Effort Expectation, Attitude Towards Enhancing Education, Social Influence, and Facilitating Conditions—demonstrate that the utilization of chatbots enhances academic self-efficacy. Nonetheless, the level of academic self-efficacy among students did not exhibit a statistically significant correlation with the anxiety subscale. This discovery suggests that the intention to utilize chatbots is unaffected by students' anxiety and does not influence their academic achievement.

Table 3. Correlation between Academic Self-Efficacy Scale and Behavioural Intention to Use and Learn Chatbot in Education Scale

	Academic Self-Efficacy Scale	
	r	p
Performance expectation	0.171	**0.020**
Effort expectation	0.147	**0.040**
Attitude towards improving education	0.193	**0.010**
Social impact	0.154	**0.033**
Facilitating conditions	0.252	**0.001**
Self-efficacy	0.135	0.054
Anxiety	-0.073	0.191
Behavioural intention to use/learn chatbot	0.280	**0.001**
Total ccore	0.190	**0.011**

This study employed hierarchical regression analysis utilizing two models. The overall score of the BIULCES scale was input as numerical data in the first model, without any control factors. The initial model demonstrated statistical significance (F=5.344, R=0.190, R^2=0.036, DW=1.819). In the initial model, the intention to utilize and learn chatbots in education (B=0.142, 95% CI [0.021-0.264], p=0.022, β=0.190) emerged as a significant predictor of academic self-efficacy. The second model incorporated the sub-dimensions of "Facilitating Conditions" and "Behavioral Intention to Use/Learn Chatbot." The second model developed was statistically significant. The second model elucidated the academic self-efficacy hypothesis from the previous model with a comparable magnitude (F=5.320, R=0.323, R^2=0.104, DW=1.871). In the second model, the intention to utilize and learn from chatbots in education (B=-0.289, 95% CI [-0.586-0.007], p=0.056, β=-0.387) ceased to be a predictor. The Behavioral Intention to Use/Learn Chatbot (B=-1.694, 95% CI [0.246-3.141], p=0.022, β=-0.348) correlated with elevated academic self-efficacy (Table 4).

Discussion

Alongside theoretical nursing education, simulation, case-based learning, and clinical practice are commonly employed in nursing education. Nonetheless, these strategies may occasionally prove inadequate for feedback

Table 4. Hierarchical regression analysis between Academic Self-Efficacy Scale and Behavioural Intention to Use and Learn Chatbot in Education Scale

	Academic Self-Efficacy Scale					95% CI		Correlations			Collinearity statistics	
	B	SD	β	t	p	Lower bound	Upper bound	Zero order	Partial	Part	Tolerance	VIF
Model 1												
Total Score BIULCES	0.142	0.062	0.190	2.312	0.022	0.021	0.264	0.190	0.190	0.190	1.000	1.000
Model 2												
Total Score BIULCES	-0.289	0.150	-0.387	-1.928	0.056	-0.586	0.007	0.190	-0.161	-0.154	0.159	5.303
Facilitating conditions	1.728	0.998	0.319	1.732	0.085	-0.245	3.700	0.252	0.145	0.139	0.189	5.300
Behavioural Intention to Use/Learn Chatbot	1.694	0.732	0.348	2.314	0.022	0.246	3.141	0.280	0.192	0.185	0.282	3.541

SD: Standard deviation; VIF: Variance inflation factor; CI: Condifence interval; BIULCES: Behavioural Intention to Use and Learn Chatbot in Education Scale.

and personalized learning.[22] This is due to the reliance of these active learning systems on comprehensive analysis and feedback mechanisms from the observer, which can extend the period of instructional feedback for students. Conversely, chatbots are instrumental in bridging this gap in nursing education. They foster a more immersive educational experience, stimulate creativity, and allow students to progress at their individual pace.[9] Moreover, prompt replies to inquiries can accelerate the feedback process. Organizing chatbots as mobile applications and supplying reference sources for their academic responses is believed to enhance the credibility of the answers, resulting in their frequent utilization by students in clinical practice. Research indicates that healthcare students, including those in medicine and nursing, extensively utilize chatbots.[8,23] The study revealed that the majority of users (83.3%) utilized chatbots for approximately one hour daily, with ChatGPT being the most commonly employed chatbot. These results align with those of a prior study. The findings indicate that chatbot-based applications ought to be integrated to enhance deep learning in surgical nursing education. The results underscore the significance of employing chatbots beyond theoretical education, facilitating prompt responses to inquiries about professional abilities in clinical practice, and effectively managing crisis situations in clinical environments.

Conversely, another study revealed that nursing students had minimal expertise with chatbots. This survey included third- and fourth-year nursing students, with 63.0% indicating a lack of experience in utilizing chatbots.[17] The difference is thought to arise from the inclusion of various countries and institutions, discrepancies in the technological infrastructure of the universities, or other factors that may influence technology utilization, such as the students' degree of digital literacy.[24] It has been determined that incorporating cross-country comparisons and assessing additional variables, such as digital literacy levels, will be essential in studies concerning the utilization of chatbots in education.

This study involved participants using chatbots to obtain general information, fulfill assignments, and reinforce instructional content. Kochis et al.[23] found that 57.0% of medical students utilize chatbots for academic purposes, enhancing their educational experience. In a study involving a systematic analysis of qualitative research, it was observed that the reasons for using chatbots among nursing students included acquiring information, academic assistance, and facilitating decision-making. These findings support the swift integration of artificial intelligence technologies into novel pedagogical approaches in academia.[15,16] In this study, participants utilized chatbots to obtain general information, fulfill assignments, and reinforce course topics. Kochis et al.[23] discovered that 57.0% of medical students utilized chatbots for academic purposes, enhancing their learning experience. These results support the rapid integration of artificial intelligence systems into innovative teaching methods in academia. It can be inferred that nursing students throughout various countries utilize chatbots for analogous goals. The implementation of chatbots in education is promising, particularly for Generation Z, who are extensively engaged with technology, indicating that students in this demographic embrace chatbots.

Conversely, the previously cited systematic study revealed that participants voiced apprehensions about information accuracy, ethical dangers, excessive dependence, and discordance with nursing principles. This study, however, did not examine this pattern. Conducting transnational comparative studies on the utilization of chatbots in nursing is deemed valuable.

This study indicates that individuals who possess knowledge of chatbots, utilize them regularly, and perceive them as beneficial to daily life exhibit a greater inclination to employ and explore chatbots in educational contexts. The study by Kang et al.[17] indicated that nursing students exhibiting a strong interest in chatbots possess a greater intention to utilize them. A comprehensive review identified the elements affecting nursing students' utilization of chatbots as technological, psychological, social, behavioral, and environmental influences. It was shown that favorable attitudes and anticipated advantages, among the psychological elements, heightened the propensity to utilize chatbots.[25] Upon evaluating these findings collectively, it is evident that chatbot utilization is associated not only with technological infrastructure but also with psychological processes. Thus, it can be concluded that, alongside technical capabilities, measures to enhance students' perceived benefits and foster favorable attitudes must also be taken into account for the integration of chatbots into nursing education.

In the correlation analysis, the study revealed that students' propensity to utilize chatbots and their academic self-efficacy both increased. The intention to utilize AIT cannot be assessed in isolation from associated factors. In accordance with UTAUT, performance expectancy serves as a significant predictor of AIT utilization, denoting the perceived utility of the examined technology.[26] In other words, the more useful students perceive the usefulness of a technological tool to be, the more likely they are to use that technology. In the literature, performance expectancy is a critical predictor of AIT utilization. This study indicates that performance expectancy is a crucial predictor of academic self-efficacy. In other words, as the belief in the usefulness of chatbots among surgical nursing students in this study increases, their academic self-efficacy also increases.

In the UTAUT model, effort expectancy denotes the perceived simplicity of utilizing AITs.[19,26] Studies show that it has a positive effect on the intention to use AIT.[19] The correlation analysis in this study revealed that effort expectancy positively influences academic self-efficacy. In other words, when students find the chatbot more user-friendly, their academic self-efficacy correspondingly rises. Given the characteristics of prevalent chatbots, including mobile applications, complimentary access, intuitive interfaces, and diverse language possibilities, it is clear that they are predominantly user-friendly. This can enhance access to knowledge in both theoretical education and intricate domains like clinical practice. These advantages are believed to enhance the prevalence of applications and their preference rates among students.

Social impact is another predictive feature revealed by UTAUT for AIT. A favorable social effect enhances the propensity to utilize technology.[20] The correlation analysis in this study indicates that an increase in social impact correlates with an increase in academic self-efficacy. In summary, possessing social support for utilizing chatbots enhances academic self-efficacy.

The ultimate predictor elucidated by UTAUT for AIT usage intention is enabling conditions. These pertain to the resources necessary for the utilization of AIT. Facilitating conditions positively influence individuals' intention to utilize a chatbot. According to correlation analysis, this study also showed that facilitating conditions had a positive effect on academic self-efficacy (49.6%). In other words, having the necessary resources to access and use chatbots increases participants' academic self-efficacy. In conclusion, this study found that the predictors of technology use intention explained in the UTAUT model[19,26,27] also affect the academic self-efficacy levels of nursing students. The study's findings underscore that the UTAUT paradigm, when applied to the integration of chatbots in creative learning frameworks, will enhance academic self-efficacy.

In this study, in addition to the predictors included in the UTAUT model, "attitude towards learning development" and "behavioral intention to use/learn chatbot" were also considered as independent variables. These variables were determined to influence academic self-efficacy. The student's receptiveness to learning and growth, along with their aspiration to persist in utilizing chatbots, enhances academic self-efficacy. Consequently, it is evident that including chatbots, which facilitate ongoing development and learning, into the educational process is crucial for academic advancement.

The results discussed in the preceding paragraphs, based on the correlation analysis of the study, are promising for the implementation of chatbots in nursing education. The initial model of the hierarchical regression analysis indicates that chatbot utilization in education significantly

predicts academic self-efficacy. In the second model, significant variables are "Facilitating Conditions" and "Behavioral Intention to Use/Learn Chatbot." Nevertheless, these variables account for quite a minor fraction of the population. This outcome indicates the potential existence of mediating variables that elucidate the connection between participants' utilization of chatbots and their degree of academic self-efficacy. Future research should replicate the study while accounting for mediating factors such as digital literacy levels and supplementary training in computer technology.

The findings of this study have several important implications for surgical nurses. The utilization of chatbots is prevalent among surgical nurses. It is essential to enhance students' understanding of artificial intelligence programs to ensure the appropriate selection and efficient utilization of these applications. Secondly, this study revealed that nurses' use of chatbots enhances academic self-efficacy. This outcome underscores the necessity of enhancing nursing education through the integration of artificial intelligence applications. Furthermore, academic staff must receive training on the use of chatbots in education. Consequently, incorporating artificial intelligence into nursing education can accelerate improvements in academic achievement.

Limitations

This study has several significant limitations. The study's execution at a university and its focus on a particular department limit the generalizability of the findings to all nursing departments. Additionally, the sample comprised solely students. Future studies that include nursing educators could enhance the understanding of the role of chatbots in educational frameworks. Consequently, multicenter research involving both students and nurse educators is essential.

Another limitation of this study is the correlation coefficient in the regression analysis and the explanatory power of the sample represented. Despite the fulfillment of regression assumptions in the study, it is posited that the diminished regression coefficient was influenced by various student-related factors (e.g., surgical clinical areas, prior academic performance, and voluntary career selection). Moreover, the study has additional limitations, including a limited sample size, self-report bias, common method variation, absence of temporal ordering, potential social desirability bias, and the lack of objective measures of academic success. The study also fails to account for confounding variables, thereby diminishing its interpretability.

Conclusion

The results indicate that chatbots serve not only as tools for facilitating rapid access to information in nursing education but also enhance students' self-efficacy by promoting their active engagement in the learning process. It is advisable to incorporate AI-based chatbots into nursing education programs in alignment with pedagogical principles and under supervision. Moreover, the incorporation of chatbots into nursing education necessitates a review of existing nursing curricula, the integration of suitable modules, the creation of training programs to assist faculty in utilizing these platforms, the development of standardized guidelines, and the assessment of their efficacy through structured chatbot-based interventions.

Ethics Committee Approval: This study was approved by the Pamukkale University Faculty of Medicine Non-Interventional Research Ethics Committee (Date: 05.03.2025, Decision no: E-60116787-020-664885).

Informed Consent: Written informed consent was obtained.

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