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# The Mediating Effects of Approaches to Learning on the Academic Success of First-Year College Students

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## ABSTRACT

Students' personal predictors of academic success are particularly relevant for first-year college students, given the specific challenges that these students face when entering higher education (HE). Academic success in HE has been related to multiple factors, including the students' approaches to learning (SAL), satisfaction (linked to commitment and persistence), study time (effort), and prior academic achievement. This study analyzes the combined effect of these predictors on perceived academic success. Data from 247 students was collected using the Approaches and Study Skills Inventory for Students and other specific measures to assess presage and process variables of academic success. Although academic success is multidimensional and difficult to explain, factors such as prior academic achievement, satisfaction with the course, SAL, and study time contribute to explain perceived academic success in first-year college students.

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ASSIST; academic success;  
first-year higher education  
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The first year in higher education (HE) is a critical period for students' retention and success. In fact, a highly diverse group of students enter universities regarding prior academic performance and competencies, level of expectations and motivation, learning strategies, and vocational projects. Students' characteristics are not always compatible with the academic demands of HE, and research demonstrates that these variables are possible predictors of academic success. Moreover, the relationships between these variables can be complex in terms of the direct and indirect effects on academic success (Diseth, 2007a; Lizzio, Wilson, & Simons, 2002; Soares, Guisande, Diniz, & Almeida, 2006). In this paper, we focus on students' learning strategies, in particular those involved in the "approaches to learning" model, as well as on other variables that theoretically predict the student's success.

Students' approaches to learning (SAL) (Biggs, 2001) are related to students' intentions, motives, and learning strategies (Diseth, 2007a; Entwistle, 2000, 2001; Lizzio et al., 2002). According to Biggs (2001), an approach to studying is a specific way of performing academic tasks, based on the task demands and the context. The concept describes students' intentions facing a learning situation, as well as the corresponding strategies by which they achieve learning outcomes. Literature confirms that approaches to learning are a function of both individual characteristics and the learning context, varying across disciplines and directly influenced by students' motivations and representations of the learning situation (Byrne, Finlayson, Flood, Lyons, & Willis, 2010; Diseth, 2007a; Donche & Gijbels, 2013; Edmunds & Richardson, 2009; Entwistle, 2001; Heiskanen & Lonka, 2012; Lizzio et al., 2002;

Lonka, Olkinuora, & Mäkinen, 2004; Phan & Deo, 2007; Richardson, 2011; Zhu, Valcke, & Schellens, 2008).

When using a deep approach, the intention to understand the material and to find meaning generates active learning processes, including relating ideas and looking for patterns in information. In this process, students make use of evidence and inquire into and evaluate the arguments in order to achieve comprehension (Entwistle, 2001). On the other hand, when using a surface approach, the intention is to reproduce what has to be learned with a minimum effort. The student sees the content as unrelated fragments of information, leading to much more confined learning processes, such as memorization (Entwistle, 2000, 2001). This suggests that students have external interests that lead to routines, memorization, and the use of learning strategies without reflection. Marton and Säljö (1976a, 1976b), for instance, discussed deep-level and surface-level processing in an artificial experiment. They expected the level of processing to be specific to the task, but when the tasks were similar a tendency to one (deep) or other (surface) approach was to be expected. A third approach, labelled “strategic” (Ramsden, 1979), is mainly influenced by exams and assessment situations (Case & Marshall, 2009). Students seek to succeed and use processes that they believe will most likely help in the achievement of higher grades. Accordingly, they monitor efficacy when studying (Entwistle, 2001) and give special attention to assessment demands. The strategic approach (that Biggs [1987] called “achieving approach”) is characterized by high levels of effort, an intention to achieve the highest grades through organized studying, time management, monitoring one’s learning progress, and exam preparation tailored towards perceived exam requirements. The existence, nature, and relevance of a strategic approach is not consensual in the literature (Biggs, Kember, & Leung, 2001; Gadelrab, 2011). Recently, Entwistle, McCune, and Tait (2013) changed the name to “organised effort,” considering it not a specific approach, although most research goes on considering this third approach.

Previous research has typically shown the impact of the approaches to learning on academic achievement. Some authors (Byrne, Flood, & Willis, 2004; Cano, 2005; English, Luckett, & Mladenovic, 2004; Entwistle, 2000; Entwistle, Tait, & McCune, 2000; Fenollar, Roman, & Cuestas, 2007; Gębka, 2013; Phan, 2010; Ramburuth & Mladenovic, 2004; Salamonson et al., 2013; Torenbeek, Jansen, & Suhre, 2013) confirmed that deep and strategic approaches are positively related to achievement, and surface approach is negatively related to this construct. However, Entwistle et al. (2013) report that, in the first year, academic performance is more closely related to strategic and surface approaches than it is to deep, probably due to the usual nature of the assessment procedures in the first year. Richardson and Remedios (2014) found that scores on surface approach were negatively related to academic achievement, but they did not identify any significant relationship between scores on deep approach and achievement. Other investigations reported a moderate (Diseth, 2003) or weak (Duff, 2003) relationship between SAL and achievement, while still other researchers failed to establish this relationship (Davidson, 2002; Smith & Miller, 2005).

Research must make clear that one of the reasons for the lack of any close relationship is that many assessments do not reward personal understanding as opposed to accurate reproduction. Therefore, academic achievement should be analysed in a more complete and systematic way, including academic processes of teaching and learning. Some research on SAL does not sufficiently consider the students’ levels of ability, in terms of previous academic performance, or study time, in terms of how much time they spend studying (effort), nor the students’ satisfaction, when linked to commitment and persistence (Arambewela & Hall, 2013; Okun, Goegan, & Mitric, 2009). Nevertheless, these issues have been investigated by Diseth (2007b), who demonstrated that course experience, students’ approaches to learning, and ability were related to examination grade, whereas effort was not. In his study, Diseth (2007b) observed that a surface approach mediated the relationship between course experience and academic achievement, whereas ability remained an independent predictor of achievement. These findings indicate that both ability and approaches to learning have considerable independent effects on academic achievement, and that the students’ perceptions of the learning environment are important sources of approaches to learning.

Other authors have studied the relationships between student characteristics, including value orientations, and approaches to learning. Matthews, Lietz, and Darmawan (2007), for example, suggested that values could be linked to approaches to learning in a situation where students have left their home countries to undertake tertiary studies in a new social, cultural, and educational environment.

More recently, Lietz and Matthews (2010) found, using multilevel modelling, that there were no changes within students in the deep and surface approaches to learning, but a significant decline for the achieving (strategic) approach, particularly for students who had previously experienced a more formal teaching authority. Diseth, Pallesen, Brunborg, and Larsen (2010) also investigated the relationship between effort and achievement and they found that SAL, effort, and prior academic performance (high school grade point average [GPA]) were independent predictors of exam performance.

Hence, academic performance is both indirectly affected by the learning context as experienced by the students and directly influenced by the students' effort, prior performance, and approaches to learning.

In what concerns prior academic achievement, Diseth (2007b) suggests the relevance of previous mastery experiences. Several studies suggest that prior academic achievement is the single best predictor of academic achievement (Duff, 2004; Lizzio et al., 2002; Soares et al., 2006; Zeegers, 2004). In addition, prior academic achievement is considered to be an important source of self-efficacy beliefs (Pintrich & Schunk, 2002) and academic self-perceptions (Ferla, Valcke, & Schuyten, 2009; Guay, Marsh, & Boivin, 2003).

Another important variable is students' academic satisfaction. Academic satisfaction is related to academic involvement and success, as well as low levels of stress and attrition (Cole, Kennedy, & Ben-Avie, 2009; Credé & Niehorster, 2012; Jackson, Pancer, Pratt, & Hunsberger, 2000; Smith & Miller, 2005). Literature suggests that students start HE with high and often unrealistic levels of expectations. Sometimes the discrepancy between initial expectations and academic experiences introduces significant levels of dissatisfaction, which have a negative impact on academic motivation, learning, and achievement (Braxton, Vesper, & Hossler, 1995; Cole et al., 2009; Jackson et al., 2000; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Smith & Miller, 2005).

Finally, the relationships between study time and students' approaches to learning have been previously described in the literature (Diseth, 2007a, 2007b). Planned, self-regulated, and strategic students tend to invest a high number of hours studying (Diseth et al., 2010; Masui, Broeckmans, Doumen, Groenen, & Molenberghs, 2014; Plant, Ericsson, Hill, & Asberg, 2005; Shell & Soh, 2013). Some studies have found positive correlations between study time and academic achievement (Brint & Cantwell, 2010; Diseth et al., 2010; Dollinger, Matyja, & Huber, 2008; Doumen, Broeckmans, & Masui, 2014; Masui et al., 2014), whereas others show that the time effect on academic achievement is not a question of the number of hours students study, but of the quality of time and task management (Monteiro, Almeida, Vasconcelos, & Cruz, 2014; Plant et al., 2005).

To assess the impact of these variables on academic success, we used Biggs' (1987) 3P Model. Some personal variables such as prior academic achievement, satisfaction with the course, and study time were considered as presage variables; approaches to learning and studying as process variables; and academic success as a product variable, both in terms of the quality and quantity of academic learning. We anticipate that presage variables may have both a direct effect on product variables and an indirect effect via process variables, which is supported by the literature (Byrne et al., 2004; English et al., 2004; Entwistle, 2000; Gębka, 2013; Ramburuth & Mladenovic, 2004; Richardson & Remedios, 2014; Salamonson et al., 2013; Torenbeek et al., 2013).

Although most studies suggest the relevance of approaches to learning to explain academic achievement, some doubts persist. Relationships between the constructs cannot be assumed to be linear, as some inconsistencies can be observed, either in terms of personal variables, but also when measuring indicators of academic success (Davidson, 2002; Phan, 2010; Salamonson et al., 2013; Smith & Miller, 2005). More specifically, in this paper, besides approaches to studying, we

explore the extent to which academic success is associated with other variables, namely prior academic performance, academic satisfaction, and study time. In addition to direct paths, indirect effects were estimated, accounting for the relevance of SAL as mediator variables of the relationship between the students' personal characteristics and academic success. It is expected that SAL will predict academic success, in accordance with previous research.

## Methods

### *Participants*

Data from 247 first year students were collected in a public university of approximately 10,000 students in the south of Portugal. The 247 students consisted of 99 men and 148 women, aged 18 to 48 years ( $M = 20.52$ ;  $SD = 4.30$ ), with 153 students in Humanities and Social Sciences (HSS) and 94 in Sciences and Technology (ScT). Regarding the distribution of men and women in the two scientific areas, there was no significant association between these two variables ( $\chi^2 = 2.03$ ,  $df = 1$ ,  $p = 0.155$ ): 97 women and 56 men in HSS, and 51 women and 43 men in ScT. Most students were attending their first-choice undergraduate degree ( $n = 189$ , 76.5%) and were full-time students.

### *Measures*

#### *Prior academic achievement.*

Students were asked to report their admission score for the particular university and degree they were attending. In Portugal, admission to HE is regulated by a numerus clausus system based on the students' high-school GPA and results of admission tests, which may vary according to the student's degree, and may include tests in subjects such as Portuguese, Mathematics, Chemistry, or History, among others. Students' admission score can vary between 0 and 20 points.

#### *Satisfaction.*

Student satisfaction was assessed by asking students one question about the degree to which they felt satisfied with their academic experience in college. Answers ranged from 1 (not satisfied at all) to 5 (totally satisfied).

#### *Study time.*

Study time was measured by asking students how many hours they spent during a typical week studying on their own.

#### *Approaches to learning/studying.*

Students' approaches to studying were assessed using one section of the Approaches and Study Skills Inventory for Students (ASSIST) (Tait, Entwistle, & McCune, 1998), composed of 52 items, with a five-point Likert response scale ranging from 1 (disagree) to 5 (agree). This section corresponds to the Revised Approaches to Studying Inventory (Tait & Entwistle, 1996). The questionnaire assesses three approaches to learning (deep, surface, and strategic), and includes 13 lower-order subscales, each composed of four items. Scores are calculated summing the four items for a given subscale. Previous research reports that the ASSIST produces satisfactory reliability coefficients when administered to samples of North-American and European students (Entwistle et al., 2000; Flood & Wilson, 2008; Tait & Entwistle, 1996), with internal consistency ranging from 0.70 (Diseth, 2001) to 0.83 (Byrne et al., 2004) for the surface approach; between 0.81 (Ballantine, Duff, & Larres, 2008; Diseth, 2001) and 0.85 (Ballantine et al., 2008) for the deep approach; and between 0.81 (Diseth, 2001) and 0.88 (Ballantine et al., 2008) for the strategic approach. A previous study with Portuguese college students reported coefficients of 0.79 for the surface approach, 0.81 for the deep approach, and 0.83 for the strategic approach (Valadas, Gonçalves, & Faisca, 2010).

### **Academic success.**

Two measures of the students' academic success were considered: the subjective perception of current academic performance and the number of failed courses in both academic terms (which can vary between 0 and 12, normally with 6 courses per semester). Subjective performance was measured using a single item, which asked the students how well they have been doing in their assessed work overall (based on the grades they have actually obtained), with answers ranging from 9 (very well) to 1 (rather badly).

### **Procedure**

After obtaining authorization from the heads of the faculties, as well as of the teachers in each class, participants were informed of the goals of this research and of the voluntary nature of their participation; confidentiality and anonymity were guaranteed. The time to read and complete the instruments ranged between 20 and 30 minutes. The measures were administered to students in class 8–10 weeks after the beginning of the second academic term.

### **Analysis**

The structure of the ASSIST scales was analyzed using confirmatory factor analysis (through AMOS, v. 22), in order to produce a measurement model for the latent factors of deep, strategic, and surface approaches. Because it is an important matter as this is only the second time the model has been tested with Portuguese students, the internal structure of the ASSIST was previously examined in order to provide latent variables for the model to be tested.

Structural models were investigated using the Mplus 7.0 program (Muthén & Muthén, 1998–2012), by which the relationships between variables were studied. Mplus provides several goodness-of-fit indices, including the chi-square ( $\chi^2$ ), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). The chi-square tests the null hypothesis that the covariance matrix and mean vector in the population are equal to the model-implied covariance matrix and mean vector (Geiser, 2013). A significant chi-square value leads to the rejection of the null hypothesis that the model fits in the population.

Because the  $\chi^2$  is highly sensitive to sample size (the larger the sample size, the more likely to reject the model), the ratio chi-square/degrees of freedom ( $df$ ) is frequently analysed. Kline (2005) recommended that a  $\chi^2/df$  greater than 3 represents inadequate fit. The CFI provides an evaluation of the difference between an independent model and the specified model. According to Hu and Bentler (1999), a CFI < 0.95 can indicate a good model fit. The TLI, for which the same cut-off values as for the CFI apply, compares the fit of the target model to the fit of the independent model. The RMSEA is a measure of approximate model fit. According to Browne and Cudeck (1993), a RMSEA < 0.09 is still an indicator of a reasonable error of approximation in smaller samples (e.g.,  $n < 300$ ). In fact, in small sample sizes ( $n < 300$ ), even a CFI  $\geq 0.90$  can indicate an acceptable fit (Bentler, 1990; Hu & Bentler, 1995). Finally, the SRMR coefficient is a standardized measure for the evaluation of the model residuals. Values range from zero to 1.0, with well fitting models obtaining values less than .05 (Byrne, 1998); however, values as high as 0.08 are also acceptable (Hu & Bentler, 1999).

## **Results**

### **Descriptive Statistics**

The descriptive statistics in Table 1 show that the data were normally distributed, with acceptable skewness and kurtosis values, except for study time and satisfaction, which were not normally distributed. Scores for the deep and strategic approaches subscales were higher than for surface



**Table 1.** Descriptive statistics (range [minimum/maximum], mean [*M*], including standard error [*SE*], standard deviation [*SD*], skewness, and Kurtosis).

	Min	Max	<i>M</i>	<i>SE</i>	<i>SD</i>	skewness	Kurtosis
Prior academic achievement	9.9	18.3	13.74	.10	1.58	.20	-.53
Satisfaction	1	5	3.85	.05	.81	-.73	1.26
Study time	0	24	4.9	.29	4.6	1.53	2.08
Deep approach	28	65	50.15	.37	5.92	-.52	.79
Seeking meaning	8	20	15.81	.13	2.09	-.46	.42
Relating ideas	7	20	14.99	.14	2.30	-.28	.17
Use of evidence	9	20	15.83	.12	1.94	-.31	.75
Interest in ideas	9	20	15.22	.13	2.17	-.49	.08
Monitoring effectiveness	9	20	16.24	.13	2.15	-.46	.11
Surface approach	21	56	37.36	.47	7.41	.28	-.46
Lack of purpose	4	20	9.53	.22	3.46	.48	-.26
Unrelated memorizing	4	19	11.31	.16	2.60	.03	-.12
Syllabus boundness	6	20	12.65	.18	2.85	.14	-.45
Fear of failure	6	20	15.15	.17	2.71	-.60	.45
Strategic approach	29	79	58.79	.50	7.97	-.09	.18
Organized studying	7	19	13.39	.16	2.57	-.15	-.51
Time management	5	20	13.24	.18	2.84	-.13	-.26
Achieving	4	20	14.49	.16	2.53	-.41	.69
Alertness to assessment	9	20	14.30	.14	2.21	-.12	-.17
Perceived academic performance	1	9	4.89	.09	1.52	-.39	.04
Number of failed courses	0	6	1.31	.09	1.43	.83	-.21

approach subscales. The average number of hours per week spent by students studying was low, but the high standard deviation indicates that there are differences to be considered between the students.

### **The Measurement Model for Approaches to Studying**

Confirmatory factor analyses were performed using robust maximum likelihood estimation to examine the structure of approaches to learning. In the first model, and according to the theoretical structure of the ASSIST (Entwistle et al., 2013), the subscales were organized into three factors. The deep approach included seeking meaning, relating ideas, use of evidence, interest in ideas, and monitoring effectiveness. The strategic approach integrated the subscales organized studying, time management, achieving, and alertness to assessment. Finally, surface approach comprised lack of purpose, unrelated memorizing, syllabus boundness, and fear of failure. This model produced poor fit to the data ( $\chi^2[62, N = 247] = 171.68, p < .001, \chi^2/df = 2.77, RMSEA = .09 [.07-.10], CFI = .90, TLI = .87, SRMR = .08$ ). Given that the three-factor model represented significant misfit, a one-factor model evaluation was conducted (Model 2). However, this one-factor model also did not fit the data well, leading to a re-specification of the model.

Modification indices provided by Mplus after conducting the assessment of Model 1, suggested that the fit of the model could be improved by allowing monitoring effectiveness to also load on the strategic approach. This has also been accounted for in previous studies (Byrne et al., 2004). This third model produced a better fit to data ( $\chi^2[61, N = 247] = 138.39, p < .001, \chi^2/df = 2.27, RMSEA = .07 [.06-.09], CFI = .93, TLI = .91, SRMR = .06$ ). A fourth alternative model, which omits monitoring effectiveness, produced slightly poorer fit indexes ( $\chi^2[51, N = 247] = 125.62, p < .001, \chi^2/df = 2.46, RMSEA = .08 [.06-.09], CFI = .92, TLI = .90, SRMR = .06$ ). We therefore chose to maintain monitoring effectiveness in the measurement model, including cross-loadings for deep and strategic approaches. On this matter, Entwistle et al. (2013) suggested that there are actually two components in this subscale, and consequently they propose the use of “monitoring understanding” for the items that load on deep approach, and “monitoring studying” for those that load on strategic approach. Standardized loadings of the ASSIST subscales range from .35 to .86 for the factor deep approach, from .33 to .75 for the factor surface approach, and from .40 to

.81 for the factor strategic approach. Regarding this structure, internal consistency (Cronbach's alpha) for the deep approach in the present study was .84, for surface approach it was .79, and for strategic approach it was .82.

### **Relationships Between Personal Variables, Approaches to Learning, and Academic Success**

Significant relationships were encountered between most of the variables in the sense expected (Table 2).

A structural equation model, using the maximum likelihood estimation method, was produced in order to further examine the relationships among prior academic achievement, satisfaction, study time, SAL, and academic success. This model produced acceptable fit indexes ( $\chi^2[115, N = 247] = 239.22, p < .001, \chi^2/df = 2.08, RMSEA = .07 [.05-.08], CFI = .91, TLI = .88, SRMR = .06$ ) and confirmed that prior academic achievement (high-school GPA) predicted current academic success, both in terms of perceived academic performance and the number of failed courses. In addition, prior academic achievement predicted SAL – there is a positive relationship for deep and strategic approaches and a negative one for surface approach. Satisfaction with the course and study time are associated ( $\beta = .23, p < .001$ ), but they are not related to prior academic achievement. Figure 1 (only significant coefficients are shown) confirms that satisfaction and prior academic achievement predict SAL, evidencing a negative relation with the use of a surface approach. Study time predicts the use of a strategic approach, but not of deep and surface approaches. As expected, the residuals of deep and strategic approaches are positively related ( $\beta = .36, p < .001$ ), and the residuals of surface approach are negatively related to deep ( $\beta = -.28, p < .001$ ) and strategic approaches ( $\beta = -.42, p < .001$ ). Finally, the number of failed courses is not predicted by SAL. Perceived academic performance is positively predicted by strategic approach and negatively by surface approach (and not predicted at all by deep approach).

An alternative model examining the direct effect of all the variables as predictors of current academic success was tested, but produced a poorer fit ( $\chi^2[120, N = 247] = 351.86, p < .001, \chi^2/df = 2.93, RMSEA = .09 [.08-.10], CFI = .83, TLI = .79, SRMR = .12$ ). This model, with no indirect effects, was significantly different from the previously tested model, which included indirect effects ( $\chi^2_{\Delta} = 111.64, df_{\Delta} = 5, p < .001$ ).

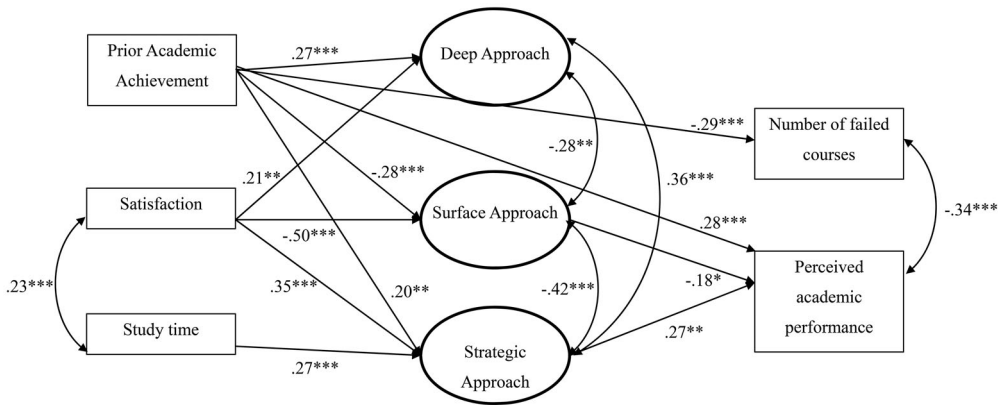
Testing of indirect effects was conducted using the bias-corrected bootstrap method ( $n = 10,000$ ) to establish confidence intervals (Cheung & Lau, 2008; Geiser, 2013). These were used to determine whether surface and strategic approaches mediated the relationship between the presage variables (prior academic achievement, satisfaction, and study time) and academic success in terms of perceived academic performance. Prior academic achievement had a marginally significant indirect effect on perceived academic performance via the strategic approach ( $\beta = .06, z = 1.91, p = .06, 95\%CI [-.00, .11]$ ). Strategic approach also mediated the relationship between satisfaction and perceived academic performance ( $\beta = .10, z = 2.06, p < .05, 95\%CI [.00, .18]$ ). Study time had an indirect effect on perceived academic performance, via strategic approach ( $\beta = .07, z = 2.48, p < .05, 95\%CI$

**Table 2.** Correlations between prior academic performance, satisfaction, study time, approaches to studying, perceived current academic performance, and number of failed courses.

	2	3	4	5	6	7	8
1. Prior academic achievement	.09	.01	.29***	-.33***	.24***	.39***	-.37***
2. Satisfaction	–	.23***	.26***	-.53***	.43***	.27***	-.20**
3. Study time		–	.15*	-.19**	.36***	.03	-.07
4. Deep approach			–	-.43***	.47***	.26***	-.34***
5. Surface approach				–	-.58***	-.40***	.32***
6. Strategic approach					–	.44***	-.31***
7. Perceived academic performance						–	-.49***
8. Number of failed courses							–

Note: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .





**Figure 1.** Structural equation model of prior academic achievement, satisfaction, study time, approaches to learning, and perceived academic performance.

Notes: All paths are significant, \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ). All values are standardized coefficients.

[.02, .13]). Finally, the indirect effect of prior academic achievement on perceived academic performance via surface approach was not significant ( $\beta = .05$ ,  $z = 1.68$ ,  $p = .09$ , 95%CI [-.00, .11]), nor was the indirect effect of satisfaction on perceived academic performance via surface approach significant ( $\beta = .09$ ,  $z = 1.58$ ,  $p = .11$ , 95%CI [-.02, .20]).

## Discussion

This study explored the relationships between prior academic achievement, satisfaction, and study time as presage variables of first-year college students' approaches to learning and academic success – in terms of the number of failed courses in the academic year and students' self-reported perceived academic performance. In addition to direct paths, indirect effects were estimated, accounting for the relevance of SAL as mediator variables of the relationship between the students' characteristics and academic success.

Although it was not the central concern of this study, the structure of the ASSIST was examined in this sample of Portuguese first-year students in order to test its validity. Our findings provide evidence of construct validity of the ASSIST for the assessment of three approaches (deep, surface, and strategic), as observed in other countries (Abedin, Jaafar, Husain, & Abdullah, 2013; Bilgin & Gozlu, 2014; Byrne et al., 2004; Diseth, 2001; Entwistle et al., 2013; Gadelrab, 2011; Tait et al., 1998), which facilitates further international comparative research. In addition, the observed positive relationships between deep and strategic approaches and negative associations between surface approach and deep and strategic approaches are consistent with previous research (Byrne et al., 2004; Diseth, 2001). The cross-loading of monitoring effectiveness on the strategic scale and on the deep scale was also observed in other validation studies of the ASSIST (Byrne, Flood, & Willis, 1999; Diseth, 2001; Entwistle et al., 2000) and conceptually justifiable. Adequate levels of internal consistency (Cronbach's alphas) were found in the three approaches, ranging from .79 (surface) to .84 (deep). Globally, these findings account for the ASSIST's robustness for the assessment of SAL of Portuguese college students.

Regarding the correlations between the variables, prior academic achievement and satisfaction were not associated in this study. One plausible explanation may be related to the interaction between academic performance and students' placement in their courses. In Portugal, due to the numerus clausus system for accessing HE, some students with higher GPAs may have been placed in a course that was not their first choice, while students with lower GPAs may have been placed in courses of their preference, a situation that may account for variability in satisfaction and

arbitrariness in the relationship between satisfaction and previous performance. This result is important because satisfaction with one's academic life may lead to persistence in one's academic major (Lent, Singley, Sheu, Schmidt, & Schmidt, 2007). In addition, satisfaction with academic experience in HE is a complex construct, since a student may be satisfied with the quality of the instruction, but not, for example, with the quality of the relationships with peers and faculty. Moreover, a student may be satisfied with the overall academic experience, but still be dissatisfied with the course because it represents a poor fit with his/her career self-concept and plans for the future. However, satisfaction was positively associated with perceived academic performance, in accordance with Nauta's (2007) study.

In this study, satisfaction was, as expected, positively associated with study time. According to the literature, academic satisfaction increases levels of intrinsic motivation and cognitive processes, like attention and reflection, in order to attend to the task demands (Pekrun, Goetz, Titz, & Perry, 2002). Our results suggest that students who perceive that they are having positive academic experiences will invest more time studying, and students who invest more time studying will probably feel more engaged with their course and therefore feel more satisfied. Satisfaction was also a positive predictor of deep and strategic approaches and a negative predictor of surface approach to learning. It is also important to reflect on the fact that the measures used are based on self-reported data. Students in different learning environments have different learning experiences and the influence of these factors on their perceptions may differ (Pike, 2000). In addition, students may report their satisfaction in what concerns their overall collegiate experience using different base lines, depending on their college experiences and their perceptions about different learning contexts (Entwistle, 2000; Prosser & Trigwell, 1999; Ramsden, 1997).

Concerning the relationship between study time and academic success, this study confirms a poor or no direct association between the number of hours students spent studying and their perceived academic performance. Research on this topic is quite controversial, and factors such as the way study time is assessed or the definition of academic success/performance have been introduced as possibly influencing the variability in results regarding the association between study time and academic performance (Masui et al., 2014). On the other hand, it has been suggested that it is the quality of the effort that students put in their study, and not the amount of time invested, that determines success (Monteiro et al., 2014; Plant et al., 2005). Our results are consistent with this assumption, because there was no direct impact of study time on academic success, but this influence was significant when mediated by a strategic approach (and not surface or deep approaches). Therefore, the impact of study time appears to be mediated by the way the students organize their studying and manage their time, as well as their orientation towards achievement.

The current study also aimed to further explore the relations between previous academic achievement, SAL, and academic success. Prior achievement was positively related to deep and strategic approaches and negatively related to surface approach, as expected, although the relationship between deep approach and academic success may not be that clear (Diseth & Kobbeltvedt, 2010). Prior academic achievement was also a direct predictor of perceived academic performance, evidencing that there is some continuity in terms of academic success, from secondary education to HE (Soares et al., 2006).

Finally, and contrary to our expectation, the students' approaches to learning were not related to the number of failed courses, which was identified as a measure of academic success. This unexpected result may be due to variability in the learning environment, namely the type of scientific field (HSS vs. ScT) and the methods of teaching and assessment in each course. However, the relationship between SAL and the students' perceptions of academic performance was, as predicted, significant for surface and strategic approaches, demonstrating that the students' intentions of avoiding failure on one hand, and planning for and organizing time on the other hand, are significantly related to the students' academic success. On the contrary, deep approach was not a significant predictor of perceived academic performance, similar to results obtained in other studies (Diseth, 2007a; Diseth & Kobbeltvedt, 2010; Diseth & Martinsen, 2003; Entwistle et al., 2000). It is also worthwhile

mentioning that there appears to be a contamination effect of the experience of success (pass/fail courses) on the students' perceptions of success, as shown by the negative association between the number of failed courses and the students' perceived academic performance.

## Limitations

Limitations of this study are mainly related to the assessment of the variables that were predicted to be associated with SAL and academic success. For example, a single item assessed academic satisfaction. In this case, the inclusion of more items capturing the many facets of first-year students' academic experience in higher education (e.g., social adjustment, studying and academic achievement, autonomy) could have provided a more robust measure of satisfaction. The same may be put forward for the assessment of study time, as a single item produced the students' representations of the time invested studying. Due to variability in the students' study patterns throughout the academic term and across courses, study time logs across extended periods may produce more valid representations of the students' effort (Masui et al., 2014).

A methodological issue concerning sampling should also be addressed. Participants were selected in the context of a class; therefore, the students who were less engaged and not attending classes were not assessed, limiting their representation in the group of participants, and therefore the generalizability of results. The selection of students who are more likely to be well motivated will tend to reduce the variation in the sample and so reduce correlations. Students who participate in fewer curricular activities are at a higher risk level for academic failure and attrition from HE. Finally, the fact that we asked the students to talk about their perceptions on previous and perceived academic performance could also be considered a limitation.

The assessment of current academic success, based on the number of failed courses, may also be conditioned by the type of academic degree that the students are enrolled in and their scientific domain. This variability may have conditioned the assessment of the relationships between the students' characteristics, SAL, and academic success, as, in this study, no associations were found between study time, satisfaction, SAL, and the number of failed courses in the school year.

Finally, although inventories like the ASSIST contribute to the measurement of the approaches to learning and studying of students in HE, Entwistle and McCune (2004) acknowledged that "the limitations of this methodology have to be accepted, and alternative approaches to research used to capture change and individuality more fully" (p. 342) must be pondered. Richardson (2011) also considered this limitation: "the SAL perspective is concerned with constructs that are not necessarily observable in students' nonverbal behaviour but have to be inferred from their self-reports in either interviews or questionnaire surveys" (pp. 292–293). Nevertheless, many researchers in the field acknowledge the weaknesses of this methodology, looking at the SAL tradition to provide alternative forms of instrumentation (Richardson, 2011).

## Recommendations for Future Research

In spite of these limitations, the research confirmed that prior academic achievement, satisfaction, and study time are important variables to be considered in the prediction of first-year students' academic success. In this study, the paths of influence of these variables on academic products were shown to be direct and mediated, specifically by the strategic approach. This is important information, showing that the students' approaches to learning have a specific contribution for their success in the first year in HE, and that the students' success may be enhanced through a learning environment that promotes organized and planned self-study assignments.

Other important contributions were the data provided on Portuguese students' characteristics, which are relevant for international comparisons and policy decision-making (concerning orientations about adjustment to college, involvement, dropout, academic failure), as well as validity indicators of a widely used measure of SAL – the ASSIST – for Portuguese students. Educational

implications must also be considered when we think about the teaching and learning contexts, particularly in what concerns the way teachers think about learning in HE.

Future research should also consider the use of other research methods and instruments, in conjunction with ASSIST, to access, for instance, models of thinking, such as those used in phenomenographic studies. This strategy could strengthen the analysis and provide insight into HE academic success.

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