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Predictive analysis of motivation and learning strategies on academic achievement of postgraduate students

Stella Eteng-Uket[1] and Eteng Uket Effiom[2]

[1]*Corresponding Author, Department of Educational Psychology, Guidance &Counseling, Faculty of Education,, University of Port Harcourt, Nigeria, Email: Stella.eteng-uket@uniport.edu.ng, ORCID:https://orcid.org/0000-0001-7042-4894*
[2]*Department of Educational Psychology, Guidance &Counseling, Faculty of Education Ignatius, Ajuru University of Education, Port Harcourt, Nigeria, ORCID:https://orcid.org/0009-0000-8219-5224*

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Abstract

In today's rapidly evolving educational landscape, attaining excellent academic achievement and outcome is often characterized by a multifaceted interaction, such as the intricate prediction and relationship between motivation, learning strategies, and academic outcomes. This thus prompted the study, which sought to carry out a predictive analysis of motivation and learning strategies on the academic achievement of postgraduate students. It adopted the correlational research design; a sample of 333 was drawn using a multi-stage sampling procedure. The Motivated Strategies for Learning Questionnaire was the instrument used. Validity and reliability measures were established. The data were analyzed using simple and multiple regression. The results revealed that motivational and learning strategies significantly predict the academic achievement of postgraduate students, both independently and jointly. Considering the findings, it was suggested, among others, that educators should promote effective cognitive strategies to improve the performance of postgraduate students.

1. Introduction

In today's rapidly evolving educational landscape, pursuing quality education has become a fundamental goal for societies worldwide. The Sustainable Development Goal 4 (SDG 4) emphasizes the importance of ensuring inclusive and equitable quality education for all, aiming to equip individuals with the knowledge, skills, and attitudes needed to thrive in an ever-changing global environment. Subsequently, in this fast-paced, evolving, and competitive educational landscape, pursuing higher education has become an indispensable pathway for individuals seeking to achieve quality education, unlock their full potential, and make meaningful contributions to society. Among these individuals, post-graduate students represent a group of highly motivated scholars who embark on a rigorous and intellectually challenging journey to attain advanced knowledge and expertise in their chosen fields. These post-graduate students' academic outcomes have profound implications for their personal and professional growth and the overall quality advancement of knowledge and innovation.

This is more so because, in today's rapidly evolving knowledge-based society, pursuing advanced education at the postgraduate level is pivotal in shaping the future of individuals and institutions alike. Thus, within this academic landscape, attaining academic excellence as an outcome has become an aspiration that is both sought-after and revered. Consequently, as the educational paradigms continually evolve, the quest to unravel the mechanisms that underlie students' academic success remains a paramount concern. Not surprisingly, within this realm of academia, the assessment and understanding of the educational outcomes and achievement of students have garnered significant attention (El-Adl & Alkharusi, 2020; Hayat et al., 2020; Mega et al., 2014; Pintrich, 2004; Obrent, 2012; Schneider & Preckel 2017; Zimmerman & Schunk, 2011).

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This is also so as the pursuit of this excellent academic achievement and outcome is often characterized by multifaceted interactions between various psychological and cognitive factors (El-Adl & Alkharusi, 2020; Duru et al., 2014; Hariri et al., 2021; Hayat et al., 2020; Lisa et al., 2023; Mega et al., 2014; Muwonge et al., 2019; Obrent 2012; Schneider & Preckel 2017; Ulstad et al., 2016; Zimmerman & Schunk, 2011). Among these and other studies, the intricate relationship between motivation, learning strategies, and academic outcomes has garnered significant attention from scholars and educators alike. (Ahmed et al., 2016; Akyol et al., 2010; Crede & Philip 2012; El-Adl, & Alkharusi, 2020; Hayat et al., 2020; Kavyar et al., 2022; Kusurkar et al., 2013; Keklik & Keklik 2013; Lynch 2010; Mega et al., 2014; Mirzaei-Alavijeh et al., 2019; Muwonge et al., 2019; Nabizadeh et al., 2019; Neroni et al., 2019; Pekrun et al., 2002; 2011; Pekrun et al., 2009; Pokay & Blumenfeld, 1990; Obrent, 2012; Schneider & Preckel, 2017; Ulstad et al., 2016; Wild & Neef, 2023; Yusof et al., 2021).

2. Motivation, learning strategy, and academic achievement

Academic achievement culminates a student's efforts and accomplishments in an educational setting. It is the progress made toward acquiring educational skills, materials, and knowledge, usually spanning various disciplines (Bolt 2011). Grades, test scores, knowledge, and skills acquisition often measure it. According to Bolt (2011), the concept is understood as a spectrum along which one can "achieve" specific skills and knowledge, possibly further developing those skills and increasing knowledge's depth, breadth, and specificity. He further posits that it revolves around the central goal of improving the educational understanding of the students. While various factors contribute to academic success, two significant components that play a crucial role are motivation and learning styles.

Motivation, a complex and dynamic psychological construct, is a force that propels one into action. It acts as the driving force behind students' behavior and academic achievement. Motivation, a central driving force behind human behavior, shapes students' engagement, commitment, and academic performance. This study recognizes motivation as a multifaceted construct. Literature has identified constructs like value (intrinsic goal orientation, extrinsic goal orientation, and task value), expectancy component (control beliefs and self-efficacy learning and performance), and affective components (test anxiety) as essential components of motivation (Duncan & McKeachie, 2005; Pintrich et al., 1993). According to them, value components focus on why students engage in an academic task. This value component includes such factors as intrinsic goal orientation (focus on learning and mastery), extrinsic goal orientation (focus on grades and approval from others), and task value beliefs (deals with judgments of how interesting, helpful, and essential the course content is to the student). Expectancy components refer to students' beliefs that they can accomplish a task (Duncan & McKeachie, 2005). This expectancy component includes factors such as self-efficacy and control beliefs for learning. Self-efficacy is a self-appraisal of one's ability to master a task. It is the expectancy for success (specific to task performance), judgments of one's ability to accomplish a task, and confidence in one's skills to perform a task. Self-efficacy includes judgments about one's ability to achieve a task and confidence in one's skills to perform that task (Duncan & McKeachie, 2005; Pintrich et al., 1993). Control beliefs for learning, on the other hand, refer to students' beliefs that outcomes are contingent on one's effort rather than external factors such as luck; it also relates to students' beliefs that their efforts to learn will result in positive outcomes. Studies have shown that the motivational components are related to students' behavior and achievement (Duncan & McKeachie, 2005; Pintrich et al., 1993). The third general motivational construct is affected and operationalized in responses to the test anxiety scale, which taps into students' worry and concern over taking exams. Research has shown that task value relates to academic achievement (Al-Harthy & Aldhafri, 2014; Stegers-Jager et al., 2012), likewise goal orientation (Bulus, 2011; Chyung et al., 2010), self-efficacy (Ahangi & Sharaf, 2013; Klassen et al., 2008) and control of belief for learning (Kavita, 2014).

Concurrent with motivation, students' strategies to navigate the educational landscape are equally crucial. According to Lee (2014), "learning strategies" encompass a broad spectrum of cognitive and behavioral characteristics. Mayer (2007) explained that a learning strategy refers to the mental processes students develop during learning to improve learning quality and help them achieve their goals. Learning strategies are processes to obtain, organize, or transform information (Ahmed, 2016; Alexander et al., 1998). Learning strategies represent diverse cognitive, metacognitive, and behavioral approaches students employ to process, assimilate, and retain information. Cognitive learning strategies refer to the steps or operations used in learning or problem-solving that involve direct analysis, transformation, and synthesis of learning materials.

Researchers, over time, to create some order, have made some classifications of this broad concept, with each classification having the recurring theme of cognitive strategy, metacognitive strategy, resource management strategy, and affective/motivational strategy (Duncan & McKeachie, 2005; Lee, 2014; Pintrich et al., 1991; O'Malley & Chamot, 1990; Shannon, 2008). Pintrich et al. (1991) specifically classified learning strategies into cognitive,

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metacognitive, and resource management strategies. Cognitive strategies relate to how learners take in and make sense of information. It includes strategies like rehearsal, elaboration, organizing, and critical thinking strategies. Rehearsal is a cognitive learning strategy adopted to memorize information by recitation and recapitulation (Lewalter, 2003). Organizing refers to that strategy that helps learners select appropriate information and construct connections among the information to be learned (Pintrich et al., 1991). Elaboration refers to a type of cognitive learning strategy that builds connections between new information and existing knowledge or experience; they help the learner integrate and connect new information with prior knowledge, e.g., paraphrasing, summarizing, and creating analogies (Duncan & McKeachie, 2004; Lewalter, 2003; Pintrich et al., 1991). Another cognitive strategy is Critical thinking, which refers to the degree to which students report applying previous knowledge to new situations to solve problems, reach decisions, or make critical evaluations of ideas or concerning standards of excellence (Duncan & McKeachie, 2004; Lewalter, 2003; Pintrich et al., 1991).

The second general classification is metacognitive strategies. Metacognition refers to the awareness, knowledge, and control of cognition. It refers to methods used to oversee, regulate, or self-direct learning. Metacognitive learning strategies relate to learner's awareness of their own learning/thinking processes and their ability to manage the processes involved in learning, such as planning (anticipating the sequence of behaviors necessary to accomplish learning tasks), monitoring (of one's comprehension and tracking of one's attention), and regulating (seeking or arranging conditions that facilitate learning as well as to fine-tuning and continuous adjustment of one's cognitive activities) progress to accomplish a learning task (Duncan & McKeachie, 2004; Lewalter, 2003; Pintrich et al., 1991). This learning strategy essentially deals with the learners' awareness of their learning/thinking processes and their ability to manage the processes of learning

The third classification is the resource management strategy. Resource management deals with learners' strategies to direct their learning using resources. Resource management strategies are learners controlling resources other than their cognition (Duncan & McKeachie, 2004). They further posit that they are techniques for managing and organizing the external resources necessary for learning (Duncan & McKeachie, 2004). It includes strategies such as time and study environment and effort regulation. Time and study environment strategy is scheduling, planning, regulating, and managing one's study time and environment (Duncan & McKeachie, 2004; Pintrich et al., 1991). Effort regulation as a learning strategy involves controlling effort and attention in the face of distractions, uninteresting tasks, and persisting in complex or tedious tasks (Duncan & McKeachie, 2004; Pintrich et al., 1991). According to Pintrich et al. (1991), two other learning strategies are peer learning, which involves using a study group or friends to help learn, and help-seeking, which consists of seeking help from peers or instructors when needed. Some studies have linked these strategies to academic achievement (Akyol et al., 2010; Hayat et al., 2020; Nabizadeh et al., 2019). Effective learning strategies are essential tools that empower postgraduate students to navigate the complexities of their chosen fields, optimize their comprehension, and facilitate knowledge application.

2.1. The present study

While many factors contribute to academic success, understanding the multifaceted interplay between motivation, learning strategies, and academic achievement is crucial in unlocking the true potential of postgraduate students. The context of postgraduate education introduces an additional layer of complexity to this intricate relationship. With rigorously heightened academic demands, intellectual challenges, specialized research pursuits, and expectations, postgraduate students navigate a terrain that necessitates a refined understanding of motivation and learning strategies. The relationship between motivation, learning strategies, and academic outcomes of postgraduate students is intricate and interdependent. A harmonious synergy between motivation and strategic learning behaviors can create a self-reinforcing cycle that fosters academic success, while a misalignment might lead to suboptimal results. As such, comprehending the dynamics of this relationship among postgraduate students can yield valuable insights for educators, institutions, and policymakers to design targeted interventions that enhance academic performance and promote holistic development.

Thus, the present study endeavors to explore the prediction and relationship between motivation, encompassing intrinsic and extrinsic goal orientation and task value, and learning strategies, encompassing control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, and help-seeking, in shaping the academic outcomes of postgraduate students. By delving into this intricate web of variables, this research aims to contribute to the existing body of knowledge, bridging the gap in the literature and guiding the cultivation of enriched educational experiences that propel postgraduate students toward realizing their fullest potential and academic aspirations. The study aims to

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examine the prediction/relationship between motivation (intrinsic goal orientation, extrinsic goal orientation, task value), learning strategies (control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, and help-seeking) and academic achievement of postgraduate students.

Research Questions: The following research questions guided the study

1. To what extent do motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking and help-seeking jointly predict academic achievement of postgraduate students

2. What are the relative predictive contributions of motivation and learning strategies of study strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking and help-seeking on academic achievement of postgraduate students

Hypotheses: To guide this study, two null hypotheses were tested at a 0.05 level of significance:

1. The combination of motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking and help-seeking jointly, do not significantly predict postgraduate students' academic achievement

2. There are no significant predictive contributions of motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time/study environment management, effort regulation, peer learning, critical thinking and help-seeking independently on post-graduate students' academic achievement

3. Methodology

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3.1. Research design

The correlation design, using multiple predictions, was used as the research design for the study. According to Kpolovie (2010), correlation research is a method used to determine the strength and direction (positive or negative) of a relationship between a dependent variable (also known as a criterion variable) and one or more independent variables (predictor variable), it examines the relationship between one dependent variable and two or more independent variables using the least-squares associate principle.

3.2. Population and sample

The study population comprises 2503 postgraduate master's students enrolled for 2015/2016 postgraduate programs at the University of Port Harcourt (Postgraduate school). The researcher chose to use doctoral students for the study because they are presumed to be more mature and have developed some individualized learning strategies during their undergraduate programs. The sample/ study group consisted of 333 students (196 males representing 59% and 137 females representing 41%) drawn using a multi-stage sampling procedure. In the first stage of the research procedure, a simple random sampling technique (balloting) was used to select four faculties out of twelve (12) at the University of Port Harcourt. In the second stage, simple random sampling (throw of a coin) was used to draw six (6) departments from the four (4) faculties. In the third stage, disproportionate stratified random sampling based on gender was used to pull 333 students. The age of the study group ranged from 24-50 years.

3.3. Data collection tools

The researcher adapted one instrument for data collection, the Motivated Strategies for Learning Questionnaire (MSLQ) by Pintrich et al. (1991). The Motivated Strategies for Learning Questionnaire (MSLQ) is a self-report instrument designed to assess University students' motivational orientations and their use of different study strategies for a college course. The MSLQ is based on a general cognitive view of motivation and learning strategies.

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There are two sections to the MSLQ: a motivation section and a learning strategies section. The researcher reviewed all the items in the instruments and selected 66 items out of 81 items for the study. The instrument had 17 items measuring motivation (intrinsic goal orientation, extrinsic goal orientation, task value), 49 items eliciting information on students' use of different cognitive, meta-cognitive strategies, resource management peer helping and help-seeking strategies (control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, and help-seeking). Responses to each question were rated on a seven-point (7-point) Likert scale from "not at all true of me" to "very true of me. Furthermore, the researcher drafted a proforma and used it to collect the participants 'CGPAs from their various departments, constituting their academic achievement.

3.4. Validity and reliability of the instrument

The Motivated Strategies for Learning Questionnaire (MSLQ) instrument was re-established for validity and reliability to fit the current study on a sample of 20 respondents; these instruments were pilot-tested even though they had already been validated by the developers of the original instruments from which they were adapted. Drafts of the instruments, along with the research questions and study's hypotheses, were given to measurement and evaluation specialists and educational psychologists to have their opinions on the instruments' content, usefulness, thoroughness, clarity, and literacy requirements to determine their face and content validity. The Construct validity was determined by correlating each sub-scale total score with the total score of motivated strategies for the MSLQ. These scores were correlated using Pearson product-moment correlation, and a correlation coefficient of .813 for extrinsic goal orientation, .838 for intrinsic goal orientation, .807 for task value, .755 for control of learning beliefs, .758 for rehearsal, .794 for elaboration, .650 for organization, .841 for metacognitive self-regulation, .893 for time/study environment management, .625 for effort regulation, .625 for effort regulation, .819 for peer learning, .514 for help-seeking, and .859 for critical thinking. All these indicate a high positive correlation. This also accounted for the reliability of the instrument. To further establish the instrument's reliability, Cronbach's alpha reliability method was used, and a Cronbach alpha reliability coefficient of 0.929 was obtained for a motivated strategy for the learning questionnaire. This result indicates a high internal consistency rehearsal.

3.5. Data analysis

Ethics was taken into consideration in the course of the research. All respondents were provided with comprehensive information about the research objectives, procedures, and the nature of the instruments they would be asked to respond to. Before their participation, respondents were requested to provide informed consent, indicating their willingness to participate voluntarily. Respondents were assured that their information would be treated with the utmost confidentiality. They were explicitly informed that their responses would be used solely for research purposes and would not be disclosed to unauthorized parties. Additionally, the data collected was anonymized through coding to protect the respondents' identity further. The collected data, including coded information, was stored on secure computer systems with restricted access. Only authorized researchers had access to these systems, and stringent security measures, such as strong passwords and firewalls, were employed to prevent any unauthorized access or breaches.

The data obtained was cleaned, and a normality test was carried out. The test showed the skewness coefficient to be .98 while the kurtosis coefficient was .752. This test result showed that the distribution for the study did not fall outside the range of normality, so the distribution was considered normal. These statistical data depict the normal distribution of the scores (George & Mallery, 2010; Hair et al., 2010, 2022; Tabachnick & Fidell, 2013). The data for the study fulfilled the assumption of normal distribution. Therefore, research questions were answered using simple and multiple regression analysis. At the same time, the hypotheses were tested using simple and multiple regressions associated with ANOVA at a significant level of .05. All these analyses were conducted through Statistical Package for the Social Sciences (SPSS) version 21.

4. Results

Research Questions 1: To what extent do motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking and help-seeking jointly predict academic achievement of postgraduate students. Multiple Regression Analysis of the joint prediction/contributions of motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation,

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time/study environment management, effort regulation, peer learning, critical thinking and help-seeking on post-graduate students' academic achievement.

Table 1. Multiple regression analysis

Model	R	R Square	Adjusted R Square
1	.833[a]	.694	.682

According to the results in Table 1, motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking and help-seeking jointly has an R-value of .833 indicating that there is a very high positive relationship between these learning strategies and post-graduate students' academic achievement. It shows an R^2 change of .694, indicating that these learning strategies jointly account for 69% of the proportion of variation in postgraduate students' academic achievement. This data suggests that motivation (intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs) and learning strategies (elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking, and help-seeking) jointly increases, academic achievement is predicted to grow as well, and vice versa.

Hypotheses 1: The combination of motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking and help-seeking jointly, do not significantly predict postgraduate students' academic achievement

Table 2. ANOVA associated with multiple regression analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.326	13	2.410	55.734	.000[b]
	Residual	13.792	319	.043		
	Total	45.118	332			

ANOVA Associated with Multiple Regression Analysis of the joint prediction/contributions of motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time/study environment management, effort regulation, peer learning, critical thinking and help-seeking on post-graduate students' academic achievement

ANOVA associated with multiple regression, as shown in Table 2 reveals an F – value of 55.734 df = (319) P. 000 <.05. Therefore, the null hypothesis that the combination of motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, critical time and study environment management, effort regulation, critical thinking, peer learning and help-seeking jointly, do not significantly predict postgraduate students' academic achievement is rejected and the alternate accepted. This implies that motivation (intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs) and learning strategies (elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking, and help-seeking) jointly predicts post-graduate students' academic achievement significantly. This statistically significant prediction of these learning strategies jointly with $p < 0.05$ is implausible to have occurred by chance. In other words, this positive relationship and prediction is genuine and not due to random variation.

Research Questions 2: What are the relative predictive contributions of motivation and learning strategies of study strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking and help-seeking on academic achievement of postgraduate students

Hypotheses 2: There are no significant predictive contributions of motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time/study environment management, effort regulation, peer learning, critical thinking and help-seeking independently on post-graduate students' academic achievement

Simple regression analysis of the prediction/contributions of motivation and learning strategies of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization,

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meta-cognitive self-regulation, time/study environment management, effort regulation, peer learning, critical thinking and help-seeking independently on post-graduate students' academic achievement

Table 3. Simple regression analysis

Motivation & Learning Strategies	R	R Square	B	t	Sig
Intrinsic Goal Orient	.817	.667	.060	25.73	.000
Extrinsic Goal Orient	.717	.514	.055	16.69	.000
Task Value	727	.529	043	19.26	.000
Control of Learning Belief	.692	.478	.050	17.42	.000
Rehearsal	.687	.472	.050	17.19	.000
Elaboration	.624	.389	.031	14.51	.000
Organizing	.668	.446	.045	16.33	.000
Self-Regulation	.743	.552	.021	20.17	.000
Time/study Environ	.671	.450	.023	16.44	.000
Effort Regulation	.539	.290	.037	11.62	.000
Critical Thinking	.737	.544	.043	19.86	.000
Peer Learning	.161	.026	.016	2.969	.003
Help Seeking	.595	.354	.044	13.47	.000

According to the results in Table 3, Intrinsic goal orientation has an R-value of .817, indicating a very high positive relationship between intrinsic goal orientation and postgraduate students' academic achievement. It shows an R^2 change of .667, indicating that inherent goal orientation accounts for 66% of the proportion of variation in postgraduate students' academic achievement. This data suggests that as Intrinsic Goal Orientation increases, academic achievement is also predicted to grow, and vice versa. The table shows that Extrinsic goal orientation has an R-value of .717, indicating a high positive relationship between extrinsic goal orientation and postgraduate students' academic achievement. It shows an R^2 change of .514, indicating that extrinsic goal orientation accounts for 51% of the proportion of variation in postgraduate students' academic achievement. It further shows that task value has an R-value of .727, indicating a highly positive relationship between task value and doctoral students' academic achievement. It shows an R^2 change of .539 five hundred twenty-nine, indicating that task value accounts for 52% of the proportion of variation in postgraduate students' academic achievement. It further shows that control of learning belief has an R-value of .692, showing a high positive relationship between control of learning belief and academic achievement. It also shows an R^2 change of .478, showing that control of learning belief accounts for 47% of the proportion of variation in postgraduate students' academic achievement. The table also reveals that rehearsal has an R-value of .687, showing a positive relationship between it and academic achievement. It also shows an R^2 change of .472, which accounts for 47% of the variation in postgraduate students' academic achievement. The table also reveals that organizing has an R-value of .684, showing a positive relationship between it and academic achievement. It also shows an R^2 change of .389, accounting for 38% of the variation in postgraduate students' academic achievement. The table also reveals that Elaboration has an R-value of .624, showing a positive relationship between it and academic achievement. It also shows an R^2 change of .446, which accounts for 44% of the variation in postgraduate students' academic achievement.

The table shows that self-regulation as a learning strategy has an R-value of .743, showing a positive relationship between self-regulation as a learning strategy and academic achievement. It also shows an R^2 change of .552, accounting for 55% of the variation in postgraduate students' academic achievement. The table also shows that time and study environment have an R-value of .671, showing a high positive relationship between it and academic achievement. It also shows an R^2 change of .450, showing that it accounts for 45% of the proportion of variation in postgraduate students' academic achievement. Effort regulation has an R-value of .539, showing a high positive relationship between it and academic achievement. It also shows an R^2 change of .290, which accounts for 29% of the variation in postgraduate students' academic achievement. Effort regulation has an R-value of .737, showing a high positive relationship between it and academic achievement. It also shows an R^2 change of .544, accounting for 54% of the variation in postgraduate students' academic achievement. Peer learning has an R-value of .161, showing a low positive relationship between it and academic achievement. It also shows an R^2 change of .026, showing that it accounts for 2.6% of the proportion of variation in postgraduate students' academic achievement. Help-seeking has an R-value of .595, showing a high positive relationship between it and academic achievement. It also shows an R^2 change of .394, accounting for 39% of the variation in postgraduate students' academic achievement.

The beta value further gives information on the relative contribution of each of these learning styles on the academic achievement of postgraduate students. It shows that Intrinsic goal orientation, with a beta value of .060,

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has the highest independent contribution to postgraduate students' academic achievement, followed by extrinsic goal orientation, with a beta value of .055; this is simultaneously followed by control of learning belief and rehearsals, both with beta values of 050. This is followed by organizing's contribution with a beta value of .045, then help-seeking with a beta value of .044, task value, and critical thinking with the same beta value of .043. This is followed by effort regulation with a beta value of .037, then by elaboration with a beta value of .031, then time and study environment with a beta value of .023, and lastly by self-regulation learning strategy with a beta value of .021, having the lowest contribution.

The t-test associated with the simple regression analysis shows that all the motivation and learning strategies independently significantly predict the academic achievement of postgraduate students as they all had $p < 0.05$. Therefore, the null hypothesis that there is no significant prediction of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time/study environment management, effort regulation, peer learning, critical thinking and help-seeking independently on postgraduate students' academic achievement is rejected and the alternate accepted. This implies that intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, elaboration, organization, meta-cognitive self-regulation, time/study environment management, effort regulation, peer learning, critical thinking, and help-seeking independently significantly predict postgraduate students' academic achievement. This shows that these statistically significant predictions of these learning strategies independently with a p-value (Sig) less than 0.05 are improbable to have occurred by chance. In other words, the positive relationship and prediction are real and not due to random variation.

5. Discussion

The result shows that motivation (intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs) and learning strategies (elaboration, organization, meta-cognitive self-regulation, time and study environment management, effort regulation, peer learning, critical thinking, and help-seeking) jointly predicts postgraduate students' academic achievement significantly. This finding aligns with previous research (Ahmed et al., 2016; Crede & Philip 2012; Dalgıç et al., 2024; Demir & Demir, 2014; Demir et al., 2023; Lynch 2010; Mirzaei-Alavijeh et al., 2019; Muwonge et al., 2019; Nabizadeh et al., 2019; Neroni et al., 2019; Pokay & Blumenfeld, 1990; Obrent 2012; Schneider & Preckel 2017; Ulstad et al., 2016; Wild & Neef,2023; Yusof et al., 2021) which showed that motivation and learning strategies significantly relates and predicts academic achievement. This is also somewhat at variance with the study of Creede & Philip (2011), where their results showed that strong relationships were found between individual grades (academic achievements) and effort regulation, time and study environment management, and metacognitive self-regulation while the remaining learning strategies proved to be unrelated to academic performance. The slight variance could be the difference in the sample demographics and location of the studies. This study result highlights the potential role of these learning strategies in enhancing and improving learning outcomes and students' success. The prediction and high positive relationship between these learning strategies and academic achievement can be explained by several factors.

Motivation factors such as intrinsic and extrinsic goal orientation reflect students' motivations for learning. When students have a strong desire to learn (intrinsic motivation) and are also driven by external rewards (extrinsic motivation), they tend to judge course contents as attractive, practical, and essential (task value) and believe that their efforts to learn will result in positive outcomes; thus they are more likely to invest effort and perform well academically. More so, the various learning strategies like cognitive strategies like rehearsal, elaboration, organizing, and critical thinking and meta-cognitive learning strategies like self-regulation enhance students' ability to comprehend, retain, and apply knowledge effectively. These strategies help students become more efficient and effective learners. Other learning strategies like effective time management and a conducive study environment can optimize the learning process, allowing students to focus on their studies and reduce distractions as well as effort regulation, which can help students monitor and adjust their effort based on the perceived difficulty of the task can lead to better performance academically. Furthermore, collaborative learning with peers and help-seeking can lead to a deeper understanding of the subject matter through discussions, assistance from peer teaching, and shared insights by postgraduate students. The joint prediction and relationship between motivation and learning strategies create a synergy that promotes academic achievement. Motivated students are more likely to seek out and implement effective learning strategies. In contrast, these strategies, in turn, can reinforce and sustain motivation, ultimately increasing students' academic achievement.

Intrinsic and extrinsic goal orientation as motivational learning strategies independently significantly predicts academic achievement. This aligns with the research findings of (Bulus, 2011; Chyung et al., 2010; El-Adl &

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Alkharusi 2020). Intrinsic goal orientation, characterized by a genuine passion for learning and personal growth, emerged as a strong predictor of academic achievement. Postgraduate students who are internally motivated tend to excel academically. Students with a solid intrinsic goal orientation are more likely to be engaged in their studies, actively seek out information, and persist in facing challenges. This inherent motivation positively impacts their academic achievement, similar to extrinsic goal orientation, while still a form of motivation driven by external rewards such as grades or recognition. Students with a high extrinsic goal orientation may perform well academically to achieve these rewards, which can lead to higher academic achievement. The result also shows that task value as a motivational learning strategy independently significantly predicts academic achievement and relates with it. This aligns with the research findings of (Al-Harty et al., 2011; Bulus, 2011; Chyung et al., 2010; El-Adl & Alkharusi 2020). This result could be because when students see the value in their learning, they are more likely to be motivated and put in the effort to succeed, resulting in higher academic achievement. The result shows that controlling learning beliefs as a motivational learning strategy relates to and independently predicts academic achievement. This is in tandem with research findings (Bulus, 2011; Chyung et al., 2010; El-Adl & Alkharusi, 2020). Believing control over one's learning processes can lead to better study habits and strategies. Students who feel in control are more likely to manage their learning actively, leading to improved academic achievement.

The result reveals that rehearsal as a cognitive learning strategy relates to and independently significantly predicts academic achievement. This agrees with the research findings of Nabizadeh et al. (2019). Rehearsal is a cognitive strategy involving repetition and memorization. Students who use effective rehearsal techniques can better retain information and perform well in exams, which is positively related to academic achievement. The result shows that organizing as a cognitive learning strategy relates to and independently significantly predicts academic achievement. This aligns with the research findings of Akyol et al. (2010) and Nabizadeh et al. (2019). Organizing information and study materials helps students create a structured study approach. When students can effectively organize their learning, they can manage their time and resources efficiently, leading to improved academic performance. The result suggests that elaboration as a cognitive learning strategy relates to and independently significantly predicts academic achievement. This is in tandem with the research findings of Akyol et al. (2010) and Nabizadeh et al. (2019). Elaboration involves connecting new information to existing knowledge and concepts. This cognitive strategy enhances understanding and material retention, increasing academic achievement. The result suggests that critical thinking as a cognitive learning strategy relates to and independently significantly predicts academic achievement. This is in tandem with the research findings of Nabizadeh et al. (2019) and Sabri et al. (2019). Students who are critical thinkers are better able to apply previous knowledge to new situations to solve problems, reach decisions, or make critical evaluations of ideas or concerning standards of excellence and thus achieve high

Metacognitive self-regulation as a metacognitive learning strategy relates to and independently significantly predicts academic achievement. This is in tandem with research findings (Al-Harty et al., 2011; Akyol et al., 2010; Crede & Philip, 2011; Kizilcec et al., 2017; Nabizadeh et al., 2019). Students who practice self-regulation are better equipped and able to set goals, monitor progress, adjust study strategies accordingly, manage time, stay focused, and achieve higher academic success. Furthermore, the result shows that time and study environment as resource management learning strategies relate and independently significantly predict academic achievement. This is in tandem with the research findings of Neroni et al. (2019), where time and effort management were the strongest significant positive predictors of academic performance. This is the same as the significant relationship that was found by Crede and Philip (2011), Cheema et al. (2018), and Schneider and Preckel (2017). This is also the same as that of Cheema et al. (2018). Effective time management and a conducive study environment are essential for academic success. Students who allocate their time wisely and create a distraction-free study space are likelier to perform well. The result suggests that effort regulation as a learning strategy relates to and independently significantly predicts academic achievement. This is in tandem with the research findings of ((Cheema et al., 2018; Ulstad et al., 2016). Effort regulation is the ability to sustain effort and maintain motivation during learning. Students who can regulate their efforts are likelier to persist through challenges, leading to improved academic outcomes.

The result reveals that peer learning as a learning strategy relates to and independently significantly predicts academic achievement. This is in tandem with the research findings of Akyol et al. (2010) and Nabizadeh et al. (2019). Peer learning, while still positively related to academic achievement, has a relatively low contribution compared to other strategies. Interacting with peers can enhance understanding through discussion and collaboration, although its impact may vary. The result further suggests that help-seeking as a learning strategy relates to and independently significantly predicts academic achievement. This is in tandem with the research findings of

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Ulstad et al. (2016). Seeking help when faced with challenges or difficulties is an important learning strategy. Students not afraid to seek assistance when needed are more likely to overcome obstacles, contributing to better academic performance.

6. Conclusion

It is concluded that various learning strategies significantly predict, relate to, and contribute to the academic achievement of postgraduate students. These findings highlight the complex interplay between different learning strategies and their impact on academic achievement.

6.1. Theoretical and practical implications

Theoretically, this study's findings have implications for strengthening the existing theoretical models that emphasize the influence of motivation and learning strategies on academic achievement. The result aligns with prominent motivational theories such as Self-Determination Theory (SDT) and Expectancy-Value Theory (EVT). It suggests that students' intrinsic and extrinsic goal orientations, perceived task value, and control of learning beliefs are crucial in determining their academic achievement. The finding supports SDT's proposition that intrinsic motivation, driven by internal satisfaction and interest in learning, leads to higher academic performance. Extrinsic motivation, stemming from external rewards or punishments, also influences achievement outcomes, as reflected by extrinsic goal orientation. Furthermore, this study's finding substantiates EVT, which posits that individuals' expectations of success and the perceived value of a task influence their motivation and subsequent performance. The study's result corroborates this theory by highlighting the predictive power of task value in postgraduate students' academic achievement. Theoretical implications extend to Cognitive Load Theory (CLT, suggesting that effective learning strategies, such as elaboration, organization, and meta-cognitive self-regulation, optimize cognitive resources, thereby enhancing academic outcomes. These strategies facilitate deeper information processing, leading to improved retention and application of knowledge.

The study's practical implications extend to educational practices, emphasizing the importance of fostering intrinsic motivation through engaging lessons and providing external rewards for extrinsic motivation. Implementing interventions that promote effective learning strategies, such as self-regulation and peer learning, can enhance academic outcomes. From a pedagogical perspective, the findings suggest the need for educators to tailor instructional methods to accommodate diverse learning styles and preferences. Educators can enhance task value and promote engagement by aligning course content with students' interests and career aspirations. This also includes integrating technology into teaching and assessment practices and creating collaborative learning environments to support students' cognitive development and motivation.

Practically, Institutions can offer professional development workshops for educators to enhance their understanding of motivational theories and effective teaching strategies. Equipping educators with the knowledge and skills to create motivating learning environments and provide constructive feedback can positively impact students' academic achievement. Another implication of this study is that educational institutions can expand student support services to include counseling, academic advising, and mentoring programs that address motivational issues and learning strategy development. By providing individualized guidance and support, institutions can empower students to set goals, overcome challenges, and succeed academically.

6.2. Limitations and suggestions for further study

Educators should nurture intrinsic and extrinsic motivation by designing engaging lessons, emphasizing task value, teaching self-regulation, and promoting effective cognitive strategies. They should support students in creating productive study environments, encourage peer learning, and foster a culture of help-seeking. Individualized guidance and timely feedback are essential. Students should cultivate intrinsic motivation, set clear goals, understand task value, practice self-regulation, and employ effective cognitive strategies. Creating a conducive study environment, engaging in peer learning, seeking help when needed, reflecting on and adjusting study habits, and maintaining persistence are crucial for success. Educational institutions should invest in faculty development, offer academic advising, establish resource centers for study skills, promote peer learning, and continuously assess and improve teaching methods and support services.

Although the research achieved its aim, it is limited by not using a larger sample size from a more diverse geographical location as it was conducted with a specific group of postgraduate students from a particular institution. Also, the accuracy of results may be affected by students' self-reported information, which may only sometimes be truthful. Although the following limitations notwithstanding, a representative sample was obtained, and

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the findings were not affected; thus, valid generalization is enabled. It is suggested that longitudinal studies that track postgraduate students over an extended period be conducted to understand how motivation and learning strategies evolve and influence academic achievement throughout their academic journeys. Given the growing prevalence of digital education, future research can also be conducted on the role of motivation and learning strategies in online and blended learning settings.

References

Ahmed, Oli, Uddin, M. & Khanam, M. (2016). Motivation and learning strategies as strong predictors of academic achievement. *Indian Journal of Psychology and Education*, *6*, 120-132.

Al-Harthy, I.S., Was, C.A., & Isaacson, R.M. (2010). Goals, Efficacy and Metacognitive Self-Regulation A Path Analysis. *International Journal of Education*, 2. https://doi.org/10.5296/IJE.V2I1.357

Ahangi, A., &Sharaf, Z. (2013). Investigating the relationship between self-efficacy, the locus of control and male and female students' academic achievements in Chenaran high school. *International Journal of Engineering Research and Applications, 3*(5), *875 – 879.*

Akyol, G. Sungur, S. & Tekkaya, C. (2010). The contribution of cognitive and metacognitive strategy use to students' science achievement. *Educational Research and Evaluation, 16,* 1-21. https://doi.org/10.1080/13803611003672348.

Alexander P. A., Graham S., Harris K. R. (1998). A perspective on strategy research: progress and prospects. Educ. Psychol. Rev, *10*, 129–154. https://doi.org/10.1023/A:1022185502996

Bolt, N. (2011). *Academic Achievement*. In: Goldstein, S., Naglieri, J.A. (eds) Encyclopedia of child behavior and development. Springer, Boston, MA. https://doi.org/10.1007/978-0-387-79061-9_20

Bulus, M. (2011). *Goal orientations, locus of control and academic achievement in prospective teachers: An individual differences perspective.* Educational Research Association, San Francisco, CA. ERIC Document Reproduction Service No: ED 383770.

Credé, M., & Phillips, L. A. (2011). A meta-analytic review of the motivated strategies for learning questionnaire. *Learning and Individual Differences*, *21,* 337–346. https://doi. org/10.1016/j.lindif.2011.03.002

Chyung, S. Y., Moll, A. J., & Berg, S. A. (2010). The role of ıntrinsic goal orientation, self-efficacy, and e-learning practice in engineering education. *The Journal of Effective Teaching*, *10*(1), 22 – 37.

Dalgıç, A., Yaşar, E., & Demir, M. (2024). ChatGPT and learning outcomes in tourism education: The role of digital literacy and individualized learning. *Journal of Hospitality, Leisure, Sport & Tourism Education, 34,* 1-13. https://doi.org/10.1016/j.jhlste.2024.100481

Demir, M., & Demir, Ş. Ş. (2014). A comparison the factors affected on academic satisfaction of students between traditional learning and distance learning models. *International Journal of Innovative Research in Education, 1*(1), 01-09.

Demir, M., Demir, Ş. Ş., & Aktürk, O. (2023). The Effects of Distance Education Capabilities and Competencies on Learning Outcomes During COVID-19 in Higher Education Institutions. *Journal of Hospitality & Tourism Education,* 1-12. https://doi.org/10.1080/10963758.2023.2191966

Duncan, T. G., & McKeachie, W. J. (2005). The Making of the Motivated Strategies for Learning Questionnaire. *Educational Psychologist, 40*(2), 117–128. https://doi.org/10.1207/s15326985ep4002_6

Duru, E., Duru, S. & Balkıs, M. (2014). Analysis of relationships among burnout, academic achievement, and self-regulation. *Educational Sciences: Theory & Practice, 14,* 1263– https://doi.org/10.12738/estp.2014.4.2050

El-Adl, A. & Alkharusi, H. (2020). Relationships between self-regulated learning strategies, learning motivation and mathematics achievement. *Cypriot Journal of Educational Science*, *15*(1), 104–111. https://doi.org/10.18844/cjes.v15i1.4461

Federal Ministry of Health (2007). *National Code of Research Ethics*. https://portal.abuad.edu.ng/lecturer/documents/1588255709NCHRE_Aug_07.pdf

George, D. & Mallery, M. (2010). *SPSS for Windows step by step: a simple guide and reference*. Pearson.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* Sage.

Hair, J., Black, W. C., Babin, B. J. & Anderson, R. E. (2010) *Multivariate data analysis*. Pearson Educational International.

Hariri, H., Karwan, D. H., Haenilah, E. Y., Rini, R., & Suparman, U. (2021). Motivation and learning strategies: student motivation affects student learning strategies. *European Journal of Educational Research*, *10*(1), 39-49.

Hayat, A.A., Shateri, K., Amini, M. et al (2020). Relationships between academic self-efficacy, learning-related emotions, and metacognitive learning strategies with academic performance in medical students: a structural equation model. *BMC Med Educ 20*, 76. https://doi.org/10.1186/s12909-020-01995-9.

Klassen, R.M., Krawchuk, L.L. &Rajani, S. (2008). Academic procrastination of undergraduates: low self-efficacy to self-regulate predicts higher levels of procrastination. *Contemporary Educational Psychology*, *33*(4), 915-931.

Kavita, K. S. (2014). Motivational beliefs and academic achievement of university students. *ISOR Journal of Research and Method in Education 4*(1), 01-03.

Kavyar, A., Torbatinezgad, H., & Ghandizadeh, M. (2022). Predicting academic achievement based on achievement motivation and self-regulated learning strategies of female high school students. *Journal of Pouyesh in Education and Consultation*, *14*(16), 24-42.

ISSN: 2149-5939

Kizilcec, R. F., Pérez-Sanagustín, M., & Maldonado, J. J. (2017). Self-Regulated Learning Strategies Predict Learner Behavior and Goal Attainment in Massive Open Online Courses. *Computers & Education*, *104*, 18-33.

Kpolovie, P. J. (2010). *Advance Research Methods*. New Owerri: Springfield Publishers Ltd.

Kusurkar, R. A., Croiset, G., Galindo-Garré, F., & Ten Cate, O. (2013). Motivational profiles of medical students: association with study effort, academic performance and exhaustion. *BMC Medical Education, 13*(1), 1-8.

Lisá E, Sokolová L, Jablonická P., Kardelisová L.(2023. Motivation to succeed is not enough: motivated students need to know how to plan/organize their steps on their way to success. *Frontiers in Psychology*, *14* https://doi.org/10.3389/fpsyg.2023.1119409

Lynch, D. J. (2010). Motivational beliefs and learning strategies as predictors of academic performance in college physics. *College Student Journal*, *44*(4),

Lewalter, D. (2003). Cognitive strategies for learning from static and dynamic visuals. *Learning and Instruction, 13*(2), 177–189. https://doi.org/10.1016/S0959-4752(02)00019-1

Lee, Mijoo, (2014). *Development of An Instrument Of Learning Strategies For Upper Elementary School Students.* PhD diss., University of Tennessee, 2014. https://trace.tennessee.edu/utk_graddiss/3147

Mega, C., Ronconi, L., & De Beni, R. (2014). What Makes a Good Student? How Emotions, Self-Regulated Learning, and Motivation Contribute to Academic Achievement. *Journal of Educational Psychology*, *106,* 121. https://doi.org/10.1037/a0033546

Marcus Credé, L. Alison Phillips, (2011). A meta-analytic review of the motivated strategies for learning questionnaire. *Learning and Individual Differences*, *21*(4), 2011, Pages 337-346, https://doi.org/10.1016/j.lindif.2011.03.002.

Mayer, R. E. (2007). *Learning and Instruction*. Englewood Cliffs, NJ: Prentice Hall.

Mirzaei-Alavijeh M , Pasdar Y , Hatamzadeh N, Solaimanizadeh L , Khashij S & Jalilian, Farzad. (2020). The role of motivational strategies in prediction of grade point average: An analytical cross-sectional study among students of Kermanshah University of Medical Sciences. *Educational Research in Medical Sciences,* 8(2), 1-12. https://doi.org/10.5812/erms.94234.

Muwonge C.M, Schiefele U, Ssenyonga J, Kibedi H. (2019). Modeling the relationship between motivational beliefs, cognitive learning strategies, and academic performance of teacher education students. *South African Journal of Psychology*, *49*(1), 122-135. https://doi.org/10.1177/0081246318775547.

Neroni, J., Meijs, C., Gijselaers, H. J. M., Kirschner, P. A., & de Groot, R. H. M. (2019). Learning strategies and academic performance in distance education. *Learning and Individual Diferences*, *73,* 1–7. https://doi.org/10.1016/j.lindif.2019.04.007

Nabizadeh, S., Hajian, S., Sheikhan, Z., & Rafiei, F. (2019). Prediction of academic achievement based on learning strategies and outcome expectations among medical students. *BMC medical education, 19*(1), 99. https://doi.org/10.1186/s12909-019-1527-9

Obrentz, Shari B., "Predictors of Science Success (2012) *The impact of motivation and learning strategies on college chemistry performance.* Dissertation, Georgia State University. doi: https://doi.org/10.57709/2227906

O'Malley, J. M., & Chamot, A. U. (1990). *Learning strategies in second language acquisition.* Cambridge University Press

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist*, *37*(2), 91–105. https://doi.org/10.1207/S15326985EP3702_4

Pekrun, R., Elliot, A. J., & Maier, M. A. (2009). Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology, 101*(1), 115–135. https://doi.org/10.1037/a0013383

Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology, 36*(1), 36–48. https://doi.org/10.1016/j.cedpsych.2010.10.002

Pintrich P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review, 16,* 385–407.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement, 53,* 801–813. https://doi.org/10.1177/0013164493053003024

Pokay, P., & Blumenfeld, P. C. (1990). Predicting achievement early and late in the semester: The role of motivation and use of learning strategies. *Journal of Educational Psychology, 82*(1), 41–50.

Sabri, S. S., Masrom, U. K., & Asshidin, N. H. N. (2020). Study On Academic Performance And Learning Strategies Of Tertiary Level Students. In N. S. Othman, A. H. B. Jaaffar, N. H. B. Harun, S. B. Buniamin, N. E. A. B. Mohamad, I. B. M. Ali, N. H. B. A. Razali, & S. L. B. M. Hashim (Eds.), Driving Sustainability through Business-Technology Synergy, vol 100. *European Proceedings of Social and Behavioural Sciences* 362-373. European Publisher. https://doi.org/10.15405/epsbs.2020.12.05.38

Shannon, S. V. (2008). Using metacognitive strategies and learning styles to create self-directed learners. *Institute for Learning Styles Journal, 1,* 14-28.

Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychological Bulletin, 143*(6), 565–600. https://doi.org/10.1037/bul0000098

ISSN: 2149-5939

Stegers-Jager, K. M., Cohen-Schotanus, J., &Themmen, A. P. N. (2012). Motivation, learning strategies, participation and medical school performance. *Medical Educaiton, 46,* 678 – 688.

Steinmayr Ricarda, Weidinger Anne F., Schwinger Malte, Spinath Birgit. (2019). The Importance of Students' Motivation for Their Academic Achievement – Replicating and Extending Previous Findings. *Frontiers in Psychology*, *10* https://doi.org//10.3389/fpsyg.2019.01730

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics (6th ed.).* Boston: Pearson

Ulstad, S. O., Halvari, H., Sørebø, Ø., & Deci, E. L. (2016). Motivation, learning strategies, and performance in physical education at secondary school. *Advances in Physical Education, 6*(01), 27-37

Wild, S., & Neef, C. (2023). Analyzing the associations between motivation and academic performance via the mediator variables of specific mathematic cognitive learning strategies in different subject domains of higher education. *IJ STEM Ed* 10, 32 https://doi.org//10.1186/s40594-023-00423-w

Yusof, N. S. H. C., Razak, N. F. A., Nordin, N. I., & Zulkfli, S. N. (2021). Self-efficacy, motivation, learning strategy and their ımpacts on academic performance. *International Journal of Academic Research in Business and Social Sciences*, *11*(9), 451–457.

Zimmerman, B. J., & Schunk, D. H. (Eds.). (2011). *Handbook of self-regulation of learning and performance*. Routledge/Taylor & Francis Group.

Author contribution statements

The authors equally contributed to the research design and implementation, analysis, and the manuscript's writing.

Disclosure statement

The authors reported no potential competing interest.

Ethics committee approval

Ethics Committee Approval is not required as this falls within the scope of regulations announced by the National Department of Health in 2007, which exempts research involving educational testing and research from formal ethical approval requirements, and since the data is based on 2015-16. All responsibility belongs to the researchers.

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