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A COMPARISON OF ACADEMIC PERFORMANCE AND ATTITUDES TOWARD E-LEARNING ACCORDING TO THE LEARNING STYLES OF TURKISH PHYSIOTHERAPY STUDENTS IN DISTANCE EDUCATION DURING THE COVID-19 PANDEMIC PROCESS

ORIGINAL ARTICLE

ABSTRACT

Purpose: Learning style plays a crucial role in the education process and academic performance. However, there exists no study investigating the academic performance and attitudes toward e-learning according to the learning styles of Turkish physiotherapy students in distance education. Therefore, this study aimed to compare academic performance and attitudes toward e-learning according to the learning styles of Turkish physiotherapy students in distance education.

Methods: The study was designed as a cross-sectional study type. Physiotherapy students were divided into 4 groups according to learning styles (visual, n=39, auditory, n=30, tactile, n=37, and kinesthetic, n=30). Their attitudes towards e-learning including the tendency to use technology (TUS), satisfaction, motivation, and usefulness were assessed with the Attitude Scale Towards e-learning (ASTE). Academic grade point averages (AGPA) for the 2020-2021 academic year fall semester were recorded.

Results: The visual group had the highest AGPA ($p<0.050$). The auditory group had a higher AGPA than the tactile group ($p=0.001$). The TUS score of the visual group was higher than the tactile ($p=0.004$) and the kinesthetic ($p=0.004$) groups. The total ASTE score in the visual group was higher than in the tactile group ($p=0.003$).

Conclusion: The visual group was better than other groups in terms of academic performance, attitude toward e-learning, and tendency to use technology. To get the highest level of efficiency from distance education, determining the learning styles of the students in e-learning environments, and supporting the students according to these learning styles can contribute to the improvement of their academic performance.

Keywords: Academic Success, Covid-19, Distance Education, Physiotherapy, Students

KOVİD-19 PANDEMİSİ SÜRECİNDE UZAKTAN EĞİTİM GÖREN TÜRK FİZYOTERAPİ ÖĞRENCİLERİNİN ÖĞRENME STİLLERİNE GÖRE AKADEMİK PERFORMANSLARININ VE E-ÖĞRENMEYE YÖNELİK TUTUMLARININ KARŞILAŞTIRILMASI

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Öğrenme stili, eğitim sürecinde ve akademik performansta çok önemli bir rol oynamaktadır. Ancak uzaktan eğitimde Türk fizyoterapi öğrencilerinin öğrenme stillerine göre akademik performans ve e-öğrenmeye yönelik tutumlarını araştıran bir çalışma bulunmamaktadır. Bu nedenle, bu çalışma uzaktan eğitim sürecindeki Türk fizyoterapi öğrencilerinin öğrenme stillerine göre akademik performans ve e-öğrenmeye yönelik tutumlarının karşılaştırılmasını amaçladı.

Yöntem: Çalışma kesitsel araştırma tipinde tasarlandı. Fizyoterapi öğrencileri öğrenme stillerine göre 4 gruba ayrıldı (görsel, n=39, işitsel, n=30, dokunsal, n=37 ve kinestetik, n=30). Öğrencilerin E-öğrenmeye yönelik tutumları teknolojiyi kullanma eğilimi (TKE), memnuniyet, motivasyon ve kullanışlılık başlıklarını içeren E-öğrenmeye yönelik tutum ölçeği (EYTÖ) ile değerlendirildi. 2020-2021 akademik yılı güz dönemi akademik not ortalamaları (ANO) kaydedildi.

Sonuçlar: Görsel grup en yüksek ANO'ya sahipti ($p<0,050$). İşitsel grubun ANO'su dokunsal gruba göre daha yüksek bulundu ($p=0,001$). Görsel grubun TKE skoru, dokunsal ($p=0,004$) ve kinestetik ($p=0,004$) gruplara göre daha yüksekti. Görsel grubun toplam EYTÖ puanının dokunsal gruba göre daha yüksek olduğu saptandı ($p=0,003$).

Tartışma: Görsel grup akademik performans, e-öğrenmeye yönelik tutum ve teknolojiyi kullanma eğilimi açısından diğer gruplardan daha iyiydi. Uzaktan eğitimden en üst düzeyde verim alabilmek için e-öğrenme ortamlarında öğrencilerin öğrenme stillerinin belirlenmesi ve öğrencilerin bu öğrenme stillerine göre desteklenmesi akademik performanslarının artmasına katkı sağlayabilir.

Anahtar Kelimeler: Akademik Başarı, Covid-19, Fizyoterapi, Öğrenciler, Uzaktan Eğitim

INTRODUCTION

In response to the transmission and exposure of the coronavirus disease 2019 (Covid-19), governments declared health emergencies and preventive measures in education, business, and social life (1), which created huge challenges in the education system. In Turkey, a distance education decision was taken by the Council of Higher Education on March 23, 2020 in order not to interrupt education (2). Distance education is defined as a kind of education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously, and its popularity has increased in recent years (3). Moreover, in the near future, it is predicted that distance education will become the main ground of education instead of being an auxiliary to face-to-face learning (4).

Learning style, depending on the individual's traits and perspective and the method of data collection, is a broad concept playing a crucial role in educational consequences and academic performance (5,6). Learning style models appear in a wide variety. Among these, sensory learning styles (visual, auditory, kinesthetic, and tactile) are frequently preferred (5,7,8). Individuals with a visual learning style learn better by visually presented information such as pictures, diagrams, and maps. (7,9). Individuals with an auditory learning style learn better when information is presented verbally (7,10). The kinesthetic learning style involves any activity such as being physically active instead of sitting, listening, and watching in classrooms (7,11). Tactile learners prefer learning with their hands through the manipulation of resources such as lab experiments and building models (11,12).

Assessment of the learning style of physiotherapy students is important to develop educational strategies and an effective curriculum depending on students' perspectives (13). Many studies have focused on investigating the learning styles of physiotherapy students (14-16). However, studies conducted on Turkish physiotherapy students are scarce (17,18).

Since distance education has gained more importance during the Covid-19 pandemic, studies that investigated the attitudes of physiotherapy students towards e-learning reported that students have positive and negative attitudes towards e-learning and their attitudes towards e-learning depend on their personal traits (17,18). Moreover, one study, conducted on medical students, indicated that learning styles were significant predictors of attitudes toward e-learning (19). Although learning styles have an important role in attitudes toward e-learning, no study has investigated the attitudes toward e-learning according to the learning styles of Turkish physiotherapy students.

Although there exist various studies related to academic performance, attitudes towards e-learning, and learning style of physiotherapy students (14,16-18), to the best of the authors' knowledge, there exists no study investigating the academic performance and attitudes towards e-learning according to the learning styles of Turkish physiotherapy students in distance education. Therefore, the current study aimed to compare the academic performance and attitudes towards e-learning according to the learning styles of Turkish physiotherapy students in distance education during the Covid-19 pandemic.

METHODS

Study Design and Participants

This cross-sectional study was carried out as a web-based assessment via an online form. Ethical approval was obtained from the Ankara Yıldırım Beyazıt University Ethics Committee (Approval Number: 2021-18) and it was conducted in line with the principles of the Declaration of Helsinki. Data collection was performed in March and April 2021. Students of the physiotherapy and rehabilitation department who received distance education in the 2019-2020 academic year fall semester were included in the study. The participants were excluded if they were unable to fill out the questionnaires, with missing data in the assessment form, and not volunteering to participate in the study. Participants were selected through the snowball sampling method in accordance with the inclusion and exclusion criteria among undergraduate bachelor students in the Department of Physiotherapy and Rehabilitation of universities in Turkey. Participants were informed about the study and their consent was obtained online.

Outcomes

The learning style, attitudes toward e-learning, and academic performance of the participants were assessed. Age, gender, grade level, and the course attendance status of the participants (synchronous, asynchronous, both synchronous and asynchronous) were recorded. Permission to use the questionnaires was obtained from the corresponding authors of them via e-mail. Learning style was assessed with the Learning Styles Scale for University Students in Health Sciences, developed by Otrar and Kuyucak. The valid and reliable scale consists of 36 five-point Likert-scale items. The scale has four factors as tactile (10 items), auditory (10 items), visual (9 items), and kinesthetic (7 items). The dominant learning style is determined by dividing the answers by the number of items in the factor after collecting the answers separately. The highest factor score is considered to be the dominant learning style (20). According to the results of the scale, participants were divided into four groups, as tactile, auditory, visual, and kinesthetic.

The attitudes towards e-learning of participants were assessed with the Turkish version of the Attitude Scale Towards E-Learning (ASTE). It consists of 23 items and 4 subgroups, namely, the tendency to use technology, satisfaction, motivation, and usefulness. It is a 4-point Likert-type scale. The higher score indicates a more positive attitude towards e-learning for the total and each subgroup (21).

Students were asked to declare their academic grade point averages (AGPA) for the fall semester of the 2020-2021 academic year in order to determine their academic performance in the distance education process. In the evaluation form, it was clearly stated that the students should write the fall semester grade point average, not the cumulative grade point average. The AGPA shown on the students' transcripts was in a four-point grading system.

Statistical Analysis

A statistical power analysis program (G*Power Version 3.0.10, Franz Faul, Universität Kiel, Germany) was used to calculate the sample size of the study (22). Five participants from each group were randomly recruited for the pilot study and the AGPA scores were used to estimate the sample size. The analysis demonstrated that a sample consisting of 116 participants (29 per group) with a 20% drop rate was needed to obtain 90% power with f = 0.394 effect size, $\alpha = 0.05$ type I error and $\beta = 0.10$ type II error.

Statistical analyses were carried out via IBM SPSS Statistics 25.0 program (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp). The distributions of the continuous variables were examined using visual (histograms, probability plots) and analytical methods (Shapiro–Wilk test). All of the continuous variables such as age, ASTE scores, and AGPA were not normally distributed. Therefore, median and interquartile range (IQR) were used in descriptive analyses of continuous variables. For categorical variables (class, gender, and lesson follow-up), frequency (n), and percentage (%) are presented. The Chi-square test was used for comparing categorical variables. The Fisher's exact test was used when the Chi-square test could not satisfy the assumptions (if the lowest expected value was below two or the eye-cell count, which is the expected value less than five, was above 20%). To compare the continuous variables of the groups, the Kruskal-Wallis test was used. Pairwise comparisons were carried out using the Mann-Whitney U test and Bonferroni correction. Any p-value < 0.050 was considered statistically significant.

RESULTS

One hundred and fifty-two participants from 10 universities were included in the study. Sixteen were excluded because of missing data in the assessment form and the study was completed with 136 participants. Using the results of the AGPA scores, the post hoc power of the study was calculated as 99% with an effect size of 0.612 and a significance level of 0.05.

Participants were divided into four groups according to learning styles as visual (n=39), auditory (n=30), tactile (n=37), and kinesthetic (n=30). The age, gender, grade level, and course attendance status of the groups were similar (p>0.050) There was no difference between the groups in terms of the class distribution of the students (p=0.521). The course patterns (synchronous, synchronous + asynchronous, or asynchronous) of the groups were similar (p= 0.323) (Table 1).

Table 1. Demographic Characteristics and Educational Information of Groups

Parameters	Visual Group (n=39)	Auditory Group (n=30)	Tactile Group (n=37)	Kinesthetic Group (n=30)	p
Age (year, median (IQR))	20(19-22)	21(20-21)	20(20-21)	21(20-22)	0.193[a]
Gender n (%) Female Male	37(94.90) 2(5.10)	27(90) 3(10)	33(89.20) 4(10.80)	25(83.30) 5(16.70)	0.480[b]
Grade level, n (%) Class 1 Class 2 Class 3 Class 4	16(41) 5(12.80) 12(30.80) 6(15.40)	12(40) 6(20) 6(20) 6(20)	13(35.10) 5(13.50) 15(40.50) 4(10.80)	6(20) 7(23.30) 10(33,30) 7(23.30)	0.521[c]
Course attendance status (n, %) Synchronous Synchronous+Asynchronous Asynchronous	14(35.90) 22(56.40) 3(7.70)	9(30) 20(66.70) 1(3.30)	6(16.20) 26(70.30) 5(13.50)	7(23.30) 18(60) 5(16.70)	0.323[b]

*p<0.050, [a]:Kruskal Wallis test, [b]:Fisher's exact test, [c]:Chi-square test, IQR: Inter Quartile Range

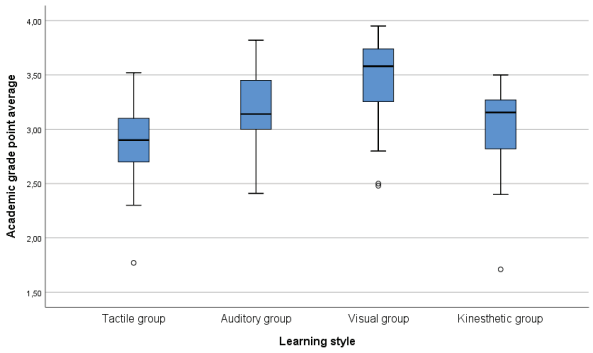

Figure 1. AGPA According to the Learning Styles of the Group

The fall semester AGPA scores of groups were different (p=0.001) (Fig 1.). The visual group had higher AGPA scores than the auditory (p=0.002), tactile (p=0.001), and kinesthetic (p=0.001) groups. The auditory group had a higher AGPA than the tactile group (p=0.001). No difference was found between the other groups in terms of the AGPA (p>0.050).

The total score of the ASTE (p=0.024) and the tendency to use technology subgroup score (p=0.007) of the groups were different. The total score of the ASTE in the visual group was higher than the tactile group (p=0.003). The tendency to use technology score of the visual group was higher than the tactile (p=0.004) and the kinesthetic (p=0.004) groups. ASTE Satisfaction (p=0.198), ASTE motivation (p=0.180), and ASTE usefulness (p=0.065) subgroup scores of the groups were not different (Table 2).

DISCUSSION

This is the first study that compares the academic performance and attitudes towards e-learning according to the learning styles of Turkish physiotherapy students in distance education during the Covid-19 pandemic. The current study yielded the following findings: Turkish physiotherapy students' learning styles affected their academic performance in the distance education process. Students with a visual learning style had higher academic performance than the others. The academic performance of the students with an auditory learning style was higher than students with a tactile learning style. Moreover, the attitudes toward e-learning in students with a visual learning style were found to be more positive than students with a tactile learning style. In addition, the tendency to use technology in students with a visual learning style was higher than in students with a tactile or kinesthetic learning style.

Each student has a unique learning style based on their personal traits. Studies focusing on learning styles emphasize that learning style is an important factor for academic performance (14,16,23). Studies conducted on physiotherapy students revealed that learning style was associated with academic

Table 2. Comparison of AGPA and Attitudes Towards E-Learning of Groups

AGPA and subscales of ASTE	Visual Group (G1) Median (IQR)	Auditory Group (G2) Median (IQR)	Tactile Group (G3) Median (IQR)	Kinesthetic Group (G4) Median (IQR)	P0	P1	P2	P3	P4	P5	P6
AGPA	3.58 (3.23-3.76)	3.14 (3.00-3.44)	2.90 (2.70-3.10)	3.16 (2.82-3.27)	0.001*	0.002** G1>G2	0.001** G1>G3	0.001** G1>G4	0.001** G2>G3	0.290	0.018
ASTE-Usefulness	15 (12-17)	13.50 (12-16)	13 (12-15)	13 (11-16)	0.198	0.169	0.065	0.070	0.919	0.710	0.770
ASTE-Motivation	13 (11-15)	12 (10-15)	12 (8-14)	13 (10-15)	0.180	0.287	0.020	0.447	0.378	0.941	0.262
ASTE-Satisfaction	13 (11-14)	11 (11-13)	11 (10-13)	11 (10-13)	0.065	0.129	0.013	0.046	0.353	0.590	0.799
ASTE-Tendency to use technology	16 (15-18)	15 (14-17)	15 (13-17)	15 (12-17)	0.007*	0.135	0.004** G1>G3	0.004** G1>G4	0.207	0.140	0.722
ASTE-Total score	56 (51-62)	51.50 (46-61)	51 (46-58)	54 (43-58)	0.024*	0.600	0.003** G1>G3	0.043	0.426	0.673	0.668

Kruskal Wallis test, Mann Whitney U test, *p<0.050, **p<0,008 (Bonferroni correction), P0: comparison of all groups, P1: comparison of visual and auditory groups, P2: comparison of visual and tactile groups, P3: comparison of visual and kinesthetic groups, P4: comparison of tactile and auditory groups, P5: comparison of kinesthetic and auditory groups, P6: comparison of tactile and kinesthetic groups, G1: Visual group, G2: Auditory group, G3: Kinesthetic group, G4: Tactile group AGPA: Academic grade point average, ASTE: Attitude Scale Towards E-Learnig

performance (16,23). Ilcin et al. indicated that participants' learning style was associated with higher academic performance (16). Olivier et al. stated that students with competitive learning styles were more successful in academic performance (23). Although it has been reported that learning style may affect the academic performance of physiotherapy students, these studies have been carried out during an in-class education period. Ergun and Kurnaz found that active learning style and independent learning style were related to academic performance in an e-learning environment (24). The current study found that learning style can affect academic performance and physiotherapy students with visual learning styles are more successful in e-learning environments. The reason for this is thought to be that students with a visual learning style are more successful when information is presented visually and the use of technological devices such as computers facilitates learning in students in this group (7,9). The physiotherapy education program involves practical courses predominantly. Students with a visual learning style in the present study may be more successful in e-learning environments than other groups because practical courses in formal physiotherapy education are presented to students with videos, photographs, and drawings during the distance education process.

One of the findings of the study was that students with an auditory learning style had lower academic performance than students with a visual learning style, but higher academic performance than those with a tactile learning style. Such students need to listen to the lessons and participate in discussions in the class for a more efficient education (10). Distance education generally takes place in a more mono-directional way (teacher talks and students listen) than face-to-face education. Therefore, in e-learning environments, it may be effective to encourage students with auditory learning styles to follow the lessons synchronously and to provide them with a discussion environment. The current study also showed that the academic performance of students with kinesthetic and tactile learning styles was lower than those with other learning styles. Students with a kinesthetic learning style learn better by doing, and students with a tactile learning style learn better by touching and feeling (12). The academic performance of students with this learning style was found lower maybe because activations involving touching and doing are more limited in distance education. Therefore, for benefiting from distance education maximally, these students should be allowed to practice during the courses, and home assignments with practical content should be increased.

One of the main focuses of our study was to investigate the attitudes towards e-learning according

to learning styles in Turkish physiotherapy students in distance education. The study revealed that the learning styles of physiotherapy students may influence their attitudes toward e-learning. Results reported in different student populations are in line with our findings (19,25). Yurdal et al. stated that learning styles may be important predictors of attitudes toward online education and the audio-visual learning style was determined as the highest predictive factor for attitudes toward online education in medical students (19). Seyal et al. demonstrated that there was a relationship between learning style (kinesthetic-doing) and attitudes towards e-learning in computer science and business students (25). In our study, which was carried out on physiotherapy students, it was found that the general attitudes towards e-learning in students with a visual learning style were found to be more positive than students with tactile learning styles. In addition, it was found that the tendency to use technology, which can affect the e-learning attitude, was higher in students with a visual learning style than in students with a tactile or kinesthetic learning style. This finding may be attributed to the ways of visual learners for getting information. The best way to get information for them is by using technological devices such as computers and videos (7,9,26). Therefore, the tendency to use technology in visual learners may be found higher. The reason why the general attitude of students with a visual learning style toward e-learning is more positive than students with a tactile learning style may be that their tendency to use technology is higher.

The current study had some limitations. First, we included physiotherapy students from all classes. Further studies should assess each class separately. The learning styles of the participants were assessed according to the sensory-based model. Further studies may also include cognitive or physiological models. As previously reported, many factors can affect academic performance. The current study only focused on the effects of learning style on academic performance. To conclude certainly, further studies should also focus on other parameters. One of the limitations of the study is that the physiotherapy training received may also affect critical thinking disposition and learning styles at the age and class level.

The current study presents that the learning styles of Turkish physiotherapy students in distance education may influence their academic performance and their attitudes toward e-learning. Visual learners had a higher academic performance than others. Moreover, attitudes toward e-learning in visual learners were higher than in tactile students, and their tendency to use the technology was higher than in tactile and kinesthetic students. The findings of our study may be important to enhance educational strategies for physiotherapy programs, support the students according to these learning styles, and improve their academic performance in distance education.

Sources of Support: None

Conflict of Interest: The authors declare that they have no conflicts of interest.

Ethical Approval:Ethical approval was obtained from the Ankara Yildirim Beyazit University Ethics Committee (Approval Number: 2021-18).

Informed Consent:Written informed consent was obtained from all participants.

Author Contributions:Conceptualization: AA, OM, STC. Design: AA, OM, STC. Supervision: STC. Resources and Financial Support: AA, OM, STC. Materials: AA, OM, STC. Data Collection and/or Processing: AA, OM. Analysis and/ or Interpretation: AA, OM, STC. Literature Research: AA, OM, STC. Writing Manuscript: AA, OM, STC. Critical Review: AA, OM, STC

Explanations:This study has been never presented or published in a scientific platform.

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