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RESEARCH ARTICLE
Health Sciences Education

The Effect of Spiral Learning Model on the Development of Self-Efficacy Perception and Attitudes Towards Anatomy Course in Therapy and Rehabilitation Department Students

Terapi ve Rehabilitasyon Bölümü Öğrencilerinde Anatomi Dersine Yönelik Öz-Yeterlik Algısı ve Tutumların Gelişiminde Spiral Öğrenme Modelinin Etkisi

Miraç Sezer [1]
Hanifi Dülger [2]

ABSTRACT

Aim: Anatomy course is a fundamental part of health sciences education, but its difficulties may have negative effects on students' attitudes towards the course and their self-efficacy perceptions. The spiral learning model aims to add depth to the learning process by providing gradual repetition of information. This study examines the effect of the education given with the spiral learning model on students' self-efficacy perceptions and attitudes towards anatomy course. **Method:** The study was conducted on 110 students at Bartın University Vocational School of Health Services. The research design was a quasi-experimental study based on a one-group pretest-posttest design. The training process was based on the spiral learning model supported by theoretical lectures, practices and quizzes for 14 weeks. After obtaining ethics committee approval, data were collected and analyzed using SPSS 25.0 program. **Results:** The findings of the study showed that there were positive changes in students' attitudes towards anatomy course and self-efficacy perceptions after the training. Before the training, most of the students had medium level attitudes, but after the training, the number of students with low level attitudes decreased to zero, and the proportion of students with medium and high-level attitudes increased. In self-efficacy perception, the proportion of students with low level perception decreased, while the proportion of students with medium and high-level self-efficacy perception increased. **Discussion:** Structural improvements made in the education process contribute to students' academic achievement and increase their confidence in learning. These findings confirm the effects of active learning and constructivist methods on academic achievement. **Conclusion:** This study highlights the effectiveness of the spiral learning model in anatomy education and emphasises its effectiveness in the field of health education. The use of this model will contribute to increasing students' self-efficacy perceptions towards anatomy course and making the learning of the course more permanent.

Keywords: Anatomy, Self-efficacy, Attitude, Spiral Learning, Therapy Rehabilitation

ÖZET

Amaç: Anatomi dersi, sağlık bilimleri eğitiminde temel bir yer tutar ancak zorlukları nedeniyle öğrencilerin derse yönelik tutumları ve öz-yeterlik algıları üzerinde olumsuz etkiler yaratabilir. Spiral öğrenme modeli, bilgilerin kademeli olarak tekrar edilmesini sağlayarak öğrenme sürecine derinlik katmayı amaçlar. Bu araştırma, spiral öğrenme modeli ile verilen eğitimin anatomi dersine yönelik öğrencilerin anatomi dersine yönelik öz-yeterlik algıları ve tutumları üzerindeki etkisini incelemektedir. **Yöntem:** Araştırma, Bartın Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu'nda 110 öğrenci üzerinde gerçekleştirilmiştir. Araştırma tasarımı, tek gruplu ön test-son test tasarımına dayanan yarı deneysel çalışmadır. Eğitim süreci 14 hafta boyunca teorik dersler, uygulamalar ve quizlerle desteklenen spiral öğrenme modeline dayanmaktadır. Etik kurul onayı alındıktan sonra veriler toplanmış ve SPSS 25.0 programı ile analiz edilmiştir. **Bulgular:** Araştırma bulguları, öğrencilerin anatomi dersine yönelik tutumları ve öz-yeterlik algılarında eğitim sonrasında olumlu değişiklikler olduğunu göstermektedir. Eğitim öncesi, öğrencilerin çoğu orta düzeyde tutuma sahipken, eğitim sonrası düşük düzeyde tutum gösteren öğrenci sayısı sıfırlanmış, orta ve yüksek düzeyde tutum gösterenlerin oranı artmıştır. Öz-yeterlik algısında da düşük düzeyde algıya sahip öğrencilerin oranı azalırken, orta ve yüksek düzeyde öz-yeterlik algısı gösterenlerin oranı artmıştır. **Tartışma:** Eğitim sürecinde yapılan yapısal iyileştirmeler, öğrencilerin akademik başarılarına katkı sağlamakta ve öğrenmeye olan güvenlerini artırmaktadır. Bu bulgular, aktif öğrenme ve yapılandırıcı yöntemlerin akademik başarıyı artırıcı etkilerini doğrulamaktadır. **Sonuç:** Bu araştırma, spiral öğrenme modelinin anatomi eğitimindeki etkisini ortaya koyarak, sağlık eğitimi alanındaki etkinliğini vurgulamaktadır. Bu modelin kullanılması, öğrencilerin anatomi dersine karşı öz-yeterlik algılarının artırılmasına ve dersin öğrenilmesinin daha kalıcı hale gelmesine katkı sağlayacaktır.

Anahtar Kelimeler: Anatomi, Öz yeterlik, Tutum, Spiral Öğrenme, Terapi Rehabilitasyon.

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INTRODUCTION

Anatomy, as one of the basic building blocks of education in the field of health sciences, contributes to the acquisition of clinical skills while improving the knowledge of health professionals. Anatomy examines the organs that make up the human structure and shape, the systems formed by the organs coming together and their relationships with each other (Turney, 2007; Süzen, 2016). In the Department of Therapy and Rehabilitation, anatomy education is critical for students to understand the structure and functions of the human body. However, learning a complex course such as anatomy, which requires constant repetition, consists of Latin words, and is a difficult science to learn, may cause difficulties for students (Sindel 2008; Mutluay, 2020). In this context, effective

[1] Lecturer; Bartın University, Vocational School of Health Services, Department of Therapy and Rehabilitation, Bartın, Türkiye. ORCID: 0000-0001-8435-599X
[2] Assist. Prof. Dr., Bartın University, Faculty of Health Sciences, Midwifery Department, Bartın, Türkiye. ORCID: 0000-0002-2442-6538

structuring of the learning process can improve students' attitudes towards the course and their self-efficacy perceptions (Harden & Stamper, 1999). Self-efficacy perception refers to students' beliefs about achievement and as an important component of the learning process, it ensures that the knowledge learnt can be put into practice in daily life. Therefore, students' self-efficacy perceptions towards anatomy course have a great impact on their academic achievement and attitudes towards the course (Bandura, 1997).

The necessity of anatomy course has been clearly expressed in the studies. In Bolatlı's (2021) study, most students stated that the anatomy course is an indispensable course for clinical practice. At the same time, it was emphasised that learning anatomy facilitates the learning and understanding of other courses (Mutluay, 2020). Which models can be more effective in the education of health professionals and what kind of educational approach should be adopted is still a matter of debate. All health-related departments should evaluate anatomy education and make continuous efforts to improve and update it. Because a strong anatomy education is one of the basic components of a strong health education (Tuygar, 2015). It has been stated in general terms that a structurally dynamic process is followed in education and therefore, the educational content should constantly maintain its up to date (Mutluay, 2020).

Today, the importance of student feedback in education is increasing day by day. Especially in vocational colleges in the field of health, collecting feedback, including students' learning experiences and satisfaction, is one of the requirements of student-centred education (Özalp & Kaymakcı, 2022; Karabilgin & Şahin, 2006). In this context, it is emphasised that student feedback enables both the development of educators' pedagogical skills and the continuous improvement of learning processes (Sincer, 2024; Kırbaç et al., 2017). In addition, it has been shown that the way teachers give feedback can directly affect students' learning attitudes and achievement (Öztürkçü, 2019; Günüşen & Üstün, 2012; Turan et al., 2010).

Changes and innovations in education can affect students' motivation and approaches to learning. In fields such as anatomy, which require practical knowledge, the effectiveness of the methods and teaching models used in education is of great importance. For this reason, it has been revealed in studies that receiving feedback continuously in the education process and the arrangements made accordingly have a positive effect on learning results (Öztürkçü, 2019; Günüşen & Üstün, 2012; Turan et al., 2010).

Spiral learning is a teaching model in which basic concepts are addressed at the initial level and repeated in a more complex and comprehensive manner in the following processes. This method allows students to regularly reinforce the knowledge they have already acquired, while learning progresses in a gradual and structured manner. The spiral learning process supports students to make sense of knowledge, to relate it to new learning and to reach a deeper level of knowledge through practice. This approach is used as an effective method especially in curricula where comprehensive knowledge and skills are taught gradually (Harden & Stamper, 1999; Osmosis, 2023; Bergman, 2014).

In conclusion, continuous efforts are required to improve the anatomy education given to the students at vocational school of health services. For these efforts to be effective, considering the student perspective will provide a clearer understanding of the difficulties and strengths in education. This study aims to examine the effect of spiral learning model on students' self-efficacy perceptions and attitudes towards anatomy course. Feedback studies in the literature have generally focused on undergraduate students in the field of health such as medical faculty students, nursing and midwife students (Buru, 2021; Mutluay, 2020; Uygur et al., 2013; Çetkin, 2016; 4. Arı & Şendemir, 2003). However, this study aims to evaluate the effects of the spiral learning method by targeting associate degree students studying in the field of health. The effect of this model in anatomy education will be evaluated by measuring the change in students' self-efficacy perceptions and attitudes before and after the course by using the Self-Efficacy Perception Scale for Human Anatomy Course and Attitude Scale for Anatomy Course. Such studies constitute an important step to better understand the learning processes of students studying in the field of health and to improve the quality of education.

METHOD

Type of Research: This research was carried out as a quasi-experimental study based on a one-group pretest-posttest design. The aim of the study was to compare the attitudes towards anatomy course and self-efficacy perception levels towards human anatomy course of therapy and rehabilitation department students before and after anatomy course.

Population and Sample: Students studying at Bartın University Vocational School of Health Services, Department of Therapy and Rehabilitation constitute the population of the study. No sampling method was used in the selection

of the sample, and a total of 110 students who met the inclusion criteria, took anatomy courses and voluntarily participated in the study participated in the study.

Training and Data Collection Process: In the first week of the anatomy course, pre-test data were collected online from all students using Participant Information Form, Self-Efficacy Perception Scale for Human Anatomy Course and Attitude Scale for Anatomy Course. After 14 weeks of training with the spiral learning method consisting of theory, practice and quizzes, post-test data were collected. The spiral learning model is effectively adapted to the anatomy course and enables students to develop their knowledge and skills gradually. In this approach, the course started with basic knowledge, and then this knowledge was expanded and elaborated with systematic anatomy topics. Structuring the course content in this way enabled the students to reinforce the information by continuous repetition. Weekly quizzes helped students to remember the previous topic and created a solid foundation for new learning. In applied trainings, it was ensured that they concretised their theoretical knowledge by demonstrating on the model model and showing it to the student. This process helped the information to become permanent and the students to understand the learning process more deeply. The pre-test data of 15 students who did not fully participate in the trainings and whose post-test data could not be obtained were deleted and the study was completed with 95 participants.

Ethical Principles: During data collection, the purpose, method and voluntary participation of the study were explained to the participants and informed consent forms were obtained. The study was conducted with the permission of Bartın University Ethics Committee (decision numbered 2023-SBB-0458) and institutional permission from the relevant hospital administration. In the study, ethical principles in accordance with the Declaration of Helsinki were followed, the privacy of the participants was ensured, and the confidentiality of the data was protected. The data were stored in a password-protected digital environment accessible only to the research team.

Data Collection Tools: The data collection tools used in the research are as follows:

Participant Information Form: It was prepared by the research team in line with the literature and consisted of 10 questions including sociodemographic and educational history of the students.

Self-Efficacy Perception Scale for Human Anatomy Scale: The scale consists of 26 items in total and is applied in a 5-point Likert-type format. The scale includes 6 negative and 20 positive statements. The tool includes three sub-dimensions: Confidence in anatomical knowledge, Awareness of practical skills in anatomy and transforming theoretical knowledge into life skills in anatomy. The scores that can be obtained from the scale range from 26 to 130. Participants' self-efficacy levels are rated as very low, low, medium, high and very high. The reliability of the scale was evaluated using Cronbach's Alpha (α) coefficient and the reliability value was calculated as 0.84 (Bahçeci, 2006).

Attitude Towards Anatomy Course Scale: It is a tool developed by Bahçeci and used to evaluate attitudes towards anatomy course. The scale consists of a total of 24 items and is administered in a 5-point Likert-type format. The instrument includes four sub-dimensions: commitment to anatomy course, negative attitudes and behaviours, prejudices towards anatomy course, and beliefs towards anatomy course. The range of points that can be obtained from ADITÖ varies between 24 and 120. Attitude levels are classified as follows according to the total score: Scores between 24-55 represent low level attitude, scores between 56-88 represent moderate level attitude, and scores between 89-120 represent high level attitude. This scale was developed and applied to systematically evaluate the attitudes of individuals in the context of anatomy course. The reliability coefficient of the scale was calculated as Cronbach's Alpha (α) value 0,75 (Bahçeci, 2006).

Data Analyses: The data obtained from the research were analysed with SPSS 25.0 package programme. The normal distribution of the data was evaluated by Kolmogorov-Smirnov test. Since the data showed normal distribution, parametric test was used. Mean ± standard deviation was calculated for continuous variables and number and percentage distributions were calculated for categorical variables.

RESULTS

Table 1 shows the change in students' attitudes towards anatomy course and self-efficacy perceptions. While most of the students (95.8%) had a moderate attitude before the training, this rate increased to 97.6% after the training. Those with low level attitudes completely disappeared, while the rate of those with high level attitudes did not change (2.1%). In self-efficacy perception, while 22.1% of the students had low level perception before the training, this rate decreased to 5.2% after the training. Medium level self-efficacy perception increased from 73.7% to 83.3% and high-level self-efficacy perception increased from 4.2% to 9.5%. These findings show that the training was effective in increasing students' self-efficacy perception and provided a positive stability on attitudes.

These results show that the training provided a positive stability in students' attitudes and perceptions towards anatomy course and a significant improvement in their self-efficacy perceptions.

Table 1. Distribution of students' attitudes and self-efficacy perception levels toward the anatomy course before and after instruction (n: 95)

Scale	Level	Pre-Education n (%)	Post-Education n (%)
Attitude Towards Anatomy Course Scale	Low level attitude	2 (2.1)	0
	Medium level attitude	91 (95,8)	93 (97.6)
	High level attitude	2 (2.1)	2 (2.1)
Self-Efficacy Perception Scale for Human Anatomy Scale	Low self-efficacy	21 (22.1)	5 (5,2)
	Medium self-efficacy	70 (73.7)	81 (83.3)
	High self-efficacy	4 (4.2)	9 (9.5)

Table 2 shows the comparison of students' attitudes towards anatomy course before and after the training. There was a significant increase in the sub-dimension of 'commitment to the anatomy course' between before and after the training (p = 0,019). Similarly, there was a significant decrease in the sub-dimension of 'prejudices about anatomy course' (p = 0,017). The other sub-dimensions, namely 'positive and negative behaviours' and 'belief in the necessity of anatomy course', did not show a significant difference between before and after the training (p > 0.05). In terms of the total scale score, although an increase was observed after the training, this change was not statistically significant (p = 0.072).

Tablo 2. Comparison of students' attitudes towards anatomy scale (n:95)

Attitude Towards Anatomy Course Scale	Pre-Test	Post-Test	p
Commitment to the anatomy course	42,6842	45,2316	**0.019**
Positive and negative behaviours exhibited in anatomy lesson	8,4000	8,4316	0.936
Prejudices about anatomy course	8,7684	8,3368	**0.017**
Belief in the necessity of anatomy course	13,8947	13,4105	0.217
Total Scale score	73,7474	75,4105	0.072

* Paired Samples t test

Table 3 shows the comparison of students' self-efficacy perceptions towards anatomy course before and after the training. After the training, significant increases were determined in the sub-dimensions of 'confidence in knowledge in anatomy' (p = 0.015), 'awareness of application skills in anatomy' (p = 0.021) and 'transforming theoretical knowledge into life skills in anatomy' (p = 0.002). When the total scale score was analysed, it was determined that self-efficacy perception increased significantly after the training and this increase was statistically significant (p = 0.001). These findings revealed that the training was effective in improving students' self-efficacy perceptions in anatomy.

Table 3. Comparison of students' self-efficacy perceptions towards human anatomy scale (n:95)

Self-Efficacy Perception Scale for Human Anatomy Scale	Pre-Test	Post-Test	p
Confidence in knowledge in anatomy	30,9684	33,0632	**0.015**
Awareness of application skills in anatomy	19,4421	22,3158	**0.021**
Transforming theoretical knowledge in anatomy into life skills	22,3368	25,5158	**0.002**
Total Scale score	72,7474	80,8947	**0.001**

* Paired Samples t test

Table 4 shows the relationship between students' attitudes towards anatomy course and their self-efficacy perception levels. According to the results of Pearson correlation analysis, a positive and statistically significant relationship was found between the scale of attitude towards anatomy course and the scale of self-efficacy perception towards anatomy course (r = 0,580; p = 0,012). This finding shows that students' positive attitudes towards anatomy course are related to the increase in their self-efficacy perceptions. The fact that the correlation coefficient obtained is positive indicates that the two variables move in the same direction.

Table 4. Relationship between students' attitudes towards anatomy course and their self-efficacy perception levels

		A	B
Attitude Towards Anatomy Course Scale (A)	r*	1	
	p		
Self-Efficacy Perception Scale for Human Anatomy Scale (B)	r*	0.580	1
	p	**0.012**	

* Pearson Correlation

DISCUSSION

Anatomy is a basic course in medical and health sciences and is of great importance for clinical practice. Effective learning of anatomy course for therapy and rehabilitation students can directly affect students' attitudes and self-efficacy perceptions. Self-efficacy indicates individuals' confidence in their own abilities and plays a critical role in the successful realisation of learning (Bandura, 1997). Educational strategies and methods can have significant effects on these perceptions of students. Structured educational methods such as the spiral learning model are considered an effective approach to improve attitudes and self-efficacy (Cook et al., 2008; Ng et al., 2021).

In our study, how the changes in the attitudes and self-efficacy perceptions of the students of the Department of Therapy and Rehabilitation towards the anatomy course were shaped by the educational process was discussed. The findings of the study show that spiral learning methods cause significant improvements in both students' attitudes towards anatomy course and their self-efficacy perceptions. Kardaş and Uca's (2016) meta-analysis study on the relationship between active learning method and students' achievement, attitudes, and views towards practices states that active learning methods support individual learning processes and improve students' attitudes towards learning and overlaps with our study. In addition, Buru (2020) emphasises that face-to-face education with materials such as models, cadavers, bones in anatomy education will be more effective and more permanent, and it will be more effective and permanent with one-to-one practice. These findings show that such methods in anatomy education provide a significant change in self-efficacy perception and attitudes (Yalnız Dilcen et al., 2023).

Statistically significant increases were observed in the sub-dimensions of 'confidence in knowledge in anatomy' ($p = 0.015$), 'awareness of application skills in anatomy' ($p = 0.021$) and 'transforming theoretical knowledge into life skills in anatomy'. Especially the significant increase in the total self-efficacy score ($p = 0.001$) shows that the training process had a positive effect on the students. These findings of our study are consistent with previous studies. Yılmaz et al. (2023) stated that there was no significant difference in the self-efficacy perceptions of students in anatomy course given by distance education depending on gender, but in general, self-efficacy scores were high. Similarly, in the study of Lök et al. (2009), it was revealed that the self-efficacy levels of nursing department students were higher than the students in other departments. This can be explained by the students' self-confidence in transforming theoretical knowledge into practice. The results obtained in our study support that students' self-efficacy perception can be improved by using constructivist and active learning methods in the education process. Dolu and Yalnız Dilcen (2022) emphasised that the effective use of online technologies contributed positively to the attitude towards anatomy course and self-efficacy perception. Studies show that educational interventions positively affect students' self-efficacy perception and contribute to their academic success. These findings once again reveal the importance of constructivist and active learning methods in teaching anatomy course.

The study shows that there is a significant and positive relationship between attitudes towards anatomy course and self-efficacy perceptions ($r = 0{,}580$; $p = 0{,}012$). This finding reveals that students' positive attitudes towards the course increase their self-efficacy levels. Similar findings were also found in studies conducted for other courses that require practice and repetition such as Anatomy course. Aksoğan and Özdemir (2022) emphasised that attitudes and motivation towards the course have a positive and strong effect on academic achievement, and that an increase in attitude and motivation increases academic achievement, while a decrease in attitude and motivation leads to a decrease in academic achievement. In particular, the relationship between academic achievement and attitude increases students' confidence and participation in learning. Özgenel and Deniz (2020), in their research on pre-service teachers, stated that academic attitudes have a strong relationship with self-efficacy. This finding shows that attitudes have a significant effect on both academic performance and self-efficacy perceptions. Kardaş and Uca (2016) stated that active learning methods create a strong correlation between attitude and self-efficacy. Active learning increases students' interest in the course and leads to an improvement in their self-efficacy perceptions. These findings reveal that education programmes should address attitude and self-efficacy perception together. Improving attitudes, especially in challenging courses such as anatomy, may contribute to the strengthening of students' self-efficacy perceptions and thus increase their success. Shaping educational interventions in this respect is important for sustainable academic development.

CONCLUSIONS AND RECOMMENDATIONS

This study examines the relationship between attitudes towards anatomy course and self-efficacy perceptions and shows that the training process provides significant improvements in students' attitudes and self-efficacy perceptions. After the training with spiral learning method, there was a positive change in students' attitudes towards anatomy course and their self-efficacy perceptions increased significantly. It was observed that especially active learning methods increased students' confidence in learning and supported their success in this process. These findings reveal that education has a significant effect on improving attitudes and self-efficacy perceptions. Educational processes, especially in complex and practical courses such as anatomy, should be shaped with

strategies to improve attitudes and self-efficacy perceptions. In this context, more widespread application of active learning methods can contribute to the development of both theoretical knowledge and practical skills of students. In addition, customising curricula according to individual needs and receiving student feedback regularly will provide more effective results in education.

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