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THE RELATIONSHIP BETWEEN INTRINSIC MOTIVATION, ACADEMIC SELF-EFFICACY, LEARNING ENGAGEMENT, AND TEST ANXIETY, AS PERCEIVED BY UNIVERSITY STUDENTS

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Abstract

Test anxiety or academic anxiety is an emotional state characterized by intense fear, nervousness, and stress that occurs in the context of academic assessments such as exams, tests, projects, or presentations. Test anxiety negatively affects efficiency in academic tasks, leading to decreased academic performance. Test anxiety in students can be generated or fostered by both individual and contextual, school-related factors. Teachers can play an important role in reducing test anxiety in students by adopting appropriate pedagogical practices and creating a positive, supportive, student-centered learning environment. The present work takes a structural modeling approach to explore the influence of intrinsic motivation, learning engagement, and academic self-efficacy on test anxiety. The results showed that while high levels of academic self-efficacy contribute to reduced test anxiety, learning engagement has a positive influence on test anxiety which is due to students' expectations created by their involvement in the learning activities.
Keywords: *academic self-efficacy, intrinsic motivation, learning engagement, test anxiety, university students*

Introduction

The period of university studies represents a significant stage in an individual's professional career, during which he/she needs to exploit academic opportunities and experiences to the maximum to acquire knowledge and develop skills, competencies, and values in line with the requirements of the profession for which he/she is preparing. Thus, student activity should combine participation in teaching activities (courses, seminars, laboratories, internships, scientific events), extracurricular activities (projects, clubs, student organizations, or other activities that can enrich the educational experience and develop complementary skills), individual study, homework and projects, independent research. At certain times of the academic year, overload or poor time management can increase stress and fatigue and decrease motivation and performance in educational tasks.

Test anxiety is a common problem in academia, negatively affecting students' well-being and performance (Doherty & Wenderoth, 2017; von der Embse et al., 2018). When faced with examination situations, before, during, or after a test, exam, presentation, or other assessment context, students may experience states of worry, distress, and fear of failure, leading to a range of symptoms: cognitive, emotional, physiological, and behavioral reactions and manifestations

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(Robu, 2011, p. 15), which vary in intensity from one individual to another. These may include difficulty concentrating, confusion, mental blocks, procrastinating, fainting, agitation, trembling, panic, muscle aches, dizziness, tension, headache, tachycardia, breathing problems, digestive problems, eating or sleeping disorders, avoidance, irritability, low self-efficacy, feelings of negative self-depreciative cognitions, ruminations, anticipatory failure-related cognitions etc. (Mashayekh & Hashemi, 2011; Robu, 2011, p. 33), affecting self-confidence and quality of life.

Test anxiety occurs as a subjective reaction to particular stimuli (Ping et al., 2008), which may in some cases be associated with previous unsatisfactory experiences in which the individual was assessed (poor exam results, pressure from teachers or family, emotional trauma-related to assessments) or may be caused by individual factors such as perfectionism, lack of self-confidence, low self-esteem, etc.

Zeidner (1998) (as well as Mashayekh & Hashemi, 2011; Chakraborty, 2023) has stated that at low or moderate levels of intensity, anxiety is beneficial, it generates productivity and motivation; negative effects on academic performance are the consequence of high levels of appraisal anxiety (Putwain et al., 2021). The high level of test anxiety generates ruminations about low self-efficacy in a task, resulting in poor performance (Núñez-Peña & Bono, 2019). Thus, research conducted by several authors (Cassady, 2004; Hjeltnes et al., 2015; Robu, 2011; Sarason, 1975 apud Badrian et al., 2022) has shown that test anxiety can cause academic failure because it produces self-doubt, undesirable physiological reactions, reduces intrinsic motivation and blocks or negatively affects the cognitive ability of the individual, causing him to underperform.

In the APA Dictionary of Psychology, test anxiety is considered a common example of performance anxiety (https://dictionary.apa.org/performance-anxiety), meaning that it occurs in situations where there is very high pressure to succeed or achieve high scores; Cassady (2010) considers test anxiety as a form of academic anxiety (along with math anxiety, language anxiety, science anxiety, and so on), while von der Embse et al. (2018) also referred to it under other names: exam anxiety, exam stress, or test stress.

Among the factors that can affect students' academic performance and anxiety, a major role is played by the teaching and assessment methods used by teachers. According to Davis (1999 apud Duraku, 2017), exams and voluminous projects are perceived as inappropriate forms of assessment, which can negatively affect student motivation and increase anxiety levels. Other important factors are motivation, academic self-efficacy, and student engagement. As assessment situations are inherent to the academic environment, students must develop skills in emotion management, self-control, and stress management, and know and apply strategies to reduce anxiety. The role of the teacher is thus significant, as he/she can be a resource-support for students who are experiencing high levels of anxiety, which prevent them from succeeding.

This research aimed to explore the influence of intrinsic motivation, learning engagement, and academic self-efficacy on test anxiety. A research model has been conceptualized that features intrinsic motivation as an antecedent of academic self-efficacy and engagement which, in turn, are antecedents of test anxiety. The model has been tested on a sample of 194 Romanian university students.

Related Work

The issue of test anxiety is one encountered in numerous educational research because the school environment is strongly impacted by its effects on student performance and achievement. Test anxiety has been correlated with many individual and contextual variables to better understand it and to adopt the most effective mitigation strategies. Spielberger (1966; 1970) identifies two types of anxiety: anxiety as a state and anxiety as a trait. Anxiety as a state is a temporary, transient emotional state that can fluctuate and vary in intensity. In contrast, anxiety as a trait is a relatively stable characteristic of a person that makes them susceptible to

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perceiving more threats in more contexts than other people. Mashayekh and Hashemi (2011) state that approximately 22% of students have a high level of test anxiety and 16% have moderate test anxiety, while Asghari et al. (2012) cite sources stating that the prevalence of test anxiety in children and adolescents tends towards 40% of students.

Von der Embse et al. (2018), in a meta-analysis that includes studies conducted over 30 years, summarizes the effects, predictors, and correlates of test anxiety. The variables studied concerning test anxiety were grouped into several categories: cognitive, affective/physiological, behavioral, and social (von der Embse et al., 2018).

Cassady and Johnson (2002) studied the relationship between cognitive test anxiety and academic performance, showing that high anxiety negatively correlates with academic performance. Rana and Mahmood (2010) studied the relationship between test anxiety and academic achievement; Dan et al. (2013) aimed to identify the relationship between attachment, self-esteem, and test anxiety in adolescence and early adulthood; Akca (2011) studied the relationship between test anxiety and learned helplessness; Raufelder and Ringeisen (2016) studied self-perceived competence and test anxiety, and Sarason (1981) correlated test anxiety, stress, and social support.

Steinmayer et al. (2016) investigated the relationships between subjective well-being, academic achievement, and test anxiety in adolescents. The results indicated that test anxiety negatively influences not only subjective well-being but also academic performance.

Other studies have identified a relation between test anxiety and several internal variables such as motivation, self-efficacy, learning engagement, depression, and self-regulation. Demographic predictors such as educational attainment, economic status, and cultural background have also been identified (von der Embse, 2018). Also, the study by Bodas and Ollendick (2005) provides a cross-cultural perspective on test anxiety, with Indian and American cultures being particularly targeted. Bembenutty (2008) explores the relationship between test anxiety and self-regulated learning, learning motivation, and academic performance. The findings of his study show that test anxiety and self-regulated learning influence learning motivation.

Although numerous research studies show that test anxiety generates negative effects on academic achievement, Jerrim (2023) states that there is no clear relationship between test anxiety and exam performance.

Other authors, such as Chakraborty (2023), have explored the causes of examination anxiety and proposed useful solutions and recommendations for teachers. The author believes that inadequate preparation for a test or exam, fear of poor results or not living up to one's own or others' expectations can lead to anxiety and a decrease in motivation and self-esteem. It creates a vicious circle, where anxiety leads to poor results and lack of self-confidence, and these increase anxiety in assessment situations. Also, Chakraborty (2023), consistent with other research cited by Robu (2011, p. 45-46), claims that female students show a higher level of anxiety and worry than males, although they have prepared more for exams because female students tend to be much more sensitive to evaluative stimuli, especially negative ones (Zeidner, 1998).

A few decades ago, the American researcher S.B. Sarason (1959 apud Robu, 2011, p. 315) stated that we live in a society where the culture of tests is very strong, people's lives being determined, in part, by the performances they get on tests (exams/assessments). Thus, in modern society, anxiety towards evaluative situations is a common and overwhelming problem, both in the school environment and in adult life.

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Research Methodology

Research Model and Hypotheses

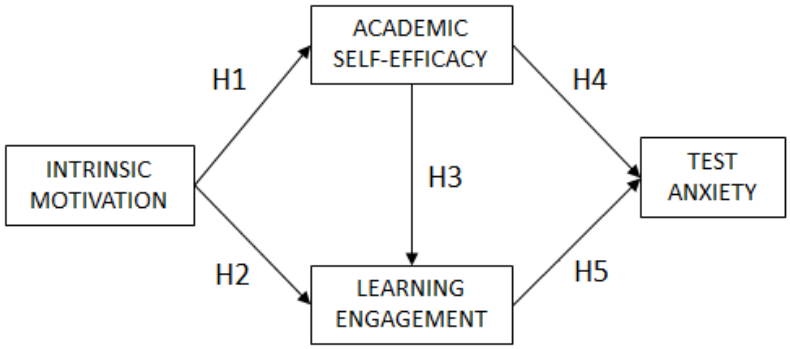
The research model that bridges intrinsic motivation, academic self-efficacy, and learning engagement with test anxiety is presented in Figure 1.

Intrinsic motivation (IM) refers to doing an activity for the pleasure and satisfaction it brings (Deci & Ryan, 1985). Intrinsic motivation is generated by a strong inner drive that energetically sustains the organism to perform the activity. When intrinsically motivated, a person follows his/her interests, and passions (Deci & Ryan, 1985), and the possible rewards that can be obtained from performing the activity are subordinated to the personal satisfaction and pleasure derived from the activity itself; intrinsically motivated people also find meaning in the work performed, experience feelings of personal fulfillment or achievement. Intrinsic motivation is the opposite of extrinsic motivation, which is driven by external factors, such as material, tangible rewards, praise, or avoidance of punishment.

Academic self-efficacy (ASE) refers to a person's belief in his/her ability to learn or succeed in academic activities (Schunk & DiBenedetto, 2022): to solve problems, to cope with academic challenges, and to achieve learning goals. According to Multon et al. (1991 apud Dadandı, 2023), students with strong academic self-efficacy beliefs set ambitious goals make sustained efforts and persevere to achieve these goals, exhibit more resilience in the face of obstacles, and have higher intrinsic motivation for learning.

H1 Intrinsic motivation has a positive influence on academic self-efficacy (IM → ASE)

Figure 1
Research Model



Learning engagement (LE) refers to the degree to which a person participates in learning. Fredricks et al. (2004) consider engagement a multifaceted construct that can be viewed from behavioral, emotional, and cognitive perspectives, these dimensions being interconnected. Behavioral engagement involves active participation, emotional engagement refers to the reactions and emotions associated with learning, teachers, peers, and academic environment, and cognitive engagement includes the thinking and willingness to put in the effort required to understand complex ideas and master difficult skills. In a meta-analysis conducted by Chang and Chien (2015), academic self-efficacy is a variable that positively correlates with cognitive, emotional, and behavioral engagement in learning. Similarly, Luo et al. (2023) showed that academic self-efficacy positively correlates with both academic performance and learning engagement.

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H2 Intrinsic motivation has a positive influence on learning engagement (IM → LE)

H3 Academic self-efficacy has a positive influence on learning engagement (ASE → LE)

Test anxiety (TA) can be defined as a subjective reaction to particular stimuli (Ping et al., 2008) in the school environment, characterized by excessive fear and worry, before, during, or after an exam. Test anxiety can negatively affect academic performance as it interferes with the cognitive processes required to solve tasks (Putwain et al., 2021).

H4 Academic self-efficacy has a negative influence on test anxiety (ASE → TA)

H5 Learning engagement has a positive influence on test anxiety (LE → TA)

The measures that were adapted from existing scales in the literature (Driscoll, 2004; Bandura, 2006) are presented in Table 1.

Table 1
Measures

Item	Statement
IM1	I am motivated to study by the pleasure and satisfaction of learning new things
IM2	I am motivated to study by the feelings I experience when I am communicating new things to others
IM3	I am motivated to study by the feeling when I am accomplishing difficult academic activities
TA2	During the test, I think about the consequences of failing
TA3	During the test, I forget what I know
TA4	When I take a test, nervousness causes me to make errors
ASE1	I believe I can keep up well with academic work
ASE2	I believe I can manage my time effectively
ASE3	I believe I can concentrate well on school subjects
LE1	I get involved in things I do in class
LE2	I get involved in class discussions
LE3	I spend a lot of time on my studies

Sample

To collect the data necessary to carry out the research, a questionnaire was applied to the students enrolled in the psycho-pedagogical training program (level I) organized by Valahia University of Târgoviște, in the first semester of the academic year 2023-2024. Completing the questionnaire was done voluntarily and anonymously. 196 students responded (out of 466, i.e. 42%), but 2 questionnaires were incomplete, therefore, after their elimination, the sample was made up of 194 respondents, of which 108 - were female and 86 - male. Regarding the age distribution of the students, 62.9% are 19-29 years old, 26 students (13.4%) are 30-39 years old, and the rest 46 (23.7%) are 40 or more years old.

Students were asked several general questions about age, gender, faculty, and specialization they are enrolled in, year of study, discipline/course, and then rated specific items on a 5-point Likert interval scale.

Data Analysis and Procedure

After checking for completion, two observations were eliminated so 194 questionnaires were used, 86 from male students and 108 from female students. Most of the students (101) are enrolled in the first year of study. A number of 122 students (62.9%) are 19-29 years old, 26 students (13.4%) are 30-39 years old and the rest of 46 (23.7%) are over 40 years old.

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The empirical validation of the model follows a two-step procedure as recommended in the literature (Anderson & Gerbing, 1988): (1) testing the measurement model to analyze construct validity, and (2) testing the structural model to check hypotheses. The model was analyzed with Lisrel 9.3 for Windows (Mels, 2006), using the maximum likelihood estimation method.

Convergent validity has been assessed according to the recommended thresholds from the literature (Fornell & Larcker, 1981; Hu & Bentler, 1998; Hair et al., 2006), as regards loadings magnitude, construct reliability (CR), and average variance extracted (AVE). Discriminant validity has been assessed through the squared correlation test (Fornell & Larcker, 1981).

The model fit with the data has been assessed by using the following goodness of fit (GOF) indices, as recommended by Hair et al., 2006: chi-square (χ^2), degrees of freedom (*df*), χ^2/df, comparative fit index (*CFI*), non-normed fit index *(NNFI*), the goodness of fit index (*GFI*), root mean square error of approximation (*RMSEA*), and standardized root mean square residual (*SRMR*).

Research Results

Measurement Model Testing Results

Testing the measurement model revealed a low factor loading on item IM1 so this has been eliminated. Model testing showed a good fit of the model with the data: $\chi^2 = 55.35$, *df* = 38, p = .034, c2/df = 1.46, RMSEA = .049, CFI = 0.979, NNFI = 0.969, GFI = 0.951, SRMR = 0.0519.

The descriptives and factor loadings are presented in Table 2.

Table 2
Descriptives and Factor Loadings (N = 194)

Item	*M*	*SD*	Loading
IM2	4.10	1.07	.59
IM3	3.96	1.15	.91
TA1	2.22	1.27	.86
TA2	2.20	1.18	.79
TA3	2.05	1.19	.70
ASE1	3.84	1.00	.75
ASE2	3.67	1.04	.76
ASE3	3.89	0.96	.68
LE1	3.91	1.06	.87
LE2	3.83	1.13	.87
LE3	3.53	0.99	.63

The convergent validity results presented in Table 3 show that composite reliability (CR) is greater than .7 and the average variance extracted is greater than .5. As regards the discriminant validity, the square root of AVE is greater than the correlations between constructs, so all latent variables have good convergent and discriminant validity.

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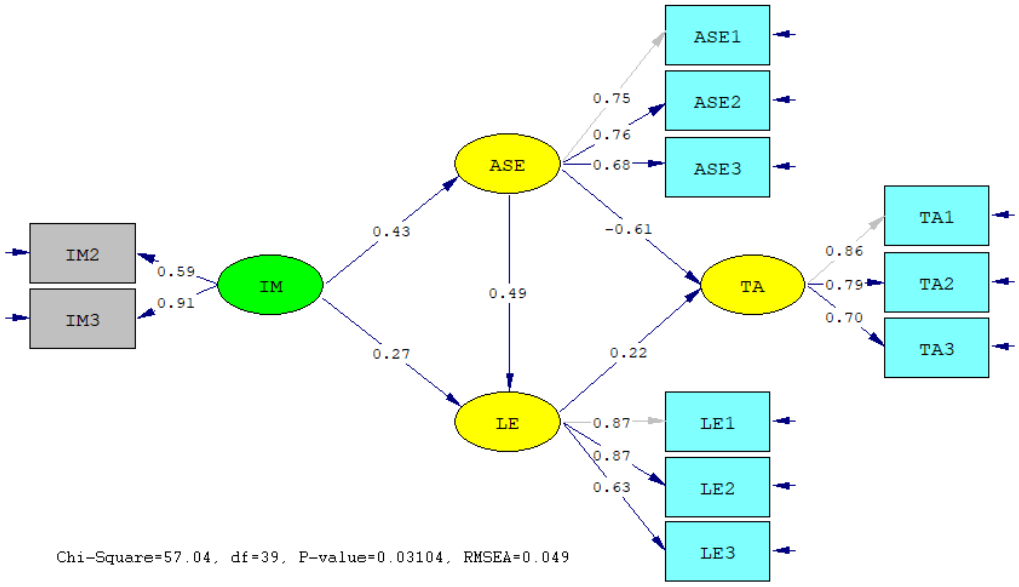
Table 3
Convergent and Discriminant Validity (N = 194)

Variable	CR	AVE	IM	TA	ASE	LE
IM	.732	.588	.767			
TA	.828	.618	-.081	.786		
ASE	.774	.534	.453	-.485	.731	
LE	.838	.637	.487	-.161	.611	.798

Note: The bold diagonal numbers represent the square root of AVE

The structural model testing results are presented in Figure 2. The GOF indices showed a good fit of the structural model with the data: $\chi^2 = 57.04$, $df = 39$, p = .031, c2/df = 1.46, RMSEA = .049, CFI = .978, NNFI = .969, GFI = .950, SRMR = .0548.

Figure 2
Model Estimation Results (N=194)



Intrinsic motivation has a significant positive influence on both academic self-efficacy (β = 0.43, $p < .001$) and learning engagement (β = 0.27, $p = .002$) so H1 and H2 are supported. Academic self-efficacy has a significant positive influence on learning engagement (β = 0.49, $p < .001$) and a significant negative influence on test anxiety (β = -0.61, $p < .001$) thus supporting H3 and H4. Learning engagement has a significant positive influence on test anxiety (β = 0.21, $p = .05$) so H5 is also supported.

The model explains a 25.8% variance in test anxiety, 43.4% in learning engagement, and 18.9% in academic self-efficacy.

Discussion

The current study provides an important contribution by proposing and validating a model that describes the relationships between 4 important variables for students and teachers in the university environment: intrinsic motivation, academic self-efficacy, learning engagement,

and test anxiety. The model explains the direct or indirect impact of IM, ASE, and LE on TA and emphasizes the role of these factors in the effective management of test anxiety levels, thus providing a deeper insight into the variables that influence academic success. All hypotheses were confirmed, indicating that all three predictors were significant.

The obtained results indicate that three regression coefficients (IM-ASE, ASE-LE, and ASE-TA) show a strong influence of motivation on self-efficacy ($\beta = 0.43$), and self-efficacy on learning engagement ($\beta = 0.49$) and anxiety ($\beta = -0.61$). Thus, self-efficacy emerges as an important factor influencing test anxiety, with a direct negative effect and an indirect effect mediated by learning engagement.

Intrinsic motivation influences learning engagement and sense of academic self-efficacy; at the same time, learning engagement influences academic self-efficacy; this is in line with the literature (Deci & Ryan, 1985; Fredricks et al., 2004; Multon et al., 1991 apud Dadandı, 2023; Schunk & Pajares, 2005).

Academic self-efficacy significantly negatively correlates with test anxiety (in agreement with research by Jia et al, 2023), thus students with high academic self-efficacy are more likely to set challenging goals, remain persistent when facing difficulties, and are less anxious in challenging situations, compared to those with low self-efficacy (according to Bandura's self-efficacy theory - 1977), because self-confidence, the feeling of being able to solve academic tasks contributes to the reduction of worry, negative thoughts and beliefs, and anticipation of success, creates a state of calm and control, and allows better concentration on the tasks to be solved. It can be considered that academic self-efficacy activates coping mechanisms and reduces the level of stress and anxiety associated with evaluation situations.

Another finding of the study is that learning engagement positively influences text anxiety. Learning engagement refers to the degree to which a person engages cognitively, affectively, and behaviorally (Fredricks et al., 2004) in the learning process. The positive correlation between LE and TA can be explained by the fact that effective engagement in learning, the effort put into learning, and the associated expectations contribute to increased levels of stress and test anxiety.

Based on the results obtained, some suggestions can be proposed for implementation in the university environment. Firstly, the proposed activities must be attractive and interesting, to awaken students' intrinsic motivation. The methods and strategies used by teachers should be varied, stimulating, and centered on the cognitive and affective needs of the learners, contributing to increasing students' engagement in learning. Secondly, education in the university environment should also address the personal development component of students, helping to improve students' academic self-efficacy.

To reduce assessment anxiety, appropriate pedagogical practices, and diverse, varied assessment methods can be adopted (in addition to traditional tests and exams, teachers can use other assessment methods such as projects, essays, oral presentations, or portfolios, which can reduce the stress associated with a single form of assessment), clear communication of expectations, assessment criteria, encouraging open communication and providing individual support (mentoring, counseling). Formative approaches focused on developing students' resilience and self-esteem can be carried out. The open and encouraging attitude of teachers, effective communication, the creation of a positive affective climate in the amphitheaters and classrooms, and an emphasis on formative, constructive feedback are of major importance. At the same time, the development of students' socio-emotional skills, positive thinking, and personal autonomy must be intrinsic objectives of university education.

This study is exploratory and has inherent limitations related to the research sample since the participants are students within the same university. Another limitation is related to the small number of variables. Further research could include other variables concerning test anxiety, such as the temperament (introvert, extrovert) of the students, or the teaching style of the teachers. It would also be interesting to see if there are gender differences and if this variable has a significant role in how test anxiety is experienced.

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Conclusions and Implications

The current research represents a puzzle piece in a complex picture of the actual academic environment. The complexity and dynamics of the factors involved in quality university education require a responsible and permanent reflective attitude of teaching staff. The generations of students are different, but their cognitive, affective, and social needs are relatively the same, and the factors that contribute to academic success can be mediated by the teaching staff, the policies, and the culture of the academic entity.

Psychologists recognize the impact of performance anxiety on the success of an activity, which is why specialized literature proposes numerous ways to reduce and manage anxiety: from various forms of therapy, carried out by specialists in the field, to the strategies that teachers can approach in the context of didactic activities.

Test anxiety represents a real problem that can significantly affect the students' lives. If discussing the causes of test anxiety, it can be stipulated as being complex, and related to each individual, particular context, or combination of both. Understanding those causes is critical to developing effective anxiety management strategies and promoting a positive academic experience for students.

There is also a complex relationship between the analyzed constructs overall **(**intrinsic motivation - academic self-efficacy - learning engagement - test anxiety**)** that is going to be examined in the following research, considering different variables for each construct, trying to reflect on both cycles that appear in real situations: (a) the productive one - high intrinsic motivation and academic self-efficacy conduct to an increased learning engagement, and have resulted in the decreasing of test anxiety, boosting in this way intrinsic motivation; (b) the unproductive one - low intrinsic motivation and academic self-efficacy have a clear contribution to the decreasing of learning engagement, leading so to influence in a great major the test anxiety, and subsequently, creating problems for learners. In this respect, university teachers may play an important role and can make significant contributions to reducing the emotional stress associated with academic assessments and promoting a more effective and satisfying learning experience.

Declaration of Interest

The authors declare no competing interest.

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