

## Original Article

# The Effect of Web-Based Education on Teaching the Nursing Process: A Quasi-Experimental Study

**Zaybak Ayten, PhD, RN**

Ege University, Nursing Faculty, Izmir, Turkey

**Gunay Ismailoglu, Elif, PhD, RN**

Izmir Bakircay University, Faculty of Health Science, Department of Nursing, İzmir, Turkey

**Ozdemir Handan, PhD, RN**

Burdur Mehmet Akif Ersoy University, Faculty of Health Sciences, Department of Nursing, Burdur, Turkey

**Ahmet Erol, PhD, RN**

Batman University, Faculty of Health Science, Department of Nursing, Batman, Turkey

**Ece Kurt, MSc RN**

Cukurova University, Faculty of Health Sciences, Adana, Turkey

**Correspondence:** Ahmet Erol (PhD RN), Batman University, Faculty of Health Science, Department of Nursing, Batman, Turkey. E-mail address: ahmet.erol630@gmail.com

This study was supported by Ege University Scientific Research Projects (Grant number 49.101.2017.0014).

### Abstract

**Aim:** This study aimed to investigate the effects of web-based education on nursing students' learning of the nursing process.

**Method:** The study was conducted in a nursing faculty. The population of the study consisted of 90 students. The control and implementation groups were determined by drawing lots. The traditional classroom education method was used in the control group for teaching the nursing process. In the implementation group, web-based education was used in addition to traditional classroom education. "Identification Form", "Nursing Process Knowledge Form", "Visual Analog Scale", "Nursing Process Assessment Form" and the software program developed on the web were used to collect data. Means, standard deviation, number, percentile, independent two samples t-test, Mann-Whitney U test, chi-square test and Brunner-Langer test were used in the analysis of the data.

**Results:** The mean age of students was  $20.77 \pm 2.25$  in the implementation group and  $20.70 \pm 1.35$  in the control group. Of the students, 77.3% in the implementation group and 89.1% in the control group were females. According to 63.3% of the students, the nursing education they received was sufficient. The students in the implementation group were satisfied with the education method used in teaching the nursing process ( $p < 0.005$ ) and their nursing process application skill scores were higher than those of the students in the control group.

**Conclusion:** The web-based education positively contributed to nursing students' learning of the nursing process and improved the nursing process application skills of the students in the implementation group at higher levels.

**Keywords:** Nursing Process; Web-Based Education; Nursing

### Introduction

Effective nursing care is carried out with the nursing process (NP), which is a systematic and planned process that brings the problem-solving approach to guide the nurses in caring

for patients effectively (Cicek and Ozdemir, 2016; Cruz et al., 2016; Melin-Johansson et al., 2017). NP, which guides nurses in making planned and purposeful decisions, brings a scientific identity to nursing practices. The use of NP in patient care creates the

opportunity to provide person-centered, holistic, and individualized care (Melin-Johansson et al., 2017). In addition, NP has many other benefits such as using time more effectively, establishing written resources and evidence for nursing education and research, making nursing services visible and improving communication among team members (Cruz et al., 2016; Rivas et al., 2016). Nurses are expected to possess the necessary knowledge and skills that are acquired throughout nursing education to use the NP practices (Uysal et al., 2016). However, previous studies reported that nursing students have problems in the implementation of NP, that nursing students who are trained in NP have difficulty in preparing the care plan and that they cannot follow through with the plan until the implementation stage (Basit and Korkmaz, 2021; Taskin Yilmaz et al., 2015; Turen et al., 2017). In addition, it was determined in previous studies that students are not able to perform the steps of data collection, determining the nursing diagnoses, identifying descriptive features, related factors, and result criteria, planning and assessment as desired (Tambag and Can, 2014; Uysal et al., 2016; Zaybak et al., 2016).

The institutions that provide nursing education in XXX utilize the traditional method in the teaching and implementation of NP. In this method, students develop their care plans on paper. However, the care plans prepared this way cannot attain the desired level/quality and problems were reported such as lack of student interest in writing (Basit and Korkmaz, 2021). Therefore, it is important to use different methods in teaching NP besides traditional teaching methods. Computer assisted and web-based learning strategies and various technology supported learning approaches are now common in all fields of education (Haleem et al., 2022; Kuruca Ozdemir and Dinc, 2022; Schneider et al., 2022). In this respect, web-based education may be an alternative method that can be used in teaching NP (Kim and Jung, 2016). Studies conducted in this field suggest that preparing NP in electronic media has several benefits such as saving time, improving the quality of care, improving the quality and quantity of records, supporting clinical decision making by increasing critical thinking and making

nursing practices more visible (Rivas et al., 2016). At the same time, it is argued that web-based teaching methods will be effective in increasing students' interest in NP and enhancing their learning of the NP since the use of technology is very common among university students. Lee and Noh's study reported that web-based NP system ensures better teaching of NP by reducing nursing students' stress and anxiety levels (Lee and Noh, 2016).

It is observed that NP is not used effectively in health care areas (Mwangi et al., 2019; Osman et al., 2021; Tadzong-Awasum et al., 2022; Zerihun et al., 2022). Nursing programs have a great responsibility in solving this issue. The results of previous studies emphasized the importance of training students on NP so that NP can be used effectively in health care areas (Mangare et al., 2016; Rajabpoor et al., 2018). Along with the change in the educational methods that have transformed parallel to the development of technology, web-based education is now among the current education methods which can be used in nursing education programs with success (Dikmen et al., 2015; Kim and Jung, 2016). Studies conducted in the field demonstrated that web-based education is used to increase students' skill levels and reduce stress (Lee and Noh, 2016; Ozturk and Dinc, 2014; Sowan and Idhail, 2014). A study conducted on students determined that using web-based education in teaching NP increases student satisfaction regarding clinical practices and proves beneficial for students in terms of learning (Lee and Noh, 2016). Kim and Jung stated that web-based education is effective for students to learn NP (Kim and Jung, 2016). In Turkiye, the study conducted by Dikmen et al. concluded that the computer assisted NP system has effects such as establishing an evidence base, ensuring effective communication within the healthcare team, using the time effectively and reducing workload (Dikmen et al., 2015).

This study aimed to examine the effect of web-based education on nursing students' learning NP.

## **Method**

**Study Design:** This semi-experimental study was designed with pre and posttest to examine

the effect of web-based education on nursing students' learning NP.

**Study Setting and Sample:** The research was conducted in a nursing faculty in a province of Turkey during 2018-2019 academic year. Written consent was received from the institutional ethics committee (Reference number (92112210-050.05.04)). The study sample consisted of 90 students selected from among the second-year students in the institution where the research was conducted (N=281). In the institution, students start clinical practice for the first time in their second year. The students were informed about the research and their written informed consent was obtained.

The participants were selected from the students who were not previously trained on NP, who did not have any clinical experience and who agreed to participate in the research. Students in the study sample were included in the control (n=46) and implementation (n=44) groups determined by drawing lots. Students cared for inpatients in internal and surgical clinics. The power of the study was calculated as 95% according to the power analysis performed to determine the control and implementation groups.

**Data Collection Tools:** "Identification Form", "Nursing Process Knowledge Form", "Visual Analog Scale", "Nursing Process Assessment Form" and the software program developed on the web were used to collect data.

**Identification Form:** The form consists of items to determine the introductory characteristics of students such as age, gender and whether they regard the level of nursing education they receive as adequate.

**Nursing Process Knowledge Form:** The form, developed by the researchers in line with the literature to determine the level of student knowledge on the NP (Biol, 2016; Bozkurt et al., 2017; Cicek and Ozdemir, 2016; Potter et al., 2015), consists of 20 items. Each question is 5 (five) points and the total score of the test varies between 0-100. Higher scores point to a higher level of knowledge about NP. Expert opinions were sought regarding content and clarity before the Nursing Process Knowledge Form was implemented. (Experts consisted of academicians who completed their doctorate education in the Fundamentals of Nursing Department.)

**Visual Analog Scale (VAS):** Student satisfaction with the teaching methodology was evaluated on VAS which uses a 10cm horizontal line marked with endpoint descriptions. Students marked the given scale from 0 to 10 (0cm=very dissatisfied, 10cm=very satisfied) to express their satisfaction or dissatisfaction.

**Nursing Process Assessment Form:** The form developed by the researchers consists of two sections. *The first section*, which includes items that focuses on students' opinions, experiences, and difficulties etc. about NP, is filled by the students. *The second section*, where the assessments about the nursing processes prepared by the students after the clinical practices are recorded, is filled by the researcher. This section includes items to assess student competences in stages during NP such as collecting data, identifying the etiological factors and descriptive features of nursing diagnoses, determining the goals and interventions, and performing assessment correctly and adequately. Rubric evaluation was used to evaluate the nursing process. Students' competency levels were determined separately in each step of the nursing process. Each step of the nursing process was scored between 0 and 10 points, in which "0-3" points were evaluated as insufficient, "4-7" points as partially sufficient and "8-10" points as sufficient. The evaluator was an academician who completed her doctorate in the field of nursing principles and was informed of the patients followed by the students. However, while evaluating the nursing process of the student, the evaluator did not know whether the student was in the control or intervention group.

**Web-Based Teaching:** NANDA-I nursing diagnoses are used in nursing process practices in the educational institution where the study was conducted. The students included in the study were practicing in adult internal medicine and surgical clinics for clinical practice and preparing the nursing process. Therefore, 142 nursing diagnoses that are frequently used or likely to be used in these clinics were added to the web page. In addition, when the student wanted to determine a different diagnosis, he/she added it from the "other" option. In determining the diagnoses added to the web page, the nursing process assignments prepared by the students in clinical practice in previous years and the

literature on NANDA-I Taxonomy II, NOC, NIC based case examples were utilized. The identified nursing diagnoses were defined in different interfaces with their descriptive features and etiologic factors and transferred to the computer environment. In addition, examples of goals specific to these diagnoses and a list of nursing interventions were created by utilizing the relevant literature and made available to students. The automation system/software developed in this manner allowed students to access the nursing diagnoses, the descriptive features and etiological factors of these diagnoses, and the nursing interventions that should be applied in patients with these diagnoses. In addition, the web environment provided the standard data collection form and care plan forms developed according to functional health patterns used in clinical and field applications of our faculty in a way that students could have easy access to these forms.

**Creating the Web Page:** The web page which was used to teach the NP was created with the cooperation of a software developer who is an expert in the field and the researchers. The "web-based nursing process program" created in this manner included the steps of the NP: data collection, diagnosis, planning, implementation, and evaluation. After creating the web page, the researchers submitted it to expert opinion regarding its scope and comprehensibility. After the expert opinion, two (2) nursing diagnoses were added to the nursing diagnoses and the "other" option was added to the nursing interventions section, giving students the option to add interventions other than the interventions on the list. It was then made available to the students. Piloting was done with 10 nursing students who were not included in the study. Students were given a password to access the web page. Participating students had access to the web page from their mobile phones, tablets, or computers. When the students logged in to the web page, they first encountered the standard data collection form developed according to functional health patterns and used in the clinical practices of the faculty where the study was conducted. Students recorded their patient's data on this form. Then, they determined the nursing diagnoses, identified the etiologic factors and descriptive characteristics of each nursing diagnosis, determined the purpose and the

nursing interventions, recorded whether they implemented the planned nursing interventions, and finally evaluated the results of the care they provided. After entering all the information, they were able to follow the care plan of their patients online on the web page and download the final version of the care plan as a PDF printout.

Interfaces created for the web page used in web-assisted nursing process teaching are as follows: The interface where participants can register and perform activation procedures, the interface where the participant can log in to the system after registering, the interface where the participant will be reminded of forgotten passwords, the interface where participants are informed about the research, the interface to send a message to the researcher, the interface where the researcher can add files, the interface to report the information collected during the application, the interface with a list of nursing diagnoses, the interface with the etiology and descriptive features of the nursing diagnoses., the interface to determine the purpose of the nursing diagnosis, the interface with the list of nursing interventions, the interface to record the implementation status of nursing interventions and the interface for assessment.

**Data Collection Process:** The steps followed in this research are as follows:

#### **Step 1**

NP was theoretically explained to both control group and implementation group students at the same time followed by the presentation of a sample case. A single instructor taught the theoretical course and presented the sample case to eliminate differences in groups that may arise from using different instructors.

#### **Step 2**

"Nursing Process Knowledge Form" was given to both control group and implementation group students as pre-test at the beginning of the clinical practice to determine what they knew about NP.

#### **Step 3**

**Control group:** The traditional method used in the current program of teaching NP was used with the students in the control group. In this method, students were asked to prepare care plans for the patients they were responsible for during clinical practice. The care plans prepared by the students were evaluated by the instructor together with the student and feedback was provided. During

these clinical practices, each student prepared at least two care plans. Students were asked to interact with the educator at any time and their questions were answered.

**Implementation Group:** As in the control group, students in the implementation group were asked to prepare care plans during clinical practice. Feedback was given about the care plans prepared by the students. In addition, the students in the implementation group benefited from the NP implementation program created on the website.

#### **Step 4**

**“Nursing Process Knowledge Form”** was given to both control group and implementation group students as post-test at the end of the clinical practice along with the “Visual Analog Scale” and the “Nursing Process Assessment Form”. The nursing processes prepared by the students were evaluated by a single researcher.

**Data Analysis:** Data collected were evaluated with the Statistical Package for Social Science (SPSS) 25.0 program. Kolmogorov-Smirnov ( $n \geq 50$ ) test was used to examine the suitability of numerical variables for normal distribution. Means, standard deviation, number and percentile were used to analyze students' introductory information. Independent two samples t-test was utilized when the distribution was normal whereas Mann-Whitney U test was used when the distribution was not normal. Pearson chi-square test and Fisher exact chi-square test were used for categorical variables. Nonparametric Brunner-Langer test was used to evaluate the pretest and posttest scores in the implementation and control groups, and the significance test of the difference between the two averages was used to evaluate the difference between satisfaction scores. For statistical significance, p value was evaluated as 0.05.

**Research Ethics:** Written permissions were obtained from the scientific ethics committee (no: 92112210-050.05.04), the institution where the research was conducted, and the students participating in the research. After collecting the research data, the web page was opened to the control group to ensure that they could benefit from the same resource.

## **Results**

**Participants' Characteristics:** Of the 90 students included in the research, 44 were in the implementation group and 46 were in the control group. The mean age of students was  $20.77 \pm 2.25$  in the implementation group and  $20.70 \pm 1.35$  in the control group. Of the students, the rate of female students in female in the control group and the implementation group was 89.1% and 77.3%, respectively. The groups were statistically similar.

### **Evaluations of Students About Education:**

Of the participants, 63.3% stated that they found the training related to NP sufficient. In addition, students made the following suggestions: more sample cases related to NP education should be provided ( $n=5$ ), course hours for NP should be increased ( $n=2$ ), the lectures should be supported by a video demonstration when NP is taught ( $n=2$ ) and during internships, the intern should prepare a NP for a patient with the help of the instructor ( $n=1$ ). No significant differences were found between groups based on the analyses conducted to determine the homogeneity of the distribution of the introductory characteristics ( $p < 0.05$ ).

**Pre/Post-test scores:** Table 1 presents the pretest and posttest mean scores regarding students' level of knowledge on NP. In the analysis, it was observed that the change between the mean knowledge scores between the implementation and the control groups was not statistically significant (group  $p=0.27$ ), but time dependent progression was similar in these groups (interaction  $p=0.99$ ). In addition, the meantime effect (the difference between pre-test and post-test) was found to be significant (time  $p < 0.001$ ) (Table 1).

### **Findings Related to Students' Nursing Process Implementation Skills:**

The analysis conducted with the findings obtained based on students' sufficiency in the implementation steps of NP demonstrated a statistically significant difference between control and implementation groups in terms

of data collection ( $\chi^2=14.486$ ,  $p<0.05$ ) and determination of nursing diagnoses ( $\chi^2=23.647$ ,  $p<0.05$ ) (Table 2).

**Nursing Process Assessment:** Table 3 presents students' opinions, experiences, and difficulties regarding NP following the clinical practice. Accordingly, it was determined that the difference between the control and implementation groups was not statistically significant in terms of time spent by students preparing the NP and in terms of distinguishing, expressing, and prioritizing nursing diagnoses and accessing the resources ( $p>0.05$ ).

However, when the distribution of students was examined according to whether they thought the use of NP in clinical areas was practical and useful, it was found that 95.5%

of the students in the implementation group and 69.6% of the students in the control group thought that the use of the NP was practical and useful. The analysis conducted in this framework demonstrated a significant difference between the control group and the implementation group ( $\chi^2=10.197$ ,  $p<0.05$ ).

**Satisfaction Score:** Students' mean satisfaction scores regarding the teaching of the NP were determined as  $7.61\pm 1.64$  for the implementation group and  $6.57\pm 1.77$  for the control group. The Mann-Whitney-U test showed a statistically significant difference between the groups ( $Z=-2,719$ ,  $p<0.05$ ) and it was determined that the satisfaction levels of the students in the implementation group were higher.

**Table 1. Distribution of Pretest and Posttest Knowledge Scores on the Nursing Process of Students**

Variable	Time	Pre-test and Post-test Knowledge Scores				Statistical analysis
		Implementation group		Control group		
		M ± SD (n=44)	Median [Min; Max]	M ± SD (n=46)	Median [Min; Max]	P
Variable	Pre-test	53.4 ± 7.83	55 [35:65]	52.17 ± 6.88	55 [35:65]	Interaction effects:0.99 Group: 0.27 Time<0.001
	Post-test	76.25 ± 8.96	80 [45:90]	74.78 ± 11.92	75 [45:95]	

Note. M=mean, SD= standard deviation

**Table 2. Distribution of Findings Related to Students' Nursing Process Implementation Skills**

Nursing Process Application Steps		Groups				Statistical analysis
		Implementation		Control		
		n	%	n	%	
Data Collection	Insufficient	0	0.0	3	6.5	$\chi^2 = 14.486$ $p = 0.001^*$
	Partially sufficient	18	40.9	33	71.7	
	Sufficient	26	59.1	10	21.7	

	<b>Insufficient</b>	2	4.5	1	2.2	
<b>Identification of the nursing diagnosis</b>	<b>Partially sufficient</b>	10	22.7	34	73.9	$x^2 = 23.647$ $p = 0.000^*$
	<b>Sufficient</b>	32	72.7	11	23.9	
	<hr/>					
<b>Planning</b>	<b>Insufficient</b>	5	11.4	10	21.7	$x^2 = 3.239$ $p = 0.198^*$
	<b>Partially sufficient</b>	11	25.0	15	32.6	
	<b>Sufficient</b>	28	63.6	21	45.7	
<hr/>						
<b>Implementation</b>	<b>Insufficient</b>	2	4.5	3	6.5	$x^2 = 5.566$ $p = 0.062^*$
	<b>Partially sufficient</b>	21	47.7	32	69.6	
	<b>Sufficient</b>	21	47.7	11	23.9	
<hr/>						
<b>Evaluation</b>	<b>Insufficient</b>	6	13.6	7	15.2	$x^2 = 1.622$ $p = 0.444^*$
	<b>Partially sufficient</b>	20	45.5	26	56.5	
	<b>Sufficient</b>	18	40.9	13	28.3	
<hr/>						
<b>Total</b>		44	100	46	100	

*\*Pearson Chi-Square Test*

**Table 3. Students' Opinions, Experiences, and Difficulties About the Nursing Process Following Clinical Practice**

<b>In Nursing Process Application</b>	<b>Groups</b>				<b>Statistical</b>	
	<b>Implementation</b>		<b>Control</b>			
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>		
<b>Time Spent</b>	<b>Less</b>	3	6.8	1	2.2	$x^2 = 1.337$ $p = 0.512^{**}$
	<b>Partly</b>	22	50.0	22	47.8	
	<b>Much</b>	19	43.2	23	50.0	
<hr/>						
<b>Expressing Nursing Diagnoses</b>	<b>Yes</b>	9	20.5	11	23.9	$x^2 = 0.156$ $p = 0.693^{**}$
	<b>No</b>	35	79.5	35	76.1	

<b>Distinguishing Nursing Diagnosis</b>	<b>Yes</b>	37	84.1	39	84.8	$\chi^2 = 0.008$
	<b>No</b>	7	15.9	7	15.2	$p = 0.928^{**}$
<b>Prioritizing Nursing Diagnoses</b>	<b>Yes</b>	33	75.0	34	73.9	$\chi^2 = 0.014$
	<b>No</b>	11	25.0	12	26.1	$p = 0.906^{**}$
<b>Accessing the Resources</b>	<b>Yes</b>	5	11.4	5	10.9	$\chi^2 = 0.005$
	<b>No</b>	39	88.6	41	89.1	$p = 1.000^{***}$
<b>Practical and Useful</b>	<b>Yes</b>	42	95.5	32	69.6	$\chi^2 = 10.197$
	<b>No</b>	2	4.5	14	30.4	$p = 0.002^{***}$
<b>Total</b>		44	100	46	%100	

*\*\*Pearson Chi-Square Test, \*\*\*Fisher's Exact Test*

## Discussion

The Nursing Information System is the computer system that manages the patient information required for nursing. The information system for the NP is important to improve the quality of nursing care and to provide nurses with a professional identity (Kim and Jung, 2016). Preparation of NP in computer media is also included in information systems. It is known that nurses prepare NP aided by computers. However, it is known that traditional methods are still used in nursing education. Therefore, this study aimed to establish and utilize a computer-based NP to improve the quality of care by presenting nursing care with a systematic approach with the understanding that NP is fundamental in nursing services.

### Pre/Post-test scores

One of the ways to increase the number of nurses who use the NP in practice is to train nurses who understand the philosophy of the NP and know how to apply it in basic nursing programs (Zaybak et al., 2016). As a result of this research, a statistically significant difference was found between the pre-test and post-test knowledge scores of both implementation and control group students. Based on this finding, it can be argued that

both web-based education and traditional education increase the knowledge level of students regarding the NP. In their study, Zaybak et al. reported a lack of information on the part of students about all stages of the NP (Zaybak et al., 2016). Akansel and Pallos's study concluded that although the students knew about the NP, they had problems in practice (Akansel and Pallos, 2020). The findings in this study that the knowledge levels of the students in both groups increased significantly and that there was no difference between the groups demonstrated that both methods of teaching were effective for students to gain theoretical knowledge in the NP. On the other hand, this finding (no significant differences between the groups) may be considered as an expected outcome since all students in the sample were provided with theoretical knowledge about the subject and since both methods used in this study focused on the steps of NP implementation and the points to be taken into consideration.

### Student Skills in Implementing the Nursing Process

The NP is a series of actions that involve the steps designed for specific purposes related to the health of the individual. Defining the problems faced by the healthy/sick individual,



and planning, implementing, and evaluating the necessary nursing interventions are the NP steps. These steps ensure the delivery of holistic nursing care that forms the basis of quality nursing care (Abdelkader and Othman, 2017). Therefore, students are expected to be competent at each step of the NP. This study found that the students who prepared the NP with web-based were more sufficient in data collection and in identification of the nursing diagnosis compared to the students in the control group ( $p < 0.05$ ). While the level of competence was higher in the implementation group regarding planning, implementation and evaluation steps, there was no statistical difference ( $p > 0.05$ ) between the two groups. The level of student competence in implementing the steps of the NP process were found to vary between 40.9% to 72.7% in the implementation group and between 21.7% and 45.7% in the control group. Previous studies reported that students who traditionally prepared NPs were inadequate and faced problems generally in collecting data and determining the nursing diagnoses (Tambag and Can, 2014; Taskin Yilmaz et al., 2015; Uysal et al., 2016; Zaybak et al., 2016). Basit and Korkmaz determined that the students who prepared web-based NPs developed better care plans and planned more nursing interventions (Basit and Korkmaz, 2021). The finding in this study that the students in the implementation group were more successful in the diagnosis and identification of the nursing diagnoses may be related to the fact that they were able to access data collection form, functional health patterns, nursing diagnoses, the descriptive features of the diagnoses and the related factors any time and place (via computer or mobile phone).

#### ***Views on the implementation of NP***

In this study, the students in the implementation group stated in higher rates that using the NP was practical and useful. While the students in the implementation group selected the nursing diagnoses from the system interface offered by the web-based NP application, the control group students selected the nursing diagnoses from written sources. This practice is believed to have been effective in implementation group students' statements that focused on the

practicality of using the NP. On another positive note, it was found that many of the students in both groups who implemented the NP for the first time faced no problems. Dalcali reported that nursing students could not adequately determine nursing diagnoses and mistook nursing diagnosis for medical diagnosis (Dalcali, 2021). Bolukbas et al. stated that although the students could determine the nursing diagnoses, the rates of correct nursing diagnoses were not at the desired level and they concluded that the studies in clinical settings should be increased (Bolukbas et al., 2020). In line with the research findings, it can be argued that using web-based NP is an effective method in helping students identify nursing diagnoses and determine the order of priority, and that students find the NP practical and useful with this method. Considering that web-based teaching is independent of time and space and provides easy and individualized learning (Oz and Ordu, 2021), it is believed that learning in their own speed by participating in the course from a place where they feel more comfortable facilitates students' learning. Almeida et al. stated that the Computerized Nursing Process System meets the ergonomic and usability standards specified by ISO (Almeida et al., 2016).

#### ***Satisfaction Score***

It is very important to evaluate the quality of new learning environments. Quality, which can be defined in many ways, can refer to usability, effectiveness, and satisfaction in the context of education. Student satisfaction is one of the most important issues in evaluating the learning environments (Jung, 2014). This study concluded that the students in the implementation group were more satisfied with the education provided to them regarding NP compared to the students in the control group. This finding supports, the results of the research reporting that students who practiced NP with web-based teaching found the application to be practical and useful at higher rates. Satisfaction is one of the most desired results when applying new technologies and services (Jung, 2014). Satisfaction from web-based teaching is important since it positively contributes to their motivation in the hospital environment

and ensures provision of better-quality care to their patients.

**Limitations of the study:** Limitations of the study: (a) possible interaction between intervention and control groups as they were classmates. (b) selecting specific clinics rather than all clinics. (c) the patient profile is not standardized.

**Conclusion:** Based on the results of this research, it was found that web-based education had a more positive effect on students' skills to implement the NP and on their level of competence in "data collection" and "determination of nursing diagnoses" steps of the NP. In addition, it was determined that the students were more satisfied with the web-based education method compared to other methods. It is recommended to use web-based education as a supporting method for traditional education methods, to carry out studies that focus on the effects of web-based education on students' NP implementation skills during their clinical performances and to conduct studies that compare web-based education with other training techniques such as standard training with a patient, video assisted training etc. as well as studies that investigate the effects of web-based education on NP implementation skills of students with varying degrees of experience.

**Implications for Nursing Practice:** While teaching the NP to students, it is necessary to use web-based teaching methods as well as traditional methods. Thus, the student can better understand the NP and give nursing care systematically. This increases the visibility and quality of care.

## References

- Abdelkader, F.A., Othman, W.N., (2017). Factors affecting implementation of nursing process: nurses' perspective. *IOSR Journal of Nursing and Health Science (IOSR-JNHS)* 6, 76–82. <https://doi.org/10.9790/1959-0603017682>
- Akansel, N., Pallos, A., (2020). Difficulties Experienced by Nursing Students in The Development of Nursing Care Plans: Root Cause Analysis. *Acibadem University Journal of Health Sciences* 11, 269–275. <https://doi.org/10.31067/0.2020.265>
- Almeida, S.R. de W., Dal Sasso, G.T.M., Barra, D.C.C., (2016). Computerized nursing process in the Intensive Care Unit: Ergonomics and usability. *Revista da Escola de Enfermagem da USP* 50, 996–1002. <https://doi.org/10.1590/S0080-623420160000700017>
- Basit, G., Korkmaz, F., (2021). The Effect of Web-Based Nursing Process Teaching on Senior Nursing Students' Care Planning Skills. *Int J Nurs Knowl* 32, 4–19. <https://doi.org/10.1111/2047-3095.12283>
- Birol, L., 2016. *Nursing Process*. Etki Publications, İzmir.
- Bolukbas, N., Irmak, B., Bulut, G., Ozdemir, D.A., Bayrak, H.Y., (2020). Evaluation of Nursing Diagnoses and Interventions Determined by Students in Surgical Diseases Nursing Summer Internship Files. *Ordu University Journal of Nursing Studies* 3, 1–9. <https://doi.org/10.38108/ouhcd.715689>
- Bozkurt, G., Duzkaya, D.S., Terzi, B., (2017). Implementation of the Nursing Process. *Clinical Decision-Making Process*. Nobel Medicine publishing, İstanbul.
- Cicek, H.S., Ozdemir, L., (2016). *Planning Nursing Care Incredibly Easy*. Nobel Medical Publisher, Ankara.
- Cruz, D. de A. da L.M., Guedes, E. de S., dos Santos, M.A., de Sousa, R.M.C., Turrini, R.N.T., Maia, M.M., Araújo, S.A.N., (2016). Nursing Process Documentation: Rationale and Methods of Analytical Study. *Rev Bras Enferm* 69, 183–189. <https://doi.org/10.1590/0034-7167.2016690126i>
- Dalcali, B.K., (2021). Determining the Problems Experienced by Intern Nursing Students During the Practice of Nursing Process. *Health Academy Kastamonu* 6, 92–106. <https://doi.org/10.25279/sak.685713>
- Dikmen, Y., Ak, B., Yorgun, S., (2015). From Theory to Practice: Application of Computer Aided Nursing Process. *Journal of Human Rhythm* 1, 162–167.
- Haleem, A., Javaid, M., Qadri, M.A., Suman, R., (2022). Understanding the Role of Digital Technologies in Education: A Review. *Sustainable Operations and Computers* 3, 275–285. <https://doi.org/10.1016/j.susoc.2022.05.004>
- Jung, H.J., (2014). Ubiquitous learning: Determinants impacting learners' satisfaction and performance with smartphones. *Language, Learning and Technology* 18, 97–119.
- Kim, H.S., Jung, H.S., (2016). Development of comprehensive web-based learning nursing Process Program on Linked NANDA, NOC and NIC. *International Journal of Multimedia and Ubiquitous Engineering* 11, 207–214. <https://doi.org/http://dx.doi.org/10.14257/ijmu.e.2016.11.4.21> Development
- Kuruca Ozdemir, E., Dinc, L., (2022). Game-Based Learning in Undergraduate Nursing Education: A Systematic Review of Mixed-

- Method Studies. *Nurse Educ Pract.* <https://doi.org/10.1016/j.nepr.2022.103375>
- Lee, E., Noh, H.K., (2016). The Effects of a Web-Based Nursing Process Documentation Program on Stress and Anxiety of Nursing Students in South Korea. *Int J Nurs Knowl* 27, 35–42. <https://doi.org/10.1111/2047-3095.12072>
- Mangare, N.L., Omondi, A.L., Ayieko, O.A., Wakasiaka, S., Wagoro, M.C.A., (2016). Implementation of the Nursing Process in Naivasha District Hospital, Kenya. *American Journal of Nursing Science* 5, 152–157. <https://doi.org/10.11648/j.ajns.20160504.15>
- Melin-Johansson, C., Palmqvist, R., Rönnerberg, L., (2017). Clinical intuition in the nursing process and decision-making—A mixed-studies review. *J Clin Nurs* 26, 3936–3949. <https://doi.org/10.1111/jocn.13814>
- Mwangi, C., Meng'anyi, L.W., Mbugua, R.G., (2019). Utilization of the Nursing Process among Nurses Working at a Level 5 Hospital, Kenya. *International Journal of Nursing Science* (2019). 1–11. <https://doi.org/10.5923/j.nursing.20190901.01>
- Osman, W., Ninnoni, J.P.K., Anim, M.T., (2021). Use of the Nursing Process for Patient Care in a Ghanaian Teaching Hospital: A Cross Sectional Study. *Int J Afr Nurs Sci* 14. <https://doi.org/10.1016/j.ijans.2021.100281>
- Oz, G.O., Ordu, Y., (2021). The Effects of Web Based Education and Kahoot Usage in Evaluation of the Knowledge and Skills Regarding Intramuscular Injection Among Nursing Students. *Nurse Educ Today* 103. <https://doi.org/10.1016/j.nedt.2021.104910>
- Ozturk, D., Dinc, L., (2014). Effect of web-based education on nursing students' urinary catheterization knowledge and skills. *Nurse Educ Today* 34, 802–808. <https://doi.org/10.1016/j.nedt.2013.08.007>
- Potter, P., Perry, A.G., Stockert, P., Hall, A., (2015). *Fundamentals of Nursing*, 8th ed. St Louis: Mosby Yearbook Inc.
- Rajabpoor, M., Zarifnejad, G.H., Mohsenizadeh, S.M., Mazloum, S.R., Pourghaznein, T., Mashmoul, A., Mohammad, A., (2018). Barriers to the Implementation of Nursing Process from the Viewpoint of Faculty Members, Nursing Managers, Nurses, and Nursing Students. *Journal of Holistic Nursing and Midwifery* 28, 137–142. <https://doi.org/10.29252/hnmj.28.2.137>
- Rivas, F.J.P., Martín-iglesias, S., Arenas, J.L., Minguet, C., Lagos, M.B., (2016). Effectiveness of Nursing Process Use in Primary Care. *Int J Nurs Knowl* 27, 43–48.
- Schneider, M.B., Hoffman, S.J., Mann, E., Miko, S., (2022). Examining Web-Based Learning to Enhance Nurse Training and the Standardization of Clinical Practice Within Complex Global Nursing Systems: A Quality Improvement Case Study. *J Nurses Prof Dev* 38, 66–70. <https://doi.org/10.1097/NND.0000000000000846>
- Sowan, A.K., Idhail, J.A., (2014). Evaluation of an interactive web-based nursing course with streaming videos for medication administration skills. *Int J Med Inform* 83, 592–600. <https://doi.org/10.1016/j.ijmedinf.2014.05.004>
- Tadzong-Awasum, G., Ghislaine, M.M., Adelphine, D., Boris, K.A., Seraphine, M.N., (2022). Nurses' Experiences with the Adoption and Use of the Nursing Process in Four Urban Hospitals. *Int J Afr Nurs Sci* 16. <https://doi.org/10.1016/j.ijans.2022.100411>
- Tambag, H., Can, R., (2014). Evaluation of the Nanda Nursing Diagnoses Level of Determining in Nursing Students During Application of the Psychiatric Nursing Course. *Yıldırım Beyazıt University Nursing E-Journal* 2, 12–20.
- Taskin Yilmaz, F., Sabanciogullari, S., Aldemir, K., (2015). The Opinions of Nursing Students Regarding the Nursing Process and Their Levels of Proficiency in Turkey. *J Caring Sci* 4, 265–275. <https://doi.org/10.15171/jcs.2015.027>
- Turen, S., Cetinkaya Isik, F., Uzun Morgul, N., Atakoglu, R., (2017). Nursing Diagnoses for Heart Failure Patients in Coronary Care Unit and Evaluation of NANDA Compliance. *Journal of Cardiovascular Nursing* 8, 115–120. <https://doi.org/10.5543/khd.2017.18199>
- Uysal, N., Gurol Arslan, G., Yilmaz, I., Yelkin Alp, F., (2016). Nursing diagnosis and analysis of data in second year students' nursing care plans. *Celal Bayar University Health Sciences Institute Journal* 2, 139–143.
- Zaybak, A., Gunay Ismailoglu, E., Ozdemir, H., (2016). Examining the Difficulties Experienced by Nurses in The Nursing Process Applications. *Anatolian Journal of Nursing and Health Sciences* 19, 269–277. <https://doi.org/10.02.2016>
- Zerihun, E., Dechasa, A., Robi, M., Chaka, E.E., kune, G., (2022). Implementation of Nursing Process and Its' Associated Factors among Nurses' Working at Public Hospitals of Central Ethiopian, 2020; Institutional Based Cross-sectional Study. *Journal of Nursing and Practice* 5, 473–479. <https://doi.org/10.36959/545/422>