RESEARCH ON THE INFLUENCE OF COLLEGE STUDENTS' SELF-EFFICACY ON ACADEMIC ACHIEVEMENT IN ONLINE LEARNING ENVIRONMENT*

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Abstract

The objectives of this study are: 1) to describe the current status of college students' online learning self-efficacy and academic achievement; 2) to examine differences across gender, grade, subject area, and online-learning experience; 3) to analyze correlations between self-efficacy and academic achievement; and 4) to estimate the predictive effect of self-efficacy on academic achievement and its dimensions. This research adopts a quantitative design supplemented by qualitative interviews. The population consists of undergraduates at a comprehensive university in Guangxi, China; the sample comprises 352 participants selected through stratified random sampling. Data were collected using an Online Learning Self-Efficacy Scale (20 items), an Online Learning Academic Achievement Scale (11 items), and semi-structured interviews with six students, and analyzed through descriptive statistics, independent-samples t-tests, one-way ANOVA, Pearson correlation, and linear regression in SPSS 27.0.

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The research results show that: 1) significant differences exist in self-efficacy and academic achievement by gender, grade, subject, and online-learning experience (with non-significant exceptions for “sense of environment” across grades and “sense of effort” across subjects); 2) self-efficacy dimensions are positively correlated with knowledge gains and ability gains ($p < .01$); 3) overall self-efficacy significantly predicts total academic achievement ($R^2 = .653$, $\beta = .808$, $p < .001$) and its subdimensions—knowledge gains ($R^2 = .624$, $\beta = .790$) and ability gains ($R^2 = .604$, $\beta = .777$); and 4) each self-efficacy dimension (competence, effort, environment, control) contributes positively to academic achievement in a multivariate model. The study concludes that strengthening students’ online learning self-efficacy is key to enhancing academic achievement. The recommended strategies include targeted skills training on platforms/tools, structured opportunities for online expression and feedback, emotion-focused supports for low-efficacy groups, learner-centered digital learning spaces, and cross-university–industry teams to develop high-quality online courses.

Keywords: Online Learning Self-efficacy, Academic Achievement, College Students, Regression Analysis, Higher Education

Introduction

In the era of global digital transformation, higher education is undergoing a profound paradigm shift driven by the integration of information and communication technologies (ICT) into teaching and learning processes. Online education has gradually evolved from a supplementary instructional mode into a mainstream approach that redefines how knowledge is transmitted, accessed, and constructed. The outbreak of the COVID-19 pandemic has further accelerated this transformation, compelling universities across the world to adapt rapidly to virtual learning environments and adopt innovative pedagogical models. In China, the Ministry of Education has vigorously promoted the concepts

of “Smart Education” and “Internet Plus Education”, encouraging universities to develop digital campuses, expand online resources, and advance blended and intelligent learning ecosystems. Nevertheless, as online education expands in scale and scope, new challenges have emerged—particularly regarding students’ learning engagement, persistence, and academic achievement in virtual contexts.

Among the numerous psychological factors influencing students’ academic success, self-efficacy has received considerable scholarly attention. Introduced by Bandura (1977), self-efficacy refers to an individual’s belief in their capability to organize and execute the actions required to achieve specific outcomes. Within educational settings, this construct fundamentally shapes how students approach learning tasks, how much effort they invest, how resilient they are in the face of difficulties, and ultimately, how successfully they perform academically. Previous research has consistently demonstrated that academic self-efficacy serves as a critical determinant of students’ motivation, self-regulation, and achievement outcomes (Schunk, 1991; Pintrich & De Groot, 1990; Zimmerman, Bandura, & Martinez-Pons, 1992). In online learning environments, self-efficacy extends beyond classroom learning and encompasses learners’ confidence in using digital tools, navigating virtual platforms, and managing their learning autonomously (Hodges, 2008; Shen, Cho, Tsai, & Marra, 2013).

Although numerous studies have examined self-efficacy in online learning contexts, the majority have been conducted in Western educational systems or discipline-specific domains. Consequently, limited attention has been paid to understanding how Chinese university students perceive and exercise self-efficacy in local online learning environments. Moreover, existing empirical findings regarding the relationship between online learning self-efficacy and academic achievement remain inconsistent. Some studies have identified strong positive associations (Jan, 2015; Ithriah, Ridwandono, & Suryanto, 2020), while others have revealed moderate or domain-specific effects. Such discrepancies

may be attributed to variations in measurement dimensions—namely, sense of competence, sense of effort, sense of environment, and sense of control—as well as contextual factors such as gender, academic discipline, grade level, and duration of online learning experience.

To address these research gaps, this study investigates the influence of college students' self-efficacy on academic achievement within online learning environments. Employing a mixed-methods approach that integrates quantitative analysis with qualitative inquiry, the study aims to:

(1) assess the overall status of online learning self-efficacy and academic achievement among Chinese university students.

(2) examine differences across demographic and learning background variables.

(3) analyze the correlations between self-efficacy and academic achievement.

(4) determine the predictive effects of self-efficacy on academic performance in various online learning dimensions.

By elucidating the internal mechanisms through which self-efficacy shapes students' online learning outcomes, this study contributes both theoretically and practically to the ongoing discourse on digital education. It not only enriches the theoretical understanding of self-efficacy within the context of higher education digitalization but also provides actionable insights for universities seeking to improve instructional design, enhance learning support systems, and promote sustainable academic success in the digital era.

Objectives

1. Describe the current status of college students' online learning self-efficacy and academic achievement.

2. Examine the differences in self-efficacy and academic achievement across gender, grade level, subject area, and online learning experience.

3. Analyze the correlations between online learning self-efficacy and academic achievement.

4. Determine the predictive effects of self-efficacy dimensions-competence, effort, environment, and control-on academic achievement and its subdimensions (knowledge gains and ability gains).

Literature Review

The concept of self-efficacy was first introduced by Bandura (1977) within the framework of Social Cognitive Theory (SCT), which emphasizes the dynamic interaction among personal factors, behaviors, and environmental influences. Bandura defined self-efficacy as an individual's belief in their capacity to organize and execute actions required to achieve specific goals. It is not merely a reflection of one's skills but rather the confidence to utilize those skills effectively under diverse conditions. According to Bandura, self-efficacy operates through four major sources: mastery experiences, vicarious experiences, verbal persuasion, and physiological or emotional states. Mastery experiences refer to direct experiences of success that strengthen one's sense of capability, while vicarious experiences involve observing others' successful performance as a social model. Verbal persuasion refers to encouragement or feedback from significant others that reinforces belief in one's own ability, and physiological or emotional states pertain to mood and affective conditions that influence perceived confidence and performance. In educational contexts, self-efficacy plays a crucial role in determining students' learning motivation, persistence, and coping strategies. High self-efficacy enhances goal commitment, promotes active engagement, and reduces anxiety when facing academic challenges. Conversely, low self-efficacy often leads to avoidance behaviors, procrastination, and self-

doubt, which can hinder academic progress. With the development of digital technologies, learning environments have become increasingly complex, requiring learners to engage autonomously and interact with learning systems. In online education, self-efficacy expands from traditional academic confidence to include students' abilities to manage technology, regulate their learning pace, and adapt to virtual environments. Hodges (2008) argued that online learning self-efficacy is multidimensional, encompassing students' confidence in using digital platforms, communicating in virtual spaces, managing time effectively, and sustaining motivation without direct supervision. Similarly, Shen et al. (2013) developed the Online Learning Self-Efficacy Scale (OLSES), identifying key components such as learning management, self-regulation, and interactional efficacy. These dimensions capture the psychological readiness required for successful digital learning. Recent studies in China (Li & Chinokul, 2023; Han, 2024; Liang, 2024) have also emphasized that online learning self-efficacy among college students is influenced by technological accessibility, digital literacy, and institutional support systems. Inadequate training in online tools or poorly designed learning platforms can weaken students' confidence and reduce their academic engagement. A substantial body of research has confirmed that self-efficacy is a strong predictor of academic achievement (Schunk, 1991; Pajares, 1996; Zimmerman et al., 1992). Students with higher self-efficacy tend to set more challenging goals, exert greater effort, and recover more quickly from setbacks. Within online learning environments, self-efficacy is particularly critical because learners must rely on intrinsic motivation and self-regulation rather than direct teacher supervision. Empirical findings (Jan, 2015; Ithriah et al., 2020; Zajacova, Lynch, & Espenshade, 2005) reveal that self-efficacy positively correlates with students' perceived competence, learning satisfaction, and overall achievement. In Thailand, Chaninsathapat et al. (2022) found that undergraduate students with higher self-efficacy reported greater learning effectiveness and motivation in e-learning systems. Similarly, Chinese researchers

(Luo & Zhang, 2022; Wang & Wu, 2017) reported that academic self-efficacy mediates the relationship between emotional intelligence, learning strategies, and performance. In summary, students' self-efficacy influences academic achievement both directly—through enhanced effort, persistence, and strategic learning—and indirectly—through emotional regulation, motivation, and cognitive engagement. Drawing on previous studies (Shen et al., 2013; Han, 2024; Li, 2020), this research conceptualizes online learning self-efficacy across four interrelated dimensions: sense of competence, sense of effort, sense of environment, and sense of control. Sense of competence refers to confidence in mastering academic content, completing assignments, and understanding online materials. Sense of effort reflects persistence and initiative during online learning tasks. Sense of environment refers to adaptability to the virtual learning setting, while sense of control concerns the ability to manage time, learning pace, and distractions effectively. These dimensions interact dynamically to shape students' behavioral engagement and learning outcomes. Strengthening each component enhances overall self-efficacy, thereby improving academic achievement and learning satisfaction. Based on Social Cognitive Theory and previous empirical literature, this study posits that online learning self-efficacy influences students' academic achievement through both cognitive and motivational pathways. Specifically, self-efficacy enhances learners' knowledge gains and ability gains by fostering proactive learning behaviors and positive emotional states. The theoretical framework developed in this study identifies online learning self-efficacy—comprising competence, effort, environment, and control—as the independent variable, and academic achievement—consisting of knowledge gains and ability gains—as the dependent variable. It also recognizes the moderating effects of demographic and experiential variables such as gender, grade, discipline, and online learning duration on the relationship between self-efficacy and academic achievement. Through this framework, the study

contributes new empirical evidence to the discourse on digital pedagogy, offering both theoretical enrichment and practical implications for improving instructional design, psychological support, and educational policy within higher education institutions.

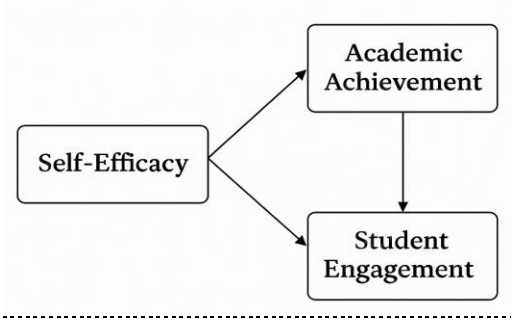

Figure 1: Conceptual Framework of Online Learning Self-Efficacy and Academic Achievement

Methodology

This section presents a systematic account of the research process to ensure transparency and replicability.

This study employs a quantitative design supplemented by qualitative interviews (mixed methods approach).

Population and Sample:

The population comprises undergraduates from a comprehensive university in Guangxi, China. The sample includes 352 students, selected using stratified random sampling to ensure representation by gender, grade, and discipline.

Research Instruments:

Online Learning Self-Efficacy Scale (OLSES) (20 items).

Online Learning Academic Achievement Scale (11 items).

Semi-structured interviews with six students for qualitative validation.

Reliability and validity were verified using SPSS 27.0.

Data Collection Procedures:

Data were collected through online surveys and follow-up interviews during the academic year 2023. Ethical approval and informed consent were obtained prior to data collection.

Data Analysis:

Quantitative data were analyzed using descriptive statistics, independent-samples t-tests, one-way ANOVA, Pearson correlation, and linear regression. Qualitative data from interviews were analyzed using content analysis to triangulate the quantitative findings.

Result

This chapter presents the results of the statistical and qualitative analyses conducted to examine the influence of college students' online learning self-efficacy on their academic achievement. The findings are derived from both quantitative data collected through questionnaires and qualitative insights obtained from interviews. The analyses include descriptive statistics, differential analysis, correlation analysis, and regression analysis, followed by a synthesis of interview results to provide a comprehensive understanding of the relationship between self-efficacy and academic achievement in an online learning environment.

Table 1 Descriptive Statistics

Variable	Category	Frequency	%	Variable
Gender	Male	171	48.6	Gender
	Female	181	51.4	
Grade	Freshman	70	19.9	Grade
	Sophomore	93	26.4	
	Junior	103	29.3	
	Senior	86	24.4	

Discipline	Liberal Arts	178	50.6	Discipline
	Science	174	49.4	
Experience	<1 year	77	21.9	Experience
	1–2 years	134	38.1	
	>2 years	141	40.1	

A total of 352 valid responses were collected, including 171 males (48.6%) and 181 females (51.4%). Most respondents were sophomores and juniors (55.7%) and had at least one year of online learning experience (78.2%).

Table 2 Descriptive Statistics of Key Variables

Variable	Min	Max	Mean	SD
Sense of Competence	1.00	5.00	3.55	0.92
Sense of Effort	1.00	5.00	3.62	0.97
Sense of Environment	1.00	5.00	3.49	0.93
Sense of Control	1.00	5.00	3.52	0.95
Knowledge Gains	1.00	5.00	3.27	0.92
Ability Gains	1.00	5.00	3.36	0.91

Table 2 presents the descriptive statistics of the main variables, including the four dimensions of online learning self-efficacy—sense of competence, sense of effort, sense of environment, and sense of control—and two dimensions of academic achievement—knowledge gains and ability gains.

The results show that all four self-efficacy dimensions have mean scores above 3.0 on a 5-point scale, indicating that students generally possess a moderate to high level of confidence in their online learning capabilities. Among them, the sense of effort (M = 3.62, SD = 0.97) ranked highest, followed by sense of competence (M = 3.55, SD = 0.92), sense of control (M = 3.52, SD = 0.95), and sense of environment (M = 3.49, SD = 0.93).

This suggests that most students believe they can persist and stay motivated during online learning, though their perceived ability to manage the learning environment is slightly lower.

For academic achievement, the mean scores for knowledge gains (M = 3.27, SD = 0.92) and ability gains (M = 3.36, SD = 0.91) were both above average, indicating that students not only acquired knowledge but also improved their practical learning skills through online learning.

Overall, the descriptive results imply that the respondents' online learning experience was generally positive, and that a higher sense of self-efficacy tends to align with stronger academic performance.

Table 3 Correlation and Regression Analysis

Relationship	**r**	**β**	**p**	**Result**
Self-Efficacy Academic Achievement	.808**	.823	<.001	Significant
Self-Efficacy Knowledge Gains	.790**	.833	<.001	Significant
Self-Efficacy Ability Gains	.777**	.813	<.001	Significant
Relationship	r	β	p	Result

Table 3 shows that online learning self-efficacy is strongly and positively correlated with academic achievement ($r = 0.808$, $p < .001$). Significant positive correlations were also found with both knowledge gains and ability gains. Regression analysis further confirmed this relationship ($\beta = 0.823$, $p < .001$; $R^2 = 0.653$), indicating that online learning self-efficacy significantly predicts students' academic performance. This suggests that higher self-efficacy leads to better academic outcomes in online learning environments.

Conclusions

This study examined the influence of college students' self-efficacy on academic achievement in online learning environments. Based on empirical data collected from 352 students at G University in Guangxi, China, the findings confirmed that online learning self-efficacy is a key psychological determinant of students' academic success. Consistent with Bandura's (1977) social cognitive theory, self-efficacy functions as a self-regulatory mechanism that guides learning behaviors, persistence, and emotional control during online study.

The results demonstrated that self-efficacy significantly predicts academic performance (β = 0.823, $p < .001$), explaining 65.3% of the variance in academic achievement. Specifically, students with stronger confidence in their learning abilities—especially in dimensions such as competence, effort, control, and environment adaptation—tended to report higher levels of both knowledge gains and ability gains. This supports previous findings by Zimmerman, Bandura, & Martinez-Pons (1992) and Schunk (1991), who emphasized that self-efficacy not only influences motivation but also enhances goal setting, self-regulation, and performance outcomes.

In addition, the study found gender, grade, subject, and online learning experience to be significant differentiating factors. Male students and those with more than two years of online experience reported higher self-efficacy and achievement scores. This aligns with Jan (2015) and Shen et al. (2013), who observed that greater familiarity with online learning tools enhances students' confidence and perceived control, leading to stronger academic outcomes.

Moreover, the regression analysis revealed that all four self-efficacy dimensions exerted significant positive effects on learning outcomes. Among them, the sense of environment had the strongest standardized coefficient (β = 0.258), suggesting that students' ability to adapt to and utilize the digital learning environment plays a central role in academic success. This finding echoes the

view of Chen and Jang (2010), who argued that learner autonomy and environmental adaptation are core predictors of e-learning effectiveness.

Theoretically, this research enriches the application of Bandura's self-efficacy theory in the digital education context by confirming that confidence in online learning abilities fosters persistence, engagement, and better learning performance. Practically, it provides empirical support for universities to design online education strategies focusing on skill training, emotional regulation, and learning support systems (Greene et al., 2004; Hodges, 2008).

In conclusion, enhancing college students' self-efficacy is essential for promoting sustainable academic achievement in online education. Educational institutions should integrate targeted interventions—such as digital learning workshops, peer mentoring, and personalized feedback—to strengthen students' sense of competence and control. As emphasized by Gist (1987) and Pajares (1996), building self-efficacy through mastery experience and positive reinforcement remains one of the most effective strategies for improving learning outcomes.

Discussion

The findings of this study confirm that online learning self-efficacy plays a crucial role in determining college students' academic achievement in digital environments. The significant positive correlation between self-efficacy and academic performance aligns with Bandura's (1977) Social Cognitive Theory, which posits that individuals' beliefs in their capabilities influence their motivation, perseverance, and emotional regulation.

The results revealed that students with higher self-efficacy achieved greater knowledge gains and ability gains. This supports the findings of Schunk (1991), Zimmerman et al. (1992), and Hodges (2008), who emphasized that strong self-efficacy enhances goal setting, self-regulation, and persistence, leading to

improved learning outcomes. In this study, all four self-efficacy dimensions—competence, effort, environment, and control—exhibited significant positive effects on academic performance, indicating that successful online learners must not only believe in their academic abilities but also manage learning contexts effectively.

Interestingly, the "sense of environment" emerged as the strongest predictor, implying that adaptability to digital learning settings and comfort with technological interfaces are key determinants of academic success. This aligns with Chen and Jang's (2010) findings that environmental adaptability and learner autonomy are critical to e-learning effectiveness. Moreover, demographic factors such as gender, discipline, and years of online learning experience also influenced students' self-efficacy levels, echoing the observations of Jan (2015) and Shen et al. (2013).

In summary, the discussion highlights that self-efficacy is not only a psychological construct but also a pedagogical foundation in digital learning contexts. Enhancing students' belief in their ability to learn online can improve engagement, emotional stability, and performance outcomes, thereby bridging the gap between technological accessibility and effective learning behaviors.

Recommendations

Based on the findings and discussion, several recommendations can be proposed for educators, institutions, and future researchers:

For Educational Institutions

Develop structured digital training programs to improve students' technological confidence and familiarity with online platforms.

Establish learner-centered online environments that promote autonomy, peer interaction, and immediate feedback.

Provide psychological support mechanisms, such as counseling and self-efficacy workshops, to assist low-efficacy students.

Integrate blended learning models combining online and face-to-face instruction to accommodate diverse learning preferences.

For Instructors

Incorporate motivational strategies that emphasize mastery experiences and positive reinforcement to strengthen students' self-beliefs.

Use interactive teaching methods, such as group projects and discussion boards, to enhance students' sense of competence and collaboration.

Offer personalized feedback to help learners monitor progress and develop self-regulatory skills.

For Future Research

Extend the investigation to other educational levels or specific disciplines to explore contextual variations.

Employ longitudinal designs to examine how self-efficacy evolves over time in sustained online learning.

Incorporate mediating and moderating variables such as emotional intelligence, motivation, or digital literacy to deepen understanding of the self-efficacy–achievement relationship.

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