

Relationships Among Nursing Students' Awareness of Artificial Intelligence Ethics, Literacy, Attitudes, and Knowledge

Hyunjung Lee¹

Abstract

This study was conducted to identify the Artificial intelligence ethical awareness, literacy, attitude, and knowledge levels of nursing students who will handle AI as future nurses and to confirm the correlation among them. The data for the study were collected through a structured questionnaire targeting 118 nursing students at K University in Gangwon-do, Korea in June 2025. The general characteristics of the subjects were calculated using frequencies and percentages, and the level of AI ethics awareness, literacy, attitude, and knowledge was calculated using means and standard deviations. The relationship among AI ethical awareness, literacy, attitude, and knowledge was analyzed using Pearson's Correlation Coefficient. The results of this study showed that AI ethics awareness had a positive correlation with AI literacy ($r=.30, p<.001$), AI attitude ($r=.42, p<.001$), and AI knowledge ($r=.30, p<.001$), and AI literacy had a positive correlation with AI attitude ($r=.35, p<.001$) and AI knowledge ($r=.65, p<.001$). In addition, AI attitude had a positive correlation with AI knowledge ($r=.27, p<.001$). In conclusion, when organizing the curriculum for AI education to improve the AI literacy ability of nursing students, it is necessary to include AI ethical awareness, attitude, and knowledge content. Since the ethical use of AI can protect patients from potential risks, various nursing educational approaches are needed regarding AI literacy and knowledge of nursing students.

Keywords: *Artificial Intelligence, Attitude, Ethical Awareness, Knowledge, Literacy, Nursing Student.*

Introduction

『Artificial Intelligence』 refers to a system that can replace human roles based on computer programs that have human thought, cognition, processing, learning ability, reasoning, and inference [1]. Artificial intelligence (AI) technology is rapidly developing and being applied in various industries and is being applied not only in private services but also in public services [2]. In the medical field, deep learning, imaging, and other AI technologies, MRI image analysis, utilize classification, object recognition, etc. to provide results as accurate as those of skilled radiologists [3]. Some hospitals have already introduced AI nurse robots, companion robots, and drug dispensing robots to assist nurses [1]. In Korea, it was announced that the fall rate decreased by 11% and the fall risk assessment time was shortened from 3 minutes to 5 seconds by establishing a 'customized AI service environment' [4]. In this way, due to the rapid development of medical AI, AI is being distributed as an alternative that can reduce the rate of misdiagnosis by medical personnel [5], and it was revealed that it is providing practical help to medical staff including AI nurses. In addition, the 'Nursing Voice Recording System (Vobile ENR)' that uses AI voice recognition technology was introduced to simultaneously perform treatment and record, thereby improving accuracy. Through these cases, the introduction of AI in the nursing field is increasing, which is contributing to reducing the burden of nursing work, improving patient safety and outcomes, and enhancing the professionalism and quality of nursing [6]. Therefore, nurses are potential users of AI and play a key role in leading the development of AI in the nursing field.

However, since AI reflects objective learning data, it can show blatant discrimination while learning biased or incorrect data [6]. If there is no ethical preparation for the above AI problems, both medical staff and patients will feel confused when using AI in clinical settings. Therefore, not only nurses but also nursing students need to consider AI ethics [7,8], and as it is a field where responsibility is clear

¹ Kyungdong University, Wonju, Korea, Email: hjlee@kdoniv.ac.kr

and can be socially sensitive, research on ethical issues should be conducted first [9]. According to a recent study, the experience of AI-related education received by nursing major college students in Korea was reported to be 28.5% in middle and high school and 24.5% in college [10], and in reality, there is a severe lack of research related to AI ethics [9,10].

According to the results of a study on knowledge and acceptance of AI conducted on nursing students, the higher the knowledge of AI, the higher the awareness, acceptance, and intention to use AI. It was also said that improving the level of understanding of AI is an important factor that can increase the confidence and adaptability of nursing students who will actually perform nursing in clinical practice in the future [10]. However, the knowledge of AI was below average, which seems to be due to the lack of education on AI, which suggests that the level of knowledge related to AI among nursing students is low [10]. In addition, it was reported that nurses' awareness of AI ethics and bioethics had a negative correlation, so it is necessary to establish a proper understanding AI as AI is applied in clinical practice [8].

Research on AI literacy, which is the ability to understand the basic concepts and principles of AI and creatively solve problems based on this, has not yet been sufficiently conducted [11]. In particular, in the nursing field, some research results have been reported that positive attitudes increase as AI literacy and knowledge levels increase [12-14], but such research is relatively lacking compared to other fields. Attitudes toward AI and previous educational experiences can enhance literacy capacity [14], and AI literacy tends to increase as knowledge improves through education [15]. In addition, AI literacy can contribute to knowledge improvement [13], but simply having a lot of knowledge does not necessarily mean high literacy ability [16]. In order for nursing students to play an effective and professional role in the medical environment where AI will be actively used as future nurses, AI literacy ability is essential [14]. Therefore, this study aims to evaluate the level of AI ethics awareness, literacy, attitude, and knowledge of nursing students and analyze the relationship between them.

Subject of the Study & Research Design

This study is a descriptive survey study conducted to identify the relationship between AI ethics awareness, AI attitude, AI literacy, and AI knowledge among nursing students at a university. The subjects of this study were third-year students enrolled in the Department of Nursing at K University located in W City, G Region. The number of subjects was calculated using the G-Power 3.1.9.2 program according to Cohen's formula. The minimum sample size was derived as 71 when calculating the sample size for correlation analysis at a significant level of 5% and a power of 95% based on the effect size of 0.4. Considering the dropout rate, a total of 119 people were recruited, but data from 118 people were analyzed after excluding one person who responded insincerely to the questionnaire. The data collection period for this study was from June 30 to July 2, 2025. The purpose and method of the study were explained to students who agreed to participate in the study, and a self-report questionnaire was collected.

Tool of the Study

This study used a structured questionnaire. The general characteristics of this study consisted of three items: age, gender, and satisfaction with nursing majors, which are demographic characteristics.

1) AI Ethics Awareness

The AI ethics awareness was measured using the 'Test for AI Ethics Awareness (TAIEA)' [17]. This test tool consists of 24 items, each with 3 items in 8 categories, on a 5-point Likert scale. The score ranges from 1 point for 'very inappropriate' to 5 points for 'very appropriate.' The Cronbach's α of the tool at the time of development was .81, and the Cronbach's α of this study was .87.

2) AI Literacy

The AI literacy was measured using the 'AI Literacy Measurement Tool for Prospective Secondary School Teachers' [11]. This test tool consists of a total of 33 items and 4 subcategories. The measurement is a 5-point Likert scale, with 1 point being 'not at all' and 5 points being 'very much' for each item. A higher score indicates a higher level of AI literacy. At the time of development, the overall Cronbach's α of the tool was .94, and the Cronbach's α of this study was .91.

3) Attitude toward AI

Attitude toward AI was measured using the Korean translation of the General Attitudes towards AI Scale (GAAIS) developed by Schepman and Rodway [18], GAAIS-K [1]. GAAIS-K consists of 11

positive attitude items and 7 negative attitude items, a total of 18 items. It is a 5-point Likert scale, and a higher score indicates a higher level of negative or positive attitude. At the time of tool development, Cronbach's α was .88 for positive attitude and .83 for negative attitude, and the Cronbach's α of the Korean version was .86 and .74. In this study, Cronbach's α was .63.

4) Knowledge of AI

Knowledge of AI was measured using the tool of Chang et al. [21], which was modified by utilizing the contents of the medical students' readiness measurement tool for medical AI [19] and the questionnaire to determine attitude [20]. This tool consists of 16 items divided into four factors: awareness, ability, attitude, and outlook. The Cronbach's α of the study of Chang et al. was .87 on a 4-point Likert scale (21). Cronbach's α in this study was .81.

Data Analysis

The collected data for this study were analyzed using the SPSS (Statistical Package for the Social Science) WIN 25.0 program. The general characteristics of the subjects were calculated by frequency and percentage, and the AI ethics awareness, literacy, attitude, and knowledge level were calculated by mean and standard deviation. The relationship between AI ethics awareness, literacy, attitude, and knowledge was analyzed by Pearson's Correlation Coefficient.

Results and Discussion

General Characteristics of Study Respondents

The general characteristics of the subjects are shown in Table 1.

Table 1. General Characteristics of Study Respondents (N=118)

Variable	Classification	N(%) or Mean \pm SD
gender	male	16(13.6)
	female	102(86.4)
Age	≤ 22	19(16.1)
	> 22	99(83.9)
		21.7 \pm 2.79
Satisfaction with major	Satisfied	93(78.8)
	Moderated	24(20.3)
	Unsatisfied	1(0.8)

AI Ethical Awareness, AI Literacy, Attitude, and Knowledge of AI

Among the sub-domains of AI ethical awareness (3.38 \pm 0.74 points), the scores were as follows: transparency and explainability 4.34 \pm 0.70 points, employment 4.20 \pm 0.68 points, responsibility 3.92 \pm 0.70 points, human-centered service 3.30 \pm 0.73 points, Permit and limits 3.20 \pm 0.71 points, stability and reliability 3.04 \pm 0.80 points, robot rights 2.96 \pm 0.29 points, and non-discrimination 2.10 \pm 0.77 points. Among the sub-domains of AI literacy (3.33 \pm 1.05 points), the scores were as follows: AI utilization 4.10 \pm 1.10 points, AI understanding 3.63 \pm 0.92 points, AI ethics 3.16 \pm 0.41 points, and AI development 2.33 \pm 0.50 points. Attitudes toward AI (3.44 \pm 1.42 points) were positive (4.36 \pm 0.81 points) and negative (2.00 \pm 0.82 points) among the sub-domains. Knowledge about AI (2.63 \pm 0.89 points) was in the following order: awareness (2.80 \pm 1.09 points), ability (2.75 \pm 0.50 points), attitude (2.60 \pm 0.89 points), and outlook (2.00 \pm 1.41 points).

Table 2. AI Ethical Awareness, AI Literacy, Attitude, And Knowledge of AI (N=118)

Variable	Range	Mean±SD
AI ethical awareness	1~5	3.38±0.74
Responsibility		3.92±0.70
Stability and reliability		3.04±0.80
non-discrimination		2.10±0.77
Transparency and explainability		4.34±0.70
human-centered service		3.30±0.73
Employment		4.20±0.68
Permit and limit		3.20±0.71
Robot rights		2.96±0.29
AI literacy	1~5	3.33±1.05
AI understanding		3.63±0.92
AI utilization		4.10±1.10
AI development		2.33±0.50
AI ethics		3.16±0.41
Attitude of AI	1~5	3.44±1.42
positive		4.36±0.81
negative		2.00±0.82
Knowledge of AI	1~4	2.63±0.89
awareness		2.80±1.09
ability		2.75±0.50
attitude		2.60±0.89
outlook		2.00±1.41

Correlation among AI ethical awareness, literacy, attitude, and knowledge

1 AI ethics awareness was found to have a statistically significant positive correlation with literacy ($r=.30$, $p<.001$), attitude ($r=.42$, $p<.001$), and knowledge ($r=.30$, $p<.001$). AI literacy was found to have a statistically significant positive correlation with attitude ($r=.35$, $p<.001$) and knowledge ($r=.65$, $p<.001$). Attitude was found to have a statistically significant positive correlation with knowledge ($r=.27$, $p<.001$).

Table 3. Correlation Among AI Ethical Awareness, Literacy, Attitude, And Knowledge (N=118)

Variables	AI ethical awareness	Literacy	Attitude	Knowledge
	$r(p)$	$r(p)$	$r(p)$	$r(p)$
AI ethical awareness	1			
Literacy	.30(<.001)	1		
Attitude	.42(<.001)	.35(<.001)	1	
Knowledge	.30(<.001)	.65(<.001)	.27(<.001)	1

The average score of AI ethics awareness was 3.38/5, which was similar to the 3.27 score of a previous study [22], but lower than the 3.62 score of a study targeting only 4th-year nursing students [23]. It is thought that 4th-year students have a higher level of ethics awareness because they experience various ethical decision-making situations through more theories and practices than other grades [23], which may have led to differences in AI ethics awareness. Therefore, further research is needed to determine whether experiences with ethics education and hospital practice affect AI ethics awareness by grade. In addition, in the sub-items, this study showed the lowest score of 2.10 for non-discrimination, but in a previous study [23], robot rights were the lowest at 2.50 and non-discrimination was 3.81, showing different results from this study. Considering the differences in each item depending on the subject, it can be interpreted that ethical awareness regarding AI differs depending on the subject, or that it is a difference that appears during the process of forming ethical awareness. Therefore, if ethics education includes the concept of ethical awareness related to AI, it is thought that these differences can be reduced.

The average AI literacy level of nursing students was 3.33/5, which was similar to the 3.19 points of a previous study [24] that measured nursing students using the same tool. Currently, in order to achieve learning outcomes that can utilize information and communication and the latest healthcare technology in the nursing curriculum, each school is opening information and communication courses, and the ability to understand and utilize AI technology and popularize AI use is being strengthened. Therefore, it is thought that in the future, AI literacy of nursing students will be fostered more than at present.

The average AI attitude score of nursing students was 3.44/5, which was similar to the 3.62 points of a previous study [11], and the average AI knowledge score was 2.63/4, which was higher than the 2.31/5 points of a previous study [11] that used a different tool. According to the Technology Acceptance Model, which verifies the process of accepting new technologies, the user's acceptance attitude toward new technologies such as AI determines the intention to use them, and the intention to use determines behavior [25]. Attitude refers to the tendency to react positively or negatively to an object (object, situation, person, etc.), and as a factor that determines behavior or perception, in order to activate new science and technology such as AI, research should be conducted in advance to investigate students' attitudes toward AI. In addition, knowledge about AI in the healthcare field is an important predictor of AI acceptance intention, and the level of knowledge about AI has been shown to affect the intention to use AI [26]. On the other hand, when the level of knowledge about AI is low, it causes negative emotions and vague anxiety about using AI [27].

The results of this study showed that AI attitudes were positively correlated with AI knowledge. This is similar to the results of a previous study [9] that found that the higher the nursing students' knowledge of AI, the more positive their attitudes toward AI were. AI ethics awareness was found to have a statistically significant correlation with literacy, attitude, and knowledge. A previous study [28] that confirmed the relationship between AI ethics awareness and digital literacy also showed a statistically significant positive correlation, which confirmed that the higher the level of digital literacy, the higher the level of AI ethics awareness. In this study, AI literacy was found to have a statistically significant correlation with AI knowledge, but a previous study [19] that examined the correlation between AI literacy and knowledge in medical students reported that having a lot of knowledge does not necessarily mean having a high literacy ability, which is different from this study. However, it is difficult to make a direct comparison because the subjects of the previous study were medical students, the tools used evaluated AI knowledge based on social desirability, and the focus was more on familiarity with AI. AI attitudes were found to have a statistically significant correlation with AI knowledge. These research results are in line with the results of previous studies [10][12] that showed that the higher the AI ethics awareness and AI knowledge, the more positive the results were for AI attitudes and intentions to use. Since the ethical use of AI can protect patients from potential risks, various nursing education approaches are needed for AI literacy and knowledge of nursing students.

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