



Student Engagement in the Context of Post-Covid: A Case of Higher Education Institutions

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The impact of covid-19 has called for an urgent need to further understand the relationship between students' motivated behavior and their engagement. This study aimed to investigate the links between adaptive cognition and adaptive behavior and the engagement of college and university students during and after the covid-19 pandemic. The recent study was framed within several relevant theories, namely the self-determination theory, the need achievement theory, and the job demand-resource theoretical model. Structural equation modeling with JASP software version 0.14.1 was employed as a robust method to investigate complex relationships in the proposed research model. Data were collected through an online survey using a structured questionnaire. Respondents comprised 263 students registered at two higher education institutions in Viet Nam. Analysis results yielded the positive and significant influence of adaptive cognition ($\beta = 0.224$) and adaptive behavior ($\beta = 0.489$) on student engagement. Furthermore, anxiety predicted student engagement in our theoretical model, and the relationship was positive ($\beta = 0.132$). We also found a strongly influential relationship between adaptive cognition and adaptive behavior ($\beta = 0.783$). These findings proposed a critical implication: to promote student engagement in the context of post-covid, management bodies and leaders in higher education institutions should adopt a comprehensive approach in which the provision of psychological conditions is an integral part.

Keywords: adaptive cognition, behavior, post-covid, student engagement, Viet Nam

INTRODUCTION

Student motivation and engagement have become an emerging study topic among scholars as it interlinks with student performance and learning outcomes. In other words, how the student achieves their academic results replies on their motivation and engagement (Frey et al., 2009). Other studies also suggested that motivation and engagement are determinants of students' academic success (Hufton et al., 2002; Woolfolk & Margetts, 2012). According to Skinner (Skinner et al., 2009), student engagement is the most influential factor that contributes to achieving learning outcomes.

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The impact of covid-19 which has resulted in a dramatic shift from traditional classrooms to other alternatives such as virtual or hybrid forms of lecture delivery has called for an urgent need to further understand the relationship between students' motivated behavior and their engagement. Statistics show that the COVID-19 pandemic has caused many waves of infections around the world, including Viet Nam. The country experienced the first wave in early 2020, followed by a more severe outbreak in July 2020. The third wave, starting in January 2021, with more infections; however, no deaths were recorded. The fourth wave, which began in January 2021, was the largest and most severe, with more than 6 million infections and more than 15,000 deaths reported across the country (The Vietnam Ministry of Health, 2021).

Without a doubt, COVID-19 has reshaped the entire higher education system in many parts of the world. Numerous universities and colleges have redesigned their training programs in a way that a major part of the programs is delivered virtually. This is also the case for student assessment in most higher education institutions in Viet Nam. These evitable changes, which are believed to continue, are posing questions on how to enable the student to achieve their desired learning outcomes. In this regard, recent studies by Besser et al. (2022) and Martin et al. (2021) argued that adaptive behavior to the changing academic environment is a key factor.

In the educational sector, few researchers have recently paid more attention to student adaptive behavior in the changing learning environment. These include Metsiou et al. (2011) who examined the impact of the learning setting on the adaptive behavior of primary school blind students, and Jowkar et al. (2020) arguing that the classroom environment influenced students' adaptive behavior. A recent study by Gu & Huang (2022), which was conducted in Hong Kong, assessed college students' adaptive behavior to online learning under the impact of the covid-19 pandemic. In a newly published article, Martin et al. (2023) expanded the implication of the job demand-resource theoretical framework to explore the relationship between the perceived adaptability and the engagement of Australian university students during the period of lockdowns due to covid-19.

Despite the rich literature on student engagement, very little is known when it comes to higher education levels (Ryan & Deci, 2017). In the context of tertiary education, the adaptive behavior of students does not solely their levels of intelligence, but their ability and skills to manage learning tasks, and flexibly apply learning resources and support tools to achieve the desired learning outcomes. Therefore, individuals must constantly learn new knowledge and skills to adapt to the ever-changing living situation. This study, therefore, aims at contributing to expanding the scientific understanding of drivers for student engagement in academic activities. Findings are expected to add value to the growing digitalized process in higher education in Viet Nam in which traditional classrooms are eclipsed by virtual learning platforms.

Theoretical Framework

Student motivation refers to the ability of the student to adjust their behavior and utilize the best of their time, energy, and effort to obtain desirable learning outcomes (Rubin et al., 2020). To measure this concept, scholars have proposed several theoretical

frameworks - particularly the need achievement theory of Covington (Covington, 1992), the self-efficacy theory of Bandura (Bandura et al., 1999), and the goal orientation theory of Ames (1992), cited by Kaplan & Maehr (2007).

Based on the self-determination theory, Martin (2003, 2007, 2009a) argued that adaptive cognition and adaptive behavior are key aspects of motivation. The author also suggested that the adaptive cognition concept can be measured by the "valuing" factor which is defined as the extent to which the student perceives the magnificence, usefulness, and relevance of knowledge and skills obtained from the school. Other studies also considered valuing as a dimension of adaptive cognition. For instance, Wigfield & Eccles (2000) clarified in his work that students are more likely to engage in their task performance once they realize the value of the given task. Therefore, in the current study, we proposed "valuing" with four observed variables to explain the adaptive cognition construct in the hypothesized model.

Adaptive behavior, which represents the practical and social capacity of an individual to be able to adapt to the needs of the living environment (Tassé et al., 2012), is a popular topic in psychology and medical studies. For example, Zukerman et al. (2022) assessed the adaptive behavior of adolescents who suffered from autism spectrum disorder; Zukerman et al. (2019) investigated the relationships between psychiatric symptoms and the adaptive behavior of patients facing autism spectrum disorder. Others concluded that children and adolescents with intellectual disabilities exhibit low levels of adaptive behavior (e.g. Müller et al., 2021).

Stemming from the Goal orientation and self-regulation theory, multiple studies concluded that two groups of observed variables: planning and task management can explain the adaptive behavior construct. Planning refers to the way students arrange their work and monitor their progress, while task management means how students schedule their time and get ready for classes and exams (Martin, 2001). Students who equip themselves with planning and task management skills are more likely to stay organized and on track. These skills can also help them use their time more effectively. Consequently, they can enhance their academic performance with increasing ease and comfort. In the current study, we included planning and task management in the hypothesized model to measure the adaptive behavior construct.

To conceptualize the motivation construct, Martin (2003) proposed a group of observed variables named "anxiety" as a negative driver of motivation. He defined anxiety as a form of nervousness or worries when students deal with their academic assignments or tasks. Once facing challenging and stressful academic assignments, students may experience nervousness, worry, or apprehension. This may lead to feeling uncertain about their ability to complete assignments or tasks. In such a situation, they may become less motivated to engage in their learning activities. We, therefore, assumed that anxiety can predict student engagement in this study.

The engagement construct stemmed from the job demand-resource model proposed by Bakker et al. (2004) and Demerouti et al. (2001). According to Siu et al. (2014), student engagement is "a positive, fulfilling state comprising vigor, dedication, and absorption in learning" (p.980). This scholar defined vigor as the ability to work hard and for long

periods of time, without getting tired or discouraged. It also reflects the ability to focus and concentrate on one's work, even when it is challenging. As for the absorption dimension, it is known as a state of flow, where one is entirely focused and engaged in their work that they lose track of time and feel a sense of joy and satisfaction. Some argue that student engagement and motivation are interwoven (Skinner et al., 2009) because the engagement concept can be interpreted as "a state in which a student puts quality effort into learning and authentic participation in academic activities" (Singh et al., 2022).

METHOD

Research Model

Based on the above-mentioned analysis of relevant theoretical frameworks and studies,

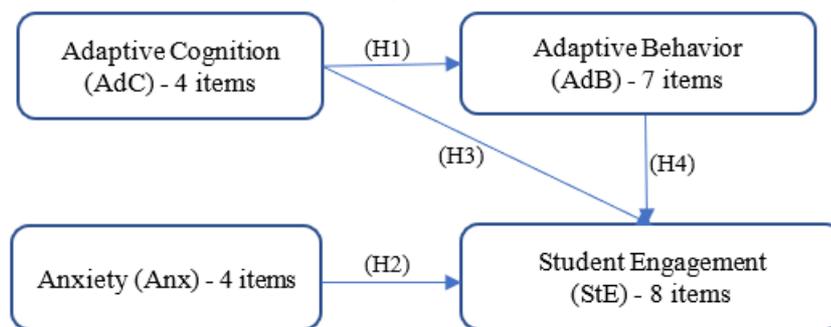


Figure 1
Proposed research model

In which:

- The concept of student engagement is explained by two groups of observed variables: vigor and absorption. Vigor is an "individual's ability to invest effort in studies willingly." Absorption is "being fully concentrated and happily engrossed in learning, whereby time passes quickly, and one feels carried away by one's work" (p. 13) (Schaufeli & Bakker, 2010).
- The adaptive cognition concept is measured by the "valuing" factor - the extent to which the student perceives the magnificence, usefulness, and relevance of knowledge and skills obtained from school (Martin, 2009b).
- The concept of adaptive behavior is explained by two groups of observed variables: planning and task management (Martin, 2001). Planning refers to the way students arrange their work and monitor their progress, while task management means how students schedule their time and get ready for classes and exams.
- Anxiety appears in a form of nervousness or worries when students deal with their academic assignments or tasks (Martin, 2003).

Sampling Method

To collect data for the purpose of this study, we carried out an online survey in the second half of 2022. We designed a structured questionnaire in Google Forms, and shared it within social platforms, namely Facebook groups and Zalo (the most widely used social network in Vietnam) to reach out to participants (i.e. students). We also kept the link to the questionnaire shareable to facilitate snowball sampling technique.

Our targeted participants in the survey included students registered in different training programs at two higher education institutions: Tra Vinh University and Tra Vinh Vocational College. Eligible respondents were those who have completed at least two semesters of their study program to ensure data reliability. As our survey questionnaire has 23 variables, we aimed to involve at least 230 participants to obtain reliable data. After the survey, a total of 263 valid questionnaires were included in the analysis. Table 1 provides details on the sample characteristics.

To the best of our knowledge, this sample size was large enough for our theoretical model in which the structural equation model analysis was employed to understand the relationships between the factors. Hoe (2008) argued that a sample size of at least 200 is statistically powerful for SEM, while smaller samples, ranging from 100 to 150 are considered acceptable (Anderson & Gerbing, 1988).

Measurement

In this study, we adopted Martin's measurement scale for the constructs of adaptive cognition and adaptive behavior (Martin, 2007). In particular, two groups of observed variables were used to measure adaptive behavior, including planning (with three items) and task management (with four items). Whereas, the adaptive cognition concept was explained by valuing with four items. For the student engagement construct, the Utrecht Work Engagement Scale-Student (UWES-S) proposed by Schaufeli et al. (2002) was adopted to develop the measurement scale. Specifically, this construct was measured by vigor and absorption, with each comprised of 4 items. The 5-point Likert scale was employed to collect responses, ranging from 1 = strongly disagree to 5 = strongly agree.

Data Processing Method

This study employed a rigorous analytical approach for data analysis. In particular, the structural equation modeling (SEM) with JASP software version 0.14.1 is a robust method that allows us to investigate complex relationships among variables (Clogg & Bollen, 1991). Hair et al. (2010) considered SEM as a powerful analytical method for studies that aim to test hypothesized relationships and explain multivariate ones, or causal relationships among variables (Hoe, 2008). Thanks to its analytical power, SEM has gained growing popularity in multiple research fields, namely psychology, sociology, and management.

Data processing procedures are comprised of four steps. First, Cronbach's alpha was employed to evaluate the internal consistency and the scale reliability. Then, exploratory and confirmatory factor analyses were performed to verify the existence of the observed variables, their convergence, and unidimensionality. Finally, structural

equation modeling (SEM) analysis was conducted to confirm and quantify the relationships between anxiety and adaptive behavior factors and student engagement.

FINDINGS

Respondents' Demographic Characteristics

Based on the descriptive statistics presented in Table 1, it is evident that the sample population in this study was well-balanced in terms of gender, the field of study, and residential areas. In particular, the gender distribution was almost equal, with 50.6% of the sample being males and 49.4% females. It is worth noting that interviewees in the survey were current students from four different training programs, with a quarter enrolled in engineering programs and an equal proportion in health science courses. Additionally, one in four students majored in either economics or education.

Furthermore, the statistics revealed that more students resided in rural areas (57.4%) than in urban areas (42.6%). Additionally, the Kinh ethnic group made up a major proportion of the sample (over 81%), followed by the Khmer with 16%. A minor part of the sample consisted of Chinese respondents, with less than 3%.

Table 1
Characteristics of the sample (N=263)

Demographic variables		Frequency	Percentage
Gender	Male	130	50.6
	Female	133	49.4
Field of study	Economics	70	26.6
	Education	50	19.0
	Engineering	72	27.4
	Health sciences	71	27.0
Level of education	4-year undergraduate (university level)	202	76.8
	3-year undergraduate (college level)	61	23.2
Ethnicity	Kinh	214	81.4
	Khmer minority	42	16.0
	Chinese minority	7	2.7
Residential area	Urban	112	42.6
	Rural	151	57.4

Scale Reliability and Convergent Validity Analysis

Initially, we used Cronbach's Alpha test to verify the reliability of scales of factors in the research model. In this step, factors that had a reliability coefficient of 0.7 were accepted as suggested by Hair et al. cited by Wang (2011). Additionally, only observed variables with a Corrected Item-Total Correlation of equal or greater than 0.3 were retained in the model (Trong & Ngoc, 2008). With these criteria, the scales of all factors were reliable as shown in Table 2 below.

The data processing procedure continued with the Exploratory factor analysis to determine the effects of anxiety, adaptive cognition, and adaptive behavior on the

engagement of college and university students. In this step, we evaluated the convergent validity of the concepts in the research model based on the KMO value, the Total Variance Explained (TVE), and the Factor Loading. In particular, concepts are acceptable if they satisfy the following conditions: the KMO value ≥ 0.6 and the TVE $\geq 50\%$ (Hair et al., 2007; Trong & Ngoc, 2008; Wang et al., 2011). Variables with the Factor Loading smaller than 0.5 will be dropped.

According to the analysis, all KMO values were above 0.6, indicating that the factor analysis was in line with the actual data. Additionally, Bartlett's Test value of 0.000 confirmed that the measurement variables were correlated within groups of factors.

Table 2
Scale reliability and convergent validity analysis

Concepts	Items	Factor loading	Cronbach's Alpha
Anxiety (Anx)	When I take a test I think about how poorly I am doing (AN2)	0.842	0.848
	I am so nervous during a test that I cannot remember facts I have learned (AN1)	0.812	
	I have an uneasy, upset feeling after I take a test (AN4)	0.803	
	I worry a great deal about tests (AN3)	0.648	
Adaptive Cognition (AdC)	I think that what I am learning in class is useful for me to know (VA2)	0.848	0.825
	I think that what we are learning in this class is interesting (VA4)	0.787	
	I think I will be able to use what I learn in this class in my future job (VA3)	0.764	
	Having a college and/or university degree is important for me (VA1)	0.582	
Adaptive Behavior (AdB)	When I do homework, I try to remember what the teacher said in class so I can answer the questions correctly (TM2)	0.730	0.853
	Even when study materials are dull and uninteresting, I keep working until I finish (PL3)	0.712	
	I outline the chapters in the book to help me study (TM3)	0.702	
	Before I begin studying I think about the things I will need to do to learn (PL2)	0.688	
	When I'm reading I stop once in a while and go over what I have read (TM4)	0.675	
	Prior to carrying out an assignment, I plan how to do it (PL1)	0.665	
	I usually study in places where I can concentrate (TM1)	0.582	
Student Engagement (StE)	I feel happy when I am studying intensively (Ab3)	0.889	0.897
	I can get carried away by my studies (Ab4)	0.806	
	When I am studying, I forget everything else around me (Ab2)	0.745	
	When studying I feel strong and vigorous (Vi3)	0.735	
	When I get up in the morning, I feel like going to class (Vi2)	0.693	
	When I study, I feel like I am bursting with energy (Vi1)	0.674	
	I can continue for a long time when I am studying (Vi4)	0.665	
Time flies when I'm studying (Ab1)	0.614		

Confirmatory Factor Analysis

The Confirmatory Factor Analysis (CFA) was used to verify the existence of observed variables and relationships of factors. The appropriateness of the model was evaluated using four fit indices which were suggested by (Bentler & Bonett, 1980; Hair et al., 2007; Joseph F & Robert P, 2003). These indices include χ^2 to its degrees of freedom

(χ^2/df), CFI, TLI, and RMSEA. According to the cited studies, the required values for these indices are $\chi^2/df \leq 3$, CFI and TLI ≥ 0.90 , and RMSEA = $0.077 \leq 0.08$.

The CFA results confirmed that the research model was appropriate to the real data as all the fit indices were satisfactory, including $\chi^2/df = 2.156 \leq 3$, the values of CFI = 0.916 and TLI = $0.905 \geq 0.90$, and RMSEA = $0.077 \leq 0.08$. The results also revealed that the correlation coefficients between the factors were weak and did not exceed 0.80; whereas, the standardized coefficients of the scales were relatively strong and statistically significant at the 5% level, with values greater than 0.50. These indicated that the unidimensionality and convergence of variables were ensured.

Determinants of Student Engagement

We continued the analytical process with SEM to test and quantify the relationships between factors and student engagement. Figure 2 shows the structural relationships of factors, while Table 3 details the estimated value of the relationships of the theoretical model. The values of the employed model fit indices were acceptable as they exceeded the cutoff values (Brown T., 2015; Hu & Bentler, 2009; Steiger, 2007). Specifically, the value of χ^2/df (= 2.173) was smaller than 3, the values of CFI = 0.914 and TLI = $0.904 \geq 0.90$, and RMSEA = $0.067 \leq 0.08$. These results indicated the consistency of the hypothesized model with the real data.

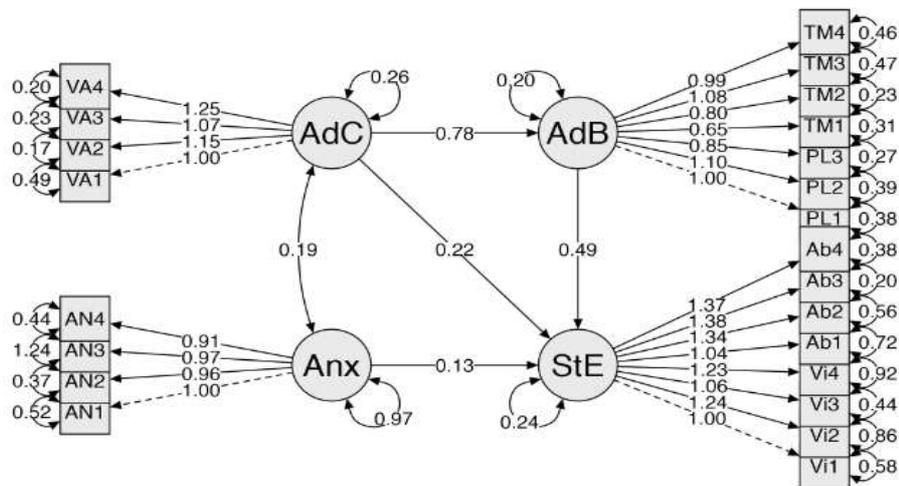


Figure 2
The structural relationship of factors

As shown in Figure 2, the factors anxiety ($\beta = 0.132$, $p < 0.001$; *medium effect*), adaptive cognition ($\beta = 0.224$, $p < 0.052$; *large effect*), and adaptive behavior ($\beta = 0.489$, $p < 0.001$; *large effect*) had positive and significant relationships with student engagement. Moreover, adaptive cognition was found positive and significant on adaptive behavior ($\beta = 0.783$, $p < 0.001$; *large effect*).

Table 3
The estimated value of the relationships of the theoretical model

Relationship of concepts			Coefficients	S. E.	p-value
AdC	→	AdB	0.783	0.110	0.001***
Anx	→	StE	0.132	0.042	0.001***
AdC	→	StE	0.224	0.115	0.052*
AdB	→	StE	0.489	0.103	0.001***

*, ***, respectively significant levels at α of 10% and 1%.

Independent simple T-tests were conducted to investigate the differences in the level of engagement between groups of female and male students, and between students at college and university levels. The test results in Table 4 revealed that there was a significant difference between college-level students ($M=27.2$; $SD=6.1$) and university students ($M=29.8$; $SD=6.9$); $t(261)$; $p<0.01$. The finding indicated that students who registered in 4-year training programs had higher levels of adaptability to the changes in their academic environment than their counterpart, which were, in this study, vocational training students. Similarly, females ($M=30.0$; $SD=7.0$) compared to males ($M=28.3$; $SD=6.4$) demonstrated a significantly higher level of engagement in their studies despite changes caused by COVID-19, $t(261)$; $p<0.05$.

Table 4
Differences in student engagement between groups

Group	N	Mean	SD	T-test		95% CI	
				df	p	Lower	Upper
College level	61	27.2	6.1	261	0.009	-4.5	-0.6
University level	202	29.8	6.9				
Female	133	30.0	7.0	261	0.048	0.0	3.2
Male	130	28.3	6.4				

DISCUSSION

The first objective of this study was to investigate the links between psychological factors: adaptive cognition and adaptive behavior and the engagement of college and university students during and after periods of uncertainties caused by the COVID-19 pandemic. Despite not being explicitly spelled out, we expected the positive and significant influence of these two factors on student engagement. And the analysis turned out that these assumptions hold true. This exploration indicated that enhancing adaptive cognition and behavior can help ensure that students are prepared for academic success. With improved adaptive knowledge and behavior, students can learn to manage their time effectively, navigate social situations, and handle stress and other challenges to achieve their desired learning outcomes. These results were in conformity with the research literature. For example, the study of Palermo & Rancourt (2022) confirmed that adaptive behaviors became more influential in the engagement of college students during COVID-19. The positive and significant relations between adaptive cognition and behavior were observed and found in other studies such as Martin et al. (2023), Singh et al. (2022), Alonso et al., 2022, and Suharno et al. (2023).

The SME analysis showed that adaptive cognition had a strongly influential relationship with adaptive behavior. This means once the student perceives that the knowledge and skills provided by their study program are relevant, important, and useful for their future career, they are more likely to find ways to adapt to the changes caused by the pandemic. We also wanted to understand whether or not anxiety, or a so-called negative driver of motivation, was an influential factor in student engagement. As shown, anxiety predicted student engagement in our theoretical model, and the relationship was positive. In other words, once students worried about tests and their performance during the tests, they were more likely to stay focused on their studies. For these students, such pressure was not perceived as a negative driver, but as a catalyst for improving their task performance. This finding was in line with the study of von Keyserlingk et al. (2022) who argued that students showed a higher level of engagement once they considered their learning tasks more challenging than they expected. However, the opposite was true in the research work of Singh et al. (2022) who found a negative link between anxiety and student engagement. The publication of W. B. Schaufeli et al. (2002) also argued that the feeling of getting exhausted due to heavy study workload and student engagement was negatively correlated.

CONCLUSION

This study was carried out to investigate the links between psychology-related factors and the engagement of college and university students during and after periods of uncertainties caused by the COVID-19 pandemic. The results suggested that how college and university students engaged in their academic activities was positively and significantly influenced by their adaptive cognition and behavior. In other words, these two psychological factors were drivers for undergraduate students' engagement in their studies. Pressure caused by examination was also a positive driver of student engagement.

The significant and influential relationships of psychological factors on engagement revealed a novel implication critical to proposing strategies and measures to support college and university students. In particular, to promote student engagement in the context of post-COVID, management bodies and leaders in higher education institutions should adopt a comprehensive approach in which the provision of psychological conditions is an integral part, alongside other fundamental support activities. Furthermore, the findings in this study demonstrated that Covington's need achievement theory, Ames's goal orientation theory, and Martin's self-determination theory provided more insightful implications beyond the workplace as they have been widely used.

The scope of this study was limited to students registered in only two higher education institutions in Tra Vinh province, Viet Nam. This sampling gap might affect the generalizability of the results. Therefore, further research with a sample size of a diverse group of learners from more advanced economical cities and regions is recommended. As another limitation, the current study did not take on all dimensions of adaptive cognition and behavior. This shortcoming may result in the theoretical model being less comprehensive, and the factors failing to entirely predict the concept of student engagement. To fulfill this gap, future research works should place a stronger

focus on the influence of psychological conditions on college and university students' learning outcomes.

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