Original Article

Cultivating Innovative Behavior and Creative Thinking among Nursing Students: An Intervention Study

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Abstract

Background: As a part of the rapidly developing and changing healthcare system, nursing students need to be creative and innovative in order to adapt to change. Studies on innovation education are few in the literature. A literature search showed that there was no study examining the effect of the "Innovation in Nursing" course on the innovativeness and creative thinking among nursing students in Turkey.
Aim: To determine the effect of this course on the innovative behavior and creative thinking of nursing students.
Methodology: Innovation in Nursing Course, one of the elective courses in the fourth grade of the nursing program, was a 14-week course that was conducted through two contact hours per week. The experimental group was enrolled in the elective course of "Innovation in Nursing." The control group was enrolled in another elective course. Overall, 124 nursing students (63, experimental group; 61, control group) in the second year of university were included. The Individual Innovativeness and Creative Thinking scales were applied to the students at the beginning and end of the term. Statistical Package for Social Sciences 20 statistical package program was used for data analysis. Data were analyzed through descriptive tests, chi-squared test, the independent samples t-test and paired t-test using statistical package software.
Results: The post-test scores of individual innovativeness and creative thinking disposition of the students in the experimental group were found to be significantly higher than those of the students in the control group.
Conclusions: It was observed that the "Innovation in Nursing" course was effective in cultivating innovative behavioral characteristics and creative thinking disposition among students. The results of this study show that the "Innovation in Nursing" course can be used to increase the innovative behavioral characteristics and creative thinking disposition among nursing students.

Keywords: Innovation, Nursing Students, Education, Creative Thinking

Introduction

Innovation and creativity are concepts that are required in the nursing profession since a long time (Isfahani et al., 2015). Innovation has become very important in nursing and healthcare over the past few years (American Nurses Association, 2018; Johnson and Johnson Innovation, 2018). Innovation is the use of knowledge/thought that has the potential to bring about change so as to provide social benefit by converting it into different products, services, or processes (Demirel & Turan, 2020; Kemer & Altuntas, 2017; Taylor, 2017). Creativity or creative thinking, on the other hand, is a type of skill and behavior that can be improved with practice (Uludag & Uzun, 2018).

Innovation is also required for diagnosing diseases early, identifying and preventing risk factors, reducing re-hospitalizations, and improving patient care outcomes (Kartal & Kantek, 2018; Ozbey & Basdas, 2018). In order for nurses to respond to the needs of the individual in patient care, they need to be

innovative, transfer innovations to patient care, and fulfill their contemporary nursing roles with an innovative perspective (Afsar et al., 2018; White et al., 2016). Innovation is realized by making the creative idea visible and applicable (Dogan, 2017). Therefore, it is important for nurses to acquire creative thinking skills to be innovative, go beyond routine, and make appropriate decisions (Isfahani et al., 2015).

Nurses frequently encounter unexpected situations in their work (Isfahani et al., 2015). To identify and meet the needs in nursing services, it is crucial for nurses to have innovative thinking skills, be open to new ideas, and not oppose creative approaches (Demirel & Turan, 2020; Zuber & Moody, 2018). Nursing students should also be open to innovation and think of innovative solutions to effectively demonstrate their innovative skills during nursing education (Demirel & Turan, 2020). Moreover, students should develop creative thinking habits to assess their own ideas as well as those of their peers (Kampylis & Berki 2014). Duhamel (2016) states that creativity and creative problem solving increases the success of nursing students (Duhamel, 2016).

Background

To encourage nurses to become creative and innovative requires the incorporation of novel practices, such as courses and seminars to encourage students to take up such initiatives, in nursing education programs to support students' creative thinking and activities (Erol et al., 2018; Liu et al., 2020; Uludag & Uzun, 2018). Lecturers or trainers can develop students' creative thinking (Ma, Yang, Wang, & Zang, 2018) and, consequently, innovative behavioral traits using engaging, motivating, and inspiring activities. As per a systematic review by Chan (2013), to encourage creative thinking among nursing students, lecturers should design lessons that encourage active learning, thus enabling them to turn thoughts into action (Chan, 2013). In the study by Isik and Saygili (2015), the post-test scores of the students who took a creativity development course were higher than the pre-test scores, and their creative thinking skills had also developed. Another study involving teachers determined that individual innovation scores of the experimental group increased after innovation training (Akdeniz, 2020).

Studies have shown that the innovative characteristics of nurses and nursing students are low (Bodur, 2018; Celik et al., 2020; Erol et al., 2018) and their creativity is moderate (Martínez & Martínez, 2010; Turner & Wattanakul, 2016). Thus, it is important for nursing students to receive innovation education to develop individual innovativeness and creative thinking. This research was conducted to determine the effect of the "Innovation in Nursing" course on students' innovative behavior and creative thinking.

Study hypotheses:

H_1: The “Innovation in Nursing” course affects individual innovation levels among nursing students.

H_2: The “Innovation in Nursing” course affects creative thinking among nursing students.

Methodology

Study type: This study was a quasi-experimental study with control group pre-test/post-test design.

Location and characteristics of the study: This study included undergraduate nursing students who were in the second year of the Nursing Faculty of a university in the 2018–2019 academic year, and taking either the elective course on "Innovation in Nursing" or another elective course.

Population sample: The data of the study were collected from the faculty of nursing of a university in eastern Turkey. Students who were in the second year of a Nursing Faculty of a university in the academic year 2018–2019 and volunteered to participate in the study were included in this study. Randomization method was not used in the allocation of students to the groups. Sixty-three students were enrolled in the elective course of “Innovation in Nursing” in the academic year 2018–2019 and all the students agreed to participate in the study. The control group of the study consisted of 61 students studying in the second year, taking another elective course and agreeing to participate in the study**.** Two students who took the “Innovation in Nursing” course again and did not attend the course were excluded from the study. The study was completed with 124

students. After the study, power analysis was performed with G*Power software (version 3.1.9.2) and the power of the study was found to be 99% at p = 0.05 significance level and 95% confidence interval.

Study Variables

Dependent variables: Individual innovativeness scale and creative thinking scale

Independent variables: "Innovation in Nursing" course

Data Collection Tools

Personal Information Form: The form, prepared in line with the literature (Erol et al., 2018; Ertug & Kaya, 2017; Utli & Dogru, 2018) and developed by the researcher, encompasses questions including the students' age, gender, cumulative grade point average (CGPA), ability to define innovation, participation in a seminar/conference on innovation, family income level, place of residence, education status of the mother, and education status of the father.

Individual Innovativeness Scale (IIS): The scale was developed by Hurt, Joseph, and Cook (1977). The scale consists of 18 statements and rated by participants using a 5-point Likert scale from 1 "strongly disagree" to 5 "strongly agree." A minimum of 18 and a maximum of 90 points are obtained from the scale. According to the scores calculated on the scale, individuals are classified as Innovative (above 82 points), Adopter (75–82 points), Interrogator (66–74 points), Skeptic (58–65 points), and Traditionalists (below 57 points) (Hurt et al., 1977; Kemer & Altuntas, 2017). In this study, the Cronbach alpha value of the scale was found to be 0.81.

Marmara Creative Thinking Dispositions Scale: The Marmara creative thinking dispositions scale (MCTDS) was developed by Ozgenel and Cetin in 2017. The scale consists of 25 items is a 5-point Likert-type scale that includes the following ratings: (1) never, (2) rarely, (3) occasionally, (4) generally, and (5) always. A minimum of 25 points and a maximum of 125 points can be obtained using this scale. The higher the score on this scale, the higher the disposition to think critically. The Cronbach alpha value of the original scale was determined to be 0.87 (Ozgenel & Cetin, 2017). In this study, the Cronbach alpha value of the scale was found to be 0.96.

Collection of Data: The data of the study were collected via face-to-face interviews of 2nd year students who agreed to participate in the study. Before collecting data, the researchers explained the purpose, content, scope, duration of the study, and what was expected from the students, and written consent was obtained from the students. "Personal Information Form" and "IIS" and "MCTDS" were administered to the 2nd year students in the intervention group who took the elective course of "Innovation in Nursing" and students in the control group who took another elective course at the beginning and at the end of the term in the classroom environment. The students in the control group, who were not subjected to any intervention, filled in forms in the classroom environment at the beginning and end of the term. The data were filled in approximately 7–10 min.

Intervention: Innovation in Nursing Course: The course "Innovation in Nursing" is included in the second year of the program. The lesson was completed in 14 weeks (2 h a week). During the course, educational methods and techniques such as narration, discussion, question–answer, discussion, brainstorming, video discussions, and group sharing were used. Table 1 shows the content and process of the "Innovation in Nursing" course. In addition, students were asked to develop an innovative product and present the product they developed at the end of the term.

Evaluation of Data: Data analysis was performed using the Statistical Package for Social Sciences 20.00 program. Descriptive statistics such as percentages, arithmetic mean, and standard deviation were used to analyze the sociodemographic characteristics. Normality analysis of the data was performed using the Kolmogorov–Smirnov test and it was determined that the data were distributed normally. The Chi-squared test was used to compare descriptive features between groups. The independent samples *t*-test was used to compare the mean pre- and post-test scores between the two groups. Paired *t*-test was used to determine the relationship between the intragroup mean pre- and post-test scores of the control and experimental groups. Cronbach's alpha values of the scales were calculated. The data were evaluated at 95%

confidence interval and p <0.05 significance level.

Ethical principles: Before starting the study, approval was obtained from the Ethics Committee of the Nursing Faculty (Ethics No: 2018/10-15). Necessary explanations were provided to the students regarding the aim, method of application, and outcomes to be achieved; in addition, their verbal consent was obtained. The identity of the students and the information obtained from the surveys are confidential. Because individual rights must be protected in the study, the Human Rights Declaration of Helsinki was adhered to during the study.

Results

Comparison of age, gender, ability to define innovation, participation in a seminar/conference on innovation, family income level, place of residence, education status of the mother, and education status of the father, cumulative grade point average and mean age showed that there was no statistically significant difference between the groups (p > 0.05) (Table 2). The intragroup comparison of individual innovativeness mean scores of the two groups (Table 3) revealed that the mean IIS scores of the experimental group was 58.09 ± 8.06 before and 68.00 ± 7.92 after the course; this difference was statistically significant (p = .000). The mean pre-test score of the individual innovativeness was 59.09 ± 8.55 and post-test score was 60.62 ± 8.95 in the control group; this was statistically insignificant (p = 0.348; Table 3). Although there was no significant difference between the pre-test IIS scores of the control and experimental groups (p = 0.503), the difference between the mean post-test scores of the two groups was statistically significant (p = .000; Table 3).

According to the intragroup comparison of the mean creative thinking dispositions score of the two groups (Table 4), the mean MCTDS scores of the experimental group before and after the innovation course were 91.60 ± 16.98 and 98.58 ± 16.35, respectively, and the difference was statistically significant (p = .000). The mean pre-test MCTDS score was 91.18 ± 17.53 and the mean post-test score was 92.93 ± 17.72 in the control group; this difference was not statistically significant (p = .592) (Table 4). Although there was no significant difference between the pre-test MCTDS scores of the control and experimental groups (p = 0.893), the difference between the mean post-test scores of the two groups was statistically significant (p = 0.045; Table 4).

Table 1. Content and process of the "Innovation in Nursing" course

Weeks	Course content and process
1	Introductory meeting, introduction to the course, and information about the study Obtaining informed consent form Administration of pre-test questionnaire to experimental group identifying groups to develop innovative products
2	Innovation and creative thinking The importance of creative thinking
3	Creativity processes, characteristics of the creative individual
4	Similar terms to innovation, types of innovation
4	Types of innovation in health, health product development
6	The place and importance of innovation and creativity in providing quality nursing services
7	Implementation of innovative strategies and obstacles in nursing education
8	Nurses' roles to support innovation in the future
9	Innovative idea generation process in nursing
10	Innovative product creation process in nursing
11	What is a utility model? What is a patent? Understanding and implementing the patent search methodology
12	Innovative entrepreneurs in Turkey, innovative nurses in the world, nursing innovation samples

13	Presenting the developed innovative product in the classroom (discussion with classmates and faculty members on how the product can be developed and improved)
14	Presenting the developed innovative product in the classroom (discussion with classmates and faculty members on how the product can be developed and improved) Evaluating the innovation in nursing course by administrating post-test questionnaire to the experimental group

Table 2. Comparison of the experimental and control groups according to the different variables

	Experimental group (n = 63)		Control Group (n = 61)		Significance
Variables	**Number**	**%**	**Number**	**%**	**Test and p value**
Gender (%)					
Female	50	79.4	42	68.9	$\chi^2 = 1.179$
Male	13	20.6	19	31.1	$p = 0.81$
Income status (%)					
1499 and Below	12	19.0	14	23.0	$\chi^2 = 1.88$
1500–3500	42	66.7	35	57.4	$p = 0.55$
3501 and Above	9	14.3	12	19.7	
Place of residence (%)					
City	12	19.0	10	16.4	
Town	20	31.7	19	31.1	$\chi^2 = 1.19$
Village	31	49.3	32	52.5	$p = 0.91$
Education Status of the Mother (%)					
Illiterate	7	11.1	13	21.3	
Literate	11	17.5	8	13.1	
Primary school	36	57.1	29	47.5	$\chi^2 = 3.99$
High school	8	12.7	8	13.1	$p = 0.41$
College	1	1.6	3	4.9	
Education Status of the Father (%)					
Illiterate	1	1.6	5	8.2	
Literate	7	11.1	6	9.8	$\chi^2 = 6.66$
Primary school	36	57.1	26	42.6	$p = 0.16$
High school	11	17.5	9	14.8	
College	8	12.7	15	24.6	
Ability to Define Innovation (%)					
Yes	22	34.9	20	32.8	$\chi^2 = 0.06$
No	41	65.1	41	67.2	$p = 0.80$
Participation in a Seminar/Conference on Innovation (%)					
Yes	21	33.3	20	32.8	$\chi^2 = 0.00$
No	42	66.7	41	67.2	$p = 0.94$
Cumulative Grade Point Average (CGPA) ($\bar{X} \pm SS$)	2.91 ± 0.38		2.92 ± 0.40		$t = -0.11$ p = 0.91
Age ($\bar{X} \pm$ SS)	20.03 ± 1.12		19.93 ± 0.96		$t = 0.52$ p = 0.61

SD: Standard Deviation, *t*: Student's *t*-test, χ^2 = Chi-squared test

Table 3. Comparison of pre- and post-test individual innovativeness scale (IIS) scores of control and experimental groups

IIS[c]	IIS			
	Experimental Group (N = 63) X ± SD	Control Group (N = 61) X ± SD	Statistical Analysis*	Probability
Pre-Test	58.09 ± 8.06	59.09 ± 8.55	t = −.672[a]	p = .503
Post-Test	68.00 ± 7.92	60.62 ± 8.95	t = 4.864 [a]	**p = .000 ***
Statistical Analysis*	t = −6.231[b]	t = −.947 [b]		
Probability	**p = .000 ***	p = .348		

Table 4. Comparison of pre- and post-test Marmara creative thinking dispositions scale (MCTDS) scores of control and experimental groups

MCTDS[d]	MCTDS			
	Experimental Group (N = 63) X ± SD	Control Group (N = 61) X ± SD	Statistical Analysis*	Probability
Pre-Test	91.60 ± 16.98	91.18 ± 17.53	t = −.672 [a]	p = .893
Post-Test	98.58 ± 16.35	92.93 ± 17.72	t = 2.023 [a]	**p = .045 ****
Statistical Analysis*	t = −2.760 [b]	t = − .538 [b]		
Probability	**p = .000 ***	p = .592		

Discussion

The baseline characteristics of the experimental and control group students were similar. On comparing the mean scores of the experimental and control groups, it was observed that the mean pre- and post-test scores of the control group were similar to each other. There was no change in the innovative behavior characteristics and the individuals' to display innovative behavior was insufficient in the control group students. The difference between the mean pre- and post-test scores in the control group was insignificant, indicating that there was no change in the group because they did not take the innovation program or conduct research on innovation. This situation is important in terms of predicting that students do not spontaneously make an effort for their personal development. In the experimental group, it was determined that after the 14-week course (innovation lesson), the IIS post-test scores significantly increased compared with the IIS pre-test scores. In a study conducted on teachers, it has been determined that the IIS scores of the experimental group increased by 9.55 points after the course (innovation education) (Akdeniz, 2020). The result of this study is similar to that of Akdeniz (Akdeniz, 2020).

The fact that the post-test scores of the experimental group were higher indicates that the students' innovativeness was positively affected and that desirable professional behaviors were cultivated. It can be considered that keeping the students in the experimental group active, engaging them in group work, and encouraging

them to design an innovative project also increased their innovation scores.

Comparison of mean pre-test IIS scores between the groups revealed that the experimental and control group students had a low level of innovativeness and the mean pre-test scores of the two groups were similar to each other. In the study by Celi, Bayrakçeken, and Kılınç (2020), the total mean IIS score of the nurses was 60.88 ± 6.89 (Celik et al., 2020). Erol et al. (2018) found that the total IIS score was 60.67 ± 7.14. In another study by Bodur (2018), the total IIS score was 63.12 ± 7.70 (Bodur, 2018). It has been determined that the innovation characteristics of nursing students are quite low (Erol et al., 2018). The pre-test results of the experimental and control groups of the present study are similar to those found in the literature. The lack of significant difference in the pre-test data between the control group and the experimental group shows that the characteristics of the groups are similar. This is important for better understanding of the results of the study.

In the study conducted by Tarhan and Dogan (2018), it has been stated that increasing autonomic personality traits of students increases individual innovativeness behaviors. The use of student-centered teaching methods that ensure active participation of the student affects innovation positively (Tarhan & Dogan, 2018). Liu, Chang, Wang, & Chao (2020) conducted a comprehensive course for developing creative health products in Taiwanese nursing students. Creativity, creative personality traits, and innovation levels were examined after the completion of the course. Study results indicated that the students who took the course had moderate to high level of innovation (Liu et al., 2020). The results of the present study are similar to those of Liu, Chang, Wang, & Chao and suggest that the implemented innovation program is effective. These results confirm our hypothesis H_1.

Comparison of the mean MCTDS scores between the experimental and control groups showed that the mean pre- and post-test scores in the control group were similar to each other. There was no change in the creative thinking of the control group students. In his criticism of the education system, Rogers said, "Education system raises individuals who cannot think independently, are far from being creative and original, and exhibit a conservative and stereotyped behavior" (Ataman, 1993). In the experimental group, it was determined that, compared with the pre-test data, creative thinking increased in post-test applied after the 14-week innovation program. Creative thinking is not a condition that occurs by itself; it is a phenomenon that requires seeking for various different ideas and solutions and includes rational and logical thinking as well as imaginary and intuitive thinking in every phase. From this point of view, creativity can be considered as the generation of different, original ideas that can enable reaching a conclusion (Demirci, 2007). Creative thinking can also be developed with various factors. Education constitutes one of the most important of these factors. Seminars, courses, and campaigns for students contribute to the development of creativity (Ustundag, 2005). Students in the experimental group were asked to develop a novel innovative product that required creative thinking. For this reason, it is an expected increase in creative thinking and is in parallel with the literature. On comparing the mean pre-test MCTDS scores of the experimental and control groups, it was found that the mean pre-test scores of the groups were similar and that the students had a moderate level of creative thinking. Because there are no studies with the same scales in the literature, the creativity of the students was compared with studies using different scales. Previous studies have determined that the creativity levels of the nursing students were moderate (Liu et al., 2020; Martínez & Martínez, 2010; Turner & Wattanakul, 2016). The pre-test results of the experimental and control groups of the present study are similar to those observed in the literature. There is no significant difference between the pre-test MCTDS data of the groups, indicating that the characteristics of the groups are similar.

On comparing the mean post-test MCTDS score between the experimental and control groups at the end of 14 weeks, the score of the experimental group was higher, showing that the implemented innovation program positively affects the creative thinking of the students. In the study by Işık and Saygılı (2015), it was determined that the post-test scores of students who took the creativity development techniques course were higher than their pre-test scores, and their creative thinking skills had also developed (Isık & Saygılı, 2015). Wu (2002) found that the intervention group students who took a creativity education course had higher curiosity, creativity and sensitivity scores (Wu, 2002). The result of the present study is similar to those of previous studies in the

literature, and it is believed that the implemented innovation program positively affects the creative thinking. These results confirm our hypothesis H_2 as well. In conclusion, it was determined that the "Innovation in Nursing" course had a positive effect on the individual innovativeness and creative thinking of students. In line with these results, it is recommended that institutions providing nursing education incorporate courses supporting students' innovativeness and creative thinking to their program and increase educational practices that encourage creative thinking and innovation. In addition, it is recommended that descriptive and experimental studies showing the effect of innovative teaching methods used on students' innovative behavior and creative thinking characteristics should be conducted in larger sample groups.

Limitations of the study: The study findings are limited to the nursing students at the study faculty and cannot be generalized for all faculties and regions. The data obtained are limited to the scales used and the self-report of the participants.

Conclusion: In conclusion, it was determined that the "Innovation in Nursing" course had a positive effect on students' individual innovativeness and creative thinking. The findings suggested a need for nursing to enhance and improve students' creativity and innovation. Extending the innovation course length to a year, and including a weekly lab might be warranted. In line with the results obtained from the study, it is recommended that institutions providing nursing education should incorporate courses supporting students' innovativeness and creative thinking to their program and increase educational practices that encourage creative thinking and innovation. Nursing educators who teach capstone courses are urged to implement learning experiences designed to improve student creativity and innovation. In addition, it is recommended that descriptive and experimental studies showing the effect of innovative teaching methods used on students' innovative behavior and creative thinking characteristics should be conducted in larger sample groups.

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