



ORIGINAL ARTICLE

Evaluation of Knowledge, Attitudes/Behaviours, and Anxiety Levels of Academicians in the Faculty of Nursing Regarding Artificial Intelligence Applications

Hemşire Akademisyenlerin Yapay Zeka Uygulamaları Hakkında Bilgi, Tutum/Davranış ve Kaygı Düzeylerinin Değerlendirilmesi

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ABSTRACT

Aim: This study was conducted to evaluate the knowledge, attitude/behavior, and anxiety levels of nurse academics about artificial intelligence applications.

Material and Methods: The research was conducted online with 202 nurse academicians in a descriptive type. The Data Collection Form and Artificial Intelligence Anxiety Scale were used to collect data. The data were also evaluated using the SPSS package program, version 21. Descriptive statistics, and the Kolmogorov-Smirnov, Shapiro-Wilk, Spearman, Mann-Whitney U, Kruskal-Wallis H tests were used to evaluate the data. A p-value of <0.05 was considered significant.

Results: The study was completed with 202 nursing academicians. It was determined that the average score of the academicians on the Artificial Intelligence Anxiety Scale was 57.59±8.84. All participants stated that they had heard of the concept of artificial intelligence before. It was determined that there was a significant relationship between the academicians' receiving training on artificial intelligence, their belief that artificial intelligence will affect the nursing profession in the future, and their average score on the Artificial Intelligence Anxiety Scale.

Conclusion: It has been detected that nursing academicians have high levels of anxiety about artificial intelligence. It has been determined that academicians' anxiety levels about artificial intelligence are affected by a lack of knowledge and negative attitudes. Our recommendation is to inform nursing academicians about artificial intelligence and provide the necessary support for them to take an active role in the inclusion of artificial intelligence in educational processes.

Keywords: Artificial intelligence, Nurse, Academic, Anxiety

ÖZ

Amaç: Bu çalışma, hemşire akademisyenlerin yapay zeka uygulamaları hakkında bilgi, tutum/davranış ve kaygı düzeylerinin değerlendirilmesi amacıyla yapılmıştır.

Gereç ve Yöntemler: Araştırma tanımlayıcı tipte, online olarak 202 hemşire akademisyen ile yapılmıştır. Verilerin toplanmasında; Veri Toplama Formu, Yapay Zeka Kaygı Ölçeği kullanılmıştır. Verilerin değerlendirilmesinde SPSS 21 paket programı kullanılmıştır. Verilerin değerlendirilmesinde; tanımlayıcı istatistikler, Kolmogorov-Smirnov, Shapiro-Wilk, Spearman, Mann-Whitney U, Kruskal-Wallis H testi kullanılmıştır. p<0.05 değeri anlamlı kabul edilmiştir.

Bulgular: Çalışma, 202 hemşire akademisyen ile tamamlanmıştır. Akademisyenlerin Yapay Zeka Kaygı Ölçeği puan ortalamalarının 57.59±8.84 olduğu belirlenmiştir. Katılımcıların hepsi yapay zeka kavramını daha önce duyduğunu belirtmiştir. Akademisyenlerin yapay zeka ile ilgili eğitim alma, yapay zekanın gelecekte hemşirelik mesleğini etkileceğini düşünme durumu ile Yapay Zeka Kaygı Ölçeği puan ortalamaları arasında anlamlı bir ilişki olduğu belirlenmiştir.

Sonuç: Hemşire akademisyenlerin yapay zeka kaygı düzeylerinin yüksek olduğu tespit edilmiştir. Akademisyenlerin yapay zekaya ilişkin kaygı düzeylerinin bilgi eksikliği ve olumsuz tutumlardan etkilendiği belirlenmiştir. Önerimiz; hemşire akademisyenlerin yapay zekaya ilişkin bilgilendirilmesi ve yapay zekanın eğitim süreçlerine dahil edilmesinde aktif rol alması için gerekli desteğin verilmesidir.

Anahtar Kelimeler: Yapay zeka, Hemşire, Akademisyen, Kaygı

Introduction

In today's world, advancements in technology have led to the widespread use of artificial intelligence applications across various fields. One of the most prominent areas is healthcare, where these applications are extensively utilized (1-4). There are many artificial intelligence applications developed for healthcare, such as telehealth, mobile applications, and smart devices (5, 6). These applications are used to expedite early diagnosis and treatment processes, reduce workload, enhance the quality of care, lower costs, and mitigate medical errors (7). Thus, healthcare professionals need to follow the advances

and scientific studies regarding artificial intelligence applications (5). Artificial intelligence applications in the healthcare sector are predominantly developed through collaboration between physicians and engineers (3, 8), but the rapidly advancing artificial intelligence studies are also shaping the future of the nursing profession, and nurses must therefore actively engage in this transformative process and play a dynamic role in shaping the future of nursing (1, 8, 9).

To effectively utilize artificial intelligence applications in the nursing profession and observe their impact on nursing practices, it is essential to create awareness

in this regard (10), and this requires the integration of content related to artificial intelligence and its applications into nursing education curricula (2, 7, 10, 11). Adding artificial intelligence applications to the nursing curriculum and using them in nursing education (12) will contribute to increasing the quality of teaching and will serve as the foundation for nurses to actively follow studies in the field of artificial intelligence and take part in applications in their professional lives (13). Nurse academicians involved in nursing education have essential roles in integrating artificial intelligence applications into the nursing profession (14). Within this context, the study aims to evaluate nurse academicians' knowledge, attitudes/behaviors, and anxiety levels about artificial intelligence applications.

Material and Methods

The Type, Location, and Time of the Research

The research was conducted in a descriptive design, utilizing an online data collection form, between April 1 and May 31, 2023.

Population and Sample

Sample calculation was not performed. The study was completed with 202 nurse academicians who met the inclusion criteria and were accessible online between April 1 and May 31, 2023. The power analysis following study completion indicated that the study's power was 85%. The inclusion criteria for the research were being an academician in the nursing field, agreeing to participate in the study, and completing and returning all surveys in full.

Data Collection Tools

'Data Collection Form' and 'Artificial Intelligence Anxiety Scale' were used to collect the data.

Data Collection Form: The data collection form was created by the researchers based on the literature (2, 8, 9, 11). The form includes questions about the sociodemographic characteristics of nurse academicians and their knowledge, attitudes/behaviors, and anxiety levels regarding artificial intelligence applications.

Artificial Intelligence Anxiety Scale (AIAS): The Artificial Intelligence Anxiety Scale was developed by Wang and Wang (15) to measure individuals' levels of anxiety regarding developments in artificial intelligence. The Cronbach's alpha value for the entire scale is 0.964, and the alpha values for its subdimensions are as follows: learning subdimension = 0.974, job

replacement subdimension = 0.917, sociotechnical blindness subdimension = 0.917, artificial intelligence configuration subdimension = 0.961 (15). The Turkish validity and reliability of the scale were established by Akkaya and colleagues (16). The Turkish version of the scale has the same four subdimensions and a Cronbach's alpha value of 0.937 for the entire scale, and 0.948, 0.895, 0.875, and 0.950 for the learning, job replacement, sociotechnical blindness, and artificial intelligence configuration subdimensions, respectively. It is a 16-item 5-point Likert-type scale, with responses ranging from 'Strongly Disagree (1)' to 'Strongly Agree (5)'. The total score that can be obtained from the scale ranges from 16 to 80. As the scale score increases, the level of anxiety towards artificial intelligence also increases (16).

Data Collection

Data was collected using an online form created with the 'Google Docs' application during the specified dates (April 1 to May 31, 2023). Nurse academicians for the sample were reached using the snowball sampling method. Information about the research was provided to participants with the text at the beginning of the survey questionnaire. It took approximately 10 minutes to complete the survey form.

Evaluation of the Data

The SPSS 21 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, version 21.0, Armonk, NY: IBM Corp.) software package was used for data analysis. Descriptive statistics (frequency, percentage, mean, standard deviation) were employed to analyze the data. The fit of the data to normal distribution was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The relationship between two non-normally distributed independent variables was examined using the Spearman test, and the comparison of two non-normally distributed independent variables was conducted using the Mann-Whitney U test. The Kruskal-Wallis H test was utilized to compare three or more variables. The statistical significance level was set at $p < 0.05$.

Results

The study was completed with 202 nurse academicians. Their mean AIAS score was 57.59 ± 8.84 . Their AIAS subscale score means are shown in Table 1.

Table 1. Mean Scores of AIAS and Subscales of AIAS of Academicians in the Faculties of Nursing

	Mean±SD (X±SD) (Minimum-Maximum)
AIAS Score	57.59±8.84 (34.00-79.00)
Subdimension of learning	13.70±4.12 (5.00-24.00)
Subdimension of job replacement	14.36±3.94 (4.00-20.00)
Subdimension of sociotechnical blindness	17.14±2.52 (9.00-20.00)
Subdimension of artificial intelligence configuration	12.38±2.85 (3.00-15.00)

AIAS: Artificial Intelligence Anxiety Scale, SD: Standard deviation

Nurse academicians had a mean age of 36.53±6.79 years, and the average time they worked in the

profession was 12.19±7.48 years. A significant relationship was found between the length of time in the profession and the AIAS mean score (p = 0.011). No statistical difference was detected between the participants' titles and work fields and the artificial intelligence anxiety scale mean scores (p>0.05). There was no significant relationship between other sociodemographic characteristics of academicians and AIAS mean scores (p>0.05) (Table 2).

All participants stated that they had heard of the concept of artificial intelligence before: 25.2% (n=51) from school, 24.8% (n=50) from social media, 26.7% (n=54) from their circle of friends, and 23.3% (n=47) from the news. There was a significant relationship between academicians' knowledge of the concept

Table 2. Comparison of Academicians' Sociodemographic Characteristics in the Faculties of Nursing and AIAS Mean Scores

Variables (n=202)	n (%)	AIAS Mean Score		Statistical Analysis*
		Median	Min-Max	
Age (X±SD; 36.53±6.79)				
25-37	127 (62.9)	58.0	34.0-79.0	Z=-0.167 p=0.867
38-50	75 (37.1)	57.0	43.0-75.0	
Gender				
Female	178 (88.1)	58.0	34.0-79.0	Z=-1.111 p=0.266
Male	24 (11.9)	58.0	36.0-68.0	
Educational Status				
Bachelor's degree	3 (1.5)	52.0	52.0-67.0	χ²=0.148 p=0.929
Master's degree	55 (27.2)	59.0	34.0-77.0	
Doctorate	144 (71.3)	58.0	36.0-79.0	
Marital Status				
Single	75 (37.1)	59.0	36.0-79.0	Z=-1.244 p=0.213
Married	127 (62.9)	57.0	34.0-77.0	
Having Children				
Yes	106 (52.5)	58.0	36.0-75.0	Z=-0.334 p=0.738
No	96 (47.5)	57.5	34.0-79.0	
Family Type				
Nuclear family	199 (98.5)	58.0	34.0-79.0	Z=-1.080 p=0.280
Extended family	3 (1.5)	70.0	47.0-72.0	
Income Level				
Income is less than expenses	27 (13.4)	53.0	40.0-73.0	χ²=5.821 p=0.064
Income is equal to expenses	135 (66.8)	59.0	34.0-79.0	
Income is more than expenses	40 (19.8)	59.0	36.0-72.0	
Time spent in the profession (X±SD; 12.19±7.48)				
1-10 years	73 (36.1)	56.0	34.0-70.0	χ²=9.070 p=0.011
11-20 years	60 (29.7)	58.0	40.0-79.0	
21-30 years	69 (34.2)	60.5	36.0-77.0	
Total	202 (100)			

Z = Mann-Whitney U test, χ²= Kruskal-Wallis H test

AIAS: Artificial Intelligence Anxiety Scale, SD: Standard deviation

of artificial intelligence, receiving education related to artificial intelligence, mentioning artificial intelligence applications to students in classes/practices, believing that artificial intelligence would impact the nursing

profession in the future, and their mean AIAS scores ($p=0.008$, $p=0.002$, $p=0.029$, $p=0.017$, respectively) (Table 3).

Table 3. Comparison of Academicians' Mean Scores of AIAS in the Faculties of Nursing with Some Features of Artificial Intelligence

Variable (N=202)	n (%)	AIAS Mean Score		Statistical Analysis*
		Median	Min-Max	
Knowing the Meaning of Artificial Intelligence Concept				
Yes	144 (71.3)	57.0	34.0-77.0	Z=-2.646 p=0.008
No	58 (28.7)	60.0	46.0-79.0	
Receiving Training on Artificial Intelligence				
Yes	16 (7.9)	54.5	34.0-69.0	Z=-1.298 p=0.002
No	186 (92.1)	58.0	36.0-79.0	
Mentioning Artificial Intelligence Applications to Students in Classes/Practices				
Yes	45 (22.3)	57.0	36.0-77.0	$\chi^2=7.112$ p=0.029
Partly	97 (48.0)	57.0	34.0-75.0	
No	60 (29.7)	61.5	40.0-79.0	
Thinking that Artificial Intelligence to affect nursing in the future				
Yes, it will affect negatively	187 (92.6)	64.0	34.0-77.0	Z=-2.396 p=0.017
No, it will not affect negatively	15 (7.4)	57.0	48.0-79.0	
Total	202 (100)			

Z = Mann-Whitney U test, χ^2 = Kruskal-Wallis H test

AIAS: ARTIFICIAL INTELLIGENCE ANXIETY SCALE, SD: STANDARD DEVIATION

Table 4. Academicians' Thoughts in the Faculties of Nursing on the Use of Artificial Intelligence

Variable	n	%
Purposes of Using Artificial Intelligence in Nursing		
Measuring vital signs	116	57.4
Facilitating medication preparation	111	55.0
Skills training	109	54.0
Reducing diagnosis and treatment errors	106	52.5
Automatic detection of patient safety issues	103	51.0
Positioning the patient	103	51.0
Ensuring nurse safety	103	51.0
Facilitating patient follow-up	102	50.5
Bathing a patient	101	50.0
Patient transport	101	50.0
Reducing nurses' workload	101	50.0
Organising patient routines or treatment plans	85	42.1
Problems That Artificial Intelligence May Cause in Nursing Care		
Legal issues	126	62.4
Ethical and patient privacy issues	110	54.5
Employment problems	109	54.0
Empathy issues	104	51.5
Security problems	104	51.5

**n and % are different because more than one option is marked

Nurse academicians expressed that artificial intelligence could be used for various purposes, such as measuring vital signs (57.4%, n=116), facilitating medication preparation (55.0%, n=111), and skills training (54.0%, n=109). They also indicated that artificial intelligence applications in nursing care could lead to different problems, including legal problems (62.4%, n=126), ethical issues and patient privacy (54.5%, n=110), employment problems (54.0%, n=109), empathy problems (51.5%, n=104) and security issues (51.5%, n=104) (Table 4).

Discussion

The study found that nurse academicians' anxiety levels towards artificial intelligence were high (57.59±8.84; minimum: 16, maximum: 80). The highest anxiety levels among academicians in the subdimensions were in the sociotechnical blindness, job replacement, learning, and artificial intelligence configuration subdimensions, respectively. In the literature, there is no detailed examination of subdimensions, and no study specifically involving nurse academicians could be found. In various studies (17-19), including nurses, moderate levels of anxiety about artificial intelligence were observed. Studies conducted with nursing students (3, 8, 20-22) showed that students were concerned about artificial intelligence. The results of the present study are consistent with the literature. This result may be due to nurse academicians not being involved in processes related to artificial intelligence starting from their educational life.

It was determined that as the duration of professional experience increased, the anxiety levels of nurse academicians about artificial intelligence also increased. Nurse academicians who did not know the meaning of artificial intelligence, had not received education related to artificial intelligence, did not mention artificial intelligence applications to students in classes/practices, and believed that artificial intelligence would negatively impact the nursing profession were found to have higher levels of anxiety about artificial intelligence. In studies involving nursing students (11, 20, 22), students reported not receiving education about artificial intelligence throughout their educational lives. In studies involving nurses working in clinical settings (11, 19, 23, 24), nurses expressed that if they received education about artificial intelligence during their training, their anxiety about artificial intelligence would be lower, and they would be more easily involved in processes related to artificial intelligence. In studies including working

nurses (8, 19, 22), some participants believed that artificial intelligence would threaten their profession. A study (18) underlines that artificial intelligence should be actively used in nursing education, showing that practices were more permanent in nursing groups where artificial intelligence was used in education (25). Several studies (11, 26-30) have emphasized that educators in this field have essential responsibilities in integrating artificial intelligence into the nursing profession. Buchanan et al. (6) highlighted that nurse academicians need to receive the necessary training to actively use artificial intelligence in the education of students. Our study result is consistent with the literature. Nurse academicians' negative thoughts and attitudes toward artificial intelligence may be related to their lack of knowledge about it.

Nurse academicians stated that artificial intelligence is mainly used for measuring vital signs, facilitating medication preparation, and skill training. In the literature (3, 4, 21, 31-33), it is mentioned that artificial intelligence applications will facilitate nursing care practices. The study's results are consistent with the literature and support that using artificial intelligence in nursing will provide benefits in many areas.

Participants expressed that artificial intelligence could potentially lead to legal issues, ethical problems, violation of patient privacy, employment issues, empathy problems, and security concerns. According to some studies (3, 8, 20, 21, 34, 35), artificial intelligence applications used in the field of health might cause problems such as ethics, patient privacy, and security issues. This result of the present study is consistent with the literature and may be associated with nurse academicians not actively participating in artificial intelligence processes.

Limitations of the research; data is collected online.

Conclusions

The study found that nurse academicians had high levels of anxiety about artificial intelligence. Nurse academicians who did not know the meaning of artificial intelligence, had not received education related to artificial intelligence, did not mention artificial intelligence applications to students in classes/practices, and believed that artificial intelligence would negatively impact the nursing profession were found to have higher levels of anxiety about artificial intelligence. Participants expressed that artificial intelligence could potentially lead to legal issues, ethical problems, violation of patient

privacy, employment issues, empathy problems, and security concerns. It was determined that the negative knowledge and attitudes of academicians toward artificial intelligence increased their anxiety levels. In the literature review conducted within the scope of the study, it was seen that there are very few studies on nurse academicians who play a key role in nursing education. Our recommendation is to inform nurse academics about artificial intelligence, include them in relevant processes, encourage the active use of artificial intelligence in nursing, and increase multidisciplinary studies.

Ethical Approval

Before starting the study, ethical approval (Date: 05.04.2023) and permission to use the Artificial Intelligence Anxiety Scale were obtained. Participants were provided information about the study through the text at the beginning of the survey questionnaire. Only voluntary participants were included in the study.

Author Contributions: Conceptualization, DY and AA.; Methodology, DY and AA.; Formal analysis, DY and AA.; Investigation, DY and AA.; Resources, DY and AA.; Writing-original draft preparation, DY and AA.; Writing-review and editing, DY and AA. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

This study was performed according to the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflicts of Interest

There are no financial and nonfinancial conflicts of interest for any of the authors regarding specific financial interests that are relevant to the work conducted or reported in this manuscript

References

1. Frith KH. Artificial intelligence: What does it mean for nursing? *Nurs Educ Perspect.* 2019; 40(4): 261. <http://dx.doi.org/10.1097/01.NEP.0000000000000543>
2. Sendir M, Simsekoglu N, Kaya A, Sumer K. Nursing in the technology of the future. *J Nurs Health Sci Univ.* 2019; 1(3): 209-214.
3. Betriana F, Tanioka R, Gunawan J, Locsin RC. Healthcare robots and human generations: Consequences for nursing

and healthcare. *Collegian.* 2022; 29(5): 767-773. <https://doi.org/10.1016/j.colegn.2022.01.008>

4. Hughes JD, Chivers P, Hoti K. The clinical suitability of artificial intelligence-enabled pain assessment tool for use in infants: Feasibility and usability evaluation study. *J Med Internet Res.* 2023; 25: e41992. <https://doi.org/10.2196/41992>
5. McGrow K. Artificial intelligence: Essentials for nursing. *Nurs.* 2019; 49(9): 46. <https://doi.org/10.1097/01.NURSE.0000577716.57052.8d>
6. Buchanan C, Howitt ML, Wilson R, Booth RG, Risling T, Bamford M. Nursing in the age of artificial intelligence: Protocol for a scoping review. *JMIR Res Protocols.* 2020; 9(4): e17490. <https://doi.org/10.2196/17490>
7. Bodur G, Dincer M, Tutak Z, Akyuz GE, Uyanik S, Kuvan D. The effects of artificial intelligence on the future of health: An example of a qualitative study from the perspective of university students. *J Göbeklitepe Health Sci.* 2022; 5(7): 106-115. <https://doi.org/10.55433/gsb.149>
8. Lukić A, Kudelić N, Antičević V, Lazić-Mosler E, Glunčić V, Hren D, Lukić IK. First-year nursing students' attitudes towards artificial intelligence: Cross-sectional multi-center study. *Nurs Educ Pract.* 2023; 71: 103735. <https://doi.org/10.1016/j.nepr.2023.103735>
9. Mathur P, Burns ML. Artificial intelligence in critical care. *Int Anesthesiol Clin.* 2019; 57(2): 89-102. <https://doi.org/10.1097/AIA.0000000000000221>
10. Jeong GH. Artificial intelligence, machine learning, and deep learning in women's health nursing. *Korean J Women Health Nurs.* 202; 26(1): 5-9. <https://doi.org/10.4069/kjwhn.2020.03.11>
11. Labrague LJ, Aguilar-Rosales R, Yboa BC, Sabio JB. Factors influencing student nurses' readiness to adopt artificial intelligence (AI) in their studies and their perceived barriers to accessing AI technology: A cross-sectional study. *Nurs Educ Today.* 2023; 130: 105945. <https://doi.org/10.1016/j.nedt.2023.105945>
12. Cetin B, Eroglu N. Innovative technologies in nursing care. *Acta Medica Nicomedia.* 2020; 3(3): 120-126. <https://dergipark.org.tr/tr/pub/actamednicomedia>
13. Shorey S, Ang E, Yap J, Ng ED, Lau ST, Chui CK. A virtual counseling application using artificial intelligence for communication skills training in nursing education: development study. *J Med Int Res.* 2019; 21(10). e14658. <https://doi.org/10.2196/14658>
14. Buchanan C, Howitt ML, Wilson R, Booth RG, Risling T, Bamford M. Predicted influences of artificial intelligence on nursing education: A scoping review. *JMIR Nurs.* 2021; 4(1): e23933. <https://doi.org/10.2196/23933>
15. Wang YY, Wang YS. Development and validation of an artificial intelligence anxiety scale: An initial application in predicting motivated learning behavior. *Interact Learn*

- Environ. 2019; 1-16. <https://doi.org/10.1080/10494820.2019.1674887>
- 16.Akkaya B, Ozkan A, Ozkan H. Artificial Intelligence Anxiety Scale: Adaptation to Turkish, validity and reliability study. *Alanya Acad Overview*. 2021; 5(2): 1125-1146. <https://doi.org/10.29023/alanyaakademik.833668>
- 17.Filiz E, Guzel S, Sengul A. Examining the artificial intelligence anxiety states of healthcare professionals. *J Acad Value Stud*. 2022; 8(1): 47-55. <http://dx.doi.org/10.29228/jav.57808>
- 18.Gumus E, Uysal Kasap E. The level of artificial intelligence anxiety in the health ecosystem: A sample of nurses. *J Artificial Intelligence Health Sci*. 2022; 2(3): 1-7. <https://doi.org/10.52309/jaihs.v2i2.43>
- 19.Menekli T, Senturk S. The relationship between internal medicine nurses' artificial intelligence concerns and spiritual care perceptions. *J YOBU Health Fac Sci*. 2022; 3(2): 210-218.
- 20.Akyuz HO, Alkan S, Yucebas SC. Examining the knowledge levels of Health Services Vocational School students about artificial intelligence. *Med Res Rep*. 2021; 4(3): 28-35.
- 21.Yilmaz Y, Yilmaz DU, Yildirim D, Korhan EA, Ozer D. Opinions of health sciences faculty students regarding artificial intelligence and the use of artificial intelligence in health. *J Süleyman Demirel Univ Health Sci*. 2021; 12(3): 297-308. <https://doi.org/10.22312/sdusbed.950372>
- 22.Orhan M, Bulez A. Evaluation of healthcare personnel's thoughts about artificial intelligence. *Kesit Acad Magazine*. 2022; 8(33): 52-69. ISSN:2149-9225.
- 23.Sapci AH, Sapci HA. Artificial intelligence education and tools for medical and health informatics students: Systematic review. *JMIR Med Educ*. 2020; 6(1): E19285. <https://doi.org/10.2196/19285>
- 24.Hosgor DG, Gungordu H, Hosgor H. Health professionals' views on artificial intelligence: A metaphorical research. *Al-Farabi Int J Soc Sci*. 2023; 8(1): 71-87. <https://doi.org/10.46291/Al-Farabi.080105>
- 25.Harmon J, Pitt V, Summons P, Inder KJ. Use of artificial intelligence and virtual reality within clinical simulation for nursing pain education: A scoping review. *Nurs Educ Today*. 2021; 97: 104700. <https://doi.org/10.1016/j.nedt.2020.104700>
- 26.Aslan F, Subasi A. A different perspective on artificial intelligence technologies from the perspective of nursing education and nursing process. *J Nurs Health Sci Univ*. 2022; 4(3): 153-158. <https://doi.org/10.48071/sbuhemsirelik.1109187>
- 27.Hooda M, Rana C, Dahiya O, Rizwan A, Hossain MS. Artificial intelligence for assessment and feedback to enhance student success in higher education. *Math Prob Engineering*. 2022. <https://doi.org/10.1155/2022/5215722>
- 28.Huang AY, Lu OH, Yang SJ. Effects of artificial intelligence-Enabled personalized recommendations on learners' learning engagement, motivation, and outcomes in a flipped classroom. *Comput Educ*. 2023; 194: 104684. <https://doi.org/10.1016/j.compedu.2022.104684>
- 29.Liaw SY, Tan JZ, Lim S, Zhou W, Yap J, Ratan R, Ooi SL, Wong SJ, Seah B, Chua WL. Artificial intelligence in virtual reality simulation for interprofessional communication training: Mixed method study. *Nurs Educ Today*. 2023; 122: 105718. <https://doi.org/10.1016/j.nedt.2023.105718>
- 30.Tam W, Huynh T, Tang A, Luong S, Khatri Y, Zhou W. Nursing education in the age of artificial intelligence powered Chatbots (AI-Chatbots): Are we ready yet? *Nurs Educ Today*. 2023; 129: 105917. <https://doi.org/10.1016/j.nedt.2023.105917>
- 31.Cifci BS, Basfirinci C. Examining the subject of artificial intelligence within the context of gender: A research on professions. *J Çukurova Univ Soc Sci Institute*. 2020; 29(4): 183-203.
- 32.Dogan Merih Y, Akdogan E. Artificial intelligence in nursing. In 4th International Eurasian Conference on Biological and Chemical Sciences (EurasianBioChem 2021) November (pp. 24-26). 2021.
- 33.Yigit D, Acikgoz A. Evaluation of comfort behavior levels of the newborn by artificial intelligence techniques. *The Journal of Perinatal & Neonatal Nursing*. 2024; 38(3): E38-E45. <https://doi.org/10.1097/JPN.0000000000000768>
- 34.Ozdemir L, Bilgin A. Use of artificial intelligence in health and ethical issues. *J Health Nurs Manage*. 2021; 8(3): 439-445.
- 35.Ergin E, Karaarslan D, Sahan S, Cinar Yucel S. Artificial intelligence and robot nurses: From nurse managers' perspective: A descriptive cross-sectional study. *J Nurs Manage*. 2022; 30(8): 3853-3862. <https://doi.org/10.1111/jonm.13646>