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# INVESTIGATION of RELATIONSHIP BETWEEN LEARNING STYLES and PSYCHOMOTOR SKILLS of NURSING STUDENTS

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**ABSTRACT**
This study was performed to investigate the relationship between learning styles and psychomotor skills of nursing students. The study was conducted between November 2013 and May 2014 in a Nursing Faculty in Izmir. The sample of the study comprised 2nd grade students (n = 174) who took "fundamentals of nursing" course and agreed to participate in the study. In the study, all the participating students were first given theoretical knowledge about the intramuscular (IM) injection in the classroom, and then they were administered the "Felder-Soloman Index of Learning Styles" and "IM Injection Knowledge Form". Later, in the skills lab, the participants were demonstrated how to administer IM injection. Fifteen days after the demonstration, the participants' IM injection skills were assessed using the "IM Injection Practice Skills Checklist". The majority of the participants in the study were determined to have active, visual, sensing and sequential learning styles. In the present study, IM injection knowledge mean scores of the participants with the sensing and sequential learning styles were higher than those of the participants with the intuitive and global learning styles. No significant differences were determined between the participants' mean scores for psychomotor skills (IM injection) in terms of their learning styles. In the study, no relationship was determined between the learning styles and psychomotor skills (IM injection) of the participating nursing students.

**Keywords:** Nursing student, learning styles, psychomotor skill.

# HEMŞİRELİK ÖĞRENCİLERİNİN ÖĞRENME STİLLERİ ve PSİKOMOTOR BECERİLERİ ARASINDAKİ İLİŞKİNİN İNCELENMESİ

**ÖZET**
Bu araştırma, hemşirelik öğrencilerinin öğrenme stilleri ile psikomotor becerileri arasındaki ilişkinin incelenmesi amacıyla yapılmış tanımlayıcı bir çalışmadır. Araştırma, Kasım 2013 - Mayıs 2014 tarihleri arasında İzmir'de bir Hemşirelik Fakültesinde yapıldı. Araştırmanın örneklemini, hemşirelik esasları dersini alan ve araştırmaya katılmayı kabul eden 2. Sınıf öğrenciler (n=174) oluşturdu. Araştırmada öncelikle bütün öğrencilere sınıf ortamında İM enjeksiyon ile ilgili teorik bilgi anlatıldı ve "Felder ve Soloman Öğrenme Stilleri Envanteri" ve İM

enjeksiyon bilgi formu uygulandı. Daha sonra, öğrencilere beceri laboratuvarında, İM enjeksiyon uygulaması demonstre edildi. Demonstrasyondan 15 gün sonra "İM Enjeksiyon Beceri Listesi" kullanılarak öğrencilerin IM enjeksiyon uygulama becerisi değerlendirildi. Araştırmaya katılan öğrencilerin genel olarak; yaparak, görsel, hissederek ve sıralı öğrenme stiline sahip oldukları belirlendi. Hissederek öğrenme stiline sahip öğrencilerin İM enjeksiyon bilgi puan ortalamalarının sezgisel öğrenme stiline sahip öğrencilerden, sıralı öğrenme stiline sahip öğrencilerin İM enjeksiyon bilgi puan ortalamalarının bütünsel öğrenme stiline sahip öğrencilerden anlamlı derecede yüksek olduğu saptandı. Öğrencilerin öğrenme stillerine göre elde edilen psikomotor beceri (İM enjeksiyon) düzeyi puan ortalamaları arasında anlamlı fark olmadığı belirlendi. Çalışma sonucunda, hemşirelik öğrencilerinin öğrenme stilleri ile psikomotor becerileri (İM enjeksiyon) arasında ilişki bulunmamıştır.

**Anahtar Kelimeler:** Hemşirelik öğrencisi, öğrenme stilleri, psikomotor beceri.

## INTRODUCTION

Nursing discipline is nursing practices based on nursing knowledge, theory and research (1). While theory provides materials for nursing practices, practice enables professionals to take the first step needed, to test their nursing knowledge and to develop theories (2).

The purpose of the nursing education is to train individuals who can use values, attitudes, knowledge and skills inherent in nursing profession and work in compliance with ethical principles (3,4). To achieve this purpose, targets should be identified accurately, a curriculum to ensure the attainment of the objectives should be developed, effective teaching methods should be used, a suitable learning environment should be created and whether the objectives have been achieved should be assessed (5).

Nursing profession is the result of the close relationship between theory, practice and education. In order to use theories and practical information of nursing science, the members of the profession must already have acquired psychomotor skills. Nursing is a profession which cannot tolerate any error related to occupational skills, because the result of the error will be very serious. Therefore, adequate importance, labor and time should be devoted to the occupational skills training, and the training process should be evaluated continuously (5).

In general, learning styles are defined as "characteristic difficulties and preferences of individuals in the way of receiving, keeping and processing information" (6). Each individual has different backgrounds, individual abilities, learning degrees and learning strategies in terms of knowledge, skills, attitudes and behaviors. The way in which a student learns best is his/her learning style. Making necessary arrangements by identifying a student's learning style increases the student's success. Of the necessary arrangements, preparation of the appropriate teaching materials and learning strategies takes the lead. Therefore, training programs to enrich students' professional viewpoints should be organized, their learning styles should be

identified, and learning should be realized in line with the student's individual characteristics and differences, and learning pace and style (7). Being aware of learning styles of students will help educators to determine not only the objectives and content of education, but also the ways of assessing teaching methods and techniques, and tools to be used by taking these learning styles into account (7,8). In studies on learning styles of nursing students, the focus has mostly been on the determination of the students' learning styles and the impact of learning styles on their academic success (7,8,9,10,11,12). However, there is a gap in the literature on the relation between learning styles and psychomotor skills, an important an important element of their profession. Therefore, we consider that the relationship between nursing students' learning styles and their psychomotor skills should be investigated.

This present study was conducted to examine the relationship between learning styles and psychomotor skills of nursing students.

## METHOD AND MATERIALS

### *Participants*

The study was conducted between November 2013 and May 2014 in a Nursing School in Izmir. The sample of the study comprised 174 2nd grade students who took the "fundamentals of nursing" course for the first time and agreed to participate in the study.

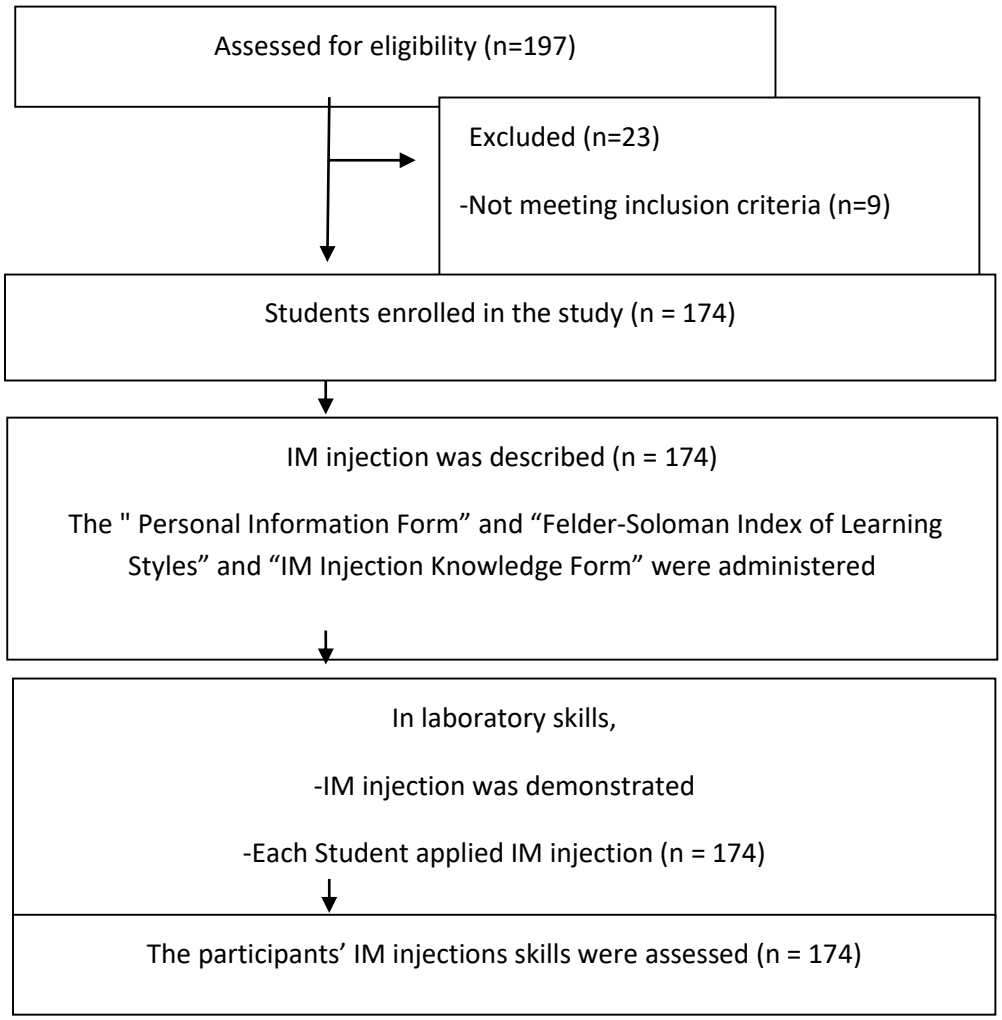
In the Nursing School, there were 197 2nd grade students. Of them, nine had clinical experience and fourteen did not accept to participate in the study. Thus, 174 participants were included in the study.

### *Data Collection*

The study data were collected through questionnaires and observations. The assessment of the participants' psychomotor skill levels was confined to IM injection application skills. To collect the study data, "Personal Information Form", "IM Injection Knowledge Form", "Felder-Soloman Index of Learning Styles" and "IM Injection Practice Skills Checklist" were used. During the data collection process, all the participating students were first given theoretical knowledge about the intramuscular (IM) injection in the classroom by a lecturer, and then they were administered the "Personal Information Form" and "Felder-Soloman Index of Learning

Styles". Later, in the skills lab, how to administer IM injection was demonstrated to the participants who were divided into groups. Before IM injection administration was demonstrated, the participants were given the "IM Injection Knowledge Form". Fifteen days after the demonstration, the participants' IM injection skills were assessed using the "IM Injection Practice Skills Checklist" (Figure 1).

**Figure 1.** Flowchart of the study

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*IM Injection Knowledge Form:* The form developed in line with the relevant literature (13,14,15) on intramuscular administration skills about which the participants were given theoretical information includes 20 items. A respondent can receive five points from each item. The lowest and highest possible scores to be obtained from the scale were 0 and 100 respectively.

*Felder-Soloman Index of Learning Styles:* The Turkish validity and reliability study of the Felder-Soloman Index of Learning Styles developed by Felder and Soloman (2004) (16) was performed by Samancı and Keskin (2007) (17). Felder-Soloman Index of Learning Styles has the following four dimensions: sensing-intuitive, visual-verbal, active-reflective, and sequential-global. Each dimension has two poles corresponding to different learning styles. For example, visual-verbal dimension has two poles: visual and verbal. These poles are expressed as visual learning style and verbal learning style (17). In the index which has 44 items in total, each item has two options: "a" and "b" referring to the learning style they are associated with (e.g., visual and verbal). The "a" option in the 11 items of each of the 4 dimensions refers to sensing, visual, active or sequential pole, whereas the "b" option refers to intuitive, verbal, reflective or global pole.

*IM Injection Practice Skills Checklist:* The checklist includes 25-item intramuscular injection process steps assessed after the teaching process which was conducted through demonstration. The participants were given the following scores for each of the steps in the checklist: 4 points for the completely performed step, 2 points for the partly performed step and 0 points for the unperformed step. The total score the participant received was accepted as the participant's psychomotor skill score. The minimum and maximum possible scores to be obtained from the checklist were 0 and 100 respectively.

*Statistical Analyses*

Statistical analysis of the data obtained from the survey was performed using the Statistical Package of Social Science (SPSS) 16.0 (18). To analyze the data, numbers, percentages, the Student t test, Mann-Whitney U test and Kruskal–Wallis analysis were used. In order to conduct the study, an ethical approval was obtained from the Scientific Research and Publication Ethics Committee of Ege University Faculty of Nursing (Date: 13.12.2013, Protocol no: 2013-57). The required permission for the use of the Turkish questionnaire was taken from the authors. The objective of the study was explained to the students and their written consent was obtained.

## RESULTS

Of the participants, 48.3% were in the 18-20 age group, 79.9% were women and 44.8% chose the nursing profession willingly (Table 1).

**Table 1.** Descriptive Characteristics of the Participants (n=174)

| **Age groups** | **n** | **%** |
|---|---|---|
| 18-20 years | 84 | 48.3 |
| 21-22 years | 79 | 45.4 |
| ≥23 years | 11 | 6.3 |
| **Gender** | | |
| Female | 139 | 79.9 |
| Male | 35 | 20.1 |
| **The reason for choosing the nursing profession** | | |
| Of his/her own free will | 78 | 44.8 |
| Upon someone else's suggestion | 48 | 27.6 |
| By chance | 26 | 14.9 |
| Others | 22 | 12.6 |

The results showed that more of the participants in the active-reflective learning style group had the active learning style (62.6%). In the sensing-intuitive learning style group, more of the participants had the sensing-intuitive learning style (67.2%). In the visual-verbal learning style group, more of the participants had the visual learning style (87.4%). In the sequential-global learning style group, more of the participants had the sequential learning style (71.3%) (Table 2).

The mean score the participants obtained from the IM injection knowledge form was 26.18 ± 16.07. The mean scores the participants with the active and reflective learning styles obtained from the IM injection knowledge form were (26.47 ± 15.70) and (25.69 ± 16.79) respectively. The difference between them was not significant ($p > 0.05$). The mean scores the participants with the sensing and intuitive learning styles obtained from the IM injection knowledge form were (29.28 ± 16.20) and (19.82 ± 13.91) respectively. The former group's score was

significantly higher (p <0.05). The mean scores the participants with the visual and verbal learning styles obtained from the IM injection knowledge form were (26.61 ± 14.90) and (23.18 ± 22.81) respectively. The difference between them was not significant (p> 0.05). The mean scores the participants with the sequential and global learning styles obtained from the IM injection knowledge form were (29.08 ± 13.98) and (19.00 ± 18.65) respectively. The former group's score was significantly higher (p <0.05) (Table 2).

**Table 2.** The Participants' Learning Styles and the Mean Scores for the IM Injection Knowledge Form in terms of the Participants' Learning Styles

| LEARNING STYLES | | Mean scores for Knowledge Levels | | | | |
|---|---|---|---|---|---|---|
| | | **n** | **%** | **X±SS** | **Min.-Max.** | **Statistics** |
| **Active – Reflective** | **Active** | 109 | 62.6 | 26.47±15.70 | 0.00-80.00 | t=0.311 P=0.292 |
| | **Reflective** | 65 | 37.4 | 25.69±16.79 | 0.0-70.00 | |
| **Sensing – Intuitive** | **Sensing** | 117 | 67.2 | 29.28±16.20 | 0.00-80.00 | t=3.779 P=0.000 |
| | **Intuitive** | 57 | 32.8 | 19.82±13.91 | 0.00-45.00 | |
| **Visual-Verbal** | **Visual** | 152 | 87.4 | 26.61±14.90 | 0.00-70.00 | U=1.338 P=0.128 |
| | **Verbal** | 22 | 12.6 | 23.18±22.81 | 0.00-80.00 | |
| **Sequential - Global** | **Sequential** | 124 | 71.3 | 29.08±13.98 | 0.00-80.00 | t=3.983 P=0.008 |
| | **Global** | 50 | 28.7 | 19.00±18.65 | 0.00-70.00 | |
| **Total** | **Mean** | 174 | 100 | 26.18±16.07 | 0.00-80.00 | |

The total mean score the participants obtained from the psychomotor skills was 58.87 ± 7.78. The mean scores for the psychomotor skills in terms of the participants' learning styles were as follows: active-reflective learning styles: 59.28 ± 8.21 and 58.18 ± 7.00 respectively, the sensing-intuitive learning styles 58.18 ± 7.00 and 59.22 ± 8.23 respectively, the visual-verbal learning styles 58.92 ± 7.85 and 58.54 ± 7.43 respectively and the sequential-global learning styles 59.03 ± 7.69 and 58.48 ± 8.04 respectively. The analysis revealed no significant differences between mean scores for the psychomotor skills in terms of the participants' learning styles (p> 0.05) (Table 3).

**Table 3.** Mean Scores for the Psychomotor Skill Levels (IM Injection) in Terms of the Participants' Learning Styles

| LEARNING STYLES | | Mean scores for Psychomotor Skill Levels | | | |
|---|---|---|---|---|---|
| | | **n** | **X±SS** | **Min.-Max.** | **Statistics** |
| **Active – Reflective** | **Active** | 109 | 59.28±8.21 | 44.00-80.00 | t=0.901 P=0.089 |
| | **Reflective** | 65 | 58.18±7.00 | 44.00-76.00 | |
| **Sensing – Intuitive** | **Sensing** | 117 | 58.18±7.00 | 44.00-80.00 | t= 0.418 P= 0.585 |
| | **Intuitive** | 57 | 59.22±8.23 | 44.00-80.00 | |
| **Visual-Verbal** | **Visual** | 152 | 58.92±7.85 | 44.00-80.00 | U=1.645 P= 1.898 |
| | **Verbal** | 22 | 58.54±7.43 | 46.00-72.00 | |
| | **Sequential** | 124 | 59.03±7.69 | 44.00-78.00 | t=0.423 P= 0.737 |
| | **Global** | 50 | 58.48±8.04 | 44.00-80.00 | |
| **Total Mean** | | 174 | 58.87±7.78 | 44.00-80.00 | |

## DISCUSSION

Students' learning styles should be identified, and learning should be realized in accordance with the student's individual characteristics and differences, and learning pace and style (7). The results of this present study performed to investigate the relationship between learning styles and psychomotor skills of nursing students revealed that the majority of the participants had active, sensing, visual and sequential learning styles. Similarly, in a study conducted by Ültanır et al. (2012) (19) health science students mostly had active, sensing, verbal and sequential learning styles.

According to the learning style characteristics of the participants in this study, the participants had more than one learning style and learning styles they preferred in the learning process were similar. These results suggest that training methods used in nursing programs whose aim is to gain students cognitive, affective and psychomotor skills should address all learning styles.

Several studies on learning styles have targeted to investigate the effects of learning styles on students' achievement. While some studies report that learning styles affect academic achievement and knowledge levels of students, some other studies state that learning styles do not affect academic achievement and knowledge levels of students. In a study conducted by Seven et al. (2012) (12) to investigate the learning styles of nursing students and the relationship between their learning styles and academic achievement, they determined that learning styles did not affect the students' academic achievement. Similarly, in their study conducted with medical students, Baykan and Naçar (2007) (20) reported that the students' learning styles did not affect their academic achievement. However, some other studies conducted on learning styles yielded different results. These studies reported that the students' learning styles were an important factor in determining their academic achievement and knowledge (21,22,23). In Uzuntiryaki et al.'s study (2003) (24), learning styles affected the students' academic achievement. In a study by Bilgin and Durmus (2003) (25), learning styles were reported to be a factor affecting students' achievement and the importance of teaching methods based on learning styles was emphasized.

In the present study, IM injection knowledge mean scores of the participants with the sensing and sequential learning styles were higher than those of the participants with the intuitive and global learning styles ($p < 0.05$). That these results might be related to the topic about which the participants' knowledge level was questioned should not be overlooked, because in this study, the participants' IM injection-related knowledge levels were assessed.

IM injection-related knowledge is concrete rather than abstract knowledge and learning it and putting it into practice require a certain procedure. Therefore, this might have caused the participants who tended to learn concrete knowledge and topics that should be learned in a specific order to obtain higher mean scores.

In this study, given the participants' learning styles, no differences were determined between the mean scores obtained by the participants from the psychomotor skills (IM injection application) (Table 3). The review of the relevant literature demonstrated that although there are several studies on the effects of learning styles on students' skill levels, studies conducted with nursing students on the same issue are not many. In Koç's (2013) (26) study, the relationship between the students' map-related skill levels and their learning styles was not significant. On the other hand, in Uzuntiryaki et al.'s study (2003) (24) , the participants' learning styles affected their success in and attitudes towards chemistry. On the other hand, in

Alşan's study (2009) (21), learning styles of prospective teachers affected their success in the basic chemistry laboratory course.

In the present study, the participants' psychomotor skill levels were not affected by their learning styles, which is probably due to the teaching methods used in the Nursing School where the study was conducted, because psychomotor skills training holds an important place in nursing education which is an applied profession, and the purpose of this education is to gain students these skills. Students are first given information on theory and application. Then, in the skills lab, they are demonstrated how to put this information into practice. Students are then asked to perform the same skills and to observe their peers. In order to achieve this, a checklist including the application steps of targeted skills that students are required to gain during their education is used. This process which includes several training methods may help students with different learning styles to gain psychomotor skills. For instance, while there were differences between the participants' knowledge levels related to IM injection application before the demonstration process in terms of their learning styles, after the demonstration process and implementation of the skills by the students when their psychomotor skills were assessed, these differences disappeared. In addition, all the participants were evaluated by the same researcher in order to eliminate differences likely to result from researchers' attitudes. Therefore, the participants may have been affected by each other during the evaluation process.

## CONCLUSIONS

At the end of this present study, the majority of the participants were determined to have active, sensing, visual and sequential learning styles. IM injection knowledge mean scores of the participants with the sensing learning style were significantly higher than those of the participants with the intuitive learning style, and IM injection knowledge mean scores of the participants with the sequential learning style were significantly higher than those of the participants with the global learning style. No significant differences were determined between the participants' mean scores for psychomotor skills (IM injection) in terms of their learning styles.

In line with the results of the present study carried out to investigate the relationship between nursing students' learning styles and psychomotor skills, institutions giving nursing education are recommended to identify students' learning styles and to implement teaching methods in

parallel with these styles, which is expected to facilitate students' learning. In this present study conducted to determine the relationship between learning styles and several psychomotor skills, only one psychomotor skill was assessed, which can be considered as a limitation of the study. Therefore, it is recommended that more studies should be conducted to investigate the relationship between learning styles and psychomotor skills and that more of the psychomotor skills should be assessed in these studies.

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