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PAPER

The Relationship Between Learning Motivation and Online Learning Performance: The Mediating Role of Academic Self-Efficacy and Flow Experience

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ABSTRACT

Learning motivation is one of the key factors influencing students' engagement in online learning. This study aims to explore the relationship between learning motivation and online learning performance and to delve into the mediating roles of academic self-efficacy and flow experience in this relationship. A questionnaire survey was conducted with 427 online learners, and structural equation modeling was employed for analysis. The results indicate that learning motivation has a positive effect on online learning performance. Academic self-efficacy and flow experience play a mediating role in the relationship between learning motivation and online learning performance. When students possess higher levels of academic self-efficacy, they are more likely to actively engage in learning, thereby improving their learning performance. Simultaneously, flow experience plays a significant role during the learning process. When students experience a state of flow, learning becomes more enjoyable and efficient, consequently enhancing academic achievement. Therefore, educators and educational institutions can take measures to cultivate students' academic self-efficacy, such as providing positive feedback and support and encouraging students to face challenges. Additionally, creating a positive learning environment that fosters flow experiences can help improve students' academic performance.

KEYWORDS

learning motivation, online learning, self-efficacy, flow experience

1 INTRODUCTION

With the rapid development of information technology, online learning has gradually emerged as a significant innovation in the field of education. Among these innovations, massive open online courses (MOOCs) and other forms of online learning have garnered widespread attention and adoption [1]. Online learning offers

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students a more flexible way of studying [2] and facilitates the global sharing of educational resources. However, it has also brought forth a series of challenges. Despite the increased learning opportunities brought about by online courses, issues related to self-discipline and learning motivation have arisen [3]. Many students face self-discipline difficulties when engaging in online learning, lacking the strict management and designated study hours of traditional classroom settings, resulting in decreased learning effectiveness [4]. Additionally, compared to traditional face-to-face teaching, some students struggle to experience the joy of learning in an online context, lacking positive learning motivation. This can lead to feelings of boredom or loss of interest during the learning process, ultimately leading to a higher dropout rate. Therefore, it is necessary to conduct an in-depth study on the mechanisms underlying the relationship between learning motivation and academic performance in online learning.

By exploring the impact mechanism of students' learning motivation in the online learning process, we can better understand the motivation and attitudes that students develop during their studies. This understanding can provide valuable insights for formulating corresponding educational strategies. Focusing on the relationship between learning motivation and academic performance helps us explore ways to stimulate students' interest in online learning, enhance learning motivation, reduce dropout rates, and optimize the teaching effectiveness of online learning. Against the backdrop of rapid development in educational informatization, this paper aims to conduct a thorough analysis of the relationship between learning motivation and academic performance in online learning. Drawing from perspectives in psychology and education, it examines the influence of factors such as self-discipline, learning motivation, and joy of learning on online learning performance. Through scientific research methods and data analysis, we hope to offer valuable insights for improving and innovating online education, thereby contributing to the enhancement of educational quality and the learning experience in online learning.

2 RESEARCH MODEL AND HYPOTHESES

2.1 Learning motivation and online learning performance

Learning motivation refers to the drive, willingness, and interest that individuals experience during the learning process, which leads them to engage actively in learning activities and make sustained efforts to achieve learning goals. Learning motivation can be classified into intrinsic motivation (based on inner interests and satisfaction) and extrinsic motivation (influenced by external rewards or punishments) [5, 6]. On the other hand, online learning performance refers to the learning outcomes and academic achievements that students attain through participating in online courses and completing learning tasks in the online learning environment. Performance indicators may include learning grades, levels of knowledge mastery, and course completion rates, among others [7, 8].

Learning motivation plays a crucial role in online learning. Firstly, it serves as the primary driving force behind students' engagement in online learning. Students with higher learning motivation tend to actively participate in online learning because they are interested in learning content and academic accomplishments, and they are willing to exert effort to achieve their learning goals. Conversely, students lacking in learning motivation may find learning tasks uninteresting, leading to procrastination and resistance, thereby affecting their motivation for learning. Secondly, there is a close association between learning motivation and online

learning performance [9]. Higher levels of learning motivation generally lead to better online learning performance. This is because learning motivation stimulates students to invest themselves and make continuous efforts in their learning, increasing their willingness to actively explore knowledge and, consequently, enhancing the effectiveness of their learning. In the context of online learning, students typically need strong self-discipline and autonomous learning abilities, both of which are closely related to learning motivation. Students with strong learning motivation are more likely to persevere in their studies and demonstrate greater focus and effort, resulting in better learning performance.

In summary, learning motivation is a critical factor influencing students' engagement and performance in online learning, directly affecting the level of their dedication to learning and their motivation for learning. Therefore, we propose hypothesis *H1: Learning motivation positively predicts online learning performance.*

2.2 The mediating role of academic self-efficacy

Academic self-efficacy refers to an individual's confidence and belief in their ability to successfully complete specific academic tasks. In essence, it reflects a student's judgment and expectation of whether they can achieve success in their academic endeavors [10]. Academic self-efficacy is an important concept proposed by psychologist Albert Bandura's social cognitive theory. According to social cognitive theory, an individual's learning behavior and motivation are influenced by their perceptions and beliefs about their own capabilities. If a student has high confidence in their academic abilities, they are more likely to actively engage in learning and strive to achieve their learning goals.

In the context of online learning, academic self-efficacy plays a significant mediating role in learning motivation and learning performance. When students face online learning tasks, they make decisions about their participation and effort based on their evaluation of their academic self-efficacy [11]. If students have a positive perception of their academic self-efficacy and believe in their ability to complete learning tasks successfully, they will be more motivated and willing to actively engage in the learning process. Conversely, if students have low academic self-efficacy, they may lack confidence and perceive the learning process as challenging, leading to a decrease in learning motivation. Additionally, academic self-efficacy also has a crucial impact on learning performance. There is a positive association between higher academic self-efficacy and better learning performance. Students who believe in their ability to complete academic tasks are more likely to overcome difficulties, persist in their studies, and maintain focus during the learning process. This positive attitude and behavior contribute to improved learning performance. On the other hand, low academic self-efficacy may lead to insufficient motivation and negative learning attitudes and subsequently impact learning performance. Therefore, we propose hypothesis *H2: Academic self-efficacy serves as a mediating factor between learning motivation and online learning performance*.

2.3 The mediating role of flow experience

Flow experience, a concept proposed by psychologist Mihaly Csikszentmihalyi, refers to a state in which individuals become fully immersed and absorbed in an

activity, experiencing a heightened sense of concentration on the task itself and losing track of time during the process, leading to a state of flow or being in the zone [12]. In the context of online learning, flow experience plays a significant mediating role in learning motivation and learning performance. Flow experience enables students to be fully absorbed, disregarding external distractions, and become more focused on the learning activity, thereby enhancing the efficiency and quality of learning [13].

The mediating role of the flow experience (between learning motivation and online learning performance) can be explained through the self-determination theory. According to this theory, the motivation sources for an activity can be categorized into extrinsic motivation and intrinsic motivation. Flow experience often accompanies intrinsic motivation, as students develop interest and satisfaction in the learning task not merely due to external rewards but because of internal enjoyment and the need for self-fulfillment. This intrinsic motivation and flow experience mutually reinforce each other, enhancing the positive nature of learning motivation [14]. Therefore, we propose hypothesis *H3: Flow experience serves as a mediating factor between learning motivation and online learning performance*.

2.4 The chain mediating role of academic self-efficacy and flow experience

Academic self-efficacy influences learning motivation, as students' belief in their academic abilities stimulates their interest and engagement in learning. Flow experience, a positive state of learning regulated by academic self-efficacy, helps students maintain focus on their studies. Through flow experience, students experience joy and satisfaction in learning, further enhancing their learning motivation and promoting improved learning performance. Thus, academic self-efficacy and flow experience form a chain of mediation, tightly connecting learning motivation with learning performance and providing crucial psychological support for students' positive performance and academic achievements in online learning. Therefore, we propose hypothesis *H4: Academic self-efficacy and flow experience serve as a chain mediating factors between learning motivation and learning performance*.

In conclusion, building upon existing research, this study focuses on online learners as the research subjects and constructs a chain mediation model (Figure 1) to explore the impact of learning motivation on learning performance and its underlying mechanisms. Specifically, it examines the mediating role of academic self-efficacy and flow experience.

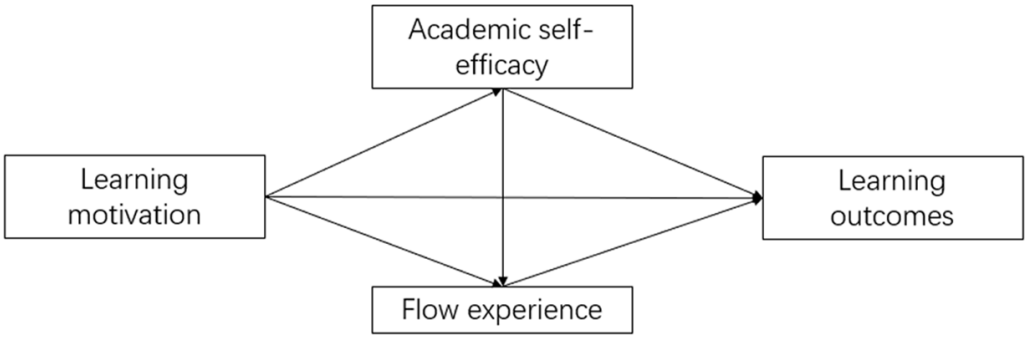

Fig. 1. The theoretical representation of a chain mediation model

3 DATA ANALYSIS

3.1 Scale design

The scale design adopted the Likert scale design method, where higher scores indicate greater agreement [15]. The learning motivation scale used in this study was adapted from DeShon et al.'s (2005) revised learning motivation scale [16], consisting of six items. The scale was modified to suit the measurement of learning motivation in the online learning context; for example, during online course learning, I aspire to be ahead of other classmates. The academic self-efficacy scale was adapted from Gibson et al.'s (1984) scale and modified to suit the online learning background [17], comprising five items. For example, I believe that I can learn the relevant knowledge and apply it proficiently. The flow experience scale was adapted from Chang et al.'s (2012) flow experience scale [18], consisting of four items. For example, during online learning, I often forget about other things besides studying. The online learning performance scale was adapted from Alghamdi et al.'s (2000) scale [19], comprising 10 items. For example, I achieved high grades through online course learning.

3.2 Data analysis method

Descriptive statistics were used to comprehensively understand the basic characteristics of the sample and the distribution of the data. Subsequently, the structural equation modelling software SmartPLS was employed to further analyze the conceptual model. The aim was to explore the relationship between academic self-efficacy, flow experience, learning motivation, and learning performance and to test whether academic self-efficacy and flow experience serve as chain mediating factors. Through structural equation modelling analysis, we can gain insights into the direct impact of learning motivation on learning performance and the mediating role of academic self-efficacy and flow experience. This will help uncover the complex relationship and underlying mechanisms between learning motivation and learning performance.

3.3 Common method bias test

The common method bias test is a method used to assess whether there is common method bias in a study. Common method bias refers to the overestimation or underestimation of the relationship between variables due to their measurement from the same source, potentially affecting the accuracy and credibility of the research conclusions. To ensure the validity of the study results, a common method bias test is often conducted to assess this potential bias. Harman's single-factor test was used in this study to test for common method bias. The results showed that the first factor explained only 23.18% of the variance, which is far less than the critical threshold of 40%. Therefore, there is no serious common method bias in this study.

4 MODEL ANALYSIS

4.1 Descriptive analysis

This study mainly investigates the impact of learning motivation on learning performance in online learning, and the sample consists of individuals who have used

online learning platforms. A total of 500 questionnaires were distributed in this survey, and 482 were collected, with 427 valid questionnaires. The survey data showed that female participants accounted for 46.7%, while male participants accounted for 53.3%, indicating a relatively even sample distribution. Most of the sample users started using online learning platforms during high school or college and have considerable experience with online learning.

4.2 Structural model verification

In this study, SmartPLS 3.0 was used to construct and measure the structural equation [20, 21], and to verify the research hypotheses. First, the model was tested for reliability and validity. Reliability was verified through composite reliability (CR) and Cronbach's alpha coefficients for each variable. From Table 1, it can be observed that the CR values are all above 0.90 and the Cronbach's alpha values are all above 0.90. Generally, when both values are above 0.8, the model demonstrates good stability. Therefore, it can be concluded that the reliability of this model is good. For validity, it was examined in three aspects: content validity, discriminant validity, and convergent validity. As all variables in this questionnaire survey were adapted from existing literature, the content validity of the measurement model is considered good. From Tables 1 and 2, it can be seen that the average variance extracted (AVE) values in this model are all above 0.70. Generally, an AVE above 0.5 indicates good convergent validity for the model. Furthermore, as the square root of the AVE for each latent variable is greater than the correlation coefficients between the latent variables and other variables, it can be concluded that the discriminant validity of this measurement model is acceptable.

Table 1. Reliability test results

	Cronbach's α	Rho_A	CR	AVE
Academic self-efficacy	0.903	0.904	0.939	0.837
Learning motivation	0.949	0.954	0.963	0.866
Flow experience	0.952	0.952	0.969	0.912
Learning outcomes	0l952	0.954	0.963	0.840

Table 2. Discriminant validity test results

	Academic Self-Efficacy	Learning Motivation	Flow Experience	Learning Outcomes
Academic self-efficacy	0.915			
Learning motivation	0.506	0.931		
Flow experience	0.734	0.533	0.955	
Learning outcomes	0.745	0.571	0.883	0.917

With the assurance of good reliability and validity of the measurement model, this study employed SmartPLS 3.0 to conduct analysis on the structural model to verify the hypotheses. The results, as shown in Figure 2, indicate that learning motivation has a β coefficient of 0.625 with $P < 0.001$, demonstrating that learning motivation

has a direct positive and significant effect on learning performance. Hence, hypothesis H1 is supported.

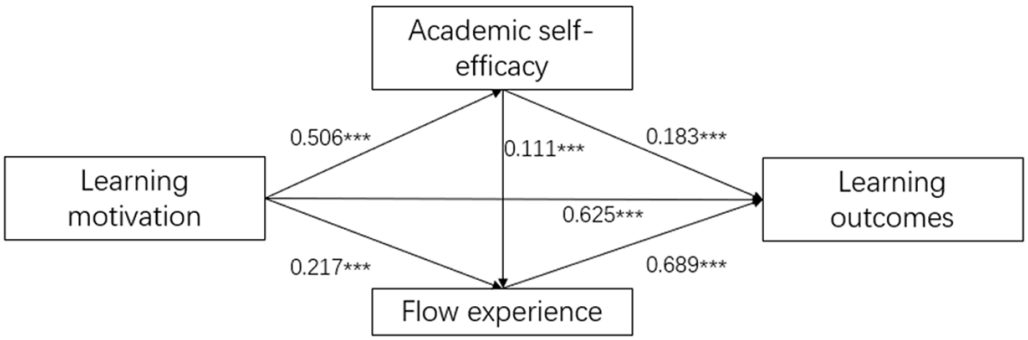

Fig. 2. Model path coefficients

In the aforementioned study, academic self-efficacy and flow experience may act as mediating variables. Now, we examine the mediating effects in the following paths: Learning Motivation → Academic Self-Efficacy → Learning Performance, Learning Motivation → Flow Experience → Learning Performance, and the chain mediation effect of academic self-efficacy and flow experience in the path: Learning Motivation → Academic Self-Efficacy → Flow Experience → Learning Performance.

As revealed in the previous tests, learning motivation significantly and positively influences academic self-efficacy and flow experience, while academic self-efficacy significantly and positively influences flow experience. Moreover, academic self-efficacy and flow experience significantly and positively impact learning performance. Therefore, it is necessary to examine the mediating effects of the specified paths. The results of the mediating effect tests are presented in Table 3, and all mediating effects were found to be significant.

Table 3. Results of mediating effects

Indirect Effect Path	Indirect Effect Point Estimate	T-Value	P-Value	Results
Learning Motivation → Academic Self-Efficacy → Learning Performance	0.093	4.119	< 0.001	Mediating effect
Learning Motivation → Flow Experience → Learning Performance	0.150	4.003	< 0.001	Mediating effect
Learning Motivation → Academic Self-Efficacy → Flow Experience → Learning Performance	0.218	6.761	< 0.001	Mediating effect

5 DISCUSSION

5.1 The relationship between learning motivation and learning performance

Learning motivation directly influences the enthusiasm and effort put into learning [22, 23]. When learners possess high levels of learning motivation, they are more likely to dedicate more time and energy to learning tasks because they are interested in the subject matter and believe that learning is crucial for their personal development and goals. On the contrary, low learning motivation often leads to a lack

of interest and drive in learners towards learning tasks, thereby impacting learning outcomes. Additionally, learning motivation affects the attention and focus in learning. Learners with high learning motivation are more likely to maintain concentration; they are more responsive to learning content and better able to resist distractions and factors that may divert their attention, thus contributing to improved learning efficiency and quality. Moreover, learning motivation is closely related to the cognitive process of learning. Learners who are interested in learning are more inclined to adopt deep learning strategies; they tend to delve deeper into understanding learning materials and engage in active thinking and exploration, thereby promoting better internalization and application of knowledge. Lastly, learning motivation also influences persistence and perseverance in learning. When learners face challenges or difficulties, high learning motivation helps them persistently overcome obstacles, maintain patience, and demonstrate resilience in their learning process, eventually leading to better learning performance [24].

5.2 The mediating role of academic self-efficacy

The relationship between learning motivation, academic self-efficacy, and learning performance forms a complex and interconnected system. Learning motivation serves as the intrinsic driving force behind learning behavior, while academic self-efficacy represents an individual's confidence and assessment of their abilities and performance in the learning process, and learning performance refers to the actual achievements and outcomes of learners [25, 26]. Firstly, learners with high levels of learning motivation often hold optimistic attitudes towards their academic abilities, believing that they can handle learning tasks and achieve success. Conversely, learners with low learning motivation may doubt and feel insecure about their academic capabilities, resulting in decreased academic self-efficacy. Secondly, learners with high academic self-efficacy are more likely to adopt proactive learning strategies; they have confidence in their academic abilities and are thus more willing to face learning challenges and difficulties. This positive attitude and behavior contribute to enhancing learners' learning performance, leading to better academic achievements and outcomes [27, 28].

5.3 The mediating role of flow experience

The relationship between learning motivation, flow experience, and learning performance constitutes an interconnected triangular relationship. Firstly, learners with high learning motivation are more likely to enter the state of flow. When learners are interested in learning tasks and perceive value in their personal development and goal attainment through learning, they are more willing to engage in learning wholeheartedly, thereby increasing the likelihood of experiencing flow. On the contrary, learners with low learning motivation often struggle to enter the flow state due to a lack of interest and motivation, making it difficult for them to fully immerse themselves. Secondly, flow experience is characterized by a high level of concentration and engagement; when learners experience flow, they are more likely to forget about time and external distractions, fully concentrating on the learning task, thereby enhancing learning efficiency and quality [29]. Thus, flow experience contributes to improving learning performance, enabling learners to achieve better grades and performance in their learning process [30].

5.4 The chain mediating role of academic self-efficacy and flow experience

The chain mediating role refers to the existence of a mediating variable between two variables, which enhances the relationship between the original two variables through its influence. Academic self-efficacy and flow experience jointly constitute the mediating chain between learning motivation and learning performance. High academic self-efficacy enables learners to enter the state of flow more easily, and flow experience, in turn, further enhances learners' learning motivation, creating a positive cycle that ultimately leads to improved learning performance [31–33].

6 CONCLUSION

The research findings indicate that learning motivation is one of the crucial factors influencing students' engagement in online learning. Students with high learning motivation are more likely to invest more effort and time in their studies, resulting in better learning performance [34–36]. Academic self-efficacy and flow experience play mediating roles between learning motivation and online learning performance. The study reveals that academic self-efficacy serves as a vital bridge between learning motivation and learning performance. When students possess higher academic self-efficacy, they are more inclined to actively engage in learning, thus promoting the improvement of online learning performance. Additionally, when students can experience flow states during learning, the learning process becomes more enjoyable and efficient, leading to further enhancement of online learning performance [37–39]. In light of the above research conclusions, educators and educational institutions should prioritize cultivating students' academic self-efficacy and creating a positive learning environment when conducting online education. This will help students better experience flow states and, in turn, maximize their learning motivation and online learning performance.

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