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Exploring the effect of online learners' academic self-concepts on student engagement

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Highlights

- The study investigated to examine whether academic self-concept is predictive of student engagement in online learning environment.
- The academic self-concept has a high impact on student engagement.
- Academic effort and academic confidence showed a high positive relationship in behavioural engagement.
- Academic trust did not affect only affective engagement.

Article Info: Research Article

Keywords: *Academic self-concept; engagement; online learning; academic effort.*

Abstract

The present study intends to evaluate the degree to which online university students' academic self-perceptions predict variations in student engagement. The relational screening method was employed in this research. Data were collected from a total of 653 university students, 113 male and 539 female. The Student Engagement Scale (SES) and the Matovu Academic Self-concept Scale (ASCS) were utilised. Stepwise regression data analyses were conducted. Based on the results that the study yielded, it was observed that ASC had a high level of impact on student engagement, the levels of which varied across different factors of engagement. Academic effort and academic confidence variables accounted for 44% of the variance in behavioural engagement and showed a high positive relationship, while accounting for 33% of cognitive engagement with a moderate level of positive relationship. However, only academic effort was found to have a relationship with affective engagement, which was at a moderate level, accounting for 17% of the variance. Academic effort is relation with all student engagement factors. However, while academic confidence is only relation with behavioural and cognitive engagement, it is not relation with affective engagement. As a result, positively influencing student engagement in online learning environments will lead to positive changes in students' academic self-concept.

1. Introduction

Self-concept is "a person's self-perceptions formed through experiences with and interpretations of one's environment" (Shavelson et al., 1976). They defined students' self-concept as their self-perceptions in relation to their experiences and interactions with the outer world. Self-concept is reported to have an impact on the level of success in all kinds of work (Arens et al., 2021; Burns et al., 2020; Herrera Torres et al., 2020; Kenç & Oktay, 2002; Özen & Karaca, 2021). Generally, the academic self-concept (ASC), which comprise of academic and non-academic contents, is hierarchical and multidimensional (Marsh, 2014; Shavelson et al., 1976). It can be comprised of discipline-specific perceptions of, for example, mathematics, science, verbal or school concepts, or perceptions related to the general academic field. Students with high academic self-concept evaluate their own skills better, accept challenge and competition, take risks, are enthusiastic about trying new things, and can produce multiple cognitive strategies (Bilgin et al., 2020).

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ASC is a student's view respecting how competent s/he is in an academic task in comparison to other students (Arseven, 1986). It concerns to one's beliefs about ability in academic settings (Susperreguy et al., 2017). Also, it's described as a cognitive representation of one' own academic potentiality in various academic fields (Brunner et al., 2010). Marsh (1992) examines the concept of self-concept from three elements: physical, social and ASC. ASC points out students' interests, pleasures, and attitude regarding their own competencies in a specific academic field. As a higher correlation was found between students' academic achievements and their self-concept when compared to the other dimensions, ASC has been regarded as one of the most significant dimensions in the context of education (Lyon, 1993; Wu et al., 2021). Based on findings such as individuals with a high level of ASC making more effort in lessons or having a higher tendency to continue their education give rise to the opinion that ASC has some degree of relation with variables impacting academic achievement (Green et al., 2006).

There are study results in the literature indicating that a higher level of ASC increases not only academic grade point averages but also exam results (Cokley & Patel, 2007; Kornilova et al., 2009). Some researchers have shown that it is both a cause and a consequence of students' academic success. (Guay et al., 2003). For instance, Wu et al. (2021) reported that ASC is not just one of the goals of education. At the same time, it provides individuals to obtain personal results such as higher academic achievement, engagement, intrinsic motivation, and lower test anxiety. Schnitzler, Holzberger and Seidel (2020) state that student academic self-concept is an important antecedent of student engagement.

Student engagement, which is an important component of academic achievement (Ergün & Usluel, 2015; Fung et al., 2018), plays an important role in leading learning activities and draws conclusions about learning environments (Cohen et al., 2018; Das & Madhusudan, 2023). Whether or not the expected academic and social outcomes are obtained from student belongingness and the learning environment provides information about the effectiveness of the lesson (Arslan, et al., 2023; Henrie et al., 2015). Lei et al. (2018) carried out a meta-analysis study of 69 independent research comprising a total of 196 473 participants. They reported that there were positive correlations varying between moderate and strong effect between student belongingness and academic achievement. Guo et al. (2022) state that student engagement mediated between ASC and skill development and learner satisfaction in the learning environment.

In research, it states that student engagement is a significant variable and is used to gain insight into online learning environments and drawing conclusions about academic achievement. Student engagement is measured based on the time students spend in online learning environments and the degree of effort they make. Student engagement is a multidimensional concept encompassing the degree to which students express and engage themselves in learning activities behaviourally, cognitively, and emotionally (affective) (Christenson et al. 2012; Fredricks et al., 2004). Engagement shows how students actively manage the learning process in both academic and non-academic tasks.

Behavioural engagement is considered to consist of a series of externally observable and measurable behaviours that entail different aspects, such as avoidance of absenteeism, avoidance destructive behaviour, withdrawal, compliance to instructions, and participation in all discussions in conformity to rules and class norms (Fredricks et al., 2004; Hospel et al., 2016). Behavioural engagement can also be regarded as students' acts of participating verbally, answering questions, making recommendations, or raising their hand to ask a question. Otherwise, cognitive engagement state increased mental effort. Individuals use self-regulation skills, such as learning new things, trying to gain better understanding of the topic, or revising what is learnt (Finn & Zimmer, 2012). Affective engagement state students' emotional attitude in response to class activities (Appleton et al., 2006; Fredricks et al., 2004). It is used to refer to both positive and negative reactions of learners towards their teachers, peers, and the school.

It is necessary to establish student engagement in learning environments for learning to occur; it yields many benefits, such as instilling in students the feeling of school belonging and providing them with the opportunity to demonstrate higher levels of critical thinking, display positive personal development and dispositions and gain higher academic achievement. Owing either to negative experiences such as natural disasters, pandemics, and wars or within the scope of life-long learning, tertiary education institutions have started to respond to the need for online learning environments. Based on the increasing demand for online

learning, Redmond et al. (2018) mentions the need to adjust regarding student engagement in online learning environments.

Coopersmith (1982) stated that people with high academic self-confidence display persistent and more active participation in their environments. Online learning environments provide learners with opportunities to access educational resources anytime, anywhere, to communicate with each other in such ways as e-mails or discussion forums, and to engage in either synchronous or asynchronous discussions. It depends on the students' decision whether or not to make the effort to participate in any of the class or out of class activities. Their ASC plays an influential role when making this decision. Thus, if student engagement is regarded as effort devoted by the student, then it can be deduced that there is a relationship between ASC and engagement. Similarly, Schnitzler, Holzberger and Seidel (2021) reported that ASC could have an impact on student engagement. Accordingly, the present study aimed to examine whether ASC is predictive of student engagement.

The research questions were as follows:

1. Is ASC a predictor of student engagement in online learning environments?
    1.1. Is ASC a predictor of behavioural engagement in online learning environments?
    1.2. Is ASC a predictor of affective engagement in online learning environments?
    1.3. Is ASC a predictor of cognitive engagement in online learning environments?

2. Methodology

2.1. Research Model/Design

The present study, the aim of which was to investigate whether ASC was a predictor of student engagement in online learning environments, employed the relational screening model. Studies based on the relational screening model aim is to explain relationships among variables, if any, and the variance created by the combined effect of these variables (Karasar, 1994; McNeill, 2006).

2.2. Data Collecting Tools

In the study, the Matovu ASC Scale and the Student Engagement Scale were utilized to collect data. In addition, a personal information form was used to obtain information such as students' gender and level of education.

Matovu ASC Scale. The Matovu ASC Scale (ASCS), which was initially developed by Liu and Wang (2005) and later adapted to university students by Matovu (2014), consists of 20 items that measure university students' ASCs. Turkish adaptation of the scale was carried out by Cantekin and Gökler (2019). It is a 7-point Likert scale which generates a total score for each of the two factors in the Scale – Academic Confidence and Academic Effort.

Both exploratory and confirmatory factor analyses were conducted to ensure the construct validity of the Matovu ASCS. Half of the data obtained from the 400 students to whom the Scale was administered were used for exploratory analysis and the other half were used for confirmatory analysis. The Kaiser-Meyer-Olkin (KMO) coefficient and the Barlett test were administered in the exploratory analysis. The KMO coefficient was .86, while the Barlett chi-square value was to be 7880.23 ($p<.001$). In the exploratory factor analysis, Matova ASCS yielded a two-factor structure and the factor loadings ranged between .72 and .96. The confirmatory fit indices confirmed the two-factor structure of the Matova ASCS (GFI= .91, CFI=.90, RMSEA=0.051). The internal consistency coefficient (coefficient alpha) of the Scale was found to be 0.93. The item total correlations obtained from the Scale ranged between 0.43 and 0.80.

Student Engagement Scale (SES). The "Student Engagement Scale", which was developed by Sun and Rueda (2012) and adapted to Turkish by Ergün and Usluel (2015), was employed to identify students' levels of engagement in online learning environments. The Scale, which consisted of nineteen items and three sub dimensions, entailed a 5-point Likert scale: 1-strongly disagree and 5-strongly agree. In the adaptation study

of the scale, the translated form was submitted to five expert opinions. After it was administered to a group of students, an evaluation was made to verify the equivalence of the original and the translated versions of the form. The translated form was administered to 398 students who had online learning experience, and the collected data were used to conduct factor analysis. The first and second level confirmatory factor analysis results showed that the values obtained demonstrated a satisfactory or perfect fit. The Cronbach α reliability coefficients were found to be .62 for the behavioural engagement sub-dimension, .90 for the affective engagement sub-dimension, and .86 for the cognitive engagement sub-dimension. The Cronbach α reliability coefficient for the entire scale was calculated as .90. The confirmatory fit indices confirmed the three-factor structure of the Student Engagement Scale ($\chi 2$ (84, *N*=393) = 453.93, *p*<.000, *RMSEA*= 0.072, *S-RMR*= 0.059, *GFI*= 0.89, *AGFI*= 0.86, *CFI*= 0.96, *NNFI*= 0.96, *IFI*= 0.96).

2.3. Sampling or Study Group

The study group was comprised of students who were participating in online lessons for all their courses in the 2019-2020 academic year due to the Covid-19 pandemic. While determining the study group, the researchers used easily accessible case sampling, one of the purposeful sampling methods, in order to provide speed and practicality to the research. The data were collected online from students in a state university who were attending either interpersonal relations, developmental psychology, presentation techniques or statistics lessons. The courses are conducted by different lecturers. All students attend any of these courses online. These lessons were conducted through the Microsoft Teams learning management system. The video conferencing method and digital devices were used to conduct these 14-week online lessons. Students were given the opportunity to share their screens, ask live questions, make presentations, and share comments or resources related to class content.

Table 1.

Qualifications of sample group.

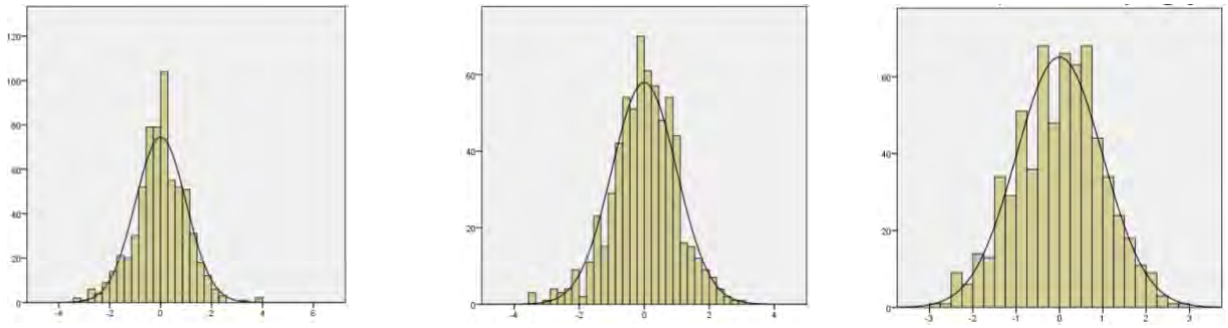
	Qualification	Number	Percentage
Gender	Female	539	82,7
	Male	113	17,3
Academic level	College	419	64,3
	Faculties	233	35,7

The research data were collected from a total of 652 students in the study. The demographic characteristics of the students in the study group are presented in Table 1 above. Of the students in the study group, 82.7% (*n*=539) were female, and 17.3% *(n*=113) were male and 64.3% (*n*=419) were college and 35.7% (*n*=233) were undergraduate students. When the data were collected, 33.9% of the students were in the first grade, 43.9% in the second grade, 18.4% in the third grade and 3.8% in the fourth grade.

2.4. Data Analysis

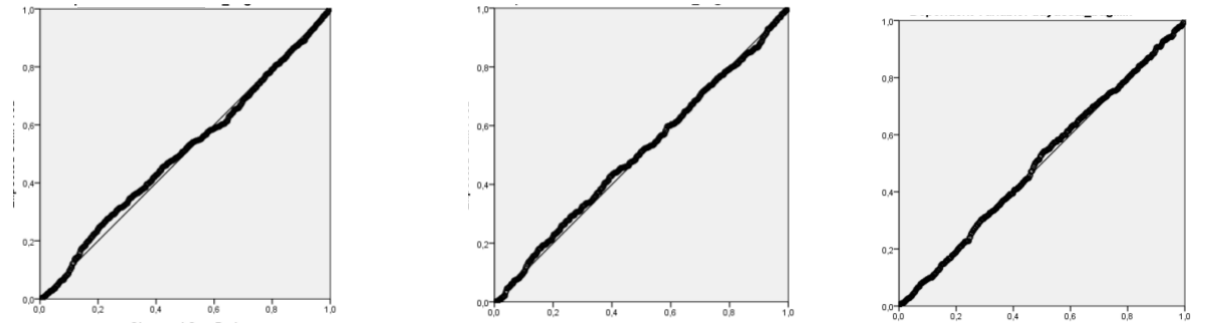
Stepwise multiple regression analysis was utilized to analyze the data. Prior to the multiple linear regression analysis, however, the data collected were analyzed for reliability purposes. The Cronbach α reliability coefficients for the data obtained from the Matovu ASC Scale and the Student Engagement Scale were found to be 0.79 and 0.87, respectively. These findings indicate that the obtained data were reliable.

Of the assumptions of multiple linear regression analysis, the presence of normality, linearity, and constant variance as well as the absence of autocorrelation and multiple collinearities were checked. No problem of multicollinearity was found as the tolerance value was greater than .20, the *VIF* value was lower than 10 and the *CI* value was smaller than 30 (Büyüköztürk, 2017). A Durbin-Watson value between 1.5 and 2.5 was an expected condition (Albayrak, 2006; Kalaycı, 2009). Appropriate analyses were conducted to compare the results obtained against the mentioned criteria. Figure 1 and Figure 2 display the results of the normality and linearity assumptions of the multiple linear regression analysis conducted with the obtained data.



Factor of Cognitive Engagement Factor of Behavioral Engagement Factor of Affective Engagement

Figure 1. Histogram and Normal Distribution Curves for the Standardized Predicted Values.



Factor of Cognitive Engagement Factor of Behavioral Engagement Factor of Affective Engagement

Figure 2. Scattering Diagrams for the Standardized Residual Values and Standardized Predictive Values.

As can be observed in Figures 1 and 2, the histogram for the predicted values and the normal distribution curves displays a normal distribution, and the data points on the scatterplot seem to accumulate along a single axis and the scatterplot describes a positive, linear relationship. After the normality and linearity assumptions were tested, the assumption of multicollinearity was assessed. The tolerance values were found to fall between .66 and 1.51, the variance growth factor (*VIF*) was between 1 and 1.51, the condition index (*CI*) was between 13.06 and 18.70 and the Durbin-Watson value was between 1.99 and 2.07. These statistics serve as evidence that the data met the assumptions of the stepwise multiple regression.

In the regression equation test of a variable, the significance level of α=0.05 was used. To exclude a variable from the analysis in the later stages of a variable's regression equation test, the significance level of α=0.10 was used. The level of student engagement in online student environments was the predicted variable of the study. The predictor variables in the study consisted of continuous variables. The scores obtained from the ASC Design Scale were continuous variables; the factor scores of the academic confidence and academic effort – the sub-factors of the Scale – were obtained to be used in the analysis.

2.5. Findings and Discussions

This section dwells on the results of the power of academic effort and academic confidence, the sub-factors of the Matovu ASC Scale, in predicting student engagement in online learning environments. The stepwise multiple regression analysis was repeated for each sub-factor of the Student Engagement Scale: behavioural engagement, affective engagement, and cognitive engagement. The results obtained for each sub-factor are provided respectively.

Table 2.

Results of the Multiple Regression Analysis of the Behavioural Engagement Factor

Variable	*B*	B_{se}	*R*	ΔR^2	β	*t*	*p*	Pairwise *r*	Partial *r*
Constant	3,563	0,675				5,278	.000		
Academic effort	0,196	0,014	0,636	0,405	0,495	13,730	.000	0,636	0,474
Academic confidence	0,102	0,015	0,666	0,443	0,243	6,731	.000	0,531	0,255
R= 0,66	R^2= 0,44	$F_{2, 649}$= 258,512	p=.000						
Behavioural Engagement = 3,563 + 0,196 X_1 + 0,102 X_2									

A significant high relationship was found between the combined variables of academic effort and academic confidence and the scores of behavioural engagements in online learning environments, R=0.666, R^2= 0.442, p<.01 in Table 2 above. Academic effort and academic confidence variables explained 44% of the total variance in behavioural engagement. An examination of the *t*-Test results in the regression analysis revealed that both variables, academic effort, and academic confidence, were predictors of behavioural engagement.

The dual and partial correlations revealed positive moderate level of relationships between behavioural engagement and academic effort (r=.64) and between behavioural engagement and academic confidence (r=.53). In explaining behavioural engagement, standardized regression coefficients (β) show the relative order of importance of the predictors. In this study, the relative order of importance of the predictors explaining behavioural engagement was academic effort and academic confidence. The academic effort variable sat at a higher point in the order of more importance when compared to the academic confidence variable.

Table 3.

Results of the Multiple Regression Analysis of the Affective Engagement Factor

Variable	*B*	B_{se}	*R*	ΔR^2	β	*t*	*p*	Pairwise *r*	Partial *r*
Constant	1,726	1,292				1,336	.182		
Academic effort	0,303	0,026	0,414	0,172	0,414	11,606	.000	0,414	0,414
R= 0,414	R^2= 0,172	$F_{1,650}$= 134,693	p=.000						
Affective Engagement = 1,726 + 0,303 X_1									

A statistically significant moderate degree of relationship was found between the academic effort variable and the scores of online affective engagements in learning environments; R=0.414, R^2= 0.172, p<.01 in Table 3 above. Academic effort accounted for 17% of the total variance in affective engagement. Based on the *t*-Test results in the regression analysis, it was concluded that the academic variable was predictive of affective engagement. The academic confidence variable did not enter the regression equation; it was not a predictor of affective engagement (t=0.197, p>.05).

The dual and partial correlations revealed a statistically significant moderate level of relationship between academic effort (r=.41) and affective engagement. However, no significant relationship was found between academic confidence (r=-0.008) and affective engagement.

Table 4.

Results of the Multiple Regression Analysis of the Cognitive Engagement Factor

Variable	*B*	B_{se}	*R*	ΔR^2	β	*t*	*p*	Pairwise r	Partial r
Constant	11,002	1,121				9,817	.000		
Academic effort	0,294	0,024	0,565	0,319	0,492	12,432	.000	0,565	0,439
Academic confidence	0,079	0,025	0,574	0,329	0,125	3,155	.002	0,411	0,123
R= 0,574	R^2= 0,329	$F_{2, 649}$= 159,125	p=.000						
Cognitive Engagement = 11,002 + 0,294 X_1 + 0,079 X_2									

The combined variables of academic effort and academic confidence were found to have a high level of significant relationship with cognitive engagement scores in online learning environments; R=0.574, R^2= 0.329, p<.01 in Table 4 above. Academic effort and academic confidence variables account for 33% of the total variance in cognitive engagement. The *t*-Test results in the regression analysis revealed that the academic effort and academic confidence variables were predictors of cognitive engagement.

The dual and partial correlations revealed a positive moderate level of relationship between cognitive engagement and academic effort (r=.56) and between cognitive engagement and academic confidence (r=.41). In explaining cognitive engagement, standardized regression coefficients (β) show the relative order of importance of the predictors. In this study, the relative order of importance of the predictors explaining cognitive engagement was academic effort and academic confidence. The academic effort variable sat at a higher point in order of importance when compared to the academic confidence variable.

3. Discussion, Conclusion and Suggestions

The self could be regarded not as an innate feature but as a learned system of beliefs (Bracken, 1996; Rosenberg, 1989). Hence, the self is shaped based on interactions with one's environment throughout his/her developmental periods (Bong & Skaalvik, 2003; Marsh & Shavelson, 1985). In the related literature, there are findings that indicate a weak relationship between an individual's general self-perception and academic achievement and school performance (Bums, 1979; Hansford & Hattie, 1982; Skaalvik & Hagtvet, 1990; West et al., 1980). These findings intrigued researchers to study the differences between the general self-concept and ASC and the relationship between these concepts and school performance (Guo et al., 2022; Marsh, 1992). As for the current research, the academic self-perception's predictive power of student engagement has been investigated.

In online learning environments, continuity in learning is important because students have limited opportunities in receiving encouragement from their teachers and peers when compared to those in formal schools; they can easily feel isolated, they can lose their self-confidence and can cease their learning process. In consideration of this information, it can be declared that ASC can have a restrictive or a supportive role in online learning environments. As positive changes in students' ASCs can positively influence student engagement, increase in students' learning performance can also be observed. There are views and study findings that positive and high ASC scores will increase student participation (Connell & Wellborn, 1991). The findings from this study also confirm this condition. The results that can be obtained from the findings obtained from this research, aiming examine the predictive effect of ASC on student engagement, can be summarized as follows:

- The combined sub-factors of ASC, namely academic effort and academic confidence can be considered to be significant predictors of behavioural engagement. As the level of academic effort and academic confidence increase, so does behavioural engagement.
- It is believed that as academic effort increases, emotional engagement is also likely to increase to some degree in online learning environments. However, this relationship is not as high as it is in behavioural and cognitive engagement.

• It was observed that the combined sub-factors of ASC, namely academic effort and academic confidence, are predictive of cognitive engagement in online learning environments. As academic effort and academic confidence increase so does cognitive engagement in online learning environments.

These conclusions drawn from the present study indicate that ASC has an impact on student engagement, yet it has varying levels of effect on different engagement factors (behavioural, affective, cognitive).

O'Connor et al. (2017) state that students who demonstrate low engagement in terms of behaviour can display high cognitive and affective engagement. This can account for the varying levels of effect of ASC on student engagement. In research by Conner and Pope (2013), it was reported that a group of students with low cognitive and affective engagement levels developed high levels of behavioural engagement. This shows that the sub-factors of student engagement are interrelated but can operate in different ways in different individuals; hence, it suggests that individuals can be influenced by their ASC at varying levels.

Students' ASCs are shaped based on their past experiences in educational contexts (past achievements/failures), the feedback they get from other people (teachers, parents, peers etc.) and their impressions when they compare their skills to those of peers (Byrne, 1996; Cokley, 2000). It is stated that when students have confidence in their academic skills, they make more effort to carry out their learning tasks; on the other hand, students who regard themselves as academically incompetent and fail to carry out their learning tasks (Marsh, 1992; Muijs, 1997; Pinxten et al., 2014). These kinds of internal features related to learning and success can play a more determining role in online learning environments. In online learning environments, students' affective attributes affect the learning processes as much as the learning environment (Ergün & Kurnaz, 2017; Ergün & Kurnaz Adıbatmaz, 2020; Kuh, 2009; Mupinga et al., 2006).

ASC affects not only students' academic performances but also their in-class efforts, participation, attendance, intrinsic motivation, support-seeking behaviour, and selection of their courses. Students with higher academic self-perceptions were found to have higher levels of tendencies to increase their hand and express their views to their teachers and peers (Böheim et al., 2020; Jurik et al. 2013). Filiz (2018) reported that behavioural effort and focus could be one of the significant factors of behavioural engagement in learning and academic tasks. Bong and Skalvick (2003) stated that students with varying self-beliefs could demonstrate participation in class activities at varying levels in the cognitive, social, and affective domains. These findings indicate the ASC's predictive power of student engagement.

Cognitive engagement is an indication of students' motivation in the education and their active participation level in learning activities (Skinner & Pitzer, 2012). At the same time, it is also an indication of to what extent students will be paid attention and motivated towards learning activities. When students are not willing or interested to learn, it is substantially difficult for learning to occur (Bingham & Okagaki, 2012). It has been reported that students whose academic self-perception are reported to have increased cognitive participation (Liem, et al. 2008). Similarly, in the present study, it has been concluded that ASC is a significant predictor of cognitive engagement. Another question that emerges at this point is whether cognitive engagement has a mutual effect on ASC as well. Various studies in the literature have reported findings revealing that ASC is a predictor of academic success; however, at the same time, it has been revealed that an increase in academic achievement also has a positive effect on ASC (Marsh, 1992; Muijs, 1997). Thus, it may not be wrong to assume in the present study that such a mutual effect can occur between student engagement and ASC.

In recent years, studies on school achievement have highlight that high achievement students have higher levels of intrinsic motives towards learning (Gottfried, 1990; Mac Iver et al., 1991; Skaalvik, 1998) and underscore the importance of affective factors in school achievement (Ackerman, 2003; Marsh, 1992; Marsh, 2014; Marsh & Yeung, 1997). It has been reported that students who have self-confidence in their abilities in a certain subject area display higher levels of interest in (Ainley & Ainley, 2011) and derive more pleasure from it (Pinxten et al., 2014). Thus, it is accepted that the findings of the current research will make a contribution to the related literature in relation to the identification and discussion of which affective factors have an influence on increasing student performance and academic achievement, the

adjustments to be made in schools and learning conditions for students' acquisition of affective skills, and the evaluation role of the teacher's in equipping students with the affective skills in these environments. The writers of the present article believe that further studies should be carried out on the explanatory roles of students' ASC and their feelings of engagement in student success.

Whether education takes place online or in formal school settings, students' academic self- perceptions (Bong & Skaalvik, 2003; Muijs, 1997; Skaalvik & Rankin, 1996) as well as their feelings of engagement (Fung et al., 2018) are important in learning processes. Considering that environment is a significant factor in ASC, with various adjustments in schools and online environments, the expected positive developments can be achieved in relation to students' ASC. In designing online learning environments, teachers play a significant role. They should be able to use technology well, be creative in presenting course content, and create a good interaction environment. Online counseling should be offered to students when needed. Providing timely feedback on online learners' work is highly encouraged to maintain positive perspectives about their abilities. Providing individualized feedback to online students to let them know when they are performing well (or not performing well) relative to their classmates is thought to positively impact their academic self-esteem.

In the current study, the ASC's predictive power of student engagement was investigated, and it was showed that ASC is a important predictor of student engagement. Another important point that should be discussed at this point is whether or not student engagement has a predictive effect on ASC; that is, questions as to whether there is a mutual effect. To conduct further studies on this discussion, it is believed that there should be further studies conducted to investigate whether there is a mutual effect between these two variables. One limitation of the current study is that ASC and student engagement could show variation across different courses, thus being course specific. However, the generalizability of the study results is increased in the present study with inclusion of data included from different courses. Nevertheless, further studies need to be conducted to investigate how both variables would change in different fields of performance.

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