Clinical and Experimental Health Sciences

Effect of Online Case-Based Teaching Method on Professional Development of Nursing Students

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ABSTRACT

Objective: This study was conducted to determine the effect of online case-based education, as part of distance education, on nursing students' professional values, professional behavior, problem-solving, critical-thinking skills, and self-directed learning skills.

Methods: The study was conducted using a single-group pretest-posttest quasi-experimental design. A total of 58 3rd grade nursing students participated in this study The data before the study were collected electronically with the Google forms application using the personal information forms and scales (Self-Directed Learning Skills Scale, Problem Solving Inventory, California Critical Thinking Disposition Scale, Nurses Professional Values Scale, Nursing Students Professional Behaviors Scale).

Results: After online case-based nursing process teaching, the difference in the total mean score of the students in all scales was found to be statistically significant ($p< 0.01$). It was found that, after the training had been provided through case-based education, the score average of students' professional values, professional behaviors, problem-solving, critical thinking skills and self-directed learning increased.

Conclusion: Use of online case-based teaching is useful for increasing nursing students' nursing skills in distance education.

Keywords: Care, distance education, nursing student, online case-based teaching, professional development

1. INTRODUCTION

The coronavirus disease (COVID-19), which has spread across the world in a short period since its emergence in Wuhan, China, and which has caused the mobilization of international health authorities due to its effects, is now accepted as a pandemic by the World Health Organization (WHO) (1,2). For months, COVID-19 has caused death, disease, and socioeconomic problems (2,3) and has also caused serious disruptions in educational processes, both in Turkey, and globally (3). In this context, universities in Turkey suspended their provision of education from 12th March 2020, based on the decision of the Higher Education Council in Turkey. As the coronavirus pandemic continues to affect the world unimpeded, the Higher Education Council has stated that it has decided to continue the 2019–2020 spring term education via distance education only, open education, and digital education opportunities, and that face-to-face education will not be provided in Turkey (4). The distance-education process, which has become mandatory across all higher education in Turkey due to the coronavirus epidemic, is also affecting nursing education. In order to continue learning, information technologies will be particularly beneficial when face-to-face training is impossible. Nurses use technology as a tool of change by guiding this process and policies for the provision of good-quality, qualified, and low-cost care to individuals and communities (5). It is noted that distance education, which contributes significantly to the widespread use of lifelong education and which has the capability of reaching a large student population, independently from time and place (6), and which focus on individual learning (7), can be performed by web support using different teaching techniques (8). Within this process, with the exception of existing methods that teaching methods that would keep the student active, reinforce learning, and increase individual responsibility-undertaking in learning have been researched and used in line with possibilities available to students within nursing programs.

The aim of nursing education is to teach cognitive, psychomotor and attitudinal behaviors to the student (9,10). Especially, clinical practice training aims to improve students' critical thinking, psychomotor, communication and management skills and to strengthen their sense of self-confidence (11). Team studies are recommended for increasing the learning effectiveness among students, and

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case-based teaching is an example of one of these methods (12). Furthermore, it is noted that self-efficacy perception can also be improved with case-based teaching (13). Self-efficacy is shown to be one of those individual characteristics that forms the professional identity of nurses (14). Training nurses with self-efficacy is an important issue, one that is also included in nursing education programs. The aim of nursing undergraduate education is to develop individuals who follow developments and updates within their field; who use lifelong learning, problem solving, and critical thinking skills; and who participate in those activities that will contribute to their professional development (15). Self-efficacy is an important factor for nurses to successfully perform the practices required by their profession (16,17). Furthermore, it is noted that nurses' self-efficacy is directly related to professional autonomy (18), and that nurses with high self-efficacy more often perceive threats as opportunities (19). It is essential for nurses to meet current needs and cope with contemporary problems (20). Thanks to a qualified nursing education provided with innovative and active learning methods, the quality of healthcare services will also increase (21).

This study was conducted to determine the effect of case-based education provided within the scope of a pediatrics course within the process of distance education, on the nursing students' professional values, professional behavior, problem solving, critical thinking, and self-directed learning skills.

2.METHODS

Hypotheses of Study

H_1: After the trainings provided with case-based education in the distance education process, the score average of students' professional values increases.

H_2: After the trainings provided with case-based education in the distance education process, the score average of students' professional behaviors increases.

H_3: After the trainings provided with case-based education in the distance education process, the score average of students' problem-solving increases.

H_4: After the trainings provided with case-based education in the distance education process, the score average of students' critical thinking increases.

H_5: After the trainings provided with case-based education in the distance education process, the score average of students' self-directed learning increases.

2.1. Study design

This research was conducted using a single group pretest–posttest quasi-experimental design.

2.2. Setting and sample

This study was performed in the Nursing Department of a Faculty of Health Sciences during the spring semester of the 2019–2020 academic year. Originally, the study was to be carried out with 61 students who were studying in the third year of nursing and who participated in the practice of Pediatric Nursing course. The study sample comprised 58 students who agreed to take part in the study, who participated in training full-time, and who answered the questionnaires completely. The participation rate in this research study was 95%.

2.3. Measures

Personal Information Form: This comprises nine questions on the students demographic characteristics, feelings toward the nursing profession, studying system, and academic achievements.

***Self-Directed Learning Skills Scale (SDLSS)*:** This scale was developed by Koçdar et al. (2018), comprises 30 items, and has a five-point Likert-type structure. Responses to the Scale items answered by the participants are rated between "I strongly disagree" and "I strongly agree". The scale measures the participants' skills in regard to setting goals, seeking help, developing self-study strategies, managing their physical environment, and managing their efforts (22). The Cronbach's alpha reliability coefficient of the scale was found to be 0.93. In this study, the Cronbach's alpha reliability coefficient was found to be 0.93 in the pretest and 0.96 in the posttest.

Problem Solving Inventory (PSI): Developed by Heppner and Peterson (1982), this inventory is a six-point Likert-type scale comprising 35 items that measure the self-perception of adolescents and adults toward problem-solving skills. Each scale item asks the responder how often they undertake a certain behavior, with responses being rated between "I always behave like this" and "I never behave like this". The lowest score obtainable from the scale is 32, and the highest obtainable score is 192. Higher total scores obtained from the scale indicate that the individual perceives themselves to be insufficient in regard to their own problem-solving skills. In other words, as the score obtained from the scale increases, problem-solving skill decreases. The total scale comprises six subscales, including four effective problem solving methods, i.e., "self-confident", "thinking", "evaluating" and "planned" approaches, and two ineffective problem-solving methods, i.e., "hasty" and "avoidant" approaches. In the study conducted by Şahin et al. (1993) on 244 university students, the Cronbach's Alpha reliability coefficient of the PSI was found to be 0.88 (23). The current study, the Cronbach's Alpha reliability coefficient of the PSI was found to be 0.83 in the pretest and 0.87 in the posttest.

California Critical Thinking Disposition Scale (CCTDS): This scale, developed by Facione et al. (1990), was used to evaluate the critical thinking level of the individual responder (24). The scale comprises a total of 51 items and six subscales: truth seeking, open-mindedness, analyticity, systematicity,

self-confidence, and inquisitiveness. California Critical Thinking Disposition Scale (CCDTS) is a six-point Likert-type scale. Items are rated on a 6-point rating scale ranging from 1–6 (ranging from "strongly disagree": 1 point, to "strongly agree": 6 points). To evaluate the subscales, the total score obtained from each question within the subscale is divided by the number of in that subscale before being multiplied by 10. The minimum score possible from each of the subscales is 10 and the maximum score possible is 60. The sum of the subscales scores then gives the critical-thinking disposition score. A subscale score below the value of 40 indicates low critical thinking disposition, while a score above 50 points indicates high critical thinking disposition. In this context, a total CCDTS score below 240 points indicates a low critical thinking disposition, and a total Scale score of more than 300 points indicates a high critical thinking disposition. The Turkish validity and reliability study of the scale was conducted by Kökdemir (2003) and the Cronbach's alpha coefficient of the Scale was found to be 0.88 (25); in the current study, the Cronbach's alpha reliability coefficient of the Scale was found to be 0.82 in the pretest and 0.84 in the posttest.

Nurses Professional Values Scale-Revised (NPVS-R): The NPVS-R was developed by Weis and Schank (2009) (26), and a validity and reliability study of the Scale in Turkish as conducted by Acaroğlu (2014) (27). The scale, which is used to evaluate nurses and nursing students' professional values, is a five-point Likert-type scale (whereby responses are rated between 1= "not important" to 5= "very important") comprising 26 items and three sub-dimensions: care, professionalism, and confidence. The total score obtained from the Scale is determined by adding up those numerical values corresponding to the answers given. The lowest score obtainable from the Scale is 26, and the highest score obtainable is 130. High scores indicate a strong compliance with professional values (27). The total Cronbach's alpha value of the Scale for this study was found to be 0.92; the Cronbach's alpha value of the Scale was found to be 0.94 in the pretest and 0.91 in the posttest in the current study.

Nursing Students Professional Behaviors Scale (NSPBS): This scale, used to determine the professional behaviors of nursing students, was developed by Göz and Geçkil (2010) (28). The scale is a five-point Likert-type measurement tool that comprises 27 items and includes three sub-dimensions, i.e., healthcare practices, activity practices, and reporting. Items in the scale are rated between "very inadequate" (1 point) and: "satisfactory" (5 points). The total score that can be obtained from the scale is 27–135. The high scores of the scale indicate that the students' level of professional behavior is high. The total Cronbach's alpha value of the scale for this study was found to be 0.95 and was calculated as being 0.93 for both the pretest and the posttest.

2.4. Practice

In the current study, the effectiveness of case-based teaching of nursing process – which was conducted by distance education method – was evaluated based on 10 cases prepared in the pediatric nursing field. After the courses in the faculty have been theoretically taught in classrooms, they are applied in basic skills laboratories and clinical/field areas. Educational activities within the faculty are carried out according to the classical method of education. Innovative teaching methods, such as simulation, mobile learning, and online learning, are also used to teach courses. Teaching on the subject of the "nursing process" in the faculty is performed theoretically and practically within the scope of the vocational courses. The form, developed on the basis of Gordon's Functional Health Patterns, is used as part of the nursing education process taught within each department. Information on face-to-face teaching concerning the nursing process as part of the Pediatric Nursing course is provided in the table below (Table 1).

Table 1. *Information on teaching of the nursing process in face-to-face education in the Pediatric Nursing course*

Course content information	Time	Explanation
Nursing process theoretical and classroom hours	4 hours	The course is conducted as 4 hours theoretical, 2 hours laboratory and 10 hours clinical practice per week. Clinical practice continues along with theoretical course topics. A half-day case discussion is held every week throughout the practice. The received care plan is reviewed by the instructor and delivered to the student with written feedback. The form developed based on Gordon's Functional Health Patterns is used to collect data in the clinic.
Weekly laboratory practice hours	2 hours	
Weekly clinical practice time	10 hours	
Total clinical practice time	14 weeks	
Case discussion/ rotation	Half-day case discussion every week throughout the practice	
Number of care plans that a student is expected to deliver	14 pcs	
The way how the instructor evaluates the care plan	A note is taken on the delivered care plan and the student is given feedback.	

Within the scope of the Pediatric Nursing course, the subject of the nursing process was taught to those students in the classroom environment in the form of face-to-face education; this comprised 4 hours of theoretical lessons and 4 hours of a sample case discussion. After the face-to-face education was suspended during the epidemic process, it was decided to continue the practice in the form of distance education (course notes, homework, case analysis). In this context, relevant course notes, case presentations, and sample articles that supported the learning of the course subject were uploaded to the online course system. Before the commencement of the online course, all students were prepared for the relevant case according to the practice

calendar. For case-based nursing process teaching the practice, an online case discussion was conducted over the program Zoom under the moderation of the instructor of the course for at least 4 hours per week over a 10-week period. Additionally, the WhatsApp social media platform was used to create a group including all students and instructors, which was used by the instructor to answer students; questions throughout the preparation process. After the case discussions had been held online on those dates and times specified in the practice calendar, students were asked to write down the nursing care details they learned in practice (Table 2). Students were then expected to answer the following five questions in the care plan.

- Which nursing diagnoses did you identify?
- What data did you use to identify this issue? How did you get this data?
- What nursing initiatives did you apply for this diagnosis?
- What change did you expect in the patient as a result of the nursing intervention or interventions you applied?
- How did you assess the effectiveness of the nursing intervention you used?

Table 2. *Online teaching of nursing process and practice calendar in the distance education process*

Case Topics	*Practice Date and Time*	*Method*	*Instruction*
NEWBORN RDS CARE	23.03.2020 18:30 – 22:30	Question-Answer Discussion	• Distance education practices are made between the dates and hours announced by the instructor. • Preparation for the relevant topic is made before the practice day. • The practice subject is discussed on the date specified in the program. • Students record their notes on care in their notebooks after the course. • At the end of the practice, students send their care plans to the instructor.
ASTHMA CARE	30.03.2020 18:30 – 22:30	Question-Answer Discussion	
CONGESTIVE HEART FAILURE CARE	06.04.2020 18:30 – 22:30	Question-Answer Discussion	
DIABETIC KETOACIDOSIS CARE	13.04.2020 18:30 – 22:30	Question-Answer Discussion	
NECROTIZING ENTEROCOLITIS (NEC) CARE	20.04.2020 18:30 – 22:30	Question-Answer Discussion	
NEPHROTIC SYNDROME CARE	27.04.2020 18:30 – 22:30	Question-Answer Discussion	
EPILEPSY CARE	04.05.2020 18:30 – 22:30	Question-Answer Discussion	
SICKLE CELL ANEMIA CARE	11.05.2020 18:30 – 22:30	Question-Answer Discussion	
ACUTE LYMPHOBLASTIC LEUKEMIA CARE	18.05.2020 18:30 – 22:30	Question-Answer Discussion	
OBESITY CARE	25.05.2020 18:30 – 22:30	Question-Answer Discussion	

2.5. Data Collection

Pretest data were collected electronically through the Google forms application by using the personal information forms and many scales (SDLSS, PSI, CCTDS, NPVS-R, NSPBS) created by researchers as a result of a literature review.

Students were informed that that their participation in this research was entirely voluntary. The voluntary consent requirement was specified at the beginning of the questionnaire, and those students who agreed to participate in this research confirmed this by electronically responding to the questionnaire questions. Thus, students were enabled to fill out the data collection forms without interacting with one another. All participants were asked to provide a specific nickname in the form. The questionnaire took approximately 30–35 minutes to complete. Online practices and initiatives were given over a period of 4 hours a week and continued for a total of 10 weeks. At the end of the practice, students were then asked to send their care plans to the instructor. One week after the end of the practice, the forms were submitted again and filled out by the student participants. Students were asked to write the nickname they had used in previous questionnaires on this questionnaire.

2.6. Data Analysis

The research data was analyzed using the IBM SPSS 23.0 (IBM Statistical Package for the Social Sciences Corp.; Armonk, NY, USA) software program. In the data analysis, descriptive statistics (number, percentage, average, standard deviation) were used in the characteristics of variables, while the dependent t-test (paired t-test) was used to compare the pretest and posttest values of the scales. The normality of the data for numeric variables was analyzed using the Shapiro–Wilk test, histogram, and *Q-Q* graphics. Results were then evaluated at 95% confidence interval according to a significance level of $p<0.05$. In addition, Cohen's d (effect size) was used to determine the effect size of the difference, which was significant in paired comparisons (d= 0.2 small, d= 0.5 medium, d= 0.8 high, d≥ 1 very high).

2.7. Ethical Considerations

For this research, permission to use the study scales was obtained from the scale creators, institutional permission was granted by the faculty in which the research was conducted, ethical approval was granted by the Clinical Research Ethics Committee affiliated to the state university in the region (Decision number: 70904504/287 dated 29/04/2020), and informed consent was obtained from all the study participants.

3. RESULTS

Sociodemographic characteristics

Of those students included in the study 63.8% were female; the average age of all participating students was 21.06±0.83

years. It also was determined that 62.1% of the students chose the nursing department willingly, 65.5% liked their profession, and 43.1% wanted to change their profession because they don't like the nursing department. Most students stated that they wanted to become academic nurses (37.9%) or clinical nurses (36.2%) after graduation. Students reported that they studied more during the examination time, that they worked an average of 3.79±2.46 hours per day, and reported their academic success as being 43.1% good and 39.7% moderate (Table 3).

Table 3. *Descriptive characteristics of the students*

Characteristics	n	%
Age	21.06±0.83	
Gender		
Female	37	63.8
Male	21	36.2
Willing choice of nursing department		
Yes	36	62.1
No	22	37.9
Fondness of nursing profession		
Yes	38	65.5
No	20	34.5
Desire to change nursing profession		
Yes	25	43.1
No	33	56.9
Studying system		
During examination time	52	89.7
Regularly	6	10.3
Study time per day	3.79±2.46	
Academic achievement		
Very good	2	3.4
Good	25	43.1
Moderate	23	39.7
Poor	8	13.8
Post-graduation plan		
Become an executive nurse	7	12.1
Become a clinical nurse	21	36.2
Become an instructor nurse	8	13.8
Become an academic member	22	37.9

Scales-level differences

Students' total mean SDLSS scores were determined as 97.68±19.05 in the pretest and 103.98±22.64 in the posttest; the difference between these two scores was found to be statistically significant ($p < 0.01$). The score increases in the seeking help ($p < 0.01$), self-study strategies ($p<0.05$), and managing the physical environment ($p < 0.01$) sub-dimensions of the scale were also found to be statistically significant.

Students' total mean PSI score was determined as 121.29±10.33 in the pretest and 102.22±15.79 in the posttest; this difference was found to be statistically significant ($p<0.001$). The score decreases in the self-confident approach ($p<0.001$), evaluating approach ($p<0.01$), planned approach ($p<0.01$), hasty approach ($p<0.001$), and avoidant approach ($p<0.001$) sub-dimensions of the scale were also found to be statistically significant (Table 4).

The total mean CCTDS score was determined as 222.52±24.82 in the pretest and 238.90±24.03 in the posttest; this difference was also found to be statistically significant ($p<0.001$). Furthermore, it was determined that the student's average scores increased in regard to the analyticity ($p<0.01$), self-confidence ($p < 0.01$), inquisitiveness ($p<0.05$) sub-dimensions of the scale; this increase was also found to be statistically significant (Table 4).

Students' total NPVS-R mean score was found to be 104.67±16.09 in the pretest and 114.27±11.03 in the posttest; this difference was also found to be statistically significant ($p<0.01$). It was also found that the increases in the care ($p<0.01$), professionalism ($p<0.05$), and confidence ($p<0.01$) subscales of the NPVS-R Scale were statistically significant (Table 4).

Students' total mean NSPBS score was determined as 113.12±15.72 in the pretest and 121.58±12.56 in the posttest; this difference was also found to be statistically significant ($p< 0.01$). It was also determined that the score increases in the healthcare practices ($p< 0.05$), activity practices ($p< 0.001$), and reporting ($p< 0.001$) sub-dimensions of the NPVS-R Scale were statistically significant (Table 4).

Table 4. *Students' mean scale scores pre-test and post-test*

MEAS and its subscales	Pre-test		Post-test		*t*	*p*	*d*
	Mean	SD	Mean	SD			
Self-Directed Learning Skills Scale	**97.68**	**19.05**	**103.98**	**22.64**	**3.016**	**0.004****	**0.295**
Setting goal	17.32	2.95	17.03	3.85	0.586	0.560	0.084
Seeking help	27.91	6.39	30.24	7.49	3.189	0.002**	0.329
Self-study strategies	26.44	6.97	28.32	7.80	2.348	0.022*	0.252
Managing the physical environment	19.60	6.04	21.94	6.41	3.202	0.002**	0.376
Managing efforts	6.39	2.49	6.43	2.48	0.142	0.887	0.014
Problem Solving Inventory	121.29	10.33	102.22	15.79	7.050	0.000***	1.439
Self-confident approach	25.60	3.14	21.31	5.39	5.129	0.000***	0.974
Thinking approach	22.03	3.06	21.63	3.46	0.611	0.544	0.121
Evaluating approach	12.55	2.82	10.05	5.30	3.378	0.001**	0.580
Planned approach	16.70	2.70	14.48	3.79	3.541	0.001**	0.676
Hasty approach	34.44	5.13	27.37	7.67	5.943	0.000***	1.081
Avoidant approach	9.94	4.05	7.36	2.75	4.000	0.000***	0.746

MEAS and its subscales	Pre-test		Post-test		t	p	d
	Mean	SD	Mean	SD			
California Critical Thinking Disposition Scale	222.52	24.82	238,90	24.03	3.774	0.000***	0.670
Seeking truth	32.83	8.22	35.71	7.43	1.888	0.064	0.367
Open-mindness	28.69	6.62	30.63	10.05	1.247	0.218	0.228
Analyticity	44.37	6.78	47.89	5.46	2.950	0.005**	0.572
Systematicity	34.62	6.54	34.59	6.16	0.024	0.981	0.005
Self-confidence	40.24	7.71	44.33	6.03	2.908	0.005**	0.592
Inquisitiveness	41.74	9.35	45.72	7.00	2.568	0.013*	0.483
Nurses Professional Values Scale	104.67	16.09	114.27	11.03	3.433	0.001**	0.700
Care	60.10	9.68	66.05	7.81	3.405	0.001**	0.677
Professionalism	32.01	5.54	34.39	3.66	2.541	0.014*	0.509
Confidence	12.55	2.22	13.82	1.54	3.295	0.002**	0.669
Nursing Students Professional Behaviors Scale	113.12	15.72	121.58	12.56	3.321	0.002**	0.594
Health-care practices	77.03	10.36	81.00	9.76	2.245	0.029*	0.394
Activity practices	28.20	4.95	31.25	3.09	3.965	0.000***	0.739
Reporting	7.87	1.81	9.32	0.96	5.161	0.000***	1.004

Mean: Average, SD: Standard Deviation
*t: Paired t-test, *p<0.05, **p<0.01, ***p<0.001, d: effect size*

4. DISCUSSION

Considering the importance of nursing and its contribution to the health system – and in order to make those contributions visible and improve nursing-related reports – nurses need to be entrepreneurial, adopt technological advances, and follow the world agenda closely (5). When technology is used correctly within nursing education, it supports an effective classroom environment and clinical learning. Learning; the millennial generation is particularly open to new educational methods (8).

Considering that web-based teaching can be conducted regardless of temporal and spatial restrictions (4,29) and enables individual learning (29), it is thought that students will follow the course according to their own learning speed (29,30), and their participation within an environment in which they feel comfortable will facilitate their learning. It is one of the aims of those institutions that provide nursing undergraduate education in Turkey to determine the nursing care needs of healthy or sick individuals in every environment, as well as to educate professional nurses who can plan, implement, and evaluate the nursing care necessary for meeting these requirements to professional standards (15). In order to be able to use the nursing process effectively and correctly in their professional lives, nursing students must correctly and effectively use the nursing process in clinical practice, starting with their undergraduate education (31).

In the current study, the total mean score of students' professional values was determined as being 104.67±16.09 in the pretest and 114.27±11.03 in the posttest, and this difference was found to be statistically significant. Consequently, it can be suggested that case-based teaching has a positive effect on students' professional values. One of the education methods recommended for the improved education of nurses is the case-based teaching method (32). Case-based teaching is a method based on the realization of learning by analyzing a previously prepared situation, one that has already been experienced or that is likely to be experienced. This method is based on the theory of "constructivism" (33), and facilitates student-centered learning, strengthens individual decision-making, and it is supported by studies in the literature (34,35). It was also seen that the score increase in the NPVS-R scale sub-dimensions—those of care, professionalism, and confidence—was also statistically significant. The current study also showed that case-based teaching had a positive effect on these results, and that it is effective for helping nurses to reflect on the facts and act professionally. Furthermore, it is stated that the case-based teaching method is enjoyable and strengthening, that it improves skills and diagnostic ability, reduces stress levels, and supports the gaining of professional competence (36). Moyo et al. (2016) reviewed 50 studies on the personal and professional values of nurses, doctors and other healthcare professionals. They reported that the professional values of healthcare professionals were related to their critical thinking skills, problem-solving skills, and professionalism (37). Professional values also affect the problem-solving and critical-thinking skills of nurses, and therefore have a significant effect on the quality of care provided (38). In the current study, the total mean score of professional behaviors of the students was determined as 113.12±15.72 in the pretest and 121.58±12.56 in the posttest; the difference between these two values – and the score increase in the sub-dimensions of healthcare practices, activity practices, and reporting – were also found to be statistically significant. According to case-based teaching, nursing students can the technique being taught, look integrally, and conduct in-depth learning by discussing the technique with their instructor (39).

The effect of case-based teaching on the persistence of knowledge in nursing is also mentioned (40), and it is explained that critical-thinking skills and problem-solving skills develop faster in teamwork trainings (12). In the current study, it was discovered that the problem-solving skill levels of the students increased (p<0.01) after training had been given through case-based education as part of the distance-education process, and so it can be concluded that the method used was effective. Other studies note that the use of case-based teaching method is recommended

for the development of problem-solving skills (33). Case-based learning is involves team working (12) while also being a method based on problem-solving (33). A nurse must be able to cope with nursing problems and identify complex patient-care needs. They need to develop critical-thinking and problem-solving skills to identify patient care needs and provide systematic care (41). In order to achieve this, it is suggested that the application of case-based teaching—a method that develops critical thinking—instead of traditional teaching methods will prove more effective. The current study also determined that students' total mean critical-thinking skills score was 222.52±24.82 in the pretest and 238.90±24.03 in the posttest, and that this difference was statistically significant. Furthermore, it was discovered that the score increase in the analyticity, self-confidence, and inquisitiveness sub-dimensions of the CCTDS scale was also a statistically significant. It seems that the method used is effective in increasing of critical thinking skills. The level of critical thinking should reflect students' ability to question, research, analyze, and work out the clinical situation they face, or else their clinical decision-making that is, in practice, related to these skills in the nursing discipline. In nursing, it is important for students to gain the ability to think critically (34,35); this is because nurses should be able to solve patient problems, an ability that can be gained during student life (42). A nurse who can think critically will be able to solve problems more easily and produce faster and more accurate solutions to the problems of their patient. For this reason, students should learn to think critically throughout the education period, and should be able to solve problems using this ability (43). Furthermore, nurses should be able to think critically, seek information, question, find solutions to problems, and have social sensitivity in order to respond to the health needs of the society (44). It was seen that critical thinking significantly affected the perception of nursing care (45) and that it increased the quality of care (46). Studies in the literature suggests that case-based teaching increases critical thinking in nursing students (32,33,36,47).

Case-based teaching also involves teamwork as it is planned in groups. Therefore, it is reported that both critical thinking (47) and a sense of self-efficacy can be developed when using the case-based teaching method (13). It is also noted that the improvement in self-efficacy perception in nurses positively reflects on clinical practices and the development of management skills, and self-efficacy should be supported during student life in order to increase the student's self-efficacy (48). It is also emphasized that, as the experience in nursing increases, self-efficacy also increases and that the teaching method used for self-efficacy development is important (49).

The current study also determined that the total mean score of the students' self-directed learning skill (103.98±22.64) after the practice was higher than the pre-practice value (97.68±19.05), and that this difference was statistically significant ($p< 0.01$). Therefore, it can be argued that nursing process education supported by online case discussions is effective in increasing students' self-directed learning skills. Student readiness is also considered to be important for the successful realization of e-learning practices, which are rapidly becoming more pervasive in education and training applications. It is noted that student readiness is influences factors such as self-orientation and interaction with the learning environment (50). In the current study, the score increase in the seeking help ($p< 0.01$), self-study strategies ($p< 0.05$), and managing the physical environment ($p< 0.01$) sub-dimensions of the scale were also found to be statistically significant. In order for the individual to be ready for self-directed learning, and for them to be able to acquire self-learning skills, it is necessary to have an academic background in a certain area (51). It is also reported that knowledge has a positive effect on increasing self-efficacy (52). The high level of knowledge and skills of a nursing student supports their self-confidence and greater clinical compliance (32). In addition, it was reported that self-efficacy skills could be improved via e-learning methods (53). The communication skills, success, and motivation of nurses can also be improved by increasing nurses self-efficacy (54).

In an information society, there are certain characteristics that individuals should possess: problem solving, critical thinking, questioning, information literacy, effective communication and collaboration skills, entrepreneurship, etc. To ensure students gain these characteristics, individuals of the information society should be equipped with those skills they need to access information, instead of information being directly transferred to them. In this context, learners who can manage their own learning processes and meet their own learning needs are therefore required (55).

5. CONCLUSIONS

After online case-based teaching practice, the difference in the total mean scores of all students in all scales was found to be statistically significant ($p< 0.01$). After the training have been provided with case-based education via the distance education process, the scoring average of students' professional values, professional behaviors, problem-solving, critical-thinking, and self-directed learning increased. All study hypotheses (H_1, H_2, H_3, H_4, H_5) have therefore been accepted. Use of online case-based teaching is useful in increasing nursing students' nursing skills in distance education. It is therefore important to use new approaches that improve professional skills in nursing education.

One of the limitations of the research is that the data was collected through online forms instead of face-to-face interviews due to the social distance rule and curfews after the COVID-19 pandemic process during the research phase. Another limitation in terms of generalization of the research results is that the results of the research include 3rd grade students of the nursing department of a school selected for the sample group.

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