

The evaluation of simulation maket in nursing education and the determination of learning style of students

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ABSTRACT

Objective: The aim of this study is to detect the overall evaluation of nursing students toward simulation makets throughout the practice education and to reveal their learning styles in relation to certain individual features.

Materials and Methods: The data were collected via questionnaires including students' evaluation toward simulation makets and "Kolb learning styles inventory." Participants included 103 male and female nursing students in Turkey. For the analysis, percentage, means, standard deviation, *t*-test, and ANOVA were utilized.

Results: 71% of the students stated that the laboratory was suitable for the skill education but 53.4% uttered the duration of the practice was not enough. Students were found to have different learning styles (28.2% assimilating, 27.2% convergent, 26.2% accommodating, and 18.4% divergent).

Conclusion: The results demonstrated that the duration of the laboratory practice and the number of the makets should be increased during the education of students with different learning styles.

Keywords: Learning styles, Kolb learning styles, nursing education, nursing students, simulation maket

Introduction

Learning, which plays a very important role in human life, is a concept that has been explained and defined very differently by scientists and philosophers since ancient times. Today, nearly, all of the educators and psychologists define learning as the permanent behavioral change derived from experiences. A student's perception, relationship with others, cognitive, emotional, and physiological structure determine his/her learning style.¹⁻⁴ Learning styles are affected by personality, career choice, educational features, present work, and duties. The indicators of "what" and "how" of a student's processing while learning form his/her learning style. Kolb points out that a stable learning is impossible and learning occurs in a cycle which changes from concrete to abstract and from reflective observation (RO) to experience.⁵ Defining learning as "formation of information through experiences," Kolb is one of the prominent authors who have an influence on educators with his ideas.⁶

Kolb defines experiential learning theory as a four-stage cycle. Concrete experience (CE): Students learn through perception and feeling. The individual finds theoretical approaches beneficial and interprets every action in him/herself. He/she benefits experiences in a maximum level. An approach based on intuitions rather than systematic and scientific approach is preferred in the solution of the problems. RO: Learning by

observing is preferred. These individuals make their decisions after analyzing the others' perspectives carefully without participating actively. The courses in the form of lecturing are beneficial for them. It is observed that instead of practices, they are good at understanding the fundamentals of the event, trying to find answers to questions such as what is truth, how it is formed, trusting her/his own emotions and opinions in the formation of ideas, and making decisions by thinking patiently, objectively, and carefully. Abstract conceptualization (AC): They learn by thinking about a subject and doing analysis. These individuals are prone to symbols more. They learn well with learning styles in which systematic analysis and theory are practiced and which are directed by the authority. It is advocated that the people who have this kind of learning style are more successful in making systematic plans. They prefer thinking using scientific approaches in problem solution. Active experimentation (AE): They learn best by doing. These individuals learn best when they participate in assignments, discussions, and projects actively. They are extrovert. They want to learn by touching. The individuals who have this kind of learning style possess the tendency to change the situation and the environment. They prefer to take the beneficial and practical one rather than a single scientific truth.⁵

Kolb learning style model, which is also defined as experiential learning model, is based on learning cycle model suggested by

Jung. Kolb's model, learners simultaneously employ different abilities to some extent: CE, RO, AC, and AE. These abilities are arranged into two bipolar dimensions, abstract to concrete, and active to reflective. The dimensions are then translated into four learning styles: Convergent (AC and AE) combine AC with AE. These individuals develop practical methods based on ideas and theories and can be hasty in the implementation. Divergent (CE and RO) combine CE with RO. They prefer to observe concrete situations from more than one point of view and will probably delay action. Assimilating (AC and RO) combine AC with RO and are able to grasp a large range of information and put it into a logical form. They are more concerned with the theory than the application. Accommodating (CE and AE) combine concrete experimentation with AE. They learn best from a hands-on approach and are those one relies on to get the job done.⁶ Kolb proposed that certain disciplines, such as nursing, employ the divergent learning style and are stronger with concrete and reflective learning situations rather than active and abstract situations. The question that research needs to answer is whether this reflects the current nursing student population given its diversity of age and experience.⁷

As in the various scientific fields, there are different applications in nursing education in addition to the learning styles. Among these, simulation applications are seen crucial in terms of professional competence and development. In health care, simulation is defined as a method which makes a clinical situation as similar as possible to its real form during clinical applications so that if a person faces with it in real life, he/she can understand and manage it easily.^{8,9} Simulation is influential in the development of learners' cognitive, psychomotor, and attitudinal knowledge and skills by providing a real learning environment, in which real-life situations are transformed into experiences. Learning by themselves, increase in critical thinking skills, the improvement in the skill of using technology, putting theoretical knowledge into practice interactively and making corrections in the problems the learners come across are some of the advantages of simulation education for the students of nursing.¹⁰

The fact that patients' safety and patient rights are among the rising values, and the efforts to increase students' competency have made an extending usage of simulation possible in the education of health professionals.¹¹ Today, in nursing education, the importance of professional skill laboratories, in which students can develop their self-confidence and psychomotor skills through ongoing practice on makets before they meet with patients in real life, has increased. It is known that studying on makets that are very similar to human body have contributed to making learning faster, providing a safe environment for the students who will practice for the first time due to the absence of patients, decrease in anxiety before clinic, and the development of communication skills.¹²⁻¹⁴

The learners are given opportunities to encounter more real obstetric-gynecologic case and do practice in a safe

environment in terms of gynecology and obstetrics. The interactive experience, which is carried out with the simulation tools that are unique to the application of gynecology and obstetrics, results in student's learning the practices in this field better, and the increase in critical thinking skills.¹² Simulation provides a learning environment which is assuring, supporting, and gives chances for learner-centered experiences to students. It enables learners to have experiences by making mistakes and learning from them without damaging individuals. Application scenarios can be prepared as desired, and all cases can be tested. In such an educational environment, what has been learnt could be transferred to the clinical atmosphere by means of appropriate techniques for skill education. Trainings based on simulation are the atmospheres where each student is given opportunity to learn, equalitarian, and adult learning principles are utilized efficiently and which are suitable for various learning styles. In these environments, concern and requirements are depicted by learner and educator; learner experience is given priority, learning by doing is given a chance, and supported by feedback.^{15,16}

In the light of this information, the aim of this study is to detect the overall evaluation of nursing students toward simulation makets in professional skills laboratory throughout practice education and by identifying learning styles with "Kolb learning styles inventory" to reveal its relationship with certain features.

Materials and Methods

The study included 103 3rd-year students in Nursing Department in Afyonkarahisar City of Turkey Health Training School and they were taking Obstetrics and Gynecology Nursing throughout the fall term in 2014-2015 academic year. 5-h theoretical and 8-h practical courses in total were carried out with 110 students and 4 instructors per week in two separate sections (3/A and 3/B). The practice steps were demonstrated by an instructor by doing with a group of 10-12 students each week after the theoretical lesson by means of utilizing simulation makets in the related topics (pregnant examination, Leopold's Maneuvers, the pursuit of fetal heart rate, the practice of normal delivery). After that, all the learners were required to perform one-to-one application. For the application of the study, the permission was obtained from Afyon Kocatepe University the Ethical Committee of the Faculty (2014/311) of Medicine.

The questionnaire was administered between 02 and 10 January 2015 after the student's completed skill practices. The questionnaire included demographic information, 8 questions for the evaluation of simulation maket, and 12-item Kolb Learning Styles Inventory which was developed by Kolb (1984; 1985) and translated into Turkish by Aşkar and Akkoyunlu (1993). In Kolb Learning Styles Inventory, learners' answers are placed in such a way that they contain numerical values such as 4,3,2,1 - from more to less-; thus,

the total score of the individual who has the same learning styles could be calculated. The lowest score to be obtained from the inventory is 12, and the highest is 48. After this grading, combined scores were calculated. Combined scores were stated as AC-CE and AE-RO, and the scores obtained after this process range between -36 and $+36$. The positive score obtained from the difference between AC-CE displayed that learning was abstract and negative score obtained from the difference between AE-RO showed that learning was concrete. Similarly, the scores obtained from the difference between AE-RO demonstrated whether learning was active or reflective. Combined scores were placed on a coordinate system. The number obtained by AE-RO process was placed on x-axis, the number obtained by AC-CE process was placed on y-axis, and the place where two numbers intersect showed the score related to the individual's learning style (divergent, assimilating, convergent, and accommodating). When the obtained score was extracted from the score of the opposite learning style, the place of the individual in this dimension was found.

The data obtained was analyzed by using SPSS 18.0 and used through descriptive statistics such as frequency, percentage, means, standard deviation, and through *t*-test, one-way ANOVA.

Results

In this study, 82.5% ($N = 85$) of the participants were female. 88.3% of them ($N = 91$) were the graduates of regular high school, and 11.72% of them ($N = 12$) were the graduates of medical-vocational high school, and the mean of age was 21 ± 1.4 . The descriptive statistics related to the students' opinions about laboratory application were presented in Table 1. According to this, 70.9% of the participants stated that laboratory setting was suitable for the skill education; however, 53.4% of them expressed that the duration of the application was not sufficient. Moreover, 68% of the students pointed out that simulation market was suitable for practice education, whereas 47.6% expressed that it was not sufficient. 86.4% of the students uttered that it was beneficial to practice on makets before practicing on patients at hospital, and 93.2% stated that the practices s/he was engaged in individually would lead to better learning. Along with these, 91.3% of the students expressed that they were satisfied with this practice education, and 79.6% stated that they felt themselves better after practice education (Table 1).

The scatter diagram indicating the scores obtained from four main learning styles in Kolb Learning Styles Inventory (assimilating, convergent, divergent, and accommodating), learning style inventories (CE, RO, AC, and AE), and combined scores (AC-CE and AE-RO) were presented in Figure 1. In the Figure 1 which was formed by combined scores, the place where two scores intersect showed the most suitable learning style for the individual.

Table 1: The participants' opinions about the simulation makets used in practice education

Question	N (%)	
	Yes	No
Is the laboratory appropriate in general?	73 (70.9)	30 (29.1)
Is the duration of the application sufficient?	48 (46.6)	55 (53.4)
Are simulation makets appropriate?	70 (68.0)	33 (32.0)
Are simulation makets sufficient?	54 (32.0)	49 (47.6)
Are simulation makets useful in the practice education?	89 (86.4)	14 (13.6)
Did application on your own influence learning positively?	96 (93.2)	7 (6.8)
Is he/she happy with the education with simulation makets?	94 (91.3)	9 (8.7)
Does he/she feel more competent after the education?	82 (79.6)	21 (20.4)

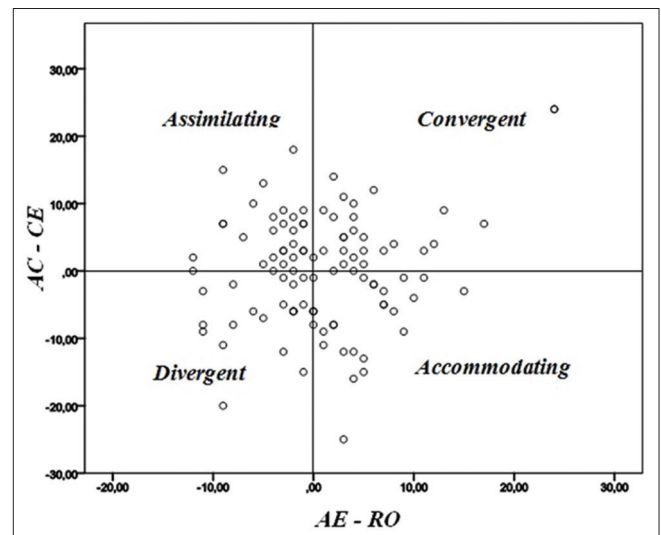


Figure 1: Distribution of the students according to learning styles and learning style inventory

The distribution of the participant students in terms of learning styles was presented in Table 2. According to this, it was found out that 28.2 of the students had “assimilating,” 27.2% had “convergent,” 26.2% had “accommodating,” and 18.4% had “divergent” learning styles.

The results of the *t*-test and variance analysis in regard to the participant students' academic success comparison according to learning style inventories and learning styles were presented in Table 3. Academic success is value in the 1-4 (min = 1 and max = 4) range. According to this, the students whose score from (RO) inventory was higher than (AE) inventory among the learning style inventories were found to have higher academic success ($P < 0.05$). Furthermore, no significant difference has been found between the students in (AC) and (CE) in terms of academic success ($P > 0.05$). On the other hand, the students' academic success differed significantly according to their learning styles ($P < 0.05$). According to

Table 2: Distribution of the students according to learning styles

Learning styles	N (%)
Convergent	28 (27.2)
Assimilating	29 (28.2)
Accommodating	27 (26.2)
Divergent	19 (18.4)
Total	103 (100.0)

Table 3: The comparison of the students' academic success with respect to learning style inventories and learning styles

Groups	N	$\bar{x} \pm SD$	t/F	P
AE	47	2.53±0.48	2.511	0.014*
RO	42	2.80±0.55		
AC	50	2.60±0.50	1.065	0.290
CE	39	2.72±0.57		
Convergent	26	2.55 ^b ±0.51	3.867	0.012*
Assimilating	24	2.65 ^b ±0.48		
Accommodating	21	2.48 ^b ±0.44		
Divergent	18	3.00 ^a ±0.58		

* $P < 0.05$. ^{a,b}The difference between groups having different letters is significant ($P < 0.05$).
 t: t values for t-test, F: F values for ANOVA. \bar{x} : Mean values for academic success (min=1 and max=4), SD: Standard deviation, RO: Reflective observation, CE: Concrete experience, AC: Abstract conceptualization, AE: Active experimentation

this, the students who have divergent learning style had higher academic success.

Discussion

It is very important for a qualified nurse to use his/her skills and abilities gained during his/her education in terms of self-confidence and personal satisfaction. When the fact that prospective nurses are given basic education about their professions in health training schools/faculties are taken into consideration, it is quite clear that a good education should be given both in basic and higher levels. As it is known, education can be successful if it meets the personal needs. In this respect, it is thought that taking learning styles from individual differences in education into consideration, will contribute positively for educating nurses.

103 students participated in this study which aimed to determine the overall evaluation of nursing students regarding the simulation makets in application laboratories during the process of application education and to reveal the relationship of their learning styles with several individual features by means of "Kolb Learning Styles Inventory." While more than the two-third of participants stated that the laboratories were appropriate, more than half of the participants expressed that the application period was not enough for them. The reason for insufficiency is thought to be the fact that there were too many students and they did not have enough opportunity for application education. In a parallel study conducted by Eker *et al.*,¹⁴ 66.7% of their nursing student participants stated that their laboratories were appropriate and 57.1%

stated that physical conditions and period were sufficient for them. Statistically, significant knowledge gains occurred in the overall sample. This is consistent with other studies of knowledge gains in pre-licensure nursing students after human patient simulation.^{17,18}

Moreover, most of the students stated that they were pleased with the practice education with simulation makets and felt themselves more competent. In addition to this, about two-third of students thought that simulation makets were appropriate for the application education, most of them (86.4%) found them beneficial, and about half of them stated that the number of makets was not enough. Three simulation makets were present in the school laboratory for application; hence, it is expected that the number of it was found to be insufficient when taken into the number of the students. Similarly, Eker *et al.*¹⁴ also found that, after the simulation education, 85.7% of students felt themselves more competent, 92.1% would use these skills in their professional lives, 93.7% were happy to have this education and 87.3% stated positive feedback on the sufficiency of the makets, which is the contrary to the current study. In their study which focused on the impact of simulation education on students' efficacy and self-confidence, Wagner *et al.*¹⁹ concluded that students who got preclinical scenario/computerized simulation education were more satisfied with clinical experience, became more beneficial to patients, were accepted by clinic nurses more, felt an increase in their knowledge and nursing skills.

In this study, the relationship between learning styles and gender could not be examined because the number of male nursing students was inadequate. In their study entitled as the assessment of learning style in a sample of Saudi medical students, Buali *et al.*²⁰ found that the majority of convergent and accommodating learning styles were seen in male students more than females (85% and 60% respectively) while the majority of divergent and assimilating styles were seen in female students more (60% and 56%, respectively). The study carried out by Ekici²¹ also showed that there is a statistically significant relationship between gender and learning styles. It was found in this study that while the ratio of prospective teachers having divergent learning style among female ones was 32.2%, the ratio of divergent learning style was 64.9% among prospective male teachers. On the other hand, Çelik and Şahin⁴ put forward that learning styles of female and male teacher candidates did not differ significantly according to their gender. In the same vein, Özen²² also concluded that there is not a statistically significant relationship between the learning styles and gender of students and gender did not have an impact of determining the dominant learning styles of students.

This study found that there is not a significant relationship with learning styles and the types of school students graduated from. In the study conducted by Özen²² to examine the relationship of learning styles with several variables among teacher candidates of Social Sciences, it was revealed that there is

not a relationship with the students' learning styles and their learning domains at high school.

In this study, it was seen that nursing students had assimilating and convergent learning styles most and divergent learning style least. This finding which shows parallelism with numerous studies^{1,23-26} revealed the fact that nursing education programs should be constructed around the features of assimilating and convergent learning styles and in a way that will help students be decision-makers, think critically, synthesize the knowledge, produce ideas, take responsibilities, produce solutions for problems, and integrate with his/her environment both individually and holistically. The study conducted by Hasırcı to find out the dominant learning styles of students showed that about half of the students had assimilating learning styles and they had accommodating learning style least.²⁴ Ergür²⁷ maintained that since students mostly had convergent and assimilating learning styles and since they were graduates of science domain (90.9%-339 students), they reflected the features which the domain they graduated from had. In another study conducted on this issue, Fowler²⁸ reached 224 radiology technicians. The findings showed that 33% of the participants had convergent, 33% of them had assimilating, 21% of them accommodating, and 13% had divergent learning styles. These results demonstrated that students were successful in comprehending extensive knowledge and making it a meaningful whole, and they preferred problem-solving while learning, making decisions, learning by doing and experiencing, and focusing on abstract thoughts, and terms rather than people.

In the current study, it was revealed that, in learning style inventories, students in RO group had more academic success than the ones in AE group. Besides a significant relationship was found between the academic success and learning styles of students, and students in the group of divergent learning style had more academic success. In the study conducted by Cavanagh *et al.*,²⁹ it was stated that nursing education mostly developed the features of students related to AC and RO learning cycles. Buali *et al.*²⁰ revealed that there was significant difference between male and female students regarding the mean values of AE-RO (6.7 vs. 1.5) and AC-CE (4.1 vs. 2.1). Today, the intellectual fundamentals and terms of nursing and nursing education agree on the fact that nurses should approach individuals with a holistic perspective which interacts with their environment during all steps of health-illness continuity. It was emphasized this can only be achieved with students' systematic thinking, their using logic and ideas with a scientific approach, transferring theoretical knowledge to application areas, and education should be built on these fundamentals.^{30,31}

In a study examining the relationship between students' learning styles and several variables, Şenyuva²³ identified a relationship between the classrooms where students were taught and mean scores of the levels of learning cycles. Students mostly preferred AC and RO levels of the learning

cycle in this study, and no significant relationship was found between the learning styles and the classroom they were taught, the school and the department they graduated from. Finally, it was reported that CE level (learning by feeling/touching) was used by very few students.

Conclusion

The students expressed that the preclinical application of skill development in the laboratory atmosphere was useful for them. Most of the students also stated that they felt themselves insufficient during the clinical applications in hospitals and for this reason, they had problems with nurses, patients, and other health-care workers. According to the results of this study, the method of simulation education will contribute to students' education based on the positive opinions of students regarding its effectiveness in improving their preclinical skills and competencies. Students complained about the period of laboratory applications and the low number of makets, so, the increase in the time of application and the number of makets would contribute to the quality of education positively.

The low number of students having divergent learning styles and the fact that students with high active living points had higher academic success were among other important results of this study. Based on this, it can be said that educational activities on ACs and reflective practices should be included in the process of education.

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