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Research Article

Reflection of Learning Styles on Students' Anxiety and Learning Levels in Simulation Education: An Obstetrics and Neonatology Nursing Experience

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Abstract

AIM: This study aimed to investigate whether the learning styles of nursing students affected their anxiety and learning levels during simulation education.

METHOD: This was a cross-sectional and quasi-experimental study, which included a total of 60 nursing students. The students received simulation education about labor management and first care of newborns. The Learning Styles Inventory III, the Trait Anxiety Scale, and a pretest were used before the simulation education, and the Perceived Learning Scale and a posttest were used after the simulation education to collect data.

RESULTS: According to data from the learning styles inventory, 81.6% of the students had a diverging learning style, 11.7% had an assimilating learning style, and 6.7% had an accommodating learning style. The mean state anxiety score was 49.83 ± 10.59 just before the simulation. The mean pretest score was 51.50 ± 16.96 and the mean posttest score was 54.17 ± 15.22. The perceived learning score was 35.45 ± 5.12. There was a significant difference in anxiety levels in terms of learning styles ($p < .005$).

CONCLUSION: Most of the students in this study had a diverging learning style. Their anxiety levels did not change depending on their learning styles. The pretest/posttest results and perceived learning levels showed that simulation helped to achieve learning in all types of learners.

Keywords: Anxiety, learning, neonatology, obstetrics, simulation training

Introduction

Simulation provides high-fidelity clinical environments and allows individuals to learn and practice what they have learned in a reliable environment (Durmaz Edeer & Sarıkaya, 2015; Nehring & Lashley, 2009). It is an indispensable part of nursing education as it has many advantages, such as improvement of patient care and provision of patient safety (Goris et al., 2014; Medley & Horne, 2005; Sendir & Dogan, 2015; Ziv et al., 2000). Using simulations in nursing education increases the attention of the learners and enables them to become active learners. This will have an impact on their academic achievements. It has been reported in the literature that simulation education significantly increases knowledge of the learners (Sendir & Dogan, 2015). Using simulations in nursing education allows the learners to practice and improve their critical thinking, problem-solving ability, and decision-making skills. It should be incorporated into nursing curricula to enable the students to acquire a patient safety culture. However, high-fidelity simulations may not enable each individual to reach equal learning levels (Baker et al., 2016; Norman et al., 2012), as each individual prefers different methods to acquire and process knowledge (Kolb & Kolb, 2008; Kolb, 1984; Kolb, 2005). Therefore, if the simulation is implemented through an appropriate method that can support the learning process of each individual, it can make a great contribution.

Although learning styles are not the only factor for different levels of learning, they are important elements of the teaching process (Gonzales et al., 2017; Tutticci et al., 2016). In a study conducted by Veznedaroglu and Ozgur (2005), learning tasks based

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on learning styles were found to enhance tolerance, discipline, and development of a more positive attitude in addition to academic success (Veznedaroglu & Ozgur, 2005). There have been very few studies about the use of learning styles in simulation practices. It is important to improve the use of simulations as a teaching method in terms of learning styles. Inappropriate educational methods in terms of learning styles can increase stress in learners (Blasco, 2009; Okur et al., 2011). The stress experienced before learning distracts attention and causes concentration problems, while the stress after learning can be perceived as a punishment and can be a barrier to coding what is learned (Gordon, 2014). To achieve the desired objectives in simulation practices, stress levels of students should be managed well, and individual learning styles should be taken into consideration.

This study aimed to investigate whether the learning styles of nursing students affected their anxiety and learning levels during simulation education.

Hypotheses of the study were as follows:
H1: Learning styles of nursing students have a positive effect on stress experienced before simulation education and learning levels.
H0: Learning styles of nursing students do not have any effect on the stress experienced before simulation education and learning levels.

Method

Study Design
This was a cross-sectional and quasi-experimental study.

Sample
It was performed between May 1 and May 22, 2017 on a group of second-year nursing students from a foundation university. The students were taking the obstetric nursing and pediatric nursing courses during the study period. All the second-year nursing students who agreed to participate in the study and gave an informed consent for it were included in the study. A total of 64 students taking theoretical courses and attending laboratory practices formed the study sample; however, 4 students who did not fulfill the abovementioned inclusion criteria were excluded from the study, and the study was completed with a total of 60 students. The study sample could represent 93.75% of the study population. The sample inclusion process is shown in the flow diagram (Figure 1).

Data Collection Tools
***Learning Styles Inventory III*:** The Learning Styles Inventory, based on Kolb's experiential learning theory, was adapted to Turkish and its validity and reliability were tested by Evin Gencel in 2007. The inventory includes 12 items, with 4 options for each item; and each option is scored on a 4-point scale ranging from 1 to 4. The lowest and the highest scores for the inventory are 12 and 48, respectively. Combined scores are obtained using this scoring system. These scores yield the rankings of abstract conceptualization (AC), concrete experience (CE), active experimentation (AE), and reflective observation (RO). The combined scores vary between –36 and +36. Positive scores for AC and CE indicate abstract learning, and negative scores for AC and CE indicate concrete learning. The scores for AE and RO show active or reflective learning. The combined scores are presented as a graphic in Figure 1. The score for AE and RO is on the X axis and the score for AC and CE on the Y axis. The region where both scores converge represents an individual's learning style. Cronbach's alpha was .76 for CE, .71 for RO, .80 for AC, .75 for AE, .84 for AC-CE, and .79 for AE-RO (Evin Gencel, 2007). This study found that Cronbach's alpha for the learning styles inventory was .70 for CE, .76 for RO, .74 for AC, .72 for AE, .72 for AC-CE, and .78 for AE-RO.

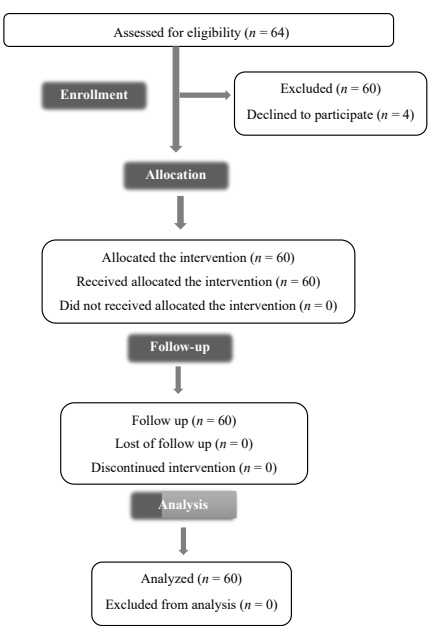

Figure 1
Flow Diagram (TREND Statement)

Pretest-Posttest: The pretest-posttest includes 10 questions prepared in accordance with the objectives of the scenario about labor management and first care of the newborn. Each question is assigned a score of 10, and the total score for the test is 100. After the questions were created, an expert opinion about them was obtained from a lecturer.

State-Trait Anxiety Inventory: The inventory was developed by Spielberger et al. (1970) and includes 40 items. It was adapted to Turkish by Oner and Le Compte (1983). The state anxiety scale is directed toward determining how individuals feel at a certain moment and under a certain condition. The trait anxiety scale is directed toward determining how individuals feel in general, independent of situations and the conditions they are exposed to. The total score for either subscales varies from 20 to 80. High scores indicate higher anxiety levels. Cronbach's alpha ranged from .83 and .87 for the trait anxiety scale and from .94 and .96 for the state anxiety scale (Oner & Le Compte, 1998). This study found that Cronbach's alpha was .70 for the trait anxiety inventory and .72 for the state anxiety inventory.

Perceived Learning Scale: This scale was developed by Rovai et al. (2009) and adapted to Turkish by Albayrak et al. in 2014. It allows learners to evaluate the knowledge and skills they have acquired. The scale includes 9 items, of which 3 are used to measure cognitive learning, 3 are used to measure affective learning, and 3 are used to measure psychomotor learning. It is a 7-point scale and 1 corresponding to wrong and seven completely correct. Items 2 and 7 are scored in the reverse order. The total score varies from 9 to 63. The internal consistency coefficient was .83 for the scale, .65 for cognitive learning, .66 for affective learning, and .72 for psychomotor learning (Albayrak et al., 2014). This study found Cronbach's alpha .75 for the perceived learning scale.

Data Collection

Stage 1 (before the scenario)

Before data collection, the aim of the study was explained to the students, and a written informed consent was obtained from those willing to participate in the study. They completed the trait anxiety scale on a day when they did not have the simulation practice. Before the simulation practice, the students were provided theoretical information in both obstetric nursing and pediatric nursing courses. An 8-h theoretical education session about labor, pain management during labor, and care during labor was given in the obstetric nursing course, and a 6-h session about care for a healthy newborn and a newborn at risk was offered in the pediatric nursing course. Following this, the students completed the learning styles inventory III. A low-fidelity skill training was offered in the simulation laboratory to put their theoretical knowledge into practice. The simulation about labor management and first care of a newborn based on theoretical knowledge and aims of both obstetric nursing and pediatric nursing courses was designed and scheduled by the researchers. An expert opinion about the simulation design was requested, and the simulation was piloted on a student group similar to the sample. In accordance with the expert opinion and results of the pilot study, the simulation design was revised and its final version was obtained. The simulation schedule and the simulation education-related literatures and videos were sent to the students through e-mail before the simulation to help them prepare. The high-fidelity clinical environment required for the simulation education was prepared by the researchers. The flow of the study is presented in Figure 2.

Stage 2 (after the scenario)

On the day of the simulation education, the students were allowed in the laboratory in randomly selected pairs in the order mentioned in the simu-

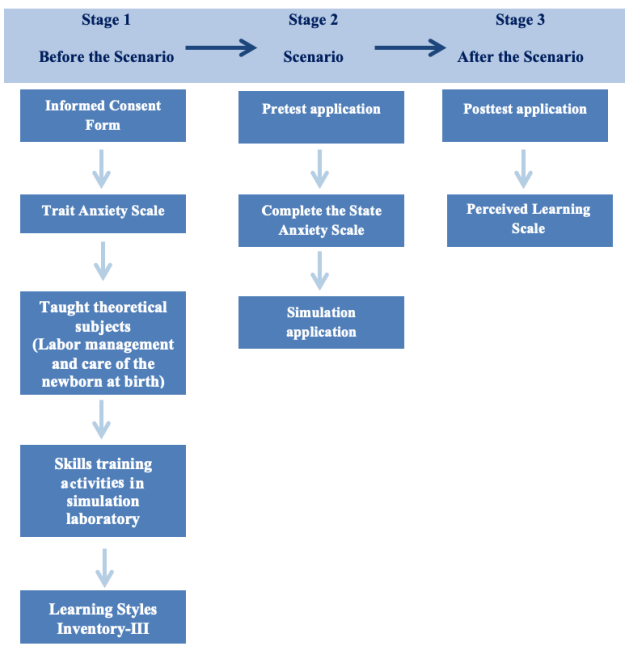

Figure 2
Study Design

lation schedule. They were asked to take the pretest that was developed in accordance with the scenario objectives. Before implementation of the scenario, they were given information by a researcher and enough time to get ready for the clinical environment and for their roles. When the preparation period was over, each student was asked to complete the state anxiety scale before starting the scenario. Soon after the completion of the scale, the scenario was implemented. The objective of the simulation education was that:

- The students could evaluate information in the scenario and determine risks based on prenatal history,
- Make all prenatal preparations completely,
- Provide care for mother candidates during labor,
- Provide care for newborns just after labor.

The scenario was implemented in a delivery room, and a standardized patient and a hybrid newborn simulator were used (Figure 2 and 3).
Before the scenario, the standardized patient was educated about the plot of and clues for the scenario. The scenario was planned to take a total of 15 minutes. The students implemented the scenario in the order mentioned in the scenario schedule; and 2 facilitators, of whom 1 was a perinatologist and the other a pediatrician, had roles in the scenario. A total of 2 educators observed and managed the flow of the scenario using a checklist.

Figure 2
Scenario Image: Care during Childbirth

Figure 3
Scenario Image: Postpartum Neonatal Care

Table 1
Distribution of Students by Their Learning Styles Based on Data from the Learning Styles Inventory III

Learning Styles	n	%
Diverging	49	81.6
Assimilating	7	11.7
Accommodating	4	6.7
Converging	-	-
Total	60	100

Table 2
Students'Scores for the Scales and Tests (n = 60)

	Reference	Range	Mean ± SD
State Anxiety Scale	20–80	20–69	49.83 ± 10.59
Trait Anxiety Scale	20–80	26–59	40.65 ± 7.08
Perceived Learning Scale	9–63	25–47	35.45 ± 5.12
Pretest	0–100	20–90	51.50 ± 16.96
Posttest	0–100	20–80	54.17 ± 15.22

Stage 3 (after the scenario)

After the implementation of the scenario, a debriefing meeting was held with each pair of students by the same researcher using the Promoting Excellence and Reflective Learning in Simulation (PEARLS) method, which involves the stages of reaction, description, analysis, and summarizing. This method was preferred in this study because it includes the approach of reflecting learning and providing perfection in simulation (Eppich & Cheng, 2015). The reflection lasted a total of 45 minutes. Each pair of students completed the posttest after the meeting. After the post-test was completed, the "Perceived Learning Scale" was applied to each participant.

Statistical Analysis

The data were analyzed using the IBM Statistical Package for Social Sciences (IBM SPSS Corp., Armonk, NY, USA) for Windows version 21.0. Data were evaluated with descriptive statistics (percentage, mean, and standard deviation). As the data did not have a normal distribution, comparisons were made using the Kruskal-Wallis test. A p value of $< .05$ was considered to be statistically significant.

Table 3
Comparison of Scores for the Scales and Tests in Terms of Learning Styles

		Learning Styles				
		Diverging	Assimilating	Accommodating		
Scale	Subscale	Mean ± SD	Mean ± SD	Mean ± SD	χ2	*p**
Perceived Learning	Cognitive	10.48 ± 2.26	10.14 ± 1.46	11.75 ± .95	2.039	.361
	Affective	14.30 ± 2.51	15.00 ± 2.58	12.75 ± .95	2.842	.241
	Psychomotor	10.71 ± 1.87	9.71 ± 1.60	11.25 ± 1.50	2.743	.254
	Total	35.51 ± 5.42	34.85 ± 4.59	35.75 ± 1.50	.228	.809
Anxiety	State Anxiety	51.65 ± 8.91	45.42 ± 14.19	35.25 ± 12.25	6.387	.041
	Trait Anxiety	40.69 ± 7.20	38.00 ± 7.14	44.75 ± 4.03	2.745	.253
Test	Pretest	49.79 ± 16.26	65.71 ± 17.18	47.5 ± 17.07	3.772	.152
	Posttest	54.08 ± 15.26	55.71 ± 19.02	52.5 ± 9.57	.276	.871
	Test difference	4.28 ± 16.20	-10 ± 19.14	5 ± 12.90	3.774	.152

*p**= Kruskal-Wallis test $p < .05$

Ethical Considerations

This study was approved by the Acıbadem University and Acıbadem Healthcare Institutions Medical Research Ethics Committee (ATADEK) (20.04.2017, #2017-7/15). The researcher provided the participants with written information about the research and explained the research purpose, confidentiality of data to be collected, protection of anonymity, and the right of refusal to participate.

Results

A total of 60 students participated in the study. Of the participants, 88.3% were women and 11.7% men. The mean age of the participants was 19.97 ± .90 (range 18–24) years. Table 1 shows the distribution of the students' learning styles according to the data from the learning styles inventory III. A vast number of students had a diverging learning style, and none had a converging learning style.

Table 2 presents the students' scores for the scales and tests. The mean score of all the students for the state anxiety scale was 49.83 ± 10.59, and the mean score of all the students for the trait anxiety scale was 40.65 ± 7.08. The mean score for the perceived learning scale was 35.45 ± 5.12. As shown in Table 2, the mean scores of the students for the pretest and the posttest were 51.50 ± 16.96 and 54.17 ± 15.22, respectively.

Table 3 shows a comparison of scores for the scales and tests in terms of learning styles.

In terms of the distribution of mean scores for perceived learning according to learning styles, the students with the accommodating learning style had 35.75 ± 1.50, those with the diverging learning style had 35.51 ± 5.42, and those with the assimilating learning style had 34.85 ± 4.59.

The distribution of the mean pretest scores according to learning styles showed that the students with the assimilating learning style received the highest score (65.71 ± 17.18). In addition, this group had a higher mean posttest score than the other groups (55.71 ± 19.02). No significant difference was found between the perceived learning scores and the pretest-posttest scores in terms of their learning styles ($p > .05$).

The distribution of the state anxiety scores of the students according to their learning styles revealed that the students with the diverging learning style had the highest score of 51.65 ± 8.91. The state anxiety significantly differed in terms of learning styles ($p < .05$). This difference was found to result from students with the accommodating-diverging learning style in the post-hoc analysis ($p < .05$).

The students with the accommodating learning style had the highest mean trait anxiety score of 44.75 ± 4.03. However, there was no significant difference in the mean trait anxiety scores of the students in terms of their learning styles ($p > .05$).

Discussion

This study was unique in the sense that it was sensitive to learning styles in the simulation practice experienced by the students and helped to achieve similar levels of learning in the students with different learning styles.

In this study, most of the students had a diverging learning style, and none had a converging learning style. In a study conducted by Tutticci et al. (2016), nearly one-third (29.8%) of the third-year nursing students who were exposed to a high-fidelity simulation, were found to have a diverging learning style. However, in a study conducted by Senyuva (2009) on the differences in stages of learning cycle and learning styles in terms of the year of study, school, and field of study, the first and the second-year students predominantly had an assimilating learning style, and the third and the fourth-year students predominantly had a divergent learning style. Celik and Sahin (2011) reported that learning styles differed widely between the first, second, and third-year students but were evenly distributed in the fourth-year students. In this study, the second-year students had such characteristics of a diverging learning style as problem solving, decision making, and systematic and rational planning of opinions. As the year of study increases, they can be expected to have characteristics of the assimilating learning style, including having different points of views about things and focusing on ideas and associating ideas.

Perceived learning scale average scores are obtained by the participant's self-evaluation of the knowledge and skills acquired during the learning process. In this study, no significant difference was found in these scores between the students with different learning styles. The highest score was obtained by the students with the accommodating learning style. It is known that these types of learners can easily adapt to changes and prefer to learn by practicing and discovering things.

Students with the accommodating learning style had the lowest score for the pretest; however, they got the highest score for the posttest. This also suggested that simulation education had a positive effect on learning. The perceived learning scores for the subscales revealed that these students had higher scores for cognitive and psychomotor learning but lower scores for affective learning. The students with the assimilating learning style got the highest score for affective learning, which could be attributed to thinking skills and awareness of values and meanings in such students. Shinnick and Woo (2015) in their study on the effects of learning styles on knowledge acquisition following a simulation education about heart failure proved that this simulation was effective in obtaining knowledge in all types of learning styles.

In this study, all the students received higher scores for the state anxiety scale than for the trait anxiety scale. This finding indicated that simulation education created anxiety in students. There was a significant difference in the state anxiety before the simulation between different types of learners. In a study conducted by Shultz (2011) on factors causing anxiety in nursing students, anxiety was found to affect all individuals and have a strong impact on the mind, health, and wellbeing of students. Increased anxiety levels were reported to create a negative effect on the academic performance. Students with the diverging learning style got the highest score for state anxiety. It is thought that students with this learning style that prioritized to to details and try to understand the whole from the parts, these features may cause them to experience more anxiety.

Although the students with the diverging learning style had a higher mean score for state anxiety, lack of a significant difference between their scores for the pretest and the posttest shows that high state anxiety levels did not have a negative impact on the students' learning ability. Students with the assimilating learning style had a lower mean score for state anxiety than those with the diverging learning style. These students received the highest score for the pretest; however, they got a lower score for the posttest than the other types of learners. The scores for the subscales of the perceived learning scale revealed that the students with the assimilating learning style got the highest score for affective learning. This can be explained by the fact that individuals with the assimilating learning style prefer to learn systematic knowledge (Celik & Sahin, 2011), but that simulation education directs learners toward systematizing information by themselves. With the simulation, students can practice multiple aspects of patient care, strengthen course objectives and evaluate their own learning without the risk of making mistakes with the real patient. A study conducted by Cato (2013) suggested that anxiety at man-

ageable levels helped students to achieve the best learning and to be motivated in a simulation session. Park et al. (2015) examined the effects of the number of simulation sessions on anxiety levels, interest in learning, and problem-solving skills. They reported that the students had high anxiety levels even though they had attended many simulation sessions earlier.

The evaluation of the results based on the hypotheses of the study revealed that the anxiety levels of the students did not change and that their learning styles did not affect their stress levels before the simulation education. The pretest/posttest scores and perceived learning levels also showed that learning styles did not affect learning levels. Therefore, we believe that regardless of learning styles, simulation education helps to achieve similar learning levels in students.

Study Limitations

One limitation of this study is that it included 60 students and only the second-year students. Thus, the results cannot be generalized to all students. Another limitation is that there were no students with the converging learning style and that the distribution of the students by their learning styles was not homogeneous. Finally, this study did not include a control group and did not have a long-term follow-up plan.

Conclusion and Recommendations

Most of the students in this study had the diverging learning style. The anxiety levels did not vary with the learning styles. The results of the pretest/posttest and the perceived learning levels showed that the simulation education provided similar learning levels. However, we believe that the creation of different simulation designs on the same subject by considering different student learning styles can affect these variables. Therefore, it is important to conduct further studies comparing different learning styles with different classes and experimental researches.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Acıbadem University and Acıbadem Healthcare Institutions Medical Research Ethics Committee (ATADEK) (20.04.2017, #2017-7/15).

Informed Consent: Written informed consent was obtained from participants who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – Z.K.Ö., M.K., E.A., S.K.; Design – Z.K.Ö., M.K., E.A., S.K.; Supervision – Z.K.Ö.; Resources – Z.K.Ö., M.K., E.A.,S.K.; Materials – Z.K.Ö., M.K., E.A., S.K.; Data Collection and/or Processing – Z.K.Ö., M.K., E.A., S.K.; Analysis and/or Interpretation – Z.K.Ö., M.K., E.A., S.K.; Literature Search – Z.K.Ö., M.K., E.A., S.K.; Writing Manuscript – Z.K.Ö., M.K., E.A., S.K.; Critical Review – Z.K.Ö., M.K., E.A., S.K.; Other – Z.K.Ö.

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