

Factors Contributing to High School Students' Academic-Cognitive Engagement: Studying in Northwest Province, Cambodia

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Abstract

This study examined different factors influencing high school students' learning in Battambang, Cambodia. The respondents were 290 students (118 males and 172 females). Data was collected from various factors relating to the student's Academic-cognitive engagement impacted by Psychological engagement, Self-efficacy, and Teacher-student involvement. The data has been analyzed at four levels: (a) Excel for entering data (b) SPSS to rescue and remove the data and to check scales' reliabilities, using the Cronbach Alpha Coefficient; (c) *Mplus* for analyzing correlations between the variables, and structural equations model to predict Academic-cognitive engagement. The most influential factor was Psychological engagement (.723), impacting the predictor of Academic-cognitive engagement. Our findings suggested parents and educators should also construct self-efficacy, optimism, hope, and resilience to improve students' motivation support and enhance their engagement. This study is an impactful contribution to understanding the academic challenges in Cambodia, offering evidence-based strategies to improve student outcomes. Its alignment with national educational goals adds strategic relevance, making it a valuable resource for policymakers and educators.

Keywords: *Teacher-student involvement, Academic-cognitive engagement, Self-efficacy, and Psychological engagement.*

Suggested citation: Yan, P., Chea, R., & Sopheaktra, C. (2024). Factors Contributing to High School Students' Academic-Cognitive Engagement: Studying in Northwest Province, Cambodia. *European Journal of Arts, Humanities and Social Sciences*, 1(6), 180-192. DOI: 10.59324/ejahss.2024.1(6).19

Introduction

Cambodia's contemporary general education system comprises three fundamental levels: primary, lower secondary, and upper secondary school. It plays a vital role in the development of human capital. It is linked with an individual's well-being and opportunities for better living (Robinson, Allen, & Lewis, 2014). It ensures the acquisition of knowledge and skills that enable individuals to increase their productivity and quality of life.

The government of Cambodia provides subsidies for free general education for people from kindergarten to higher education in Cambodia (Kim, & Rouse, 2011). According to the Cambodian Education Law and a New Pentagonal Strategy related to the first part is human capital development, which focuses on education, technical skills, health, social protection, the food system, and equity based on the spirit of



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leaving no Cambodian citizen behind, all Cambodian children are eligible to receive general education at public schools for free and human capital quality (Manet, 2023).

The Government shaped the educational field which will lead 2030 to achieve its ambitious goal of reaching upper middle-income status, and a high-income status by 2050, boosting economic growth, so the government has set up a strategic plan that chose the priority is education quality from the grassroots k1-k12 and higher education (Heng, & Doeur, 2024), and include the Ministry of Labor and Vocational Training (MoLVT) focussing on the technical and vocational educational system. The Action Plan for Teacher Policy for 2024-2030 launching in December 2023, continues to improve teacher professionalism, and knowledge providers by reforming teacher training with new technologies, libraries, modern facilities, leadership, and management skills (Meas, No, & Sok, 2023).

The above policy increased productivity also leads to new sources of earning which enhances the economic growth of a country (Sahlberg, 2006). The quality of students' performance remains a top priority for educators. It is meant to make a difference locally, regionally, nationally, and globally. Educators, trainers, and researchers have long been interested in exploring variables contributing effectively to the quality of performance of learners.

Cambodia has tried to reform the education system since 1979 Cambodian education has been progressing well from limited human resources to present rapid expansion of education (Ayres, 2000), but still struggled to be successful in going through the Education for All goals, despite reformed by Ministry of Education, Youth and Sport (MoEYS, 2015). The condition of the educational system has not been satisfactory. Quality is its biggest obstacle. A lot of evidence points to the general lack of information and skills that Cambodian schools are failing to provide their students to make them competitive in both regional and global settings which were according to the findings of credible national and international assessments, Cambodian students continuously fall short of academic expectations (Tao, & Kao, 2023). However, the satisfaction of educational needs has not been in the goals of educational development because some attributions are related to high school students dropping out still high. According to the statistics the dropout rate in 2015 was high for the upper secondary school at 20.20 % (MoEYS, 2017), and in 2016 the dropout rate still kept the same percentage (20.20%) (MoEYS, 2016). However, in 2017 the dropout rate decreased to 19.30% (MoEYS, 2018), and most interestingly, in 2018 still decreased to 17.40% which was an urgent issue for the Ministry of Education Youth and Sport (MoEYS, 2018) to find out the most effective strategic plan.

The reasons have been leading the students to make decision to drop out deriving from inside and outside school and also impacting the students' quality of academic achievement and student factors, family factors, school factors, and peer factors too (Yan, & Chea, 2024). Furthermore, theory of Educational Productivity (Walberg, 1982) determined three groups of nine factors based on affective, cognitive, and behavioral skills for optimization of learning that affected the quality of academic performance: Aptitude (ability, development, and motivation); instruction (amount and quality); environments such as home, classroom, peers, and television (Roberts, et al., 2007).

And also, there is a range of factors that affect the quality of students' performance (Fonner, Bierlein-Palmer, & Reeves, 2012). A series of variables are to be considered when identifying the factors affecting academic success quality. Identifying the most contributing variables to the quality of academic performance is very complex and challenging.

Besides other factors, socioeconomic status is one of the most researched and debated factors among educational professionals that contribute to students' academic performance. The most prevalent argument is that the socioeconomic status of learners affects the quality of their academic performance. Most experts argue that low socioeconomic status harms the academic performance of students because the basic needs of students remain unfulfilled, and hence they do not perform better academically (Adams, et al., 2003). The low socioeconomic status causes environmental deficiencies which results in low self-esteem in students (Berliner, 2009). More specifically, this study aims to identify and analyze factors that affect the quality of students' academic performance.



Student-Teacher Involvement

Involvement refers to the quality of relationships between teachers and their students and between students and their peers (Skinner, & Belmont, 1993). Teachers can have strong relationships with their students by taking time for them, displaying affection to them, and distributing resources to them (Skinner, & Belmont, 1993b). Other emotionally-supportive relationships in the classroom include teachers' expressions of care, concern, and respect for students; their desire to acknowledge students' opinions and emotions; and their dependability (Amerstorfer, & Freiin von Münster-Kistner, 2021). When teachers engage in these instructional behaviors, they are more likely to satisfy students' relatedness needs and enhance their self-determined motivation (Tessier, Sarrazin, & Ntoumanis, 2010). In contrast, when teachers are neglectful of these teaching styles or hostile towards students, students appear to feel that they are unlovable and that the learning environment is untrustworthy (Skinner, & Edge, 2002).

In this sense, what involvement sharply contrasts with is hostility (Dodge, et al., 2015). With regard to peer relationships, Ryan and Patrick (2002) suggest that peers are uniquely influential in building the social context and learning environment in the classroom. Students can establish strong relationships through interacting with each other in a positive, supportive, and respectful way. When students have positive interaction with their teachers and classmates, they may experience the feeling of being connected to a community of learners, and so their relatedness need is supported (Skinner, & Belmont, 1993). In this respect, their relatedness satisfaction is gained when they feel that they are accepted or welcomed, and it is frustrating when they feel that they are rejected or ignored. However, peer interaction may contribute to a decrease in students' task efficiency and learning engagement when it is not involved with purposeful and knowledge-constructive collaboration (Moon, & Ke, 2020). Thus, in addition to peer relationships, collaborative or cooperative learning should be taken into account to reflect effective peer involvement (Kimber, & Leung, 2006). Of course, teachers can promote meaningful cooperation among students by providing a cooperative learning context in which students can engage in small group learning activities such as group discussion, peer teaching, peer feedback, and peer assistance with needed materials and information (Gillies, 2007; Johnson, & Johnson, 2020; Kuh, 2009; Bizimana, Mutangana, & Mwesigye, 2022). In the present study, only support for cooperative learning was selected to reflect how teacher educators promoted effective involvement among pre-service teachers.

Effective communication with teachers and other students is critical to academic and social success at school. Communicative exchanges are based on the ability to express one's thoughts. Difficulty with social-communicative interactions may stem partially from low self-efficacy beliefs. Fortunately, intervention research involving parents, caregivers, and teachers indicates that adults can have a strong influence on improving language skills and social interaction (Constantine, et al., 2019). An early childhood education study demonstrated that adults increased social engagement by using utterances to support peer communication and inviting children to interact together (Luigi, Elaine, & Janice, 2005). Teachers need to recognize communication challenges and provide responsive strategies to help their students succeed academically and socially.

Academic and Cognitive Engagement

Cognitive engagement is defined as the extent to which students are willing and able to take on the learning task at hand. This includes the amount of effort students are willing to invest in working on the task (Howard-Rose, & Winne, 1993), and how long they persist with new learning related to a prior experience (Richardson, & Newby, 2006). And as a major part of overall learning engagement, learners to immerse themselves in in-depth reflective learning processes that are situated in realistic problem-solving tasks. For academic engagement has been increasingly studied, debated, and theorized in the higher education context depending on four research perspectives (Kahu, 2013): (1) the behavioral perspective, which highlights student behaviors and institutional practices as aspects of engagement; (2) the psychological perspective, which stresses four aspects of engagement i.e., emotion, behavior, cognition, and conation; (3) the socio-cultural perspective, which underlines socio-cultural contexts where students are schooled and socialized; and (4) the holistic perspective, which combines the previously-mentioned perspectives together to reflect stronger views of engagement. However, three



dimensions of academic engagement that have appeared in most studies are affective, behavioral, as well as cognitive engagement. Affective engagement is concerned with students' interests in learning and sense of school settings (Lam, et al., 2014).

To date, research on the effect of academic engagement on student learning has revealed favorable results. Students appear to have greater academic achievement when they are affectively, behaviorally, and cognitively engaged in learning (Heng, 2014). Moreover, students' deep learning approaches are significantly associated with their academic performance (Piumatti, et al., 2021), self-perceived academic improvement (Wang & Zhang, 2019), as well as need for cognition (Wang, et al., 2015). In the teacher education setting, although limited in number, recent research has established that pre-service teachers' deep learning approaches have significant and positive influences on their extensive knowledge integration strategies (Lee, & Turner, 2017).

Self-Efficacy

Self-efficacy is an individual's belief in their ability to perform specific behaviors, expressing confidence in their motivation, behavior, and social environment, and achieving specific goals or outcomes (Bandura, 1986). Albert Bandura's self-efficacy theory suggests that learners achieve what they believe they can, which is linked to strong student achievement. Self-efficacy is influenced by mastery experiences, vicarious experiences, and positive social persuasions. It is partially determined by individual psychological underpinning but can be diminished by negative mastery experiences (Usher, & Pajares, 2008).

Vicarious experiences impact students of all ages. Self-efficacy, originating from Bandura's theories, is crucial in educational settings. It is often more meaningful in learning contexts than performance, as highlighted by Artino, (2006). Bandura said self-efficacy is believed to motivate individuals to choose challenging activities, exert effort to succeed, and persist longer on difficult tasks, leading to better learning and achievement. However, in educational settings, self-efficacy may be influenced by situational factors, such as teacher directives, rewards, or avoiding appearing incompetent. The study suggests a relationship between self-efficacy and choice, with higher self-efficacy leading to more challenging activities. It also highlights the need for clarification on the relationship between self-efficacy, effort, and persistence, as students initially lack skills. Self-efficacy is significantly influenced by social persuasions, particularly positive feedback from high-regarded individuals. A positive learning environment and collaborative support significantly shape self-efficacy and achievement (Afari, & Eksail, 2022).

Psychological Engagement

Psychological engagement is operationally defined as an individual's active and intrinsic involvement in a specific task, activity, or environment, encompassing cognitive, emotional, and behavioral dimensions. Cognitive engagement reflects the mental effort and persistence individuals invest in learning, such as asking questions, clarifying concepts, persisting with difficult tasks, and going beyond assigned requirements (Finn, & Zimmer, 2012). The second being as a self-regulated learning process which includes the use of cognitive (e.g. connecting new ideas to existing knowledge) and metacognitive strategies (e.g. setting goals, planning, monitoring progress) (Blumenfeld, Kempler, & Krajcik, 2006). The application of these strategies facilitates understanding and retention of learning materials, thereby leading to higher levels of performance (Greene, 2015).

Emotional Engagement

Emotional engagement denotes the affective bond individuals form, marked by positive feelings such as interest and enthusiasm or the absence of negative emotions like boredom, anxiety, and sadness. It is assessed through surveys or physiological measures. Researchers have referred to emotional engagement using terms like motivational engagement (Linnenbrink, & Pintrich, 2003), psychological engagement (Finn, 1993), and affective engagement (Archambault, et al., 2009). Despite these variations in terminology, they all describe the same essential aspects of emotional engagement, which involve students' emotional responses—both positive and negative—toward teachers, peers, academic tasks, and the school environment (Fredricks, Blumenfeld, & Paris, 2004). Moreover, emotionally engaged students



tend to feel a sense of belonging and identification with their school, place value on academic success, and perceive support from both peers and teachers (Fredricks, Blumenfeld, & Paris, 2004).

Behavioral engagement refers to the observable actions and efforts demonstrated by individuals, such as participating in tasks, interacting frequently, and dedicating time to activities. This engagement is commonly measured through direct observation or activity logs, capturing the extent of psychological involvement beyond mere surface-level participation. Fredricks, Blumenfeld, & Paris, (2004) identified three key dimensions of behavioral engagement Skinner, & Belmont, (1993), which Dockery, (2012) highlighted as critical in mitigating the risk of dropping out.

The first dimension involves positive conduct, characterized by adherence to classroom norms, compliance with rules, and avoidance of disruptive behaviors, such as causing trouble or skipping school (Finn, & Rock, 1997; Fredricks, Blumenfeld, & Paris, 2004). The second dimension emphasizes participation in academic tasks, including contributing to discussions, asking questions, staying attentive, maintaining focus, demonstrating persistence, and putting in effort (Skinner, & Belmont, 1993). The third dimension, outlined by Skinner, & Belmont, (1993) and Finn, (1993), encompasses involvement in school-related activities, such as participating in school governance and sports (Finn, Pannozzo, & Voelkl, 1995). Thus, behavioral engagement is a directly observable facet of overall engagement. Key indicators include attendance, preparation for school, participation in both curricular and extracurricular activities, truancy, and discipline referrals (Appleton, Christenson, & Furlong, 2008).

Significance of the Study

This study holds several significant implications. First, it aims to identify the fundamental factors of student learning at the school under study. Second, the findings of this research will provide effective solutions to address the factors that concern the school. Third, this paper will serve as a crucial advisory resource for school administrators at the Department of Education, Youth, and Sport in Battambang province. Lastly, this research project will act as a practical reflection and a valuable case study for other schools across Cambodia.

Research Question

While there are three questions related to the study, this survey primarily addresses the following:

- What are the most important factors influencing students' academic-cognitive performance at four high schools in Battambang province?
- What are the relationships between factor and factor?
- What strategic measures can be implemented to improve the student's academic performance?

Research Objectives

This study, conducted in four high schools in Battambang province, primarily aims to identify the most influential factors contributing to the student's academic-cognitive engagement. The information gathered will be utilized to formulate programs for children who have performed their academics. More specifically, the study intends to accomplish the following objectives:

- To examine the factors that influence the students' academic-cognitive engagement at high schools
- To examine the correlation relationship between factor and factor.
- To propose measures or strategies to improve the student's academic-cognitive engagement at high school

The study seeks answers to these and other similar questions to ascertain the status of children in four high schools in Battambang province.



Scope and Limitations of the Study

The research aims to examine the issue of the student's academic-cognitive engagement in Cambodia, with a particular focus on the impacts of their learning experiences. It also seeks to explore the enhancement of service quality, emphasizing the resolution of human resource issues such as improving student learning performance, addressing the needs of high school students, enhancing student motivation, and other related matters.

The study will primarily focus on high schools in the urban area of 4 high schools in Battambang province, serving as key case studies for the entire country of Cambodia. This inclusion is the significant progress made in expanding the high school student population's coverage and developing a more tailored pathway for the Ministry of Education, Youth, and Sport to reduce student dropouts.

Method and Procedure

This descriptive study was conducted using a survey method. The population was high school male and female students from Battambang City Cambodia. The students of the 11th grade were selected randomly from 4 high schools which were public high conveniently. Thus, the sample size for the study was 290 students (118 males and 172 females). The study was delimited to only demographic factors such as students' gender, the scores of the reliability test, and Cronbach 0.826 of each factor. Data regarding the variables were collected by using a questionnaire.

Research Instrument

A questionnaire, consisting of four sections with 24 items in total. The first section was the factor of Teacher-student involvement (TSt, 6 items). The second section was Psychological engagement (PsEng, 6 items). The third section was Academic-cognitive engagement (AcCog, 6 items). The final section was Self-efficacy (SelEs, 6 items). The questionnaires were asked to respond to each item by a rating scale with numeric values of 1= strongly disagree, 2=disagree, 3=usual, 4=agree, and 5=strongly agree, respectively. The first drafts of the questionnaire were given to thirty high school students to examine the suitability of wording and question items to establish the expert validity of the instrument. Based on their comments, some items were revised to make them appropriate to the context and subjects in the study. Being completed by thirty high school students for a pilot test, and then it was conducted to collect the data from 290 samples. Then some unnecessary items were removed such as four items of Teacher-Student Involvement (items 1, 2, 3, and 4). Three items of Psychological engagement (items 1, 2, and 3), three items of Academic-cognitive engagement (items 4, 5, and 6), and three items of Self-efficacy (items 1, 2, and 3). The data was analyzed to examine its reliability and the overall value of Cronbach's alpha (α) was .852. Accounting for an effective retrieval rate of 82.5% was considered reasonable (Carmines, & Zeller, 1979).

Findings

Data Analysis

The data has been analyzed at four levels: (a) Excel for entering data (b) SPSS to fix the data and to check scales' reliabilities, using the Cronbach alpha coefficient; (c) Zero-order correlations between the variables, and structural equations to predict Academic cognitive engagement of high school students.

Confirmatory Factor Analysis (CFA) and structural models were estimated by maximum likelihood with robust Satorra-Bentler corrections for standard errors and fit indices (Finney & DiStefano, 2006). The analysis used data from categorizing variables into four latent constructs: PsEng, AcCog, SelEs, and TSt. Fit statistics indicate a well-fitting model, with an Akaike Information Criterion (AIC) of 5048.832, Bayesian Information Criterion (BIC) of 5191.958, and Root Mean Square Error of Approximation (RMSEA) of 0.084, suggesting an acceptable fit. Additional indices, including the Comparative Fit Index (CFI) at 0.938 and the Tucker-Lewis Index (TLI) at 0.910, also support the model's adequacy. Parameter



estimates highlight significant loadings for each indicator on its latent construct at 0.749, and relationships between latent variables—such as AcCog’s dependence on PsEng and SelEs—are strong and statistically significant.

Descriptive Statistic

The results of descriptive statistics of the main factors are given in Table 1 below. It was found that Academic-cognitive engagement (AcCog) with a mean of 3.683, Std. .607, and Teacher-student involvement (TSt) with a mean of 3.739, Std. .716, and Psychological engagement (PsEng) with a mean of 4.005, Std.689, but there was one more factor, the mean is 4.026, which is the highest. This result shows that Self-efficacy (SelEs) holds strong beliefs about the relevance of students’ learning outcomes.

Table 1. Descriptive Statistics of the Main Variables

n=290	Mean	Std. Deviation
Teacher-student involvement (TSt)	3.739	.716
Psychological engagement (PsEng)	4.005	.689
Academic-cognitive engagement (AcCog)	3.683	.607
Self-efficacy (SelEs)	4.026	.662

Correlation Analysis

The results of the Pearson correlation analysis are shown in Table 2 below. As can be seen, Psychological engagement (PsEng) has a low degree of correlation with Self-efficacy (SelEs)-($r=.064$) which is a positively weak, correlation with Teacher-student involvement (TSt). ($r=.110$) which is very positively weak too, including a correlation between Self-efficacy (SelEs) with Student-teacher involvement (ST) ($r=.102$).

Table 2. Correlation of the Main Variables

n=290	PsEng	SelEs	TSt
Teacher-student involvement (TSt)	.110	.102	
Psychological engagement (PsEng)		.064	.110
Self-efficacy (SelEs)	.064		.102

Regression Analysis

As shown in the figure below the independent of Student-teacher involvement regression is .128, and Self-efficacy is .146, which is higher than Student-teacher involvement, but the regression of Psychological engagement. is .723, which is the highest one impacting the predictor of Academic-cognitive Engagement, causing high school students to drop out.

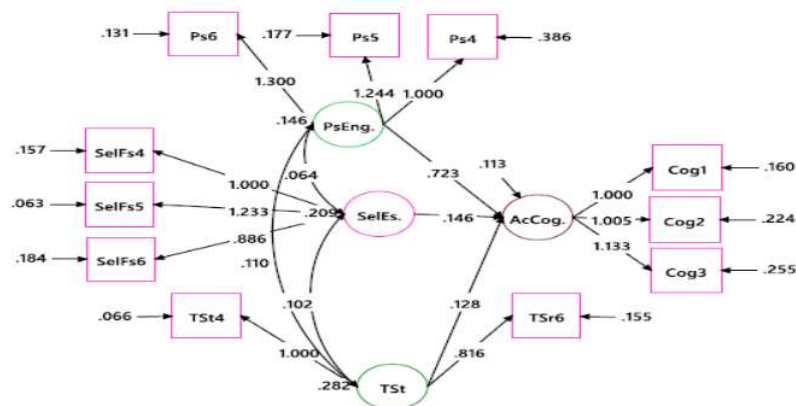


Figure 1. Regression Analysis



Discussion

This study investigates the relationship between high school students' learning which has different factors such as Student-teacher involvement, Psychological-academic engagement (3) Academic-cognitive Engagement, and (4) Self-efficacy to reveal the prediction of the potential influence of these four factors. It aims to discern which factors (Student-teacher involvement, (2) Psychological engagement, Self-efficacy) exert the most pronounced impact on students' academic-cognitive engagement. This study revealed the following findings:

First, the Self-efficacy factor is the second influence on Academic-cognitive engagement because it has a factor loading of 0.146, a fundamental aspect of Bandura's theory of academic achievement, significantly contributing to students' educational and cognitive engagement by fostering their belief in their ability to succeed. This enhanced self-confidence encourages active involvement in learning, the application of effective strategies, and maintaining motivation, even in the face of adversity. Educators can support the development of self-efficacy by clearly outlining expectations and learning objectives, ensuring that students comprehend what is required of them. When students are aware of these expectations, they are more likely to feel confident in their ability to meet them. Additionally, assisting students in setting realistic, achievable goals and breaking down complex tasks into smaller, more manageable components can further bolster their confidence and self-efficacy (Morisano, 2013). Also, it enhances goal setting, effort, and persistence, which are critical factors in cognitive engagement. Students with higher levels of self-efficacy are more likely to establish ambitious academic goals, thereby strengthening their engagement and self-regulation. Such students tend to invest greater mental effort in challenging tasks, employ more effective learning strategies, and persistently overcome obstacles (Honicke, Broadbent, & Fuller-Tyszkiewicz, 2023). Self-efficacy not only directly affects academic success but also indirectly influences it through cognitive engagement. Students with higher self-efficacy are more likely to actively engage with learning materials, which enhances their ability to understand and apply knowledge effectively. This engagement functions as a mediator, amplifying the positive impact of self-efficacy on academic performance (Meng, & Zhang, 2023).

Second, the teacher-student relationship is the third influence on Academic-cognitive engagement because it has a factor loading of 0.128 with the perceived social support and academic pressure being the principal mediators in the influence of the Teacher-student relationship on academic engagement (Liu, 2024). The dynamics of Teacher-student relationships, along with students' perceptions of their instructors, are critical determinants of academic engagement which is a part of the teaching strategy called Problem-based learning (PBL), a pedagogical approach particularly effective in higher education, immerses students in authentic problem-solving tasks, fostering the development of self-regulation and collaborative competencies. The learner-centered strategy is the emphasis on cultivating robust interpersonal relationships (Amerstorfer, 2020), so a substantial body of research indicates that a positive teacher-student relationship can cultivate teachers' favorable expectations (Liu, 2024). Grounded in social control theory and a social developmental-contextual framework, it is posited that by acknowledging students' viewpoints and decision-making capacities, educators can foster respectful school climates that support the establishment of healthy behavioral norms (LaRusso, Romer, & Selman, 2008). The roles of support were the most important factors in the children's lives (Kerres Malecki, & Kilpatrick Demary, 2002).

Third, Psychological engagement is the most influential factor in Academic-cognitive Engagement because it has a factor loading of 0.723 with psychological capital originating from positive psychology. Psychological capital refers to a person's positive psychological state of development as follows: (1) self-efficacy refers to the confidence to take on and put in the required effort to succeed when facing challenging tasks; (2) optimism refers to making a positive attribution about success not only now but also in the future; (3) hope refers to persevering toward objectives and, when required, redirecting paths to goals to succeed, and (4) resilience refers to sustaining and bouncing back and even beyond to attain success when beset by problems and adversity (Luthans, et al., 2007). Studies have suggested there was a positive relationship between psychological capital and academic performance (You, 2016). It affects



academic performance (Slåtten, et al., 2023), and also School psychological capital was associated with optimal academic outcomes (King, & Caleon, 2021).

Conclusion and Recommendations

In conclusion, this study underscores the significant role of various factors in fostering academic-cognitive engagement, with each contributing to students' success in distinct yet interconnected ways. Self-efficacy, as the second influential factor, enhances students' belief in their ability to succeed, motivating them to engage actively in learning, persevere through challenges, and employ effective strategies. Educators play a key role in nurturing this self-belief by clearly outlining expectations and facilitating achievable goal-setting, promoting greater academic engagement and cognitive development. The teacher-student relationship, the third influential factor, highlights the importance of positive interpersonal dynamics and social support in shaping academic engagement. A positive relationship between teachers and students fosters trust, academic motivation, and engagement, especially when coupled with pedagogical approaches like Problem-based learning (PBL) that promote active learning and self-regulation. Lastly, psychological engagement, with its deep roots in psychological capital, proves to be the most influential factor. Psychological capital—comprising self-efficacy, optimism, hope, and resilience—enhances students' emotional and cognitive resilience, leading to higher levels of engagement and better academic performance. The interrelationship between these factors illustrates how academic engagement is a multifaceted phenomenon, shaped by individual beliefs, social interactions, and psychological resilience, all of which contribute to students' overall academic success.

Based on the previous conclusions, the following recommendations are proposed: First, it is essential to prioritize the enhancement of students' self-esteem and academic self-efficacy. To achieve this, parents, teachers, caregivers, and the broader community should actively encourage students to develop a positive self-assessment, supporting them in constructing reasonable attributions for success and failure, particularly in the face of setbacks. Second, a collaborative effort is necessary to foster a supportive and constructive learning environment. In this context, it is important to ensure that students feel adequately reinforced and encouraged while cultivating a sense of familiarity and security. Educational settings should be designed to promote trust and solidarity, allowing students to experience the encouragement of their peers and reinforcing their sense of belonging to a supportive group. Third, attention must be paid to the academic engagement of students, particularly those exhibiting signs of disengagement, weariness, or potential malingering. It is crucial to remain vigilant in recognizing these indicators and to provide guidance and support accordingly. Furthermore, the design of teaching methods should be innovative and engaging, tailored to meet the diverse needs of students, ensuring that the learning experience remains relevant and stimulating.

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Appendix

Table S1. Inventory List of Questionnaires

No.	Statements	Codes
1	Academic-cognitive engagement	AcCog
2	Ministry of Education, Youth and Sport	MoEYS
3	Ministry of Labor and Vocational Training	MoLVT
4	Psychological engagement	PsEng
5	Self-efficacy	SelfEs
6	Statistical Package for the Social Sciences	SPSS

