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Self-efficacy, Anxiety, Positive Affect, and Students' Expected Grades in the Context of the Bachelor Exam

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Abstract: *Identifying variables that impact students' grades is a constant concern but also a challenge for teachers in the field of educational sciences. The study investigates the association between self-efficacy, positive affect, anxiety, and students' expected grades before the final exam of bachelor university studies. The study is based on Pekrun's (2006) control-value theory, and it aims to investigate the relationship between self-efficacy, anxiety, positive affect, and students' expected grades. Specifically, the study seeks to understand how anxiety mediates the relationship between self-efficacy and expected grades and how positive affect mediates the positive relationship between self-efficacy and anxiety levels. The study was conducted on 170 students from Primary and Preschool Education Pedagogy and Orthodox Pastoral Theology studying at a state university in Romania. The students completed the assessment tools that assess the research variables: general self-efficacy, positive affect, anxiety - as a self-regulated learning strategy - and the student's expected grade in the bachelor exam. The results of the structural equation modeling indicate that the level of self-efficacy has an impact on student anxiety levels. This anxiety, in turn, negatively influences the expected grades that students predict before taking the assessment tests required to complete their bachelor's studies. Therefore, anxiety acts as a mediator between self-efficacy and expected grades. Additionally, the results show that the relationship between self-efficacy and anxiety is mediated by positive affect. These findings emphasize the importance of effective teaching and learning methods that promote academic success.*

Keywords: *self-efficacy, positive affect, anxiety, expected academic performance.*

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Literature review

We may begin the present study with a question that we would all answer with some reluctance or, in our way, what is emotion? Emotions represent a subjective situation, and certain physiological states accompany it. These states are present in certain conditions and situations where the individual finds himself. Some authors define emotion as events or situations that have a specific result following some activities (Pekrun, 2006). Regarding education sciences, emotion can be classified into several dimensions (Pekrun et al., 2002): positive emotion, expressed through pride, hope, and pleasure; negative emotion, expressed through anxiety, anger, and boredom. Emotions are observable in school and classroom, especially during study, assessment, and testing.

Emotions can influence academic performance; positive emotions increase school results, and negative emotions, such as boredom, can disrupt students' academic performance (Pekrun, 2006). Also, from an educational point of view, emotions can be a significant factor in students' achievements after an assessment. However, it can be a direct or indirect factor in learning motivation, satisfaction, health (mental), teacher-student relationship, and academic performance (Hayat et al., 2020). Scientific research has shown that activating positive emotions, such as hope, joy, and pride, can significantly enhance students' academic performance and exam scores. This proves a significant correlation between positive emotions and students' school performance (Pekrun et al., 2011).

Education specialists aim to identify methods or factors to increase and consolidate students' academic performance. Over time, specialists interested in this field have identified, in their research, two determining factors that influence academic performance, namely self-efficacy and anxiety (Richardson et al., 2012; Schunk & Meece, 2005). In carrying out some activities (for example, evaluation), emotions of achievement intervene. When examining or evaluating students, we cannot ignore anxiety, the most critical achievement emotion. Assessment anxiety leads to a decrease in school performance, and this is due to how this emotion is perceived, and many perceive it as a threat. Test anxiety is multidimensional, in the sense that it involves a cognitive dimension, manifested by a concern about what may happen following failure; a somatic dimension, manifested by an affective-bodily state (e.g., increased heart rate); and a behavioral dimension, manifested by avoidant behavior (towards evaluation) (Pekrun & Stephens, 2010; Zeidner, 2007; Lowe et al., 2008).

Test anxiety is a significant issue that affects many students. Some researchers in China have developed this theme and have shown through studies that anxiety among students increases as they get older. They paid particular attention to how this anxiety that behaves under different degrees of emotional reaction can be reduced (Zhang et al., 2022). Through research, scientists have discovered that exercise can improve life expectancy and quality of life by buffering stress and mitigating its negative effects on life (Cohen & Wills, 1985). In general, students want to achieve the highest possible performance following an assessment to obtain the best grade possible, and for educational specialists, identifying the factors that influence students' academic success has been a constant concern and challenge.

Test anxiety refers to those feelings of worry, self-depreciation, feelings of tension, and somatic symptoms that occur during assessment situations. Many students experience stress, anxiety, and discomfort before or during testing. This physiological condition affects their ability to perform well, social-emotional and behavioral development, and attitudes about themselves and the academic environment. Test anxiety is inversely related to test performance, with anxious students performing below non-anxious students. This is not due to a lack of intelligence or insufficient academic preparation but to the stressful nature of testing situations, which can impact attention and memory. In other words, test anxiety is characterized by persistent symptoms of anxiety experienced during assessments (Roşan, 2015; Strickland, 2001).

Test anxiety can be characterized by nervousness, mental tension, and apprehension. At the same time, we can talk about somatic symptoms such as excessive sweating in the absence of physical effort, palpitations, and hand tremors (Salame, 1984). Anxious students show negative expectant attitudes about themselves in certain academic assessment situations. So, these attitudes contribute to how they experience fear in assessment situations, influencing the response in the given situation (Moore, 2006). Students with high levels of evaluation anxiety include in their responses self-deprecating cognitions, perception of negative emotional states, anticipation of negative evaluation, avoidant behavior, and low personal efficacy (Arch, 1987). Assessment-anxious students are sensitive individuals when it comes to assessment situations and perceive these situations as threatening. The result may be decreased confidence in one's abilities to cope with the evaluative situation. Underlying this failure are self-deprecating and anticipatory cognitions about failure (Zeidner, 1998).

Students' personality plays an essential role in expressing this unpleasant emotional state. Evaluation anxiety reactions are activated by several cognitions and personality trait variables (Robu, 2008):

- negative cognitions regarding the loss of self-esteem in case of failure;
- negative cognitions regarding the loss of trust from others;
- negative cognitions regarding the loss of future possibilities in career development;
- negative cognitions regarding inevitable consequences associated with failure;
- negative cognitions regarding one's competence;
- negative cognitions regarding one's ability to succeed.

The causes of the manifestation of these characteristics can be multiple. We can say that the predisposition to anxiety can accentuate the lack of confidence in one's skills, lack of familiarity with similar evaluative situations, poor performance obtained in similar situations, and more. All of these can accentuate negative cognitions about success in academic performance. Numerous studies have reported that academic assessment anxiety is the most common source of stress among students (Salame, 1984; Robu, 2008).

Positive emotions can indirectly influence students' exam results. They mediate students' behavior (cognitive, metacognitive, and self-regulatory) (Pekrun, 2006; Goetz et al., 2006). Emotions can affect students' academic performance both cognitively and motivationally (Artino et al., 2012; Pekrun et al., 2010). Positive emotions (flexible and complex) facilitate students` learning. We refer here to the situations where students who use deeper strategies (metacognitive strategies) manage to improve their academic performance by using metacognitive learning strategies as an effect of positive emotions on academic performance (Pekrun et al., 2009).

Self-efficacy is an essential factor that influences academic performance. It refers to a student's belief in their ability to perform and succeed academically (Bandura, 1997; Schunk & Ertmer, 2000). Students with high levels of self-efficacy and ability are likelier to put in the necessary effort to achieve academic success. In contrast, low levels of self-efficacy can result in fear or anxiety when approaching academic tasks (Pintrich, 2003; Kurbanoglu & Akin, 2010). This can lead to a lack of persistence and lower academic performance.

Students' beliefs have an impact on their state of anxiety when it comes to learning and self-efficacy. According to some theories, self-efficacy refers to a student's belief in their ability to handle academic demands and

achieve their academic goals (Bandura, 1997; Roick & Ringeisen, 2017; Putwain et al., 2013). We are concerned with understanding the comprehensive relationship between self-efficacy, anxiety, and academic performance. Can we move towards a holistic model of student anxiety during school assessment? Some authors do this (Lowe et al., 2008). The latter believe that how the evaluation is perceived can determine anxiety and self-efficacy. Students can perceive the examination as a threat, and the result will manifest anxiety during the assessment.

In the context of self-efficacy and academic performance, we can talk about Control Value Theory, which considers evaluating emotions. This theory includes two large dimensions (Roick & Ringeisen, 2017):

1. Subjective control, determined by expectations of how emotions can be controlled;

2. The value given to the academic evaluation and its results are determined by how these values are evaluated from a personal point of view (positive or negative).

Several cognitive factors trigger anxiety. Through this theory, we can show that through self-efficacy, the risk of failure in academic assessment can be reduced through self-control in achievement situations.

The present study examines the relationship between self-efficacy, anxiety, positive affect, and expected grades, previously linked to academic performance. The study is based on the Control-Value Theory (CVT) of academic emotions by Pekrun, which refers to a sequence of variables that predict emotions related to the desire for achievement and expected performance (Pekrun, 2006; Pekrun et al.,2007). The research aims to determine self-efficacy's direct and indirect impact on students' expected grades. The mediating variables included in the model were positive affect and anxiety levels.

Method

The study aims to identify the direct and indirect factors that affect the expected final exam grades of students pursuing a bachelor's degree at a university. Starting from this general objective, we derived seven working hypotheses, having as variables in the study: self-efficacy, anxiety as a self-regulated learning strategy, positive affect, and students' expected grades in the final exam.

Research hypotheses

The following statements are hypotheses regarding the relationship between academic self-efficacy, anxiety, positive affective dispositions, and expected academic performance.
H1: Academic self-efficacy directly impacts the expected grades of undergraduates in their exams.
H2: Academic self-efficacy directly impacts anxiety as a self-regulated learning strategy.
H3: Academic self-efficacy directly impacts positive affect.
H4: Positive affect directly impacts anxiety as a self-regulated learning strategy.
H5: Anxiety as a self-regulated learning strategy has a direct impact on expected school performance.
H6: The relationship between self-efficacy and expected academic performance is mediated by anxiety as a strategy for self-regulated learning
H7: The relationship between self-efficacy and anxiety as a self-regulated learning strategy is mediated by positive affect.

Participants

The University of Oradea from Romania conducted a study with 170 students from Pedagogy of Primary and Preschool Education (n=129; 75.9%), Special Psychopedagogy (n=16; 9.4%), and Orthodox Pastoral Theology (n=25; 14.7%) programs. Students range in age from 21 to 53, with an average of about 27. Distribution of participants by gender: 84.1% are female, 15.3% are male, and 0.6% did not specify gender. All participants registered for the final exam of their undergraduate university studies after the pandemic period.

Working tools

Self-efficacy

The General Self-Efficacy Scale (SES) is a ten-item questionnaire. It was developed by Matthias Jerusalem and Ralf Schwarzer in 1981 to evaluate an individual's beliefs about their ability to handle challenges while completing tasks. The SES assesses self-efficacy in dealing with everyday problems, confidence in setting goals, willingness to invest effort, and persistence in taking action. Participants used a four-point Likert scale from 1 (completely untrue) to 4 (entirely true) to respond. Sample items: *I am confident I can successfully cope with unforeseen events; I am usually prepared to handle any situation or problem*.

Authors of the scale report strong psychometric properties, with Cronbach's alpha values ranging from 0.82 to 0.93. The measurement tool was adapted to fit the local language and culture and then tested and verified in Romania by Vasiliu et al. in 2015. They found a Cronbach's alpha score of 0.786, while in our study, the coefficient value was 0.833.

Positive affect

During the study, participants' positive affect was evaluated using the PANAS-X Scale. This scale was developed by D. Watson and L.A. Clark in 1994 and comprises ten emotions, including active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong. Participants were asked to indicate how much they felt each emotion during the past three weeks, using a five-point Likert scale ranging from 1 ("very little or not at all") to 5 ("very much").

The scale's authors reported a Cronbach alpha coefficient of .87; in our study, it is .742.

Anxiety as a self-regulated learning strategy

The Learning and Study Strategies Inventory (LASSI) assessed the students' anxiety levels. This inventory was created by C. E. Weinstein, D. R. Palmer, and T. W. Acee in 2016. The LASSI comprises ten dimensions, each with six items. The Anxiety subscale measures how worried or tense students feel when dealing with academic tasks. The participants rated their anxiety levels on a 5-point Likert scale ranging from 1 (Not typical of me) to 5 (Very typical of me).

The original instrument developed by the authors had a Cronbach alpha coefficient of .87. In our study, the coefficient for the Anxiety subscale was .753.

Expected grade or academic performance

To determine the expected academic performance of students after completing the study program, they were asked to provide their expected grade on the assessment test. This grade was based on their level of training and knowledge accumulated during the three years of study. Grading in Romania is carried out in the 1 (minimum) – 10 (maximum) range. The grade to be considered passed is 5. We mention that the average calculated from the grade obtained in the test for the assessment of specialized knowledge and the test for supporting the thesis must be 6 to be considered a pass on the Bachelor exam.

Procedure

The work tools were administered in a pencil-and-paper format before taking the evaluation tests in the bachelor exam. After specifying the purpose of the research, the participants consented to participate voluntarily and anonymously.

A structural equation model generated through AMOS was used to test the relationships. The model subjected to statistical processing in AMOS was evaluated for fit indices (figure 1).

Fit Indices

A structural equation model was created using AMOS software to examine relationships between variables involved in our study (see Figure 1). The model underwent statistical processing and was assessed for fit indices.

Good fit indices are CMIN/df between 2 and 5, GFI, TLI, and CFI indices greater than 0.90 (see Hair et al., 2010; Tucker & Lewis,1973; Bentler, 1990), and RMR less than 0.05 and RMSEA between 0.05 and 0.08 (Hair et al., 2010). This model had an acceptable range with CMIN/df of 2.898, a GFI of .994, a TLI of .946, a CFI of .991, an SRMR of 0.053, and an RMSEA of 0.073.

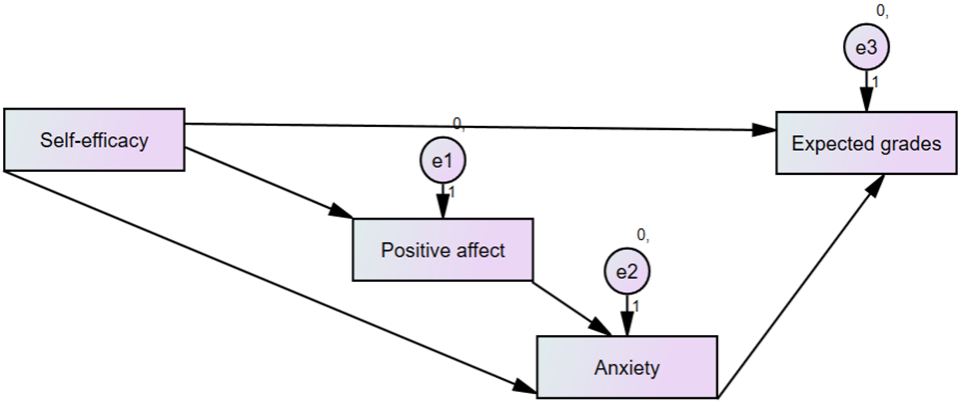


Figure 1. Conceptual model

Results

Direct effect. Testing hypothesis H1 to H5

A Bootstrap Test with 500 resamplings was performed to generate t-test and standard error values for the model parameters. Table 2 and Figure 2 present the results regarding testing the first five statistical hypotheses.

Table 1. The relationship between self-efficacy, anxiety, positive affective moods, expected grade

	Hypothesized Relationship			Std. Estimates	S.E.	C.R.	p	Decision
H1	Expected Grade	<---	Self-efficacy	.257	.074	3.469	***	Supported
H2	Anxiety	<---	Self-efficacy	-.205	.078	-2.549	.011	Supported
H3	Positive Affect	<---	Self-efficacy	.449	.069	6.527	***	Supported
H4	Anxiety	<---	Positive affect	-.282	.078	-3.603	***	Supported
H5	Expected grade	<---	Anxiety	-.258	.074	-3.487	***	Supported
***p<.001								

According to the data obtained in Table 1, the hypotheses of the study H1-H5 are sustainable. So, self-efficacy has a positive impact on expected grades (H1) (b=.257, t=3.469, p<.001), on positive affect(H3) (b=.449, t=6.527, p<. 001), and a negative impact on anxiety (H2) (b=-.205, t=-2.549, p<.05).

At the same time, the level of anxiety has a negative impact on the level of positive affect(H4) (b=-.282, t=-3.603, p<.001). In addition, the level of anxiety has a negative impact on the expected grade (H5) (b=-.258, t=-3487, p<.001).

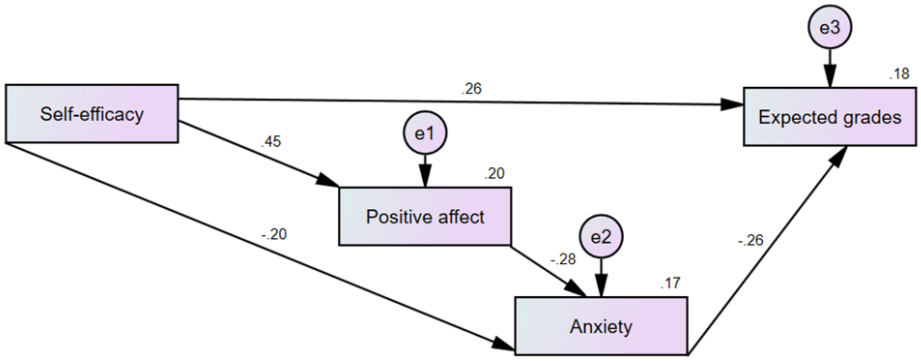


Figure 2. SEM depicting relationships between self-efficacy, positive affect, anxiety, and expected grades

Direct and Indirect effects of X on Y. Testing hypothesis H6 and H7

To test H6, we used Hayes's (2022) process macro (Model 4) in SPSS 4.2 to examine the mediating role of anxiety between self-efficacy and expected grades. The square multiple correlation was R-sq=0.176 for the expected grade ($F(2,167)=17.871$, $p<0.001$), indicating that 17.6% of the variance of the expected grade is due to self-efficacy and anxiety.

The summary of the mediation analysis can be found in Table 2.

Table 2. Summary of the mediation analysis: Self-efficacy - anxiety - expected grades

Total effect (self-efficacy -> expected grades)	Direct effect (self-efficacy -> expected grades)	Relationships	Indirect effect	Confidence Interval (for indirect effect)		Conclusion
				Lower Bound	Upper Bound	
.7068 (.000)	.5302 (.000)	Self-efficacy -> anxiety -> expected grades	.1765	.0624	.3226	Partial mediation

The results showed that self-efficacy had a significant indirect effect on expected grades through anxiety (b= 0.1765, CI [.062, .322]), supporting H6. The sign of direct and indirect effects is the same (positive for both), so the relations are complimentary.

For testing the mediating effect of anxiety on the relationship between self-efficacy and expected grades (H7), we used Model 4 of Hayes's (2022) process macro for SPSS (version 4.2). The square multiple correlation was R-sq=0.171 for anxiety ($F(2, 166)= 17.1339$, $p<0.001$), indicating that 17.1% of the variance of the anxiety is due to self-efficacy and positive affect.

The summary of the mediation analysis can be found in Table 3.

Table 3. The summary of the mediation analysis: self-efficacy - positive affect- anxiety

Total effect (Self-efficacy -> positive affect -> anxiety)	Direct effect (self-efficacy -> anxiety)	Relationships	Indirect effect	Confidence Interval (for indirect effect)		Conclusion
				Lower Bound	Upper Bound	
-.6716 (.000)	-.4128 (.011)	Self-efficacy -> positive affect -> anxiety	-.2588	-.444	-.1131	Partial mediation

The results showed that self-efficacy significantly indirectly affected anxiety through positive affect (b=0.2588, CI [-0.444, -0.1131]), supporting H7. The sign of direct and indirect effects is the same (negative for both), so the relations are complimentary.

Discussions and conclusions

First, the study examines the relationship between self-efficacy, anxiety, and students' expected grades upon completion of bachelor's studies. The correlational study found a positive association between self-efficacy and expected grades and a negative association with anxiety levels, supporting hypotheses H1 and H2. At the same time, self-efficacy has a negative impact on anxiety, which supports hypothesis H5. Self-efficacy has also been reported in previous studies to be negatively associated with anxiety (see Hwang et al., 2016; Morales-Rodríguez & Pérez-Mármol, 2019; Qudsyi & Putri, 2016; Wang & Liu, 2000). When students have confidence in completing a task, their anxiety levels decrease, leading to better-expected grades during exams.

Conversely, if students lack confidence in completing a task, they are more likely to give up, increasing their anxiety during assessment periods. Therefore, having high self-efficacy can protect against anxiety, while anxiety can lead to lower self-efficacy (Morales-Rodríguez & Pérez-Mármol, 2019). Thus, improving self-efficacy may be a prerequisite for improving self-regulated learning strategies by reducing anxiety levels.

The main objective of the study was to explore how anxiety impacts the relationship between self-efficacy and expected grades. Previous research has identified several factors that impact the relationship between self-efficacy and academic achievement. These factors include, for example, academic self-concept (Choi, 2005), academic aspirations (Carroll et al., 2009; Leung et al., 2010), and academic engagement (Neghabi et al., 2013; Meng & Zhang, 2023). The present study revealed that anxiety moderates the relationship between self-efficacy and the expected grade in undergraduate university final exams. This variable needs to be studied in the context of final assessments beforehand. The analysis suggests that self-efficacy directly impacts expected grades and indirectly impacts them when anxiety serves as a mediator variable. The ascertainment supported working hypothesis H6. According to various research studies, including Bandura et al. (2001), Honicke and Broadbent (2016), Komarraju and Nadler (2013), Meng and Zhang (2023), Zimmerman and Bandura (1994) and Yokoyama (2019), self-efficacy is a direct and significant predictor of students' academic performance. Those who scored higher on self-efficacy have higher

academic performance expectations upon completing their bachelor studies. In addition, students with high levels of self-efficacy are more likely to feel capable of completing complex tasks, leading to greater academic achievement.

According to the study results, self-efficacy has a positive and significant effect on students' expected grades via the mediating role of anxiety as a self-regulated learning strategy. It has been observed that students who experience less anxiety tend to have a stronger belief in their ability to learn. This increased confidence positively impacts their potential for success. Hence, creating an environment that promotes optimal learning conditions is essential while imparting education.

The role of emotions in teaching and learning processes has also been highlighted by Pekrun et al. (2007). After the pandemic, we found that positive affect strongly correlated with self-efficacy (H3) and anxiety as a self-regulated learning strategy (H4). In addition, we found that positive affect mediates self-efficacy and anxiety (H7). According to recent studies, self-efficacy impacts positive emotions that can enhance students' academic performance by improving their metacognitive strategies (Hayat et al., 2020). Perkun (2006) launched this theory, which has been the subject of recent research (see Hayat et al., 2020). Pekrun et al. (2007) assumed in the control-value theory that students' cognitive appraisal affects their positive emotions, which, in turn, influence their academic results through metacognitive strategies. The findings of our study provided evidence for the correlation between positive affect and self-efficacy, anxiety, and expected grades. However, positive affect was found to be a mediating factor between self-efficacy and anxiety, which still had a direct impact on expected grades. Therefore, students confident in their learning abilities will experience positive affect and reduced anxiety as a self-regulated learning strategy. Recent research based on Pekrun's value-control theory suggests that emotions can impact academic performance by affecting metacognitive strategies (Artino Jr et al., 2012; Hayat et al., 2020). However, our study found that a positive affect alone is not enough to create high expectations related to academic success. The level of anxiety, which is one of the self-regulated learning strategies, also plays an important role. It is likely that other self-regulated learning strategies, which were not considered in our study, will fully support the value-control theory upon which we based our research.

Limitation

This study examines self-efficacy's direct and indirect effects on students' expected academic performance (expressed in grades) in the bachelor university final exam. The obtained results join other studies conducted in this field and broadly support the control-value theory.

However, this study had some areas for improvement.

The first aspect is that this study was a cross-sectional analytical type with some limitations. Thus, this type of study makes it difficult to predict whether there is causality between the variables, and reliable predictions cannot be made. Another weak point derives from the type of working tools that were used. These were self-report questionnaires, which, although they allow us to find out the personal beliefs and perceptions of the participants, there is a high risk that they will provide a desirable response. Also, due to the small number of participants and the non-random sampling method, it is impossible to generalize the results. It would be helpful to investigate whether anxiety mediates the relationship between positive learning affect and exam grades. A model testing this relationship can provide additional insights beyond the expected grades. Hayat et al. (2020) tested such a model on medical students and found supportive evidence for Pekrun's (2016) Control-Value Theory.

Implications

In recent studies, self-efficacy has been intensively studied and considered a component that influences and adjusts human behaviors (Meng & Zhang, 2023). It builds over time and impacts how the person self-assesses their ability to complete a task. Even after age 18, when young people begin their bachelor university studies, self-efficacy remains a construct that can positively impact academic performance. Therefore teachers should focus on forming a high academic and general self-efficacy level. Having a high level of self-efficacy is essential to approach professional tasks and responsibilities successfully in the workplace (Zhao et al., 2005). The study highlighted that the level of general self-efficacy, directly and indirectly, impacts expected grades, which means that, along with this construct, other factors act together on academic performance. This fact should be emphasized to open up the possibility of reflections and self-reflections by teachers and students related to identifying the factors responsible for learning and academic success. However, the approach is complex. The personal factors involved in learning can contribute decisively to how each student approaches learning and proposes a standard for

academic success (Laurian-Fitzgerald & Fitzgerald, 2021; Muntean et al., 2021; Popa Berce et al., 2022). A high level of self-efficacy can be formed in the university by creating a supportive environment in learning based on cooperation because they can stimulate positive affect, which is necessary to obtain a state of well-being and a high level of satisfaction in learning activities. Also, teacher enthusiasm and constructive feedback in learning activities are positively related to greater engagement in learning activities and hope for academic success. These aspects highlight that beyond the formal curriculum and learning contents, an essential role in obtaining a high level of students' confidence in achieving academic success is played by self-regulated learning strategies and the positive affect accompanying students' emotional disposition in everyday life.

Author Contributions

All authors contributed equally to the article and approved the submitted version.

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