Sportif Bakış Spor ve Eğitim Bilimleri Dergisi
E-ISSN : 2148-905X
Year: 2025, Volume: 12, Issue: 1, pp.: 77-88

Learning Styles and Academic Self-Efficacy: Active Student Engagement

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DOI: 10.70736/spjses.283		**Research Article**
Received:	Accepted:	Published:
12.03.2025	21.04.2025	30.04.2025

Abstract

The aim of this study is to examine the relationships between academic self-efficacy, student engagement, and learning styles of students in different sports sciences departments, and to identify which learning style leads to more effective learning during student engagement. A total of 629 students, including 355 male and 274 female participants, voluntarily took part in the study. These students were enrolled in three universities in the Aegean region of Turkey: Ege University, Celal Bayar University, and Adnan Menderes University. Scales measuring academic self-efficacy, student engagement, and learning styles were used to assess the students' characteristics. Descriptive statistics, correlation analysis, cluster analysis, multivariate analysis of variance, and post-hoc tests were conducted for data evaluation. The results revealed a low positive correlation between the subdimensions of all three scales. Students with high academic self-efficacy preferred both verbal and visual learning styles, with a stronger preference for verbal styles. Additionally, male students with high academic self-efficacy used both verbal and visual learning styles more frequently than their female counterparts. These findings highlight the influence of self-efficacy on learning preferences and engagement in the academic context.

Keywords: Academic self-efficacy, cognitive engagement, learning styles, student engagement

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INTRODUCTION

Recent dynamic changes in the fields of education and research have had a significant impact on students' academic achievements. Among the key factors influencing students' collective success, there is a growing awareness of the important role that educational concepts such as student engagement, learning styles, and academic self-efficacy play in shaping their overall learning experiences. Educators have emphasized that student engagement in higher education is a fundamental factor in enhancing the quality of learning environments (Ashwin & McVitty, 2015). One of the pioneers of this concept is Fredricks, who defined student engagement as behavioral, emotional, and cognitive engagement (Fredricks et al., 2004).

Behavioral engagement is determined by various behaviors such as concentration, effort, active class participation, and time spent in the learning process. Cognitive engagement is defined as the psychological effort students make to overcome challenges, resulting in a preference for deep learning rather than superficial learning (Fredricks et al., 2004). Emotional engagement refers to establishing positive relationships with teachers and peers, willingness to participate in class, engaging in learning activities, and feeling a sense of belonging to the school. These three dimensions directly affect students' learning processes during class, potentially leading to better understanding of the material. According to Shin and Bolkan (2021), when teachers effectively involve students in the learning environment, students become more willing to engage in the process. In this regard, it is emphasized that student engagement helps students perceive the learning process not as an obligation but as an enjoyable experience. Therefore, when students actively participate in the learning process, they are expected to enjoy it more and become more satisfied with their learning experiences.

Recent research indicates that students' success in the educational process is not only dependent on their perception of student engagement but also on self-efficacy and learning styles (Sökmen, 2012; Almasri, 2022). In this context, to demonstrate a certain level of performance in their academic life, students need to possess a sense of self-efficacy regarding their abilities (Meng & Zhang, 2023). Examining definitions of academic self-efficacy in the literature, Pajares and Schunk (2005) define academic self-efficacy as an individual's confidence in their ability to learn or act in a certain way within their educational experience. Bandura (1997) describes self-efficacy as "an individual's belief in their capacity to organize and perform the necessary actions to achieve a specific performance." In this context, successful experiences in learning lead to an increase in students' academic self-efficacy (Bandura, 1994). Anthonysamy et al. (2020) stated that students with high academic self-efficacy are more confident and motivated in their learning, which improves their performance. Similarly, Yi et al. (2024) found that students with high self-efficacy are more willing to engage in activities and put more effort into learning during class.

To enhance students' academic self-efficacy and ensure their participation in class, educators can use different teaching styles to promote more effective learning. According to Yotta (2023), learning styles refer to the preferences students have when learning a new topic. Dalaman et al. (2019) define learning styles as the path an individual chooses to acquire knowledge during the learning process. A review of the literature shows that the most commonly preferred learning styles are verbal and visual learning (Chen & Sun, 2012; Akgün

et al., 2014). Individuals with a dominant visual learning style tend to understand topics that involve visual stimuli such as shapes, diagrams, and images better, while those with a dominant verbal learning style are more inclined toward verbal elements such as sound and words (Pallapu, 2007). According to Fleming, educators present new information in graphic forms, flashcards, and images to students with a visual learning style for better comprehension, while they convey new information through verbal presentations, listening activities, and group discussions for students with a verbal learning style (Chen & Sun, 2012).

Knowing which learning style is dominant in the learning process can contribute to making learning easier and more efficient for students. In this context, understanding the relationships between academic self-efficacy, student engagement, and learning styles will facilitate the development of more effective strategies in education. Understanding the differences in learning styles during student engagement and adapting teaching methods accordingly can provide a more effective approach in education. With this approach, students' potential can be better realized, and the overall efficiency of educational systems can be enhanced. The aim of this study is to determine the academic self-efficacy levels of students engaged in class participation and identify which learning styles they use for more effective learning, based on their academic success in different departments of sports sciences faculties. Additionally, the relationship between these three constructs will be examined. Although numerous studies in the existing literature have examined the relationships between academic self-efficacy, student engagement, and learning styles, research that considers these variables together within a holistic framework particularly focusing on students in the field of sports sciences remains limited. In this context, the aim of our study is to reveal the relationship between academic self-efficacy and student engagement among students with different learning styles, and to determine which learning style leads to more effective learning processes based on individual differences and varying levels of academic self-efficacy in the field of sports sciences.

METHOD

Research Model

The study examines the relationships between academic self-efficacy, student engagement, and learning styles (verbal and visual). Data were collected using the Academic Self-Efficacy Scale, the Student Engagement Scale, and the Verbal and Visual Learning Styles Scale, through a survey method.

Research Group

The The population of this study consists of students enrolled in the Sports Sciences Faculties of Ege University, Adnan Menderes University, and Celal Bayar University, located in the Aegean Region of Turkey (İzmir, Manisa, and Aydın). The study includes first, second, third, and fourth-year students from the departments of Physical Education and Sports Teaching, Sports Management, and Coaching Education at these faculties. The sample group consists of 629 students in total, including 355 male and 274 female participants, who were selected randomly.

Data Collection Tools

This study, which is based on quantitative data, utilizes a descriptive general survey model. The data collection technique for the study was conducted through a questionnaire. Three measurement tools were used in this study:

Academic Self-Efficacy Scale: Developed by Jerusalem and Schwarzer (1981), this scale was later adapted to Turkish by Yılmaz et al. (2007), with validity and reliability studies conducted. The scale consists of 7 items, each with a 4-point Likert scale (1=strongly agree, 4=strongly disagree). The Cronbach's alpha internal consistency coefficient of the Academic Self-Efficacy Scale was determined to be .79.

Student Engagement Scale: Developed by Eryılmaz (2014), this scale consists of 15 items, divided into three sub-dimensions: emotional engagement (5 items), behavioral engagement (5 items), and cognitive engagement (5 items). The scale uses a 5-point rating scale (1=Not suitable at all; 5=Completely suitable). The Cronbach's alpha values for the sub-dimensions were found to be .84 for cognitive engagement, .84 for emotional engagement, and .86 for behavioral engagement (Eryılmaz, 2014).

Verbal and Visual Learning Styles Scale: Developed by Childers et al. (1985), and later adapted into Turkish by Akgün et al. (2014), this scale consists of 16 items, divided into two sub-dimensions: verbal learning (8 items) and visual learning (8 items). The scale uses a 4-point likert scale (1=Always true for me, 4=Always false for me). The Cronbach's alpha values for the sub-dimensions were found to be .69 for verbal learning and .71 for visual learning.

Data Collection

The authors of the scales were contacted for the necessary permissions to use the measurement tools in the study. After obtaining permission from the universities where the research would be conducted, informed consent forms were read and signed by all participants before the study began. The scales were completed by students in the classroom environment, taking approximately 10-15 minutes. The data were collected in 2024, during the months of April and May. During the data collection process, informed consent forms were signed by the students.

Data Analysis

The data for this study were analyzed using the SPSS 20 software. During the statistical analysis of the data, descriptive statistics were first used. Then the normality of the data was examined in terms of skewness and kurtosis values, and it was found that the skewness and kurtosis scores were within acceptable ranges. To determine the relationships between the three constructs, Pearson correlation analysis was employed. To better understand the relationships among the variables, hierarchical and non-hierarchical cluster analyses, as well as Two-Way MANOVA (Multivariate Analysis of Variance), were conducted.

FINDINGS

Table 1. Descriptive statistics and correlations for all variables in the sample

Scale	M	SD	α	1	2	3	4	5
Academic Self-Efficacy	13.72	3.53	0.73	1				
Verbal Learning Style	17.80	3.32	0.63	0.42**	1			
Visual Learning Style	13.12	3.71	0.82	0.25**	0.42**	1		
Emotional Engagement	12.37	3.51	0.80	0.40**	0.38**	0.26**	1	
Behavioral Engagement	12.12	3.47	0.86	0.39**	0.36**	0.21**	0.62**	1
Cognitive Engagement	10.72	3.49	0.88	0.31**	0.31**	0.38**	0.60**	0.57**

**p<.01; M: Mean, SD: Standard

Descriptive statistics and Pearson moment correlation coefficients between verbal and visual learning styles, academic self-efficacy, and the subscales of student engagement are presented in Table 1. According to the results, a low positive correlation was found between the Academic Self-Efficacy Scale and the verbal and visual learning styles (r=.25; r =.42, p<.01), as well as with the subscales of the general student engagement scale (r=.40; r=.39; r=.31, p<.01). Furthermore, a low positive relationship was observed between the verbal and visual learning styles and all subdimensions of the general student engagement scale (p<.01).

Table 2. Means and standard deviations for each cluster and results of the multivariate analysis of variance

Variable	Cluster[1] Low (n=199) M(SD)	Cluster[2] Middle (n=209) M (SD)	Cluster[3] High (n=221) M(SD)	F	Post hoc
Verbal Learning Style	16.28(3.66)	17.68(2.91)	19.27(2.69)	49.08***	3>2.1
Visual Learning Style	12.91(3.62)	12.24(3.15)	14.14(4.04)	15.11***	3>2.1
Emotional Engagement	11.34(3.62)	11.74(3.42)	13.90(2.94)	36.66***	3>2.1
Behavioral Engagement	11.34(3.50)	11.14(3.62)	13.74(3.94)	42.40***	3>2.1
Cognitive Engagement	10.31(3.43)	9.94(3.43)	11.82(3.34)	18.52***	3>2.1

M: Mean; SD: Standard deviation

Cluster Formation

To group the participants based on their academic self-efficacy, both hierarchical and non-hierarchical cluster analysis methods were utilized. Initially, a dendrogram was examined. The distance coefficients in this diagram were used as a criterion for determining the number of clusters, where three significant jumps were observed in the final three steps. Subsequently, a tree diagram (dendrogram) was carefully analyzed, serving as a tool to finalize the number of clusters. Upon examination, it was observed that the 629 participants generally clustered into three groups. Following this analysis, since the hierarchical clustering method indicated three clusters, the number of clusters was set to three for the K-means clustering and the analysis was validated. Accordingly, the first cluster was identified as the "Low" group, the second as the "Medium" group, and the third as the "High" group.

To assess whether there were significant differences in the academic self-efficacy scores among the identified groups, an ANOVA was conducted. The analysis revealed significant differences in self-efficacy scores between the groups [F(2.626)=510.33; p<.001]. The "Low" academic self-efficacy group consisted of 199 participants (M=10.55; SD=2.60), the "Medium" group included 209 participants (M=13.0; SD=1.87), and the "High" academic self-efficacy group consisted of 221 participants (M=17.25; SD=2.05).

Following the determination of the clusters, a one-way ANOVA was applied to identify potential differences among the groups in terms of student engagement and verbal/visual learning styles (Table 2). The analysis revealed statistically significant differences in the average scores of verbal and visual learning styles among the groups (Verbal:F(2.626)=49.08; p<.001; Visual:F(2.626)=15.11; p<.001). Additionally, there were statistically significant differences in the average scores of emotional, behavioral, and cognitive engagements (Emotional:F(2.626)=36.66,p<.001; Behavioral Engagement:F(2.626)=42.40; p<.001; Cognitive Engagement:F(2.626)=18.52; p<.001).

Table 3. Two-way MANOVA results of gender and academic self-efficacy

Multıple Comparisons	Value	F	Hypothesis df	Error df	P	η^2
Learning Styles				**Verbal and Visual**		
Intercept	.03	11205.79	2	622	.000	.97
Gender	.91	32.27	2	622	.000	.09
Academic self-efficacy	.84	28.46	4	1244	.000	.08
Gender *Academic Self-efficacy	.98	2.89	4	1244	.02	.009
			General Class Engagement Scale			
Intercept	.05	3660.01	3	621	.000	.95
Gender	.97	5.87	3	621	.001	.03
Academic self-efficacy	.85	17.45	6	1242	.000	.08
Gender *Academic Self-efficacy	.99	.396	6	1242	.88	.002

Cluster Differences in General Student Engagement, Visual versus Verbal Style of Processing, and Affect

In our study, a Two-Way MANOVA analysis was conducted to determine the joint effects of gender and academic self-efficacy on verbal and visual learning styles and general class engagement levels (Table 3). According to the analysis results, significant effects of gender and academic self-efficacy groups on the linear scores of the subscales of the verbal and visual learning style scales were found ($\lambda_{\text{academic self-efficacy}}$=0.84, F $\lambda_{\text{academic self-efficacy}}$(4)=28.46; λ_{gender} = 0.91, F_{gender}(2)=32.27; p<.001). Partial eta-squared results, according to Wilk's lambda test, showed that academic self-efficacy (η^2=.08) and gender (η^2=.09) had a moderate effect on verbal and visual learning styles. The joint effect of academic self-efficacy and gender on verbal and visual learning styles was found to be low in significance (F=2.89; p<.001; η^2=.009).

For the other construct, general class engagement, a significant effect of gender and academic self-efficacy on the linear scores of all subscales was found ($\lambda_{\text{academic self-efficacy}}$= 0.85, F $_{\text{academic self-efficacy}}$(6)=17.45; λ_{gender}=0.97; F_{gender}(3)=5.87; p<.001). However, the joint effect of academic self-efficacy and gender on general class engagement was found to be no significant.

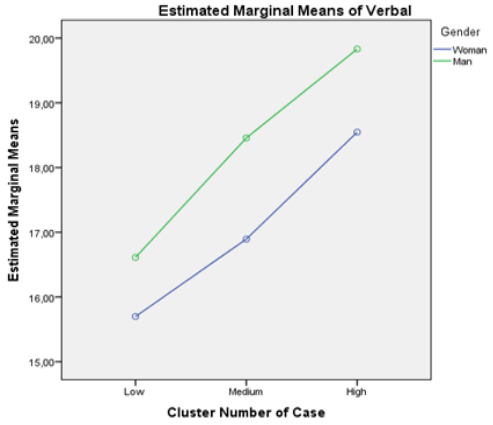

Figure 1. The relationship between visual and gender **Figure 2**. The relationship between verbal and gender

To better understand the relationships between significant variables, plots were utilized. According to the results, male students with high academic self-efficacy were found to have significantly higher verbal and visual learning averages compared to female students (Figure 1, 2). Additionally, as academic self-efficacy increased, verbal and visual learning averages also showed a significant increase for both genders.

DISCUSSION AND CONCLUSION

Recent studies have emphasized the significant impacts of student engagement, academic self-efficacy, and learning styles on educational processes. Specifically, considering these factors together plays a crucial role in determining the quality of teaching and learning experiences. The purpose of this study was to identify the academic self-efficacy levels of students during class engagement in Sports Sciences Faculties and to determine which learning styles they use to learn more effectively.

In our study, correlation analysis revealed a positive, yet weak, relationship between the sub-dimensions of academic self-efficacy and verbal and visual learning styles. Furthermore, individuals with higher academic self-efficacy demonstrated higher verbal and visual learning style scores compared to other groups, which was an expected outcome. A review of the literature shows that Mazzetti et al. (2020) found a positive but weak relationship between learning styles and academic self-efficacy in a study with 87 undergraduate students in Italy. Similarly, Hawa and Tılfarlıoğlu (2019) reported a weak and negative relationship between self-efficacy scores and the visual and verbal sub-dimensions of learning styles in a study with 312 foreign language faculty students. In contrast, Canpolat (2019) found a weak positive relationship between verbal learning styles and academic self-efficacy in a study with 434 Sports Science students, while there was no relationship between visual learning styles and academic self-efficacy. Additionally, students with high academic self-efficacy were observed to use more verbal-dominant learning styles.

In line with these findings, our study also found a significant relationship between academic self-efficacy and verbal and visual learning styles. However, due to generational differences, variations in the adopted learning styles between students could be attributed to changes over time. Older generations, influenced by teacher-centered education systems, tended to prefer

verbal learning styles, while today's students, benefiting from student-centered approaches and technological integration, have adopted both verbal and visual learning styles. This suggests that Generation Z (students who did not experience the pre-internet era) has distanced itself from traditional teacher-centered learning methods and increasingly turned to visual learning through mobile applications and new technologies.

In this study, the analysis of academic self-efficacy and student engagement revealed a positive relationship between academic self-efficacy and all sub-dimensions of student engagement. Furthermore, individuals with higher academic self-efficacy showed significantly higher engagement in all aspects compared to those with lower or medium levels of academic self-efficacy. A review of the literature supports these findings. Yi et al. (2024) reported a moderate positive relationship between academic self-efficacy and cognitive, emotional, and behavioral engagement, noting that students with higher self-efficacy were more engaged in classes. Similarly, Sökmen (2021) found moderate positive relationships between self-efficacy levels and all dimensions of engagement. Zhen et al. (2017), in their study with 605 students from Handan, Hebei province in China, also found a positive relationship between academic self-efficacy and student engagement.

In our study, the strong relationship between academic self-efficacy and classroom engagement was emphasized, supported by numerous articles in the literature (Hong et al., 2021; Helsa & Lidiawati, 2021; Azila-Gbettor & Abiemo, 2021). As Galyon et al. (2012) stated, students with high academic self-efficacy tend to invest more effort in their studies, and this effort contributes to their improved performance. This suggests that high self-efficacy not only improves academic performance but also positively influences student engagement. In this context, effective communication between students and their peers, as well as between students and teachers, can lead to increased willingness to participate in class, which in turn enhances academic success (Fredricks et al., 2016).

When examining the relationship between student engagement and verbal/visual learning styles in this study, a low positive relationship was found across all sub-dimensions. A review of the literature shows that many studies support this finding. El-Sabagh (2021), in a study with 118 high school students, emphasized that learning styles have a positive impact on student engagement. In a study by Halif et al. (2020) conducted in three universities, both visual and verbal learning styles were found to influence the cognitive engagement sub-dimension of student participation. They also noted that visual learning style had the greatest impact on all sub-dimensions of student engagement. Students with a visual learning style were found to prefer more active participation in class activities and to engage in greater interaction with other students (Riazi & Riasati, 2008).

In conclusion, this study reinforces the importance of academic self-efficacy in student engagement and the adoption of verbal and visual learning styles. It suggests that both learning styles and self-efficacy play critical roles in enhancing students' participation and academic outcomes. We found that male students with higher academic self-efficacy tend to prefer verbal and visual learning styles more. Suronoi and Narimo (2024) noted that male students adopt visual learning styles more than female students, which highlights their ability to effectively use visual materials in the learning process. However, Mašic et al. (2020) stated

that female students, with higher self-efficacy perceptions, tend to adopt visual, verbal, and tactile learning styles more than male students. This discrepancy suggests that male students in sports sciences might have more motivation toward certain learning styles, while women's perceptions of competence in different styles could also play a role. The preference of male students for verbal and visual learning styles, compared to female students, could be attributed to their early interest in sports and physical activities, which contributes to the development of their visual and verbal skills. This may lead to a higher preference for visual and verbal learning styles among male students.

In conclusion, considering the importance of class participation in higher education, understanding the factors that influence this situation is extremely critical. Our research found a low positive correlation between academic self-efficacy, verbal and visual learning styles, and all sub-dimensions of class participation scales. Additionally, a positive and significant relationship was observed between class participation and students' learning styles.

As a result of the analysis conducted to determine students' academic self-efficacy levels, students were grouped into low, medium, and high levels of academic self-efficacy. Comparisons between these groups revealed significant differences in verbal and visual learning styles as well as cognitive, behavioral, and emotional participation based on academic self-efficacy levels. Furthermore, it was found that students with high academic self-efficacy perceived themselves as more competent in both learning styles and all sub-dimensions of class participation compared to students with low and medium academic self-efficacy.

It was also determined that the joint effect of academic self-efficacy and gender on verbal and visual learning styles was low, while the joint effect of these variables on overall class participation was not significant. When considering gender, it was found that male students with high academic self-efficacy had higher averages in verbal and visual learning styles compared to female students with high academic self-efficacy.

Recommendations

The study focused on specific demographic characteristics (gender, age, which subjects do you like the most? Class, Department, University Name). However, the neglect of other potential factors may hinder a comprehensive analysis of the results. Considering these limitations provides a more balanced perspective on interpreting the results and their generalizability. Future research should address these limitations to further advance our understanding of the topic.

Our research shows that teachers can increase academic self-efficacy and encourage classroom engagement by using collaborative learning activities. Encouraging students to communicate effectively with their peers can strengthen their academic self-efficacy by enhancing their social interactions. Although the impact of gender on academic self-efficacy and learning styles was found to be limited in this study, future research could explore gender differences in more detail. Specifically, it may be beneficial to examine the different academic experiences of male and female students and how these experiences affect their learning styles and participation in class.

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Statement of Ethics Committee	
This research was conducted with the decision of Ege University Ethics Committee dated 27/03/2024 and protocol numbered 2372.	
Statement of Conflict	
Researchers do not have any personal or financial conflicts of interest with other people and institutions related to the research.	
Statement of Support and Acknowledgment	
No contribution and/or support was received during the writing process of this study.	