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Factors Impacting Students' Learning Performance in Higher Education in Chengdu, China

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Abstract

Background and Aim: The effectiveness of education has always been a focus of social attention. Previous research has mostly focused on the level of education in primary and secondary schools, and some studies have shown that college students may have different motivations and learning concepts. Therefore, this study aims to take Xihua University in Chengdu, China as an example to systematically examine various factors that affect the academic performance of university students. Through quantitative analysis, this study investigated the impact of five independent variables (learning attitude, learning anxiety, learning motivation, teacher ability, and student participation) on the dependent variable (academic performance), especially in higher education. Moreover, it aims to identify significant differences between variables.

Methodology: Research Design, Data, and Methods: This study used the Project Objective Consistency Index (IOC) to test the validity of the questionnaire, and Cronbach's Alpha was used as reliability in the pilot study (n=30). They used the multiple linear regression method to analyze the effective responses of 80 students at Xihua University and verify the significant relationship between variables. Afterward, a group of 30 students underwent a 14-week planned study. Then, the quantitative results after and before the scheduled study were compared in paired sample t-tests.

Results: In multiple linear regression, studies have shown that learning attitude, learning anxiety, learning motivation, teacher ability, and student participation have a significant impact on student academic performance. Finally, the comparison results of paired sample t-tests indicate substantial differences in student academic performance between the post-strategic and pre-strategic plan stages.

Conclusion: This research endeavors to foster students' learning performance in the context of Chengdu, China.

Keywords: Learning Performance; Impacting Factors; Higher Education

Introduction

Xihua University, also known as XHU, is situated in Chengdu, Sichuan Province in China's western region. Established in 1960, it is a comprehensive institution within Sichuan Province, encompassing five campuses and covering an area of nearly 4,000 acres. The university comprises 21 colleges, offering 99 undergraduate majors and 39 master's degree authorization points. It is staffed by over 1,000 senior professional and technical personnel and hosts nearly 45,000 full-time students. In 2018, XHU was chosen as one of the initial participants in the "New Engineering" research and practice projects by the Ministry of Education (XHU Official Website, 2024).

This investigation aimed to systematically examine the various factors that impact the behavioral intention to utilize student learning performance among engineering students at Xihua University. Currently, an increasing amount of research is focused on investigating the various elements that affect college students' academic achievements. Education is widely recognized as a crucial foundation for all human endeavors in today's globalized and technologically advanced world. Ensuring the excellence of students' performance is a major priority for educators. Educators, trainers, and researchers have always been interested in examining the factors contributing to effective performance and the quality of student learning outcomes. Numerous internal and external factors within educational institutions impact students' academic success and accomplishments. These factors can The factors influencing students' academic performance can be categorized as student, family, school, and peer factors (Crosnoe et al., 2004). The study of demographic issues has a long history dating back to the 17th century (Mann, 1985). These factors typically include age, gender, regional background, ethnicity, marital status, socioeconomic status (SES), parental education level and occupation, language proficiency, income level, and religious affiliations. These topics are commonly explored within the field of demography (Ballantine, 1993). While most research has focused on primary and secondary education levels, previous studies have suggested that advanced university students may have different motivations and learning conceptions (Valle et al., 2003). Unlike primary or secondary students who are expected to demonstrate higher levels of deep-level thinking and increased motivation and self-regulation (Vermetten et al., 1999), post-secondary students are expected

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to exhibit even greater levels of these attributes. Simons et al. (2004) concluded their study by suggesting that further investigation should be conducted to explore potential variations in the obtained results when university students are included in the research sample.

Based on this, the author consulted relevant research literature and selected five factors that may affect the academic performance of college students: learning attitude, learning anxiety, learning motivation, instructor capability, and student engagement, and explored whether these five dimensions significantly affect student academic performance, as well as their direct and indirect impact. Using quantitative and qualitative research methods, the integration of quantitative and qualitative findings provided a thorough comprehension of the diverse elements that have a substantial impact on learning outcomes, offering a comprehensive view of the intricate research matter. The study's outcomes have prompted the formulation of practical research implications and actionable recommendations, aimed at furnishing valuable insights to school administrators to facilitate informed decision-making.

Literature Review

Learning Attitude

Based on Joseph (2013), an individual's attitude is defined as their acquired inclination to react favorably or unfavorably to an object, circumstance, concept, or person. Anderson and Kida (1985) characterize attitude as a powerful emotional state that predisposes an individual to exhibit favorable or unfavorable behavior towards a specific object or concept. Therefore, it represents a mental state utilized to react to a cognitive, affective, and intention-based psychological construct. Attitudes are entrenched convictions that reflect individuals' thoughts and emotions and can manifest through actions. Cheng and Tsai (2019) define a learning attitude as a behavioral inclination, cognitive element, and attachment component.

Attitude encompasses various dimensions, as outlined by Syyeda (2016). This model encompasses effect, cognition, and behavior. The affective component involves the subjective experience of emotions, including cognitive and perceptual aspects. Emotions range from positive states such as happiness to negative states such as boredom and difficulty. Beliefs are closely associated with students' confidence in their academic capabilities. Perception involves students' cognitive understanding and interpretation of mathematical concepts. Cognition refers to students' subjective evaluation of the practicality of the subject. Behavior and student motivation to learn are interconnected, as evidenced by their engagement, commitment, and academic achievement in the classroom.

In the meantime, several supplementary studies (McKimm, 2003; Rahayu, 2018; Fu et al., 2019) have demonstrated that students' perspectives and attitudes toward learning exert a substantial influence on their ability to learn effectively. This holds true irrespective of their level of engagement in the learning process. The logical conclusion to be drawn from this evidence is that there exists a correlation between students' attitudes and their academic performance. As a result, the subsequent hypothesis is proposed:

H1: Learning attitude has a significant impact on learning performance.

Learning Anxiety

Anxiety is a psychological condition characterized by mental discomfort. It is caused by the neurological system that regulates emotions and is marked by feelings of tension, uncertainty, nervousness, and worry (Horwitz et al., 1986). Spielberger (1972) describes anxiety as a negative emotional state marked by personal feelings of stress, unease, and concern, along with involuntary activation of the nervous system. Furthermore, anxiety has been described by professionals in educational psychology and language development. Horvitz (1986) characterizes anxiety as a unique combination of self-awareness, convictions, emotions, and actions associated with language learning in the classroom environment due to the distinct nature of the language acquisition process. Trait, state, and situational anxiety are common types of anxiety, and its manifestation varies depending on its definition. The present study focuses on Gardner and MacIntyre's (1993) final category, learning anxiety, which occurs when individuals experience worries while learning something unfamiliar. The diverse definitions of anxiety as observed in the context of classroom learning processes are discussed in the debate as mentioned above.

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Anxiety has been recognized as a prominent emotional factor that significantly influences learning performance. Numerous research studies have consistently shown that anxiety plays a crucial role in determining academic achievement. As a result, numerous investigations have been conducted since the 1970s to examine this phenomenon. Students experiencing anxiety issues tend to adopt a more passive approach to learning, as evidenced by a general lack of motivation to study and subpar academic outcomes. Previous studies have also noted the significant impact of anxiety on students' learning performance. According to Singh and Jha (2013), anxiety is significantly linked to students' learning performance. Their contrastive analysis revealed that engineering students exhibit lower levels of anxiety compared to medical students and achieve relatively higher academic performance. It has been found that a student's level of anxiety in the face of challenges can accurately predict their academic achievement, particularly among engineering students. Such anxiety may diminish students' self-confidence, reduce their motivation, impair their cognitive function, and lead to academic difficulties (Yanik et al., 2016). Consequently, the following hypothesis is formulated:

H2: Learning anxiety has a significant impact on learning performance.

Learning Motivation

According to Noe (1986), the term "learning motivation" pertains to the intention to engage in and acquire knowledge from a university course. This definition was formulated specifically for the present study. As noted by Chang et al. (2022), learning can be instigated either internally, known as intrinsic motivation, or externally, known as extrinsic drive. Both forms of motivation are collectively referred to as drive. In the context of learning, motivation denotes the internal impetus that students utilize to propel themselves forward in their educational endeavors. It is primarily evident in the learner's level of interest, purpose, attitude, and ambition, among other factors. Colquitt et al. (2000) conceptualized motivation to learn as the inclination, energy, and enduring commitment to activities focused on acquiring knowledge and skills. Students are considered motivated when they are willing to engage in the learning environment. According to Di Serio et al. (2013), learners' decisions to attempt a task, the duration of their sustained engagement, the effort they invest in pursuing it, and the extent to which they feel connected to the activity can all be viewed as manifestations of motivation. Motivation functions as a source of vigor.

The impetus for learning is rooted in the motivation of students and enhancing student motivation has a positive impact on academic performance. Motivation is crucial for the learning process, as it requires students to be motivated to participate in academic activities and enhance their understanding. Employing effective learning strategies contributes to the enhancement of student motivation. Improved academic accomplishments often stem from self-regulated learning and motivation. Students who are academically inclined are more inclined to engage, persevere, and exert effort. The establishment and sustenance of motivation are critical as it can impede student advancement (Wei et al., 2015). Motivation is a fundamental factor for achieving success in learning. The greater the drive to learn, the higher the likelihood of success and acquisition of knowledge (Wardani et al., 2020). Consequently, the subsequent hypothesis is put forward.

H3: Learning motivation has a significant impact on learning performance.

Instructor Capability

Instructor capability encompasses the knowledge, skills, and attitudes of educators in designing, organizing, guiding, and assessing activities with specific learning objectives and teaching standards, to enhance student's capacity to address real-world problems within a social context (Claro et al., 2018). According to Žeravíková et al. (2015), scholars have argued that the professional competencies of a teacher extend beyond the delivery of lectures. These competencies also involve the inclination and ability to effectively harness their potential in adult education, as well as taking responsibility for their decisions throughout the educational process. The idea of competence is complex, involving not just the gaining of information but also the capacity of individuals to efficiently utilize that information in addressing problems and offering resolutions.

The definition of an effective teacher and the necessary skills for teaching have been the subject of ongoing debate within educational institutions and society. According to Biggs (1999), instructors possess a range of essential skills crucial to the teaching and learning process. Braskamp and Ory (1994) outlined six essential components of a successful teacher, which encompass the organization

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and planning of courses, effective communication, and clarity, building rapport through interaction with students, managing workload and complexity, assessment and grading methods, as well as promoting student self-directed learning.

Marks (2000) outlined five main components of a course, including structure, difficulty, performance expectations, teacher satisfaction, and learning. Abrantes et al. (2007) proposed a framework for student-teacher interaction, teacher responsiveness, course arrangement, and teacher likeability and care. Ginns et al. (2007) proposed that students assess their learning experience according to effective teaching, well-defined objectives and criteria, fair assessment, appropriate level of work, and transferable skills. Given the increasing significance of universities and the demanding responsibilities of instructors, there is a growing demand for teacher capacity. As a result, the subsequent hypothesis is proposed:

H4: Instructor capability has a significant impact on learning performance.

Student Engagement

Based on Trowler's (2010) perspective, student involvement involves a shared dedication of time, energy, and relevant resources from both students and the educational establishments they are enrolled. This commitment aims to enhance the institution's performance and reputation, as well as to improve the overall student experience, learning outcomes, and student development. Hu and Kuh's definition of "student engagement" in 2022 describes it as "the level of commitment students put into purposeful educational activities that lead to desired results." Wang and Hofkens (2020) define "student engagement" as the extent of student participation in the curriculum, programs, and activities designed to support and facilitate the learning process and academic achievement.

According to Bergdahl et al. (2020), active student involvement is essential for effective learning. Krause and Coates (2008) describe student engagement in higher education as the degree to which students are involved in activities associated with favorable learning results. Robinson and Hullinger (2008) emphasize the significant impact of student participation on education, while Su et al. (2017) assert that increased student engagement results in improved learning. Ongoing efforts to develop and popularize strategies for enhancing classroom discipline and student engagement are evident. Both learning and performance are influenced by a student's level of engagement, as highlighted by Moogan and Baron (2003). Baird and Fisher (2005) suggest that active collaboration in learning leads to increased student dedication and availability of resources and information. Ahlfeldt et al. (2005) further support the notion that student participation contributes to improvements in both student achievement and learning.

H5: Student engagement has a significant impact on learning performance.

Learning Performance

According to Kpolovie et al. (2014), the assessment of a student's learning performance involves evaluating their ability to retain information, recall it when needed, and articulate their understanding through written or verbal expression in test conditions. Katz et al. (2011) carried out a study that showed terms like academic performance, learning outcome, learning performance, academic accomplishment, and learning achievement can all be used interchangeably to describe the quantifiable outcomes of students' academic learning over a specific timeframe. Jude et al. (2014) also noted that a learner's learning performance can serve as a metric for assessing their acquisition of new knowledge and skills. Educational institutions, such as schools and universities, utilize learning performance as a measure of performance outcomes, demonstrating an individual's achievement of specific educational goals. These cognitive goals, as defined by educational systems, may encompass broad concepts such as "critical thinking" or be more specific to particular intellectual domains like "numeracy," "literacy," "science," or "history."

According to Hansen (2000), student learning is influenced by both internal and external factors within the classroom environment. Factors within the individual's control include their level of English proficiency, their class timetable, the size of their classes, their test scores, the quality of learning facilities, the amount of homework assigned, the atmosphere in class, the difficulty level of courses, the role of teachers, access to technology and examination systems. On the other hand, external factors that can impact a student's academic performance include participation in extracurricular activities, family dynamics at

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home, employment status, and financial situation as well as societal influences. Research indicates that student performance is impacted by variables such as learning facilities, gender, and age.

In general, this study aims to explore the relationships between five independent factors and one dependent variable, to determine whether a statistically significant relationship exists. The dependent variable is learning performance, while the independent variables are learning attitude, learning anxiety, learning motivation, teacher capability, and student involvement. The author believes that the above factors are the key factors affecting academic performance, and in the following, we will explore whether there is a significant correlation between them and the dependent variable of academic performance.

Methods and Materials

Research Framework

The researcher utilized the theoretical frameworks proposed by Song et al. (2022), Mahande (2022), and Biggs (1999) in conjunction with the 3P model theory from Nguyen and Nguyen (2010). These theoretical perspectives collectively contributed to the development and support of the conceptual framework depicted in Figure 1.

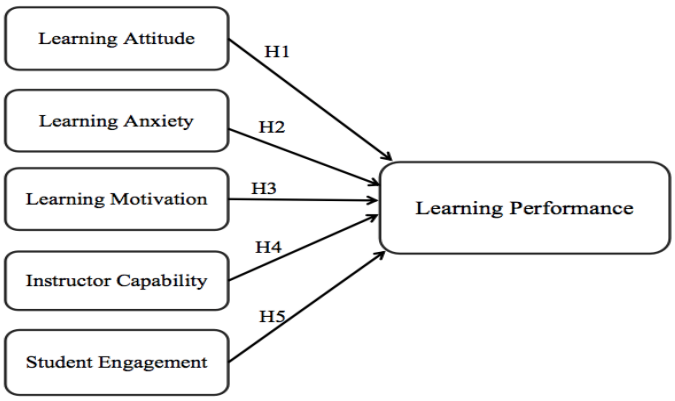

Figure 1: Conceptual Framework

H1: Learning attitude has a significant impact on learning performance.
H2: Learning anxiety has a significant impact on learning performance.
H3: Learning motivation has a significant impact on learning performance.
H4: Instructor capability has a significant impact on learning performance.
H5: Student engagement has a significant impact on learning performance.

Research Methodology

The research process consisted of four distinct stages. Initially, data for the proposed conceptual framework was gathered by surveying the entire research population (n=80). Subsequently, all hypotheses underwent rigorous testing using multiple linear regression to ascertain their significance at a p-value threshold of < 0.05. Hypotheses that received support were retained, while those that did not meet the criteria were eliminated. The second stage involved conducting pre-strategic plan surveys on the population of 80 students within the supported hypotheses. Following this, the third stage introduced the Strategic Plan, which was specifically implemented with 30 participants. In the final stage, 30 participants completed a survey, generating the necessary data for conducting a paired-sample t-test analysis to compare the pre-strategic plan and post-strategic plan results. This comprehensive process facilitated a thorough examination of the research's objectives and hypotheses.

Research Population, Sample Size, and Sampling Procedures

Research Population

Researchers selected 86 students from the School of Materials Science and Engineering at Xihua University as the research subjects for a population pre-survey. The School of Materials Science and Engineering at Xihua University (2023) has approximately 2030 students, and the number of students related to this study accounts for 4.23% of the total number of students. These research

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populations come from students of different grades, belonging to the second, third, and fourth year of university. A total of 86 students were surveyed. Afterward, the researchers checked all the answers and confirmed that 80 of them were valid.

Sampling Size

The researcher conducted a preliminary survey with a random sample of 30 students and assessed its reliability through a pilot test. Subsequently, the researcher identified 80 XHU students as the target population and obtained 80 valid responses. The researcher employed multiple linear regression to analyze the connection between independent and dependent variables. Subsequently, 30 willing students were chosen by the researcher to take part in the strategic planning stage.

Sampling Procedure

The researcher conducted various sampling procedures as part of the study.

The first sampling involved selecting 30 students at random to participate in a pilot survey and pilot test, during which they were asked to complete a survey questionnaire and provide feedback.

The second sampling focused on pre-survey data collection, with 80 XHU students from different academic years being sampled through the distribution of printed survey questionnaires. The researcher subsequently verified the validity of all 80 responses.

Lastly, for the strategic plan stage, the researcher randomly selected and sampled 30 voluntary students.

Research Instruments

Design of Questionnaire

The survey questionnaire was developed by the researcher through a structured process consisting of three steps. Firstly, the researcher identified questionnaire sources from three openly published articles (Nguyen & Nguyen, 2010; Song et al., 2022; Mahande, 2022). Subsequently, the survey questionnaires were adapted and presented within the context of Chinese university students. Finally, the survey was implemented using IOC.

Components of Questionnaire

The survey questionnaire items were structured into three distinct parts. The first part consisted of screening questions designed to exclude individuals who part of the research population was not. The second part included basic information questions aimed at gathering demographic details such as gender, age, and place of birth. The third part comprised pre-survey questions intended to assess the current levels of the independent and dependent variables among a total of 80 XHU students.

IOC Results

The researcher enlisted the participation of five unaffiliated experts, scholars, or medical professionals to conduct the Index of Item-Objective Congruence (IOC) assessment, all of whom were Chinese professors. During the IOC evaluation, the independent experts assigned a score of +1 for congruent, 0 for questionable and -1 for incongruent. All questionnaire items in the study yielded scores exceeding 0.67, leading the researcher to retain all questionnaire items for further analysis.

Pilot Survey and Pilot Test Results

The researcher conducted a preliminary survey involving 30 randomly selected students, who were asked to complete a survey questionnaire and provide feedback. Subsequently, the researcher employed Cronbach's Alpha internal consistency reliability test, with a threshold value of 0.7 or higher, as recommended by Nunnally and Bernstein (1994). The table below presents the confirmed outcomes, indicating high reliability for each construct.

Table 1: Pilot Test Result

Variables	No. of items	Sources	Cronbach's alpha	Strength of Association
Learning Attitude	5	Mahande et al. (2022)	0.904	Excellent
Learning Anxiety	3	Mahande et al. (2022)	0.841	Very Good
Learning Motivation	4	Nguyen & Nguyen (2010)	0.907	Excellent

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Variables	No. of items	Sources	Cronbach's alpha	Strength of Association
Instructor Capability	6	Nguyen & Nguyen (2010)	0.902	Excellent
Student Engagement	4	Song et al. (2022)	0.913	Excellent
Learning Performance	5	Mahande et al. (2022)	0.912	Excellent

Results

Demographic Profile

The researcher presented the demographic characteristics of the entire research population (n=80), followed by a subset of students (n=30) who took part in the Strategic Plan, as depicted in Table 2.

Table 2: Demographic Profile

Entire Research Population (n=80)		Frequency	Percent
Department	School of Material Science and Engineering	80	100%
Gender	Male	50	62.5%
	Female	30	37.5%
Grade	Second year of college	31	38.75%
	The third year of college	20	25%
	Fourth year of college	29	36.25%
Subject	Material Science and Engineering	38	47.5%
	Material Forming and Control Engineering	42	52.5%
Total		80	100%
Strategic Plan (n=30)		**Frequency**	**Percent**
Department	School of Material Science and Engineering	30	100%
Gender	Male	19	63.33%
	Female	11	36.67%
Grade	Second year of college	8	26.67%
	The third year of college	15	50%
	Fourth year of college	7	23.33%
Subject	Material Science and Engineering	13	43.33%
	Material Forming and Control Engineering	17	56.67%
Total		30	100%

Results of Multiple linear regression

The researcher utilized Multiple Linear Regression (MLR) to analyze the data from 80 survey questionnaires to determine the support for each of the five research hypotheses, with a specific focus on Learning Performance. Through variance inflation factor (VIF) analysis, it was determined that multicollinearity is not a significant issue, as the VIF value remains below 5 (Hair et al., 2006). Furthermore, the R-squared (R^2) value in the multiple linear regression model, which incorporates five independent variables, indicates that it can explain 59.3% of the variability in learning performance.

Table 3: The multiple liner regression of five independent variables on learning performance

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Variables	Standardized Coefficients Beta value	t-value	p-value	VIF	R^2
Learning Attitude	0.026	2.691	0.008*	1.28	
Learning Anxiety	-0.169	-2.239	0.028*	1.24	
Learning Motivation	0.287	3.793	<0.001*	1.25	0.593
Instructor Capability	0.278	3.220	0.002*	1.63	
Student Engagement	0.197	2.470	0.015*	1.40	

Note: p<0.05*

In conclusion, all of the first five hypotheses were found to be supported. These hypotheses were formulated based on the results of multiple linear regression analysis. Subsequently, a strategic plan was implemented to address the aforementioned hypotheses.

H6: There is a significant difference in Learning attitude between the Pre-strategic plan and the Post-strategic plan design stages.

H7: There is a significant difference in Learning anxiety between the Pre-strategic plan and the Post-strategic plan design stages.

H8: There is a significant difference in Learning motivation between the Pre-strategic plan and the Post-strategic plan design stages.

H9: There is a significant difference in Instructor capability between the Pre-strategic plan and the Post-strategic plan design stages.

H10: There is a significant difference in Student engagement between Pre-strategic plan and Post-strategic plan design stages.

H11: There is a significant difference in Learning performance between the Pre-strategic plan and the Post-strategic plan design stages.

Strategic Plan Stage

The strategic plan spanned 14 weeks and was informed by both quantitative and qualitative data gathered before its implementation. This research aimed to enhance students' learning performance by fostering positive learning attitudes, motivation, and engagement, and reducing learning anxiety, while also improving teacher effectiveness. The strategic plan was presented in a chronological sequence, as depicted in Figure 2.

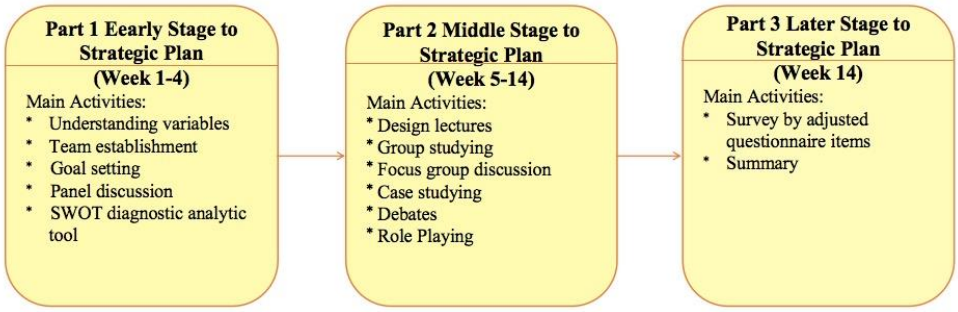

Figure 2: Strategic Plan Activities

Results Comparison Between Pre and Post-Strategic Plan

The researchers performed paired sample t-tests on six variables to assess potential differences in dimensions between the pre-strategic and post-strategic stages. The results of the paired sample t-test analysis are presented in the following table, outlining the comparison of the six variables.

Table 4: Paired-Sample T-Test Results

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Variables	Mean	SD	SE	p-value
Learning Attitude				
Pre-strategic plan	4.11	0.647	0.1181	p<0.001
Post-strategic plan	4.56	0.380	0.0694	
Learning Anxiety				
Pre-strategic plan	2.77	0.845	0.154	p<0.001
Post-strategic plan	2.20	0.635	0.116	
Learning Motivation				
Pre-strategic plan	3.77	0.760	0.1387	p<0.001
Post-strategic plan	4.27	0.382	0.0698	
Instructor Capability				
Pre-strategic plan	3.91	0.649	0.1185	p<0.001
Post-strategic plan	4.32	0.329	0.0600	
Student Engagement				
Pre-strategic plan	3.73	0.674	0.1230	p<0.001
Post-strategic plan	4.24	0.413	0.0753	
Learning Performance				
Pre-strategic plan	4.13	0.627	0.1145	p<0.001
Post-strategic plan	4.59	0.270	0.0493	

From Table 4, we can see that all six variables have undergone significant changes before and after the strategic plan. The mean of learning attitude has increased from 4.11 to 4.56, learning motivation has increased from 3.77 to 4.27, instructor capability has increased from 3.91 to 4.32, and student engagement has increased from 3.73 to 4.24 while learning anxiety has decreased from 2.77 to 2.20. This indicates that the content designed by the strategic plan has had a certain positive effect on students and is effective in improving their overall academic performance. The SD values in the table refer to the standard deviation, representing the degree of dispersion of the data, the larger the SD value, the greater the degree of data dispersion, The SE value refers to the standard error. The smaller the standard error, the more accurate the estimated value, and the more significant the impact of the independent variable on the dependent variable. It can be seen that after the strategic plan, the SD and SE values significantly decrease. The p-values are all less than 0.001, indicating that the influence of the independent variable on the dependent variable is significant.

Conclusions & Discussions

This article examines five factors that affect the academic performance of college students: learning attitude, learning anxiety, learning motivation, instructor capability, and student engagement. Firstly, extract and collect important factors that affect the academic performance of college students, and extract five dimensions: learning attitude, learning anxiety, learning motivation, instructor capability, and student engagement. The strategic plan was conducted on the academic performance of college students using these five independent variables. This study has focused on the current situation of academic performance among college students, and the collected data and its changes are all from college students, with students from Xihua University as the research object. From a quantitative perspective, verify whether there is a significant correlation between the five independent and dependent variables, as well as the effectiveness of the strategic plan.

The research design used the Project Objective Consistency Index (IOC) for validity testing, and Cronbach Alpha was used to test the reliability of the measurement tool in the pre-test. This strict measurement method enhances the credibility of the research. Data was collected from 86 students at

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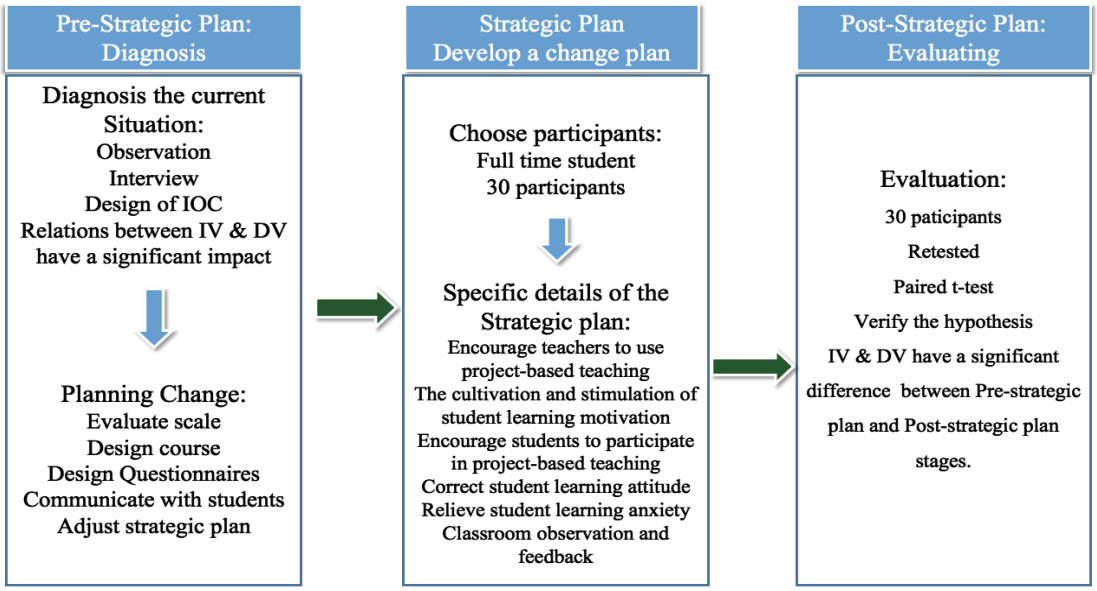
Xihua University using valid questionnaires, and multiple linear regression analysis was conducted to verify the significant relationship between the independent and dependent variables. In addition, a 14-week strategic plan was conducted on 30 selected students, and data from the post-strategic plan was collected and compared with the pre-strategic plan using paired sample t-tests. The research results indicate that the five independent variables in the study significantly affect students' academic performance. The results of the paired sample t-test showed significant differences in student academic performance before and after the planned study. This indicates that a 14-week strategic plan has had a positive and statistically significant impact on student performance, and Figure 3 shows the main findings of the research.



Notes: IV(independent variable); DV(dependent variable)

Figure 3: The Findings

In summary, this study, in the context of Chengdu, China, demonstrated the valuable contribution of cultivating students' motivation, learning attitude, and learning participation, and improving their academic performance by reducing their learning anxiety and enhancing their teaching abilities. This study provides insights into factors that can enhance students' creativity and self-leadership through comprehensive analysis and practical impact. These research findings can provide information for future educational institutions to formulate educational policy guidelines and intervention measures, aiming to help students better improve their academic performance and ultimately prepare them for success in an increasingly competitive and innovative world.

Recommendations

Improving the academic performance of underperforming students is a concern for parents, teachers, and educational researchers. Previous research in the field of education has extensively investigated various factors that affect student performance, including variables related to teachers and students. This study delves into the important determinants of student performance from different perspectives, including attitudes toward learning, anxiety levels, motivation, engagement, and teacher competence. The independent variables in this survey mainly come from the student field. Based on the results of quantitative analysis, this study proposes the following recommendations.

Firstly, motivation plays a crucial role in the academic progress of students. As students' learning motivation is crucial to their learning outcomes, educational institutions need to adopt various ways to stimulate their learning motivation. In addition, traditional university educators often rely on a consistent and unchanging set of motivational elements to attract students, without adapting to changes in student motivation or desires. Given that student motivation is a component of a broader academic motivation framework, it is necessary to systematically support it to promote the overall academic

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achievement of higher education institutions. For example, teachers can be encouraged to adopt various teaching strategies, especially student-centered strategies such as project-based learning or collaborative learning. Good learning motivation may affect students' learning attitudes, participation levels, and various other factors, thereby affecting their academic performance. In short, educational institutions must pay special attention to the learning enthusiasm of students.

Secondly, for a long time, education has been regarded as a powerful force in society and an important tool for promoting beneficial changes in various aspects of society, politics, economy, and culture. Among the key influencers in this process, teachers are key figures who play an important role in the field of education. Given the crucial role of the teaching profession as a catalyst for social progress, cultivating educators in the teaching profession is widely regarded as the most concerning issue in any country. Research on teacher knowledge indicates that teaching is influenced by the professional knowledge and skills of teachers. There are various views on the abilities of teachers; However, scholars unanimously agree that instructor competence is a multifaceted concept. The ability of a teacher is crucial for both teaching and learning. Having this ability will help students understand the course materials. The skills of teachers also help students understand the importance and advantages of their education. They will invest more time and energy in learning. For example, as a teacher, proficient teaching abilities are required, including professional knowledge, language expression skills, effective communication skills, and the ability to organize course materials. In addition, interpersonal skills play a crucial role in improving the classroom environment and promoting teacher-student interaction. Effective communication is crucial for teachers to create a dynamic and stimulating learning atmosphere. Therefore, educational institutions must enhance the abilities of teachers to promote students' learning performance.

Limitations for Future Research

Although this study provides valuable insights into the factors influencing student performance, it must be acknowledged that there are limitations to this study, to provide some reference for future research in this field. These limitations indicate possible avenues for further investigation and research improvement:

Sample size and demographic data: This study focuses on a specific group of students from the School of Materials Science and Engineering at Xihua University. Future research should aim for diverse samples, including students from different educational backgrounds, age groups, and cultural backgrounds, to evaluate the generalizability of survey results.

Variables and Relationships: This study focuses on five independent variables and one dependent variable. Future research can explore more independent variables and their potential interactions, providing a more comprehensive perspective on the factors that affect student academic performance.

Strategic research design: This study adopts a planned research model and does not involve substantial intervention measures. Future research can apply the measures discussed in this study to practical actions.

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