Araştırma makalesi

Research article

Assessment of Students' Anxiety Level and Technology Readiness in a Simulation-Based Obstetrics Training

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ABSTRACT

Aim: This study aims to evaluate the effects of simulation-based obstetrics training on students' professional development and examine students' anxiety and technology readiness.

Material and Methods: The study was quasi-experimental and performed with 3rd -year students in Midwifery Department (n=60) between September 2018 and January 2019. Students attended a 14-week simulation-based delivery training. In the pre-and post-training periods, the data were collected by the State-Trait Anxiety Inventory (STAI) and the Tendency Scale for the Use of Technology.

Results: Students reported that simulation-based delivery training improved their "professional skills" (95%) and "professional internalization" (93.4%). They stated that there was a positive effect on "anxiety in the working environment" (93.3%) in post-training. Since no significant differences were observed in scores of the Tendency Scale for the Use of Technology and STAI in pre-and post-training periods (p>0.05), it was thought that they were not potential barrier factors in the training.

Conclusion: The ensuring of professional development was achieved by using simulation-based training in the study. However, technology readiness and anxiety levels were stable in pre-and post-training periods.

Keywords: Anxiety, professional development, simulation-based education, use of technology

ÖZ

Simülasyona Dayalı Doğum Eğitimi Uygulanmasında Öğrencilerin Kaygı Durumları ve Teknolojik Hazırbulunuşluklarının İncelenmesi

Amaç: Bu çalışmanın amacı, simülasyona dayalı normal doğum dersinin öğrencilerin mesleki gelişimleri üzerindeki etkilerini değerlendirmek ve öğrencilerin kaygı durumları ile teknolojiye hazır bulunuşluk durumlarını incelemektir.

Gereç ve Yöntem: Araştırma yarı deneysel bir çalışma olup Eylül 2018-Ocak 2019 tarihleri arasında Marmara Üniversitesi Ebelik Bölümü üçüncü sınıf öğrencileri (n=60) ile yürütülmüştür. Öğrenciler, gerçek hayat senaryolarını kapsayan 14 haftalık simülasyona dayalı normal doğum dersine katılmıştır. Veriler, eğitim öncesi ve sonrası dönemde Durumluk-Sürekli Kaygı Envanteri (STAI) ve Derste Teknoloji Kullanımına Yönelik Eğilim Ölçeği ile değerlendirilmiştir.

Bulgular: Öğrenciler, simulasyona dayalı normal doğum eğitiminin, “mesleki becerilerini” (%95) ve “mesleği içselleştirmelerini” (%93.4) geliştirdiğini bildirmiştir. Eğitim sonrasında “çalışma ortamındaki kaygı” (%93.3) durumuna yönelik olumlu gelişme olduğunu belirtmişlerdir. Eğitim öncesi ve sonrasında; Derste Teknoloji Kullanımına Yönelik Eğilim Ölçeği puanı ile Durumluk-Sürekli Kaygı Envanteri (STAI) puanı arasında fark tespit edilmemiştir ve bu eğitim için olası engelleyici faktörler olmadıkları görülmüştür (p>0.05).

Sonuç: Çalışmada simülasyona dayalı normal doğum eğitiminin mesleki gelişime katkı sağladığı bulunmuştur. Ayrıca, teknolojiye hazırbulunuşluk ve kaygı düzeylerinin eğitim öncesi ve sonrası benzer düzeyde olduğu saptanmıştır.

Anahtar kelimeler: Kaygı, mesleki gelişim, simülasyona dayalı eğitim, teknoloji kullanım

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INTRODUCTION

Simulation-based training has been used for a long time in high-stake areas, e.g., aviation, military, and space exploration. In parallel, the adoption of simulation in healthcare education is also a new era. Increased demand for training hours, difficulty in practicing on the patient, limited contact with the patient during the internship period, the risk of medical errors, and the need to improve patient-employee safety have led to a new educational paradigm in healthcare. This paradigm is the use of simulation in healthcare education that meets the need for safe and learner-centered[1]. Therefore, simulation-based training has emerged as an essential element for healthcare students because it contributes to learning opportunities and clinical experiences with real-life scenarios[2,3]. Professional skills are improved by using a simulation environment without tensions in fully interactive conditions. Since it provides a safe learning environment in complex clinical situations, students ameliorate their risk management skills[2,4]. Moreover, it is a valuable strategy for teaching, learning, and evaluating clinical skills at different levels of health professionals[5]. For this reason, a simulation, which offers the opportunity to gain cognitive and psychomotor skills, is increasingly used in the education of health professionals[1].

Practical skills and medical knowledge of students in health science are improved by using this learning environment. Awareness of clinical cues and understanding of emergency cases, and integration of knowledge into clinical practice, as well as failures in clinical practice, are experienced by simulated complex scenarios[2,6]. Therefore, self-confidence, critical thinking, self-efficacy, communication skills, patient assessment as well as teamwork, crisis management, and decision-making ability of students are improved by real-life scenarios[1-3,6-9]. Both problem-based complex scenarios and medication administration scenarios improve patient safety[4]. Moreover, complex simulation scenarios regarding learning objectives also have benefits for increased patient safety and quality of healthcare[2-4]. Regarding these advantages, the World Health Organisation (2013)10 strongly recommends using simulation in the clinical training of health professionals and students. Similarly, the Institute of Medicine (IoM) (2010)[11] stated that simulation could be an effective training tool for the continuing education of health professionals.

In contrast to these supportive contributions, technology usability and anxiety status could be critical barriers in simulation-based training courses[12]. Therefore, it is necessary to focus on the impact of factors such as stress and anxiety affecting human performance and technology readiness on critical barriers in simulation-based training courses[12]. Yet, lack of information about how students feel about their simulation experiences[13].

Although the students in midwifery education in our country are theoretically well-equipped, there is a problem in gaining practical skills owing to the increase in the number of midwifery students and the decrease in normal delivery rates [14]. In addition, the fact that the rate of midwifery students in both public and foundation universities in Istanbul is incomparably higher than the hospital rate creates a serious problem. Therefore, simulation-based education has the potential to make a difference for midwifery students in terms of the experience of managing labor[15].

Aim

The aim of this study is to evaluate the effects of the simulation-based delivery course on students' professional development and to examine students' anxiety and technology readiness.

MATERIAL and METHODS

Study Design

The study was quasi-experimental and performed with 3rd - year students in Midwifery Department (n=60) between September 2018 and January 2019. Two hypotheses that simulation-based training had no effect on the professional development of students and that their technology use and anxiety levels were not barrier factors for the training were defined in the study.

Study Sample

In this study, 3rd- year midwifery students (n=60) with no experience in clinical practice and being volunteers to participate in the study were included. The sample selection method was not used. It was aimed at reaching the entire universe. The main inclusion criteria were those who are 3rd-year midwifery students, attendance for the 14-week education, volunteering to participate in the study, and having this training for the first time were inclusion criteria. Those who did not accept to participate in the study, filled in the forms incompletely and inconsistently were excluded.

Data Collection Tools

Data were collected by the State-Trait Anxiety Inventory[16], a Tendency Scale for the Use of Technology[17], and self-reported technology compliance evaluated by a 10-mm visual analog scale assessed in both pre-and post-training periods. To evaluate the effects of simulation-based education on professional development, students were given a pre-test on the first day of the course and a post-test at the end of the 14th week.

The State-Trait Anxiety Inventory (STAI) evaluates anxiety levels. The State Anxiety Inventory (S-STAI) evaluates the current state of anxiety, whereas the Trait Anxiety Inventory (T-STAI) reflects the anxiety proneness of individuals. The Turkish validity and reliability studies were performed by Oner and Le Compte in the Turkish adult population. Cronbach-alpha coefficients were 0.83 and 0.86 for these subgroups [16]. The STAI includes 40 items scored based on four intensity levels of anxiety (State-STAI and Trait- STAI). The scoring procedure was 1 point: not at all, 2 points: somewhat, 3 points: moderately, 4 points: very much in S-STAI, whereas 1 point: almost never, 2 points: sometimes, 3 points: often, 4 points: almost always in T-STAI. An increased total score (20-80 points) indicates a high level of anxiety[18].

In this study, Cronbach's alpha values for internal reliability were found as 0.898 (pre-training) and 0.925 (post-training) for S-STAI and 0.802 (pre-training) and 0.809 (post-training)

for T-STAI. Since STAI is commonly used in health sciences, factor analysis was not performed.

The technology readiness of students was evaluated by the Tendency Scale for Technology Use and Self-Reported Compliance with Technology. Self-reported compliance with technology was also scored using a 10-mm visual analog scale (0: no compliance vs. 10: very high compliance). Evaluations were carried out in the pre-and post-training periods.

Table 1. Factor Analysis of Tendency Scale for Technology Use in the Training

	Factor Loads	Variance
Technology Use (n=4 α=0.866)		25.849%
1. I want technology to be used more in classes.	0.827	
2. Using technology makes it easier to do my course-related responsibilities/assignments.	0.735	
3. I like communicating with faculty members via the Internet.	0.585	
4. I like sharing with my classmates via the Internet.	0.767	
Motivation and Technology (n=11 α=0.973)		51.873%
1. Classes involving technology use are more entertaining.	0.779	
2. I give more importance to classes which involve technology use.	0.750	
3. I learn better in classes which involve technology use.	0.833	
4. I enjoy learning with technology.	0.687	
5. I would like technology to be used in all classes.	0.746	
6. Technology use in classes increases my interest.	0.796	
7. I attend classes more which involve technology use.	0.842	
8. I am more active in classes which involve technology use.	0.879	
9. I am more willing to attend classes which involve technology use.	0.839	
10. I follow/listen to classes better which involve technology use.	0.857	
11. I am better prepared for classes which involve technology use.	0.739	
	Total: 77.722%	

In the Tendency Scale for Technology Use, items regarding students' tendency towards technology use were coded using a 5-point Likert scale (1: strongly disagree vs. 5: strongly agree)[17]. This scale was developed and validated in student teachers attending a state university by Gunuc and Kuzu, and the Cronbach-alpha coefficient of the scale was found to be 0.94[17]. Explanatory factor analysis was performed for construct validity in midwifery students. According to the Kaiser-Meyer-Olkin (KMO) measure (0.916), the database was suitable for the Explanatory factor analysis. After analysis, 15 items were distributed into two subgroups regarding Motivation and Technology (n: 11; 51.87%) and Technology Use (n: 4; 25.85%). Cronbach-alpha values were high at 0.973 in the Motivation subgroup and 0.866 in Technology Use (Table 1). In addition, these subgroup scores were correlated with the score of Self-reported compliance with technology (r: 0,35 p=0.006; r: 0,31 p=0.016).

In the study, the score range was between 15 and 75 points on the Tendency Scale for Technology Use. High scores indicated an increase in the tendency towards technology use in class. Cronbach's alpha values were 0.960 (before the training) and 0.970 (after the training).

Data Collection

Simulation-based Training

The instructor designed a 14-week simulation-based labor course (8 hours/per week) according to the learning objectives of the course. Students attended the simulation laboratory to improve their skills under the instructor's guidance for 14 weeks. The students were divided into four groups, each comprising 15 people. A simulation application was made on a different scenario every week. Theoretical analysis of the case was made for 10 minutes before each simulation application. Each student was allowed to practice on the same case separately. In each of them, each student took on the role of a midwife.

The improvements in basic skills such as dilatation, effacement, fetal head level, birth maneuvers, placenta removal, bleeding control, and vital signs control were achieved by using various cases in the training. After finishing the training, self-reported professional development as an outcome of the study noted by students. They assessed the effects of the training and their readiness for the clinic environment. In this perspective, "self-confidence", "anxiety to professional life", "crisis management", "teamwork", "professional skill", "internalizing the profession", "ability to criticize", "providing motivation" were coded as improved or non-improved students evaluated the training "improved" or "non-improved" after the program was completed. Since the outcome was to assess the effects of the training in the study, the dichotomous response was used to understand the contribution of the training to students' professional life.

Data Analysis

Data were analysed by using SPSS 26.0 (IBM, USA) statistical program. Wilcoxon rank test was used to compare STAI scores in both periods due to the non-normal distribution of the data. A paired t-test was used to compare items' scores between pre-training and post-training periods. $p<0.05$ was accepted as statistically significant.

Ethical Consideration

Ethics committee approval was obtained from the Ethics Committee of a University Health Sciences Institute (17.12.2018-234). Informed consent was taken from all students.

Limitations

The small sample size was the main limitation of the study.

RESULTS

This study included 60 midwifery students (mean age: 20.08±0.84 years). According to the self-assessment of the simulation-based obstetric training from the midwifery student's perspective, "professional skills" (95%), "internalizing the profession" (93.4%), "motivation"

(91.7%), "self-confidence" (90%), "teamwork" (83.3 %), "ability of critical thinking" (80%) and "crisis management" (75%) were improved by the training. Moreover, a decrease in "anxiety to professional life" (93.3%) was noted after the training (Figure 1).

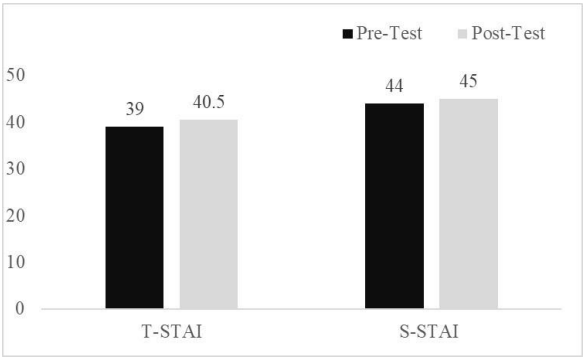
Figure 1. Assesment of the Simulation-Based Obstetric Training from Student's Perspective (%)

When technology readiness was evaluated, the self-reported technology competence score was stable in both periods (pre-treatment: 6.15±2.08 vs. post-treatment: 6.33±2.02) (p=0.390). Moreover, scores of items in the Technology Use and Motivation subgroups of the scale were found to be similar in the pre-training and post-training periods (p>0.05) (Table 2). In addition, scores of S-STAI and T-STAI in the pre-training period [median:39 (min:14-max:66) and 40.5(23-72), respectively] were not significantly different from those in the post-treatment period [44(27-67) and 45(27-70)] (p=0.775, p=0.171, respectively) (Figure 2).

Table 2. Scores of Tendency Scale for Technology Use in the Training and Technology Compliance Scale

	Pre-Test Results		Post-Test Results		
	Mean	**SD**	**Mean**	**SD**	**p**
Technology Compliance Scale*	6.15	2.08	6.33	2.02	0.390
Tendency Scale for Technology Use in the Training*					
Technology Use					
1. I want technology to be used more in classes.	3.80	1.03	3.46	1.15	0.068
2. Using technology makes it easier to do my course-related responsibilities/ assignments.	3.83	0.86	3.55	1.14	0.076
3. I like communicating with faculty members via the Internet.	3.50	1.21	3.66	1.06	0.357
4. I like sharing with my classmates via the Internet.	3.71	0.97	3.65	1.10	0.445
Motivation and Technology					
1. Classes involving technology use are more entertaining.	3.46	1.03	3.36	1.07	0.558
2. I give more importance to classes which involve technology use.	3.00	0.92	3.13	1.19	0.459
3. I learn better in classes which involve technology use.	3.50	1.17	3.58	1.06	0.774
4. I enjoy learning with technology.	3.68	0.91	3.55	1.11	0.374
5. I would like technology to be used in all classes.	3.56	0.96	3.53	0.96	0.737
6. Technology use in classes increases my interest.	3.53	1.06	3.46	1.03	0.510
7. I attend classes more which involve technology use.	3.13	1.15	3.26	1.17	0.414
8. I am more active in classes which involve technology use.	3.35	1.14	3.41	1.10	0.782
9. I am more willing to attend classes which involve technology use.	3.33	1.15	3.31	1.12	0.851
10. I follow/listen to classes better which involve technology use.	3.36	1.17	3.36	1.14	0.981
11. I am better prepared for classes which involve technology use.	3.25	1.06	3.28	1.12	0.838

* Paired T-test



* Median values p>0.05

Figure 2. Scores of STAI at Pre-Test and Post-Test Periods

DISCUSSION

Simulation-based training[19] is accepted as a suitable strategy to improve students' self-confidence, knowledge, and ability to manage care settings in clinical practice. Therefore, this method is an integral part of training to improve the safety and quality of patient care in the health sciences[19,20]. In the study, simulation-based training regarding maternal-child clinical scenarios was carried out for 14 weeks. After the training, professional skills, internalizing the professional environment, motivation, and self-confidence, as well as teamwork, critical thinking, and crisis management of students, were enhanced by the training. However, anxiety about professional life decreased.

Students felt self-confident and satisfied with using simulation in an active teaching-learning environment in the present study. Similar results are found in different studies regarding skill competence and knowledge retention using practice-based simulated scenarios in midwifery students[21,22] and nursing students[6,23,24]. In a qualitative study, the students state that real-time simulation helps them develop the knowledge and skills needed to manage obstetric emergencies in clinical practice[25]. Since students' self-confidence impacts making the right decision in clinical practice and developing clinical skills[26], simulation-based training could help increase self-confidence in intervening in similar situations encountered in the clinic[27,28].

As it is known, motivation is the strongest factor in learning. When learning by doing is considered direct access to information by the student himself, technology-containing equipment, virtual reality, and simulators are thought to be proper educational tools to achieve this[29]. Learning with simulation increases students' motivation by increasing participation in the process[30]. In a study, nursing students express that learning with a simulator improves their motivation[31]. Traditional learning models alone can no longer motivate the current generation of students willing to use new technologies. Learner-focused approaches as the new concept are needed to encourage learning and ensure satisfaction. Students can learn the clinical practice and their progress by practicing, trying, and living in a simulation-based environment. Thus, students' use of technology as a learning tool can increase their motivation and encourage individuals to learn the topics[30].

Since healthcare has hallmarks such as communication, teamwork, and crisis management, non-technical skills that healthcare professionals must acquire are critical components of the clinical practice for patient safety and optimal patient outcomes. Simulation training offers the opportunity to develop both technical and non-technical skills[7,9,32,33]. Midwifery students using obstetric emergency simulation state that the simulation facilitates the opportunity to develop communication, decision-making, and teamwork skills necessary to deal with obstetric emergencies[34].

Moreover, learning by doing permits students to improve their critical thinking and ability to make the right decisions[30]. Nursing students report that they perceive an advance in critical thinking ability when they work with pre-clinical simulation with high-fidelity human simulation[35]. According to the qualitative interview with nursing students, the students state that they find clinical simulation a valuable learning experience. Also, they improve their abilities to prioritize assessment and identify abnormal physical findings[36]. In contrast, the clinical competency and critical thinking skills of nursing students who practice with simulation remain the same compared to traditional clinical practice[37]. In a recent study, when the effects of high-fidelity simulation training on skills in nursing students are examined, simulation training is found to be ineffective in developing critical thinking and problem-solving skills compared to traditional training[38]. The differences could be explained by the lack of standardization of training technologies and evaluation methods.

The high-risk, urgent, and non-delayed nature of healthcare services makes it important for healthcare professionals to manage the service delivery process. Simulation training allows students to practice repeatedly in a safe and real-like environment. This offers opportunities that traditional training cannot provide, especially in crisis situations[39].

One of the non-technical skills is crisis management. Such skills can be not only taught by clinical experience but also be required to endeavour privately. When a high-fidelity patient simulator is evaluated in simulated anaesthesia crisis on anaesthesia residents, it was found that significant improvements from repetitive simulations between the first and second sessions and between the first and third sessions, respectively[40]. Furthermore, nurses with high fidelity simulation experiences demonstrate that simulation improves team performance and behaviour in various clinical contexts in crisis management[41].

In the study, besides, technology readiness was evaluated as a possible barrier by using two scales regarding both the *Technology Compliance* score and *Tendency Scale for Technology Use.* Interestingly, the *Technology Compliance score* was stable in the pre-training and post-training periods. The *Tendency Scale for Technology Use* was validated in the study group. Two subgroups regarding Technology Use and Motivation and Technology were obtained by factor analysis in the Tendency Scale for Technology Use. No significant differences were observed in the scores of items in both subgroups of the scale in both periods. Moreover, the *Tendency Scale for Technology Use* was found to be a feasible tool for midwifery students from the perspective of technology use. In this respect, it is expected that the new generation living with technology does not change their technology compliance scores pre- and post-training. The use of technology increases students' interest as they are familiar with technological tools[42]. In other words, it is normal that technology has an intense influence on this generation's perspectives, lifestyles, and life expectancies. It is also vital to meet their educational needs and expectations in this direction. Technologies such as the internet, smartphones, social media, and computer games have become integral to the environment in which individuals grow. This situation reveals that the new generation's learning and information processing significantly differ from the previous generations[43]. Since the practical experiences of higher education students with simulation exercises are playful; affect their motivation positively, they are satisfied with the situation owing to the improvement of their competence via practical experiences[29]. Moreover, technological materials in courses increase the student's motivation and enable them to access information quickly. It was also stated that technology contributed to being focused on learning[42]. While technology aims to make life easier, it also brings new responsibilities to individuals. Awareness of these responsibilities is thought to provide advantages to individuals, society, and professional members who

integrate with technology, produce technology and integrate it into their usage areas[44].

As it is known, stress and anxiety affect human performance in simulation-based training[12,45,46]. In the study, the STAI scale was used to assess students' anxiety levels in simulation-based training. S-STAI and T-STAI scores were stable in both pre-training and post-training periods. In the study, the simulation-based obstetric training program didn't change the anxiety levels of midwifery students. When the characteristics of the current generation of students (technology-dependent, demanding continuous feedback, etc.) are thought, computer-aided simulations could be good options in health sciences education[47]. Nursing students report that simulation-based training reduces their anxiety and improves their self-confidence during measuring arterial blood pressure measurement in the clinical setting[48]. A study comparing virtual clinical simulation and face-to-face high-fidelity manikin simulation found that nursing students using high-fidelity manikin simulation had lower anxiety levels[49]. Different findings are found when similar studies using the STAI scale are examined. The anxiety of nursing students decreased mainly state anxiety following simulation-based orientation[50]. In another study examining the effect of simulation education on the anxiety of paediatric nursing students, anxiety scores of students who practice with a high-fidelity simulator are lower than those who practice skills without a manikin[51]. Similarly, the high-fidelity human simulation used by nursing students decreases anxiety before coming across patients with mental illness[35].

Simulation-based training programs are considered valuable and feasible educational tools because this training enhances professional identity and capabilities in health sciences training. Therefore, simulation-based training reflects the clinical environment without exposing patients to undue risks or harm[52,53].

Education in health sciences is poorly affected by the Corona-Virus Disease 2019 (COVID-19) pandemic nowadays[54]. Although the virtual environment cannot fully replace face-to-face clinical training, educational scenarios for diverse and complex clinical conditions can help to improve professional competency. As an innovative approach, simulation-based learning can be more effective with artificial intelligence. Yet, qualitative studies are necessary to understand the limitations and strengths of simulation-based education programs.

CONCLUSION

In conclusion, professional development was ensured by using the simulation-based training course regarding real-life scenarios in the study. In addition, anxiety about professional life has also decreased. However, technology readiness and anxiety levels were stable in pre-and post-training periods. Since the improvement of professional skills was achieved by the simulation-based training course, this strategy could provide safe healthcare with qualified and well-educated midwives.

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Author contributions:

Study design: GM, SA, PKA, ROC, OCK, NSK, LK, MDB

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