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Factors influencing students' academic achievement: evidence from University of Ha'il Kingdom of Saudi Arabia

طلباء کی تعلیمی کامیابیوں کو متاثر کرنے والے عوامل: سعودی عرب کی جامعہ حائل کنگڈم سے شواہد

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Abstract

The current study's goal is to determine the effect of "student interest," "perceived self-efficacy," and "learning motivation" on undergraduate students' CGPA. The present investigation employed a quantitative methodology, utilizing a cross-sectional survey delivered through an online Google Form that participants self-administered. The current study's target demographic was undergraduate students at a public university. In this survey, 230 undergraduate students took part. The variable combination predicted approximately 39.6% of the overall variance in predicting the CGPA. The predicted regression model in the study was significant ($F(3,226 = 50.960$, p 0.001), and it discovered that other than "students' interest," only two factors significantly predicted the outcome variable CGPA. However, "student interest" has a positive but negligible effect on the CGPA. It is recommended that teachers use effective classroom strategies to assist students in raising their interest, learning motivation, and self-efficacy to accelerate their academic achievement.

Keywords: students' interest, self-efficacy, learning motivation, CGPA, undergraduate students, Ha'il University.

خلاصہ:

موجودہ مطالعہ کا ہدف انڈر گریجویٹ طلباء کے مجموعی گریڈ پوائنٹ اوسط پر "طلبہ کی دلچسپی"، "سمجھی ہوئی خود افادیت" اور "سیکھنے کی تحریک" کے اثر کا تعین کرنا ہے۔ موجودہ تحقیقات میں ایک مقداری طریقہ کار کا استعمال کیا گیا ہے، جس میں ایک آن لائن گوگل فارم کے ذریعے فراہم کردہ ایک کراس سیکشنل سروے کا استعمال کیا گیا ہے جس کا شرکاء خود انتظام کرتے ہیں۔ موجودہ مطالعہ کا ہدف آبادی ایک عوامی یونیورسٹی کے انڈرگریجویٹ طلباء تھے۔ اس سروے میں انڈرگریجویٹ سطح پر انگلش میجرز نے حصہ لیا۔ متغیر امتزاج نے "مجموعی گریڈ پوائنٹ اوسط" کی پیشن گوئی کرنے میں مجموعی تغیر کے 230 ، اور اس نے $(F(3,226 = 50.960, p\ 0.00)$تقریباً 39.6% کی پیش گوئی کی۔ مطالعہ میں پیشن گوئی رجعت کا ماڈل اہم تھا دریافت کیا کہ "طلبہ کی دلچسپی" کے علاوہ، صرف دو عوامل نے نتائج کے متغیر "مجموعی گریڈ پوائنٹ اوسط" کی نمایاں طور پر پیش گوئی کی۔ تاہم، " طلباء کی دلچسپی" کا "مجموعی گریڈ پوائنٹ اوسط" پر مثبت لیکن نہ ہونے کے برابر اثر پڑتا ہے۔ یہ سفارش کی جاتی ہے کہ اساتذہ طلباء کی دلچسپی بڑھانے، سیکھنے کی ترغیب اور خود افادیت کو بڑھانے کے لیے ان کی تعلیمی کامیابی کو تیز کرنے میں مدد کرنے کے لیے موثر کلاس روم کی حکمت عملی استعمال کریں۔

مطلوبہ الفاظ: طلباء کی دلچسپی؛ خود افادیت؛ سیکھنے کی حوصلہ افزائی؛ مجموعی گریڈ پوائنٹ اوسط؛ انڈر گریجویٹ طلباء؛ جامعۃ حائل

Introduction

Theoretical background

Until recently, the policy on education has not prioritized encouraging student learning as well as very precisely, how to stimulate and sustain their interest in learning (Renninger & Hidi, 2020). Besides, taking an interest in what one is doing improves comprehension (Hagay & Baram-Tsabari, 2011). The growth of interest correlates with the capacity to maintain focus,

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plan and achieve objectives efficiently, apply learning techniques to manage behavior, feel confident, and make innovative contributions (Hidi, 1995; McDaniel, et al., 2000; Harackiewicz et al., 2008; Bernacki & Walkington, 2018; Sansone et al., 2015; Lee, et al., 2014; Izard & Ackerman, 2000). Within the wider context of education, learners have a network or framework of particular interests, a few directly tied to instructional goals, and others hostile to classroom learning (Ainley et al., 2002). It has been extensively reported in the literature how researchers have reintroduced the idea of interest after years of neglect. (Hidi, 1990; Krapp, 1999; Krapp, et al., 1992). Furthermore, the opinions people have about their ability to perform at specific capacities and exercise power over situations that affect their lives are referred to as perceived self-efficacy (Bandura, 1994). Self-efficacy is still a useful term since studies have indicated that a substantial degree of self-efficacy is linked to an optimistic self-perception, the use of advanced learning techniques, success standards, and persistence in a task (Puzziferro, 2008; Wang & Wu, 2008). Moreover, self-efficacy is the conviction that one can plan and carry out the necessary actions to achieve a desired outcome (Bandura, 1997). An absence of self-efficacy is also linked to a poor perception of oneself, and an aversion to taking on new challenges (Hsieh et al., 2008). According to Demirtas (2010), achievement among learners is demonstrated by the actions, expertise, and abilities that all students develop in learning contexts. It is also reflected in their educational results (Demirtas, 2010). Numerous studies on students' academic achievement have been undertaken (e.g., Demirtas 2010; Flashman, 2012; Lindholm-Leary, & Borsato, 2006; Wang & Wu, 2008). Individual variations in learning capacity and willingness to learn have long been thought to be major antecedents of learning and training performance (Campbell, 1989; Goldstein, 1993; Noe, 1986; Noe & Schmitt, 1986).

Review of the related literature

Students' interest

It appears to have consistently shown that interest, a concept with both cognitive and emotional components, influences learning. It has been seen to impact students' self-control and focus (Ainley et al., 2002; & Hidi & Ainley, 2008). One definition of individual interest is a reasonably persistent inclination to pay attention to particular events and occurrences and get involved in particular pursuits (Krapp et al., 1992; Renninger, 1992; Renninger, 2000). The level of excellence of a person's involvement in projects, activities, and assignments is improved by interest growth. Students with minimal or no experience might not be required to choose their courses, as interest is necessary for them to reach a well-informed selection (Renninger & Hidi, 2020). Hidi and Renninger (2006) define the initial spark of interest as enabling interaction, which, if sustained, may continue to expand and expand as time passes. This is reflected in their four-phase model of interest building. According to Ainley (1998), having a broad interest in learning is a defining attitude to tackling unfamiliar, unclear, or perplexing phenomena to comprehend them. This kind of interest may entail simultaneously extending one's current understanding and acquiring new information.

Moreover, Ainley's (1998) research discovered, a variety of favorable views on education were linked to an individual's overall interest in learning and academic achievement. The following represent a few instances of techniques for piquing and sustaining attention that can take into account variations in learners' interest: i) providing current content to students by use of unique, unexpected, or challenging assignment aspects (Hidi & Baird, 1986; Nieswandt & Horowitz, 2015); ii) allowing students to collaborate directly on unrestricted assignments, capitalizing on their interest in the interpersonal aspects of collaborative tasks (Knogler, et al., 2015; Mitchell, 1993); iii) putting students' current interests within the context of texts as well as challenges to personalize the material (Bernacki & Walkington, 2018). Numerous studies on students' interest have been undertaken (Ainley, 1998; Ainley et al., 2002; Xu et al., 2012; Crouch et al., 2018; Rotgans & Schmidt, 2011).

Perceived self-efficacy

Perceptions of one's ability to plan and carry out the actions necessary to achieve certain goals are called self-efficacy (Bandura, 1997). Self-efficacy has a significant influence on students' academic achievement because students with poorer levels of self-efficacy find it harder to persevere through more demanding, tough assignments (Bandura, 1996; De Clercq et al., 2011; Richardson et al., 2012). In an unfavorable environment, students struggle with educational adjustment in university, which has a detrimental influence on their educational advancement (Bailey & Phillips, 2016; Pascarella & Terenzini, 2005). Self-efficacy refers to a person's views that are developed through their daily

interactions. These beliefs impact the motivational, intellectual, and emotional reactions that people have when acquiring and growing (Bandura, 1996). Academic self-efficacy is essential to all aspects of a student's educational process, acting as a critical mediator in how learners act (Schunk & Mullen, 2012). Several research findings suggest that those with strong academic self-efficacy are more likely to exert significant effort when accomplishing academic assignments. On the other hand, individuals who have poor academic self-efficacy typically avoid taking on academic issues that they believe are beyond their reach (Britner & Pajares, 2006; Kiran & Sungur, 2012).

Learning motivation

Learning motivation is paying attention to and absorb the knowledge offered in a course of study for one's professional development (Noe, 1986). Likewise, it is well-recognized how people's learning motivation correlates to a variety of cognitive effects, notably, post-learning motivation, satisfaction as well as responses to instruction, and anxiousness (Colquitt et al., 2000). Cole et al. (2004) predict that the favorable association between class-specific motivation to acquire knowledge and emotional effects will be best if resilience is higher. Within such conditions, students are likely to have greater demands on themselves academically, partially because they are determined, feel effective, and view their current situation including their capacity to deal with it as less threatening. They go on to say that students who have been stimulated by educational difficulties are anticipated to stay driven, feel more cheerful rather than sad, and to respond positively towards their curriculum and teachers (Cole et al., 2004). Considering learning motivation seems changeable and may alter over a while (Noe, 1986), individuals' degree of learning motivation might fluctuate over a semester. Students' motivation for academic achievement may improve, diminish, or remain unchanged (Cole et al., 2004).

Previous studies and hypotheses development

Robbi et al. (2020) conducted a quantitative study on learning motivation on learning achievement in Indonesia with a sample of 224 students. Their study showed that students' success is significantly influenced by learning motivation. Similarly, Colquitt and Simmering (1998) performed a six-week longitudinal research on goal-setting and motivation to learn using 103 samples. They observed that diligence and 'learning orientation' were associated with motivation to learn before as well as following obtaining 'performance feedback', whereas 'performance orientation' was negatively associated with willingness to study equally before and following obtaining 'performance feedback'. The Investment Model Scale was established by Rusbult et al. (1998) to assess several factors that are important for comprehending how relationships function. With the process of measuring these variables, the scale gives an in-depth structure for assessing the stability and strength of interactions.

Feng (2013) studied on 109 Taiwanese undergraduate students. Their findings indicate that learning motivation is an important aspect of acquiring English as a foreign language, while there are a few differences between genders in students' learning motivations. Moreover, Huseinović (2024) evaluated the influence of gaming on student motivation and academic performance at higher education institutions. The study's findings show that gaming tactics have a substantial influence on students' motivation and also on how well they do in EFL classes and their academic achievement. In addition to the conventional behavioral, emotional, and cognitive dimensions, Reeve and Tseng (2011) investigate the idea of agency in students' participation in learning events and propose it as a fourth dimension. Their study investigates how agency, defined as students' active involvement in the learning process, influences overall engagement and academic achievement. Through empirical research and theoretical analysis, the authors assert that fostering agency is crucial for promoting deeper and more meaningful learning experiences.

Asvio et al. (2017) carried out a study to discover the effects of students' learning motivation on their academic accomplishment. They conducted this quantitative study on a sample of 129 students. Their findings showed that students' learning motivation had a significant favorable effect on their learning accomplishment. Zhao et al. (2022) investigated the impact of various learning tactics on learning motivation. Their study revealed that learning styles had a considerable influence on 'deep motivation'. Furthermore, Muthik et al. (2022) determined the impact of students' learning motivation on academic results utilizing the reciprocal teaching-learning framework. Their findings indicate that the use of reciprocal teaching-learning strategies can enhance student achievement by inspiring students to learn. Similarly, the association between middle school

pupils' academic achievement and their self-efficacy attribution is examined by Kairong et al. (1999). Their study explores the relationship between students' self-perceptions and academic success. It is likely that the researchers looked at how students' self-perceptions of their skills affect their drive, work ethic, and academic performance.

Jiao et al. (2022) research looked into the learning motivation of Chinese ethnic backgrounds university students. This study included a sample of 776 undergraduates representing three ethnically represented universities. The research revealed four distinct forms of English learning motivation: "intrinsic interest", "learning situation", "personal development", and "international communication". Findings showed that learning context motivation had a considerably negative effect on English proficiency, but intrinsic interest motivation showed a significantly positive effect. Similarly, Munawaroh et al. (2022) conducted a study with 129 learners from Indonesia's Economics department. They sought to find out how Koschmann, Myers, and Barrows' (1993) e-PBL framework affected motivation among pupils, interest, and success. They verified their hypotheses using the path analysis approach. They discovered the e-PBL approach assists students in solving and exploring their analytical abilities while also piquing their interest in tackling problems with learning.

Renninger and Hidi (2020) suggested a four-stage model for student interest development. They discovered that transformation in each stage of interest growth by an action of activating that drives seeking information, growing knowledge, and fostering appreciation in students. Besides, Ainley et al. (2002) explored the role of computer tasks in mediating students' interest and learning. Researchers looked into whether personal context-specific elements influence subject interest in sentence learning. According to the study's findings, the most robust model relating subject interest and learning stated that subject interest was associated with a psychological reaction, the impact ultimately then linked to text persistence, and perseverance contributed to academic achievement. Wilkins et al. (2016) look at how dedicated students are to their studies, how well they perform academically, and how satisfied they are with their whole educational experience. Study results indicate that students' involvement and achievement in higher education are positively impacted by their sense of loyalty and belonging in both social and organizational environments.

Casanova et al. (2024) studied academic performance determinants in 447 undergraduate students. For demographic factors, the results reveal statistically significant pathways. Academic engagement and self-efficacy had a favorable, substantial, and statistically noteworthy correlation. A recent study conducted by Chen et al. (2023). They explored the associations between career personality, academic self-efficacy, and learning participation among students studying tourism. According to the findings, there is no substantial relationship between students' occupational cognitive abilities and educational involvement.

According to the previous evaluation of the literature, the bulk of research has explored the interests of learners, learning motivation, and self-efficacy, with relatively few studies investigating the influence of the three antecedents on the CGPA. Furthermore, the influence of these factors has not been investigated in the Kingdom of Saudi Arabia. As a result, the current study aims to answer the following research question in light of previous studies and empirical findings:

Research hypotheses

The literature that has been discussed and the evidence from empirical studies provide the basis for the following hypotheses:

H1. There is a positive impact of undergraduate students' interest on their CGPA score
H1a. There is a positive impact of male undergraduate student's interest on their cumulative grade point average score
H1b. There is a positive impact of female undergraduate student's interest on their cumulative grade point average score
H2. There is a positive impact of undergraduate students' perceived self-efficacy on their cumulative grade point average score
H2a. There is a positive impact of male undergraduate students' perceived self-efficacy on their cumulative grade point average score
H2b. There is a positive impact of female undergraduate students' perceived self-efficacy on their cumulative grade point average score
H3. There is a positive impact of undergraduate students' learning motivation on their cumulative grade point average score
H3a. There is a positive impact of male undergraduate students' learning motivation on their cumulative grade point average score

H3b. There is a positive impact of female undergraduate students' learning motivation on their cumulative grade point average score

Methodology

The current study was explanatory, and the hypothesized model included three variables: "student interest," "perceived self-efficacy," and "learning motivation." The present study used the CGPA score as a continuous dependent variable. These three dimensions are used to see their impact on CGPA score. Based on the previous studies, Figure 1 illustrates the link between these three variables and the outcome variable. Based on the foregoing explanation, the following regression model is used in the present investigation:

CGPA score = $\alpha o + \beta_1 (SI) + \beta_2 (PSE) + \beta_3 (LM) + \varepsilon$

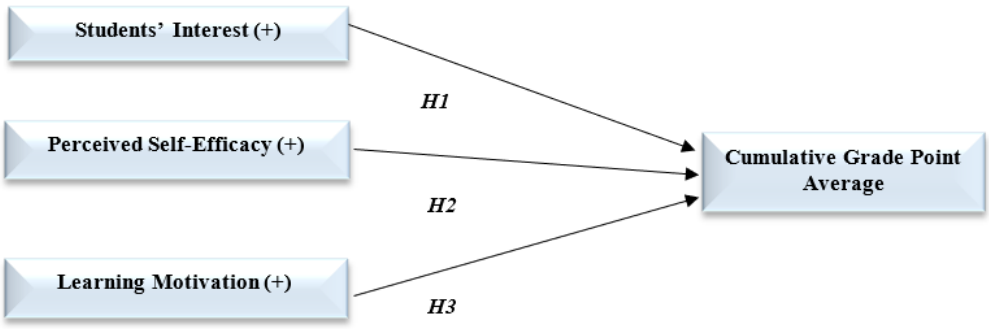

Figure 1. Research Model of the Study

Research design

Consequently, an online questionnaire that participants self-administered via Google Form was used to conduct the cross-sectional survey. Through the Blackboard network, an email was sent to the students who participated asking them to click on a link that led to the intended questionnaire. The present study's sample was derived utilizing non-random sampling strategies that included purposive and convenience sampling. Two hundred and eighty nine undergraduate students from one public university participated in the study.

Measures

Independent variables

The "student interest" among the learners was measured using seven items that were obtained from (Mazer, 2012). This construct was formed using a six-point Likert scale, ranging from "never" (1) to "every time" (7). During instrument piloting, the construct's Cronbach alpha was (n = 30; α = 0.929). Students' "perceived self-efficacy" was measured using eight items adopted from (Chen et al., 2001). A five-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5), was used to develop this construct. In the pilot study, this construct's Cronbach alpha was (n=30; α = 0.885). Six items that were taken from (Noe & Schmitt, 1986; Cole et al., 2004) were used to measure the "learning motivation" of the students. This construct was developed using a six-point Likert scale, which goes from "strongly disagree" (1) to "strongly agree" (6). The Cronbach alpha for this construct during instrument piloting was (n=30; α = 0.857).

Cumulative grade point average (dependent variable)

I am especially intrigued about the impact of students' interest, perceived self-efficacy, and learning motivation on their CGPA. The self-reported average score in all subjects taught in a university program determine educational achievement. A student's CGPA is calculated by multiplying their cumulative completed hours (i.e., hours of credit for which they received a grade) by the total amount of hours in their current semester and the grade values of the subjects they took. It varies throughout each respondent's higher education. The cumulative grade point average CGPA appears as a continuous measure. In essence, a (4.0) GPA, or an (A+ = 95-100; A = 94-90) average across all subjects, is the highest possible score. An average of (3.0) could correspond to a (B+ = 89-85; B = 84-80), (2.0) to a (C+ = 79-75; C = 74-70), (1.0) to a (D+ 69-65; D 64-60), and (0.0) to an (F = 59-0). I coded employing a seven-point scale in *SPSS* and tried out stringent cut-offs (1 = < 2.5, 2 = 2.51-2.75, 3 = 2.76-3.0, 4 = 3.01-3.25, 5 = 3.26-3.50, 6 = 3.51-3.75, 7 = 3.76 & above). Several earlier empirical studies have included

CGPA as a dependent variable (Flashman, 2012; Rosli 2012, Nurudeen et al., 2023).

Results and discussion

Techniques and procedures for studying data

Descriptive along with inferential statistics were performed using the 23rd release of the "*Statistical Package for Social Sciences*" (*SPSS*). Initially, descriptive data were used to determine their mean, standard deviations, frequency range, and percent. The reliability statistics of the loaded items and the "*Pearson correlation*" were examined. The technique of regression analysis was then employed to evaluate the model's ability to predict its hypothesis. To assess the variation in means and variances with regard to the gender variable, group analysis and an independent t-test were also carried out.

Table 1.
Descriptive Statistics

	M	*SD*	Demographics	*f*	%	Cumulative %
Gender	1.51	0.501	Male	113	49.10	49.10
Age	1.71	0.516	Female	117	50.90	100.00
College	1.99	1.135	18-21 years	73	31.70	31.70
CGPA	5.57	0.577	22-25 years	150	65.20	97.00
			26-29 years	7	3.00	100.00
			College of Arts	111	48.30	48.30
			College of Applied Medical Sciences	49	21.30	69.60
			College of Business Administration	32	13.90	83.50
			College of Community	38	16.50	100.00
			2.76-3.0	1	0.40	0.40
			3.01-3.25	7	3.00	3.50
			3.26-3.50	81	35.20	38.70
			3.51-3.75	141	61.30	100.00
			Total	*n* = 230	100.00	

The sample population's major variables and demographic features are summarized in Table 1's descriptive statistics. Values for the mean (*M*) and standard deviation (*SD*) of continuous variables, including age and CGPA, are given. Additionally, frequencies (*f*) and percentages (*%*) are shown for qualitative characteristics like gender and college affiliation. With 113 male (49.10%) and 117 female (50.90%), the gender distribution is fairly balanced, according to the data. The age distribution of the participants reveals that the majority are between the ages of 22 and 25 (65.20%), with a lesser percentage being between the ages of 26 and 29 (3.00%). The College of Arts has the highest frequency (48.30%) among the colleges included in the statistics regarding affiliation.

Table 2.
Pilot study

Sr. #	Variables	No. of Items	Cronbach's Coefficient Alpha	Cronbach Alpha of 21 items
1	Students' Interest (SI)	7	0.929	
2	Perceived Self-Efficacy (PSE)	8	0.885	0.835
3	Learning Motivation (LM)	6	0.857	
Note: (*n*= 30)		21		

Research instrument and piloting

The pilot study's results are displayed in Table 2. The self-administered questionnaire consists of 21 items. After data cleaning, the final sample size for the study consisted of 230 out of the 289 total respondents. Before the main investigation, a pilot study with thirty respondents was carried out. The respondents from the pilot study were not included in the main study.

Table 3.
Means, standard deviations, and inter-correlations between independent variables (n = 230)

	M	*SD*	1	2	3
Students' Interest (SI)	1.0510	0.1501	1		
Perceived Self-Efficacy (PSE)	0.7856	0.0717	.456**	1	
Learning Motivation (LM)	1.3962	0.1577	.510**	.654**	1
Notes: ** *p < 0.01(2 - tailed); *p < 0.05(2 - tailed)*					

The means (*M*), standard deviations (*SD*), and intercorrelations between the independent variables are displayed in Table 3. The correlation matrix contains the intercorrelations coefficients between the variables. In particular, there is a significant correlation between Students' Interest and both Perceived Self-Efficacy (r = 0.456, p < 0.01) and Learning Motivation (r = 0.510, p < 0.01), and a positive correlation between Perceived Self-Efficacy and Learning Motivation (r = 0.654, p < 0.01). Strong relationships between the variables are suggested by these statistically significant correlations.

Table 4.
Reliability before factors loading

Sr. #	Variables	No. of items	Individual Alpha	Alpha of 21 items
1	Students' Interest (SI)	7	0.924	
2	Perceived Self-Efficacy (PSE)	8	0.924	0.937
3	Learning Motivation (LM)	6	0.905	
Total Likert scale items		21		
Note: (*n*= 230)				

Reliability data for three variables are shown in Table 4 prior to factor loading. The table provides the reliability coefficient (calculated using Cronbach's alpha) and the number of elements that make up the scale for each variable. The reliability coefficients for learning motivation, perceived self-efficacy, and students' interest are 0.905, 0.924, and 0.924, respectively. High internal consistency within each variable's scale is indicated by these reliability coefficients, indicating that the items accurately assess the underlying components.

Table 5.
Reliability after factors loading

Sr. #	Variables	No. of items	Individual Alpha	Alpha of 16 items
1	Students' Interest (SI)	6	0.922	
2	Perceived Self-Efficacy (PSE)	6	0.898	0.921
3	Learning Motivation (LM)	4	0.892	
Total Likert scale items		16		
Note: (*n*= 230)				

After factor loading, Table 5 displays reliability data for the three variables that make up the scale and the reliability coefficient, which is calculated using Cronbach's alpha. Following factor loading, the reliability coefficients for learning motivation, perceived self-efficacy, and students' interest are 0.892, 0.898, and 0.922, respectively. These coefficients show strong internal consistency within the scale of each variable.

Table 6.
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.903
Bartlett's Test of Sphericity	Approx. Chi-Square	2938.010
	df	120
	Sig.	0.000

Table 6 displays Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy. The KMO measure, which indicates the percentage of variation across variables that might be shared, comes back with a value of 0.903, over the cutoff of 0.6 and indicating a high degree of factor analysis appropriateness (Kaiser, 1974). The correlation matrix's divergence from the identity matrix is examined using Bartlett's Test of Sphericity, which produces a significant chi-square value of 2938.010 having 120 degrees of freedom and a significance level of 0.000, suggesting significant differences. This suggests that the variables have sufficient correlation, hence validating the suitability of the dataset for factor analysis.

Table 7.
Rotated Component Matrix

Factors Loading Items	Components		
	(SI)	(PSE)	(LM)
SI2 I understand the course material.	0.857		
SI6 I feel like I am learning topics covered in the course.	0.838		
SI5 I realize what is expected of me.	0.825		
SI4 The information in the course is useful.	0.824		
SI3 I can understand the flow of ideas	0.816		
SI7 The information covered in the course is making me more knowledgeable.	0.719		
PSE8 Even when things are tough, I can perform quite well.		0.837	
PSE6 I am confident that I can perform effectively on many different tasks.		0.791	
PSE4 I believe I can succeed at most any endeavor to which I set my mind.		0.781	
PSE5 I will be able to successfully overcome many challenges.		0.750	
PSE7 Compared to other people, I can do most tasks very well.		0.687	
PSE2 When facing difficult tasks, I am certain that I will accomplish them.		0.684	
LM5 I try my best to study the course material.			0.839
LM3 I spend a lot of time for my study.			0.785
LM6 Overall, my learning motivation is very high.			0.745
LM4 Investment in studying the course material is my first priority.			0.730
Eigen values	4.460	3.991	3.359
% of Variance explained	27.873	24.946	20.996
Cumulative % of variance explained	27.873	52.819	73.815
Cronbach's α	**0.922**	**0.898**	**0.892**
Notes: Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization;			
Rotation converged in 6 iterations; Factor loadings less than |0.40| were omitted.			
SI, Students' interest; PSE, Perceived self-efficacy; LM, Learning motivation			

Exploratory factor analysis

In order to obtain the three desired factors, I have utilized the "Principal components" factoring option in *SPSS 23*. To maintain clarity, factor loadings smaller than |0.40| were removed from Table 7. Moreover, Table 7 demonstrates that all loaded items in EFA were more than |0.67|, indicating a highly robust convergent and construct validity (Cooper et al., 2007; Field, 2009; Hair et al., 1998; Hair et al., 2009; Tharenou et al., 2007). In the rotated component matrix table, the factor loadings obtained via a principal component analysis with Varimax rotation (Kaiser normalization) are displayed. The purpose of this research was to determine the underlying variables or dimensions that were associated with learning motivation (LM), perceived self-efficacy (PSE), and students' interest (SI). As seen, Factor 1 (SI) shows high loadings (range 0.719 to 0.857). Similarly, Factor 2 (PSE) shows a significant loading of items associated with Perceived Self-Efficacy, with loadings ranging from 0.684 to 0.837. Finally, Factor 3 (LM) shows a substantial loading of items, with loadings ranging from 0.730 to 0.839. Finally table 7 shows the dependability and explanatory power of the extracted components. The eigenvalues demonstrate the amount of variation explained by each component obtained

in the study. In this instance, the initial component, possessing an eigenvalue of 4.460, is capable of elucidating a substantial portion of the overall variation in the data. Likewise, the second and third components possess eigenvalues of 3.991 and 3.359, respectively, signifying their noteworthy contributions to the explained variance. Examining the proportion of variation explained by each element can provide further insights. For instance, the first factor represents 27.873% of the variation, the second factor represents 24.946%, and the third factor represents 20.996%.

Table 8.
Means, standard deviations, and correlations among all variables (n = 230)

	M	*SD*	1	2	3	4
Students' Interest (SI)	1.0510	0.1501	1			
Perceived Self-Efficacy (PSE)	0.7856	0.0717	.456**	1		
Learning Motivation (LM)	1.3962	0.1577	.510**	.654**	1	
CGPA (dependent variable)	5.5700	0.577	0.369**	0.600**	.546**	1

Notes: *** p < 0.01(2 - tailed); *p < 0.05(2 - tailed)*

The means, standard deviations, and correlations between the variables are shown in table 8. Numerous noteworthy conclusions are drawn from the correlations' analysis. First off, there are positive connections between Students' Interest and CGPA (r = 0.369), Learning Motivation (r = 0.510), and Perceived Self-Efficacy (r = 0.456), all of which are considered significant at p < 0.01. This suggests that increased perceived self-efficacy, learning to motivation, and students interest are significantly linked to their academic performance. Furthermore, a robust positive association is shown between Perceived Self-Efficacy and both Learning Motivation (r = 0.654) and CGPA (r = 0.600), with a statistical significance of p < 0.01. This shows that motivated students tend to do better academically and earn higher grades when they believe they are capable of doing so. Furthermore, there is a positive association (r = 0.546) between learning motivation and CGPA, suggesting that students who are more motivated tend to perform better academically. Overall, as shown via their significant correlations with CGPA, these results highlight the significance of students' motivation, interest, and perceived self-efficacy in predicting academic achievement.

Table 9.
Testing hypotheses with entry method-based simultaneous regression análisis

Hyp.	Predictors	β	SE	*t*-stat.	Sig.	VIF	Relationship observed	Remarks
	(Constant)	1.477	0.336	4.393	0.000			
H1	SI	0.208	0.234	0.891	0.374	1.401	positive	Not Supported
H2	PSE	3.318	0.556	5.965	0.000***	1.811	positive	Supported
H3	LM	0.911	0.261	3.482	0.001***	1.937	positive	Supported
DV: CGPA								

Notes: $F(3, 226) = 50.960$, (p<.001); *Adj* $R^2 = 0.396$ *$p < 0.05$

Hypothesis testing and regression análisis

The findings of testing the hypotheses using simultaneous multiple linear regression analysis for predicting "CGPA" (dependent variable) are shown in Table 9. The combination of variables predicted approximately 39.6% of the total variance in predicting the CGPA The study's predicted regression model was significant ($F(3,226 = 50.960$, $p < 0.001$), and it found that, aside from "students' interest," only two factors substantially predicted the outcome variable CGPA. The link between the predictors and the dependent variable is represented by the value of β. It is clear from Table 9 that all three of the predictors have positive β values. This proves that in a model with two variables, "perceived self-efficacy" and "learning motivation" have a positive significant impact on CGPA. On the other hand, "student interest" has a positive but insignificant impact on the CGPA. The variables used for prediction do not exhibit multicollinearity since their variance inflation factor (VIF) is lower than 10. If the VIF is more than 10, multicollinearity has been observed (Woodrow, 2014). The coefficients of parameter

estimations indicate that "perceived self-efficacy" (3.318; *t* 5.965, $p < 0.05$) and "learning motivation" (0.911; *t* 3.482, $p < 0.05$) have a statistically significant impact on CGPA. Thus, two hypotheses (*H2* & *H3*) were supported. However, "students' interest" (0.208; *t* 0.891, $p < 0.05$) had a statistically insignificant impact when predicting CGPA, hence (*H1*) was not supported. The regression equation to predict CGPA is displayed in the following equation:

CGPA score = 1.477 + 0.208 (SI) + 3.318 (PSE) + 0.911 LM

Table 10.
Multiple regression (male model); Dependent variable: CGPA

Hyp.	Predictors	*β*	SE	*t*-stat.	Sig.	VIF	Relationship observed	Remarks
	(Constant)	2.26	0.585	3.863	0.000			
H1a	SI	0.244	0.502	0.487	0.627	1.616	positive	Not Supported
H2a	PSE	2.772	1.042	2.661	0.009**	2.059	positive	Supported
H3a	LM	0.533	0.442	1.205	0.231	2.173	positive	Not Supported
Notes: $F(3, 109) = 10.475$, ($p<.001$); *Adj* $R^2 = 0.202$ *$p < 0.05$								

The findings of testing the hypotheses using simultaneous multiple linear regression analysis for predicting CGPA with respect to male gender are shown in Table 10. The combination of variables predicted approximately 20.2% of the total variance in predicting the CGPA. The coefficients of parameter estimations indicate that "perceived self-efficacy" (2.722; *t* 2.661, $p < 0.05$) has a statistically significant impact on CGPA. Thus, hypothesis (*H2a*) was supported. However, male "students' interest" (0.244; *t* 0.487, $p < 0.05$) and "learning motivation" (0.533; *t* 1.205, $p < 0.05$) had a statistically insignificant impact when predicting CGPA, hence (*H1a* & *H3a*) were not supported.

Table 11.
Multiple regression (female model); Dependent variable: CGPA

Hyp.	Predictors	*β*	SE	*t*-stat.	Sig.	VIF	Relationship observed	Remarks
	(Constant)	0.78	0.313	2.491	0.014			
H1b	SI	0.364	0.192	1.894	0.061	1.336	positive	Not Supported
H2b	PSE	3.385	0.485	6.982	0.000***	1.676	positive	Supported
H3b	LM	1.347	0.25	5.394	0.000***	1.807	positive	Supported
Notes: $F(3, 113) = 84.024$, ($p<.001$); *Adj* $R^2 = 0.682$ *$p < 0.05$								

Table 11 displays the findings of evaluating the hypotheses for predicting CGPA with regard to female gender using simultaneous multiple linear regression analysis. The combination of variables predicted approximately 68.2% of the total variance in predicting the CGPA. The coefficients of parameter estimations indicate that female students' "perceived self-efficacy" (3.385; *t* 6.982, $p < 0.05$) and "learning motivation" (1.347; *t* 5.394, $p < 0.05$) have a statistically significant impact on CGPA. Thus, hypotheses (*H2b* & *H3b*) were supported. However, female student' interest (0.364; *t* 1.894, $p < 0.05$) had a statistically insignificant impact when predicting CGPA, hence (*H1b*) was not supported.

Table 12.
Group Statistics

	Gender	*n*	*M*	*SD*	Std. Error Mean
CGPA	Male	113	5.43	0.581	0.055
	Female	117	5.71	0.542	0.05

Group statistics for CGPA according to gender are shown in table 12. Each gender group's standard error of the mean, standard deviation, mean, and number of participants are shown in table 12. The mean CGPA for male ($n = 113$) is 5.43, with a standard deviation of 0.581 and a mean standard error of 0.055. The mean CGPA for females (n=117) is 5.71, with a standard error

of the mean of 0.05 and a significantly smaller standard deviation of 0.542. This table compares male and female participants' CGPAs, providing insight into potential gender variations in academic achievement within the sample group.

Table 13.
Independent Sample Test: Mean comparison of CGPA score of male and female

Dependent Variable	Male		Female				
CGPA score	*M*	*SD*	*M*	*SD*	*t*(225.612)	*p*	Cohen's d
	5.43	0.581	5.71	0.542	3.72	0.000	0.498

An independent sample *t-test* was also conducted to compare the CGPA score for male and female respondents as shown in table 13. There were significant differences (t (df) = 225.612, p = 0.000) in the scores with mean score for male (M = 5.43, SD = 0.581) was lower than female (M = 5.71, SD = 0.542). The magnitude of the differences in the means (0.276, 95% *CI*: 0.422 to 0.13) was significant. Hence, null hypothesis was rejected. The value of Cohen's d was 0.498 (< 0.50) which indicated medium effect size (Cohen, 1988).

Conclusions

This research aimed to examine the correlation and effect of three factors: "learning motivation," "perceived self-efficacy," and "students' interest" on the CGPA of undergraduate students. Data for the study were gathered from 230 undergraduate students at a public university. The data was analyzed using descriptive statistics, exploratory factor analysis, linear regression, zero-order correlation, and an independent t-test. The variable combination predicted approximately 39.6% of the overall variance in predicting the CGPA. The study's predicted regression model was significant (F(3,226 = 50.960, p 0.001), and it indicated that, aside from "students' interest," only two factors significantly predicted the outcome variable CGPA to the current study's findings, the "students' interest" variable did not affect undergraduate students' CGPA. Furthermore, regression was performed separately on male and female students, and it was discovered that the "students' interest" variable has no significant influence on their CGPA. According to the findings, there is a positive and statistically significant correlation between undergraduate students' "learning motivation," "perceived self-efficacy," and "students' interest."

Practical implications of the study

It is a serious concern at higher education level that students' interest vary due to wide range of learning settings. Teachers and authorities may enhance academic learning for all students by fostering the development of interests. Cultivating interest amongst students preserves involvement, improves learning, and optimizes academic achievement. Teachers, instructors, and professors at the tertiary level must consider "learning motivation," "perceived self-efficacy," and "students' interest" as essential variables in encouraging students' academic progress. Teachers and instructors are essential in fostering the development of interests among students at higher education level. Moreover, the conceptualization of academic settings that students confront is in the hands of teachers and policymakers. The curriculum may be modified and revised by these important stakeholders to support the growth of each student's interest and learning motivation.

Limitations of the study and recommendations for further research

Everyone who participated in the present investigation were undergraduate students, and data were gathered from students at a single public university. In this study, "learning motivation," "perceived self-efficacy," and "students' interest" were the only three factors used to examine the connection and effect on the CGPA score of undergraduate students. In the future, studies could look into the relationship between academic resilience, academic commitment, burnout, and anxiety as a mediator or moderator, as well as verify the impact on students' CGPA at private and public universities to obtain more generalizable results.

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