



RESEARCH ARTICLE

The Study on the Impact of Chinese Vocational College Students' Online Learning Behavior on Their Learning Effectiveness: Intervened by Self Efficacy of Online Learning and Social Support

Chen Qiang^{1*}, Weng FuYuan²^{1,2} International College of Krirk University, Bangkok, Thailand

ARTICLE INFO	ABSTRACT
Received: Apr 24, 2024 Accepted: Aug 13, 2024	<p>The purpose of this study is to explore the online learning behavior, self-efficacy, social support, and learning effectiveness of vocational college students, as well as the relationship between the four variables. This study used Stratified sampling to draw about 1500 students from nine different types of vocational colleges in three provinces of northeast China as formal samples, and used online learning behavior scale, self-efficacy scale, perceived social support scale, and learning effectiveness scale to issue formal questionnaires to research subjects. Research hypothesis:A.The online learning behavior of vocational college students has a significant positive impact on learning effectiveness;B.Vocational college students' self-efficacy in online learning plays a mediating role in the impact of online learning behavior on learning outcomes;C.Social support for vocational college students has a moderating effect on the impact of online learning behavior on learning outcomes. Based on the effective data of this study, SPSS26 and AMOS26 were used for statistical analysis, the results showed that the online learning behavior of vocational students had a significant positive impact on learning effectiveness ; the self-efficacy of online learning of vocational students has a mediating role in the influence of online learning behavior on learning effectiveness;social support for higher vocational students has a moderating effect on the impact of online learning behavior on learning effectiveness.Based on the research results, measures to promote the effectiveness of online learning in higher vocational colleges are constructed from the teacher level, student level, and school level.</p>
<p>Keywords</p> Vocational college students Online learning behavior Learning self-efficacy Social support Learning effectiveness	
<p>*Corresponding Author: Chenqiang28307214@126.com</p>	

INTRODUCTION

With the vigorous development of the digital economy, new technologies such as big data, Internet of Things, cloud computing, blockchain, and artificial intelligence are accelerating their breakthrough applications. China's education informatization and digitalization are also developing very rapidly. Digital education has ushered in a period of rapid development (He Yuanyuan & Liu Chun, 2021). In February 2023, at the World Digital Education Conference, Minister Huai Jinping of the Ministry of Education of China pointed out: Adhering to the guidance of educational digital values and promoting the digital transformation of education are the general trend and development needs. In October 2022, the "Vocational Education Informatization Development Report" pointed out that teachers and students in vocational colleges use information learning more widely and use information learning platforms more naturally. More than 74% of teachers are using information technology to teach,

students' recognition of the learning effects of information technology exceeds 58%, and their recognition of new technologies such as virtual simulation teaching platforms is as high as 90% (Ministry of Education of China, 2023). In July 2023, the Ministry of Education issued the "Notice on Key Tasks to Accelerate the Construction and Reform of the Modern Vocational Education System". All schools should adapt to the trend of digital transformation of vocational education and the requirements of change, deepen the application of the national vocational education smart education platform, and encourage the construction of distinctive school-level resource banks according to the needs of talent training. All schools should effectively use new generation information technologies such as virtual reality and digital twins, guide virtual imitation bases to jointly build and share common virtual simulation training resources, and actively push high-quality resources to national or provincial vocational education smart education platforms (Ministry of Education of China, 2023). Online education in higher vocational colleges has attracted attention because it not only provides a more flexible and adaptable education method, but also helps strengthen students' practical skills and professional qualities to better meet the needs of the job market.

Theoretical Basis and Research Hypotheses

Research Theory

This study is based on the Three-dimensional Reciprocal Determinism in Bandura's (1977) Social Learning Theory, which consists of three factors: Person, Behavior and Environment. The three factors continue to influence each other and belong to a tripartite reciprocal relationship. Behavioral model P represents personal factors (such as beliefs, expectations, attitudes, knowledge), E represents environmental factors (such as resources, behavioral results, others, role models, teachers, physical situations), and B represents behavioral factors (such as individual actions, choices, verbal statement). The two-way arrow represents the interaction between the three parties. This theory is widely used in the study of educational systems. Social learning theory in the field of education focuses on how students acquire knowledge, develop skills, and interact with others in the educational environment through social cognitive processes (Bandura, 2001).

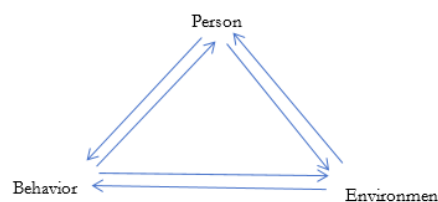


Figure 1: Bandura's three-dimensional interactive determinism model

Bandura (1986) proposed self-efficacy (Self-efficacy) based on social cognitive theory, which refers to people's confidence in their ability to use their skills to complete a certain work behavior. Self-efficacy affects learning because self-efficacy is closely related to students' use of learning strategies and self-regulated learning. Students with high self-efficacy can demonstrate higher learning strategies and be more self-regulating about learning outcomes than students with low self-efficacy. Furthermore, learning self-efficacy affects students' learning effectiveness. According to this, in the process of individual learning, individual learning behavior (online learning interaction behavior) will have an impact on learning effectiveness (online learning effectiveness) through the nature of individual beliefs (self-efficacy). Therefore, this study uses this to construct a research framework

relationship in which individual online learning behavior affects individual learning effectiveness through learning self-efficacy.

The above-mentioned ternary reciprocal determinism (Reciprocal Determinism) believes that individuals, environment and behavior are in a mutual influence relationship. Different environmental conditions (such as family, school, etc.) can shape an individual's attitudes, behaviors, and values. Factors such as social culture, social support, and resource allocation in the environment will affect individual development and behavioral choices (Cohen, S., & Wills, T.A. 1985). Social support refers to emotional support, recognition and help from social environments such as family, friends, teachers (Taylor, S.E. 2011). Therefore, when an individual completes learning tasks, important others around the individual (family, teachers or classmates, etc.) will provide encouragement and other supportive behaviors in words and actions, which is more conducive to improving students' academic performance (Yang Li, Yang Chao, 2017). According to this, in the process of individual learning, the individual's external environment (social support) will interact with the individual's learning behavior, which will have an impact on students' learning effectiveness. Therefore, this study uses this to construct a research framework on the impact of individual social support on online learning behavior on learning effectiveness.

This study is based on the perspective of social cognitive theory (Bandura, 1977) and combined with the previous collection of literature related to online learning behavior, online learning self-efficacy, social support, and learning effectiveness (Moore, 1989; Kuo et al., 2014; Qiao Weifeng, Liu Weitong and Li Manli, 2021; Zuo Xiujian, 2019; Xu Zhonghong, 2018; Ding Yucheng and Gong Xiaofei, 2020; Schwarzer et al., 1999; Ma Mengzhen, 2022; Li&Liang, 2019; Mansouri&Samad, 2018; Li&Deng, 2020; Richardson&Swan, 2003; After sorting out Nikolaidou & Haniotis 2016; Zimet et al., 1988), the architecture diagram of this paper's research is proposed, as shown in Figure 2, to understand the relationship and connotation between each variable.

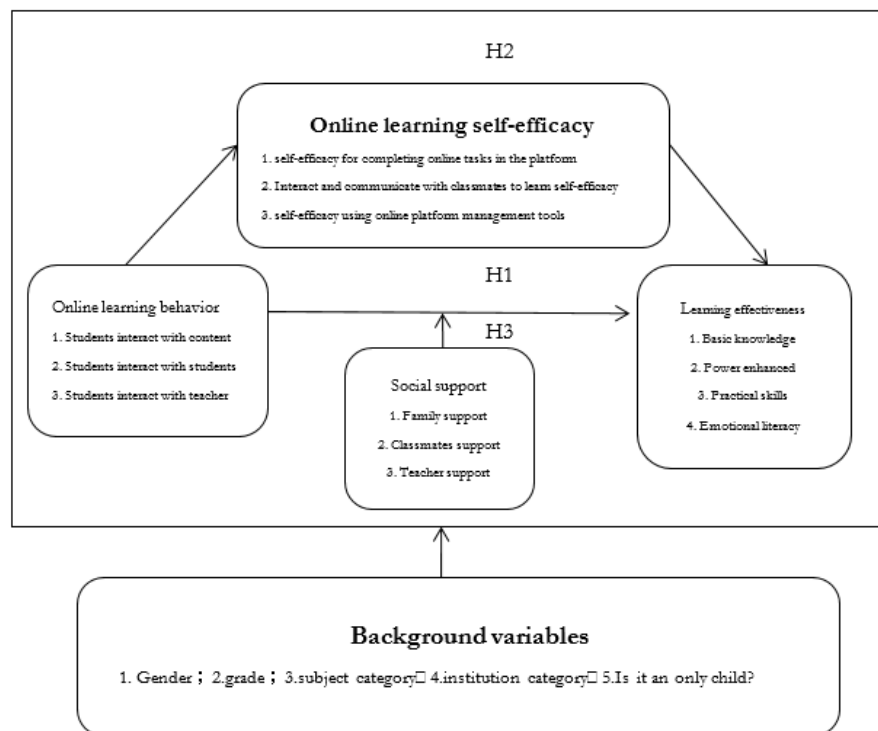


Figure 2: Research framework diagram

The impact of online learning behavior on learning effectiveness

Moore (1989) divided it into mutual interaction among learners, connection between learners and knowledge content, and communication between learners and teachers about course content. The Online Teaching Interaction Scale compiled by Kuo et al. (2014) measures online learning behavior from three dimensions: student-learning content interaction, student-student interaction, and teacher-student interaction. Learning effectiveness evaluation refers to the process of making value judgments on learners' entire learning process and learning effects based on online learning objectives (Tham, 2005). Learning behavior is the core element that affects the quality of online learning. Data exploration of online learning behavior helps to better understand the characteristics of students' activities in online courses. This is important for improving students' learning behaviour and academic performance, and also helps to assess the quality of teaching and learning to design appropriate curricula. The digitization of behavioral characteristics is changing the management model, teaching model, teaching support, teaching evaluation and educational research paradigm of the education system. How higher vocational colleges analyze learning behaviors in online learning platforms, what indicators can effectively characterize behavioral habits, and how online learning behaviors affect learning outcomes still require more empirical research (Li Shuang et al., 2016; Wang Hongmei et al., 2019).

Therefore, the hypothesis of this study is proposed: H1 The online learning behavior of Chinese higher vocational students has a significant positive impact on learning effectiveness.

The mediating role of online learning self-efficacy

Self-efficacy theory was proposed by psychologist Albert Bandura in the 1970s. It refers to an individual's perception of their confidence and ability to complete a specific task or achieve a goal, emphasizing the impact of individual beliefs and confidence on success. Self-efficacy is an important determinant of individual behavioral outcomes (Bandura, 1986). A number of studies have found that different types of learning models can significantly affect an individual's learning self-efficacy (Ran Yan, 2022). In studies on students' final learning outcomes, it has also been found that individual efficacy has a significant positive impact on learning (Chen Yaxuan and Chen Jianlin, 2007). Yang Chun's (2016) study showed that students' different types of information feedback behaviors (learning behaviors) during the learning process have different impacts on students' self-regulated learning (self-efficacy). Good learning behaviors can improve students' self-regulated learning (self-efficacy), thereby improving academic performance (learning effectiveness). In other words, individual learning behaviors are different, their learning self-efficacy is different, and ultimately their learning results are also different, which mainly shows a positive and significant impact.

From this, the hypothesis H2 of this study is deduced: The online learning self-efficacy of Chinese higher vocational students plays a mediating role in the impact of online learning behavior on learning effectiveness.

The moderating role of social support

Thoits (1986) believes that social support refers to the emotional support, cognitive support, substantive support and companionship support provided by important people (such as spouse, parents, relatives, friends or teachers, etc.) in a timely manner when an individual is under special pressure or difficulty. Various forms of support help individuals coordinate the balance of body, mind and spirit in interacting with their environment. The Perceived Social Support Scale compiled by Zimet, Dahlem and Farley (1988) has a total of 12 items, including three dimensions: family support,

classmate support, and other (friends and relatives) support. The total score reflects the individual Total perceived social support.

Research has found that social support has a positive and significant impact on online learning behavior (Hu Meng and Wang Binbin, 2018); social support has a moderating effect on online learning behavior and learning effects in colleges and universities (Su Xiaoqing, 2019). Therefore, this study introduces social support as a moderating variable into the research model and analyzes it as a moderating variable to explore the moderating mechanism of social support of higher vocational students between online learning behavior and learning effectiveness. Therefore, the hypothesis H3 of this study is proposed: The social support of higher vocational students has a moderating effect on the impact of online learning behavior on learning effectiveness.

Research design

Research object

This study adopted a stratified sampling method, and the samples came from higher vocational students from different types of higher vocational colleges and different types of disciplines in the three provinces of Northeast China. The categories of institutions are divided according to the selection results of the Ministry of Education of China. Category A refers to national-level double-high construction institutions (high-level vocational colleges with Chinese characteristics and professional construction plans), and Category B refers to provincial-level double-high construction institutions (provincial high-level higher vocational colleges). Higher vocational schools), Category C refers to ordinary higher vocational colleges. The subject categories are divided according to the higher vocational enrollment categories of the Ministry of Education of China, namely literature and history and science and engineering. A total of 1,265 questionnaires were received, and 1,250 valid questionnaires were screened, with a questionnaire validity rate of 98.8%. As shown in Table 1.

Table 1: Demographic statistics table of the main test sample

Demographic variables	Classification	Frequency	Percentage
Gender	Male	432	34.6%
	Female	818	65.4%
Grade	Freshman year	548	43.8%
	Sophomore year	352	28.2%
	Junior year	350	28%
Institution Category	National double-high school	330	26.4%
	Provincial double-high schools	332	26.6%

	Ordinary vocational colleges	588	47%
Subject Category	Literature and history	626	50.08%
	Science and engineering	624	49.92%
Is it an only child?	Yes	540	43.2%
	No	710	56.8%

Research tools

1. Online Learning Behavior Scale

The online learning behavior measurement tool adopts the Online Teaching Interaction Scale compiled by Kuo et al. (2014), with a total of 16 items. The scale is divided into three dimensions: student-to-student interaction, student-teacher interaction, and student-content interaction. The Cronbach's alpha coefficients of the three interactive dimensions of this scale are 0.93, 0.88, and 0.92 respectively (Kuo et al., 2014). At present, this scale is widely used and is used for reference by many scholars (Qiao Weifeng et al., 2021). This study considered the uniformity of the entire scale and changed the scoring to a 5-point Likert scale, ranging from 1 for "strongly disagree" to 5 for "strongly agree." The higher the score, the more in-depth the interaction behavior.

2. Online learning self-efficacy scale

The online learning self-efficacy measurement tool draws on the General Self-Efficacy Scale compiled by Schwarzer, Mueller and Greenglass (1999), and reference to Li Wen's "An Empirical Study on the Influence of Online Learning Self-efficacy and Self-regulation Strategies on the Learning of Online Writing Course for English Majors" paper, an online learning self-efficacy scale translated and compiled based on the Chinese context. The table has 16 items, including four dimensions: self-efficacy for completing online course learning, self-efficacy for using online course tools, self-efficacy for interacting with teachers during online course learning, and self-efficacy for interacting and communicating with classmates. The Cronbach's α coefficients of the four dimensions are 0.93, 0.93, 0.94, and 0.93 respectively (Li Wen, 2021). Since the research object of this study is higher vocational students, the researcher made slight changes to the scale based on the actual situation of higher vocational students. The scale adopts a 5-point Likert scale, ranging from 1 indicating "very little confidence" to 5 indicating "very confident". The higher the score, the higher the individual's self-efficacy.

3. Social support scale

The social support measurement tool draws on the Perceived Social Support Scale compiled by Zimet, Dahlem, and Farley (1988). The main change is to change the three dimensions of "family, friends and others" to "family, teachers and classmates". The scale has a total of 12 items, including three dimensions: family support, teacher support, and classmate support. In order to conform to the integrity of the scale in this study, the 7-point score of the original scale was modified into a 5-point Likert score, ranging from The score ranges from 1 "strongly disagree" to 5 "strongly agree". The

higher the score, the more social support the individual perceives. The Cronbach's α coefficient of the original full scale was 0.88 (Zimet et al., 1988).

4. Learning effectiveness scale

The learning effectiveness measurement tool refers to a large number of literatures (Chen Yumin, 2004; Carey, 2009; Shi Jiahuan, 2012; Wang Xiangbing, 2015), based on the learning effectiveness scale developed by Qiao Weifeng et al.(2021), it was slightly modified combine with the actual learning characteristics of Chinese higher vocational students. The scale contains a total of 12 items, including four dimensions: basic knowledge (professional knowledge), ability improvement (comprehensive ability), practical skills (operational ability), and emotional literacy (ideological quality). This scale uses a 5-point Likert scale, ranging from 1 for "strongly disagree" to 5 for "strongly agree." The Cronbach's α coefficients of the four dimensions of the original scale are 0.889, 0.857, 0.913, and 0.815 respectively (Qiao Weifeng et al., 2021).

2. Reliability analysis

Cronbach's reliability coefficient was used to conduct reliability analysis on online learning behavior, online learning self-efficacy, social support and learning effectiveness. The Cronbach's coefficient of each variable was greater than 0.8, as shown in Table 2, indicating the reliability of the explanatory scale is relatively good.

Table 2: Reliability analysis

Variable	Cronbach Alpha	Number of items
online learning behavior	0.940	16
online learning self-efficacy	0.951	16
social support	0.876	12
learning effectiveness	0.889	12

Research procedures and data processing

This study mainly adopts the questionnaire survey method. Based on the aforementioned literature review, relevant theories and research purposes, after confirming the research structure and objects, measurement tools suitable for this study are selected for testing, and the social science statistical analysis software SPSS26 and AMOS26 are used for statistical analysis of data. Based on the impact of background variables (school type and grade) in the study on online learning behavior, online learning self-efficacy, social support, and learning effectiveness, this study controlled demographic variables to perform correlation analysis, mediating effect testing, and moderating effect testing.

RESEARCH RESULT

Common method bias test

This study uses a questionnaire survey, which is a self-reported form of data collection by the subjects. The measurement method itself may have biases that affect the research results. Therefore, the Harman's single factor test method is used, that is, all indicators are placed under one factor for factor analysis. If the variance explanation rate of the factor is less than 40%, it is considered that there is

no serious common method bias in the research data. On the contrary, it is considered that there is common method bias (Podsakoff, P.M., MacKenzie, Lee, & Podsakoff, N.P., 2003). During the questionnaire administration process, the researcher adopted strict procedural controls, including emphasizing that the questionnaire results were only used for academic research and that the information was kept strictly confidential and filled in anonymously. In terms of post hoc statistical testing, Harman's single factor test method was used to extract a total of 10 factors before factor rotation. The first factor explained 30.625% of the variation, which is less than the critical standard of 40%. Therefore, there are no serious common method bias in this study.

Descriptive Statistics and Correlation Analysis

Descriptive statistics were used to conduct basic statistics on each variable, and Pearson product-difference correlation analysis was used to analyze the preliminary relationship between variables. The results are shown in Table 3.

Table 3: Descriptive statistics and correlation analysis

	Number of items	M	SD	1	2	3	4
1.online learning behavior	16	3.466	0.498	1			
2.online learning self-efficacy	16	3.999	0.512	.759**	1		
3.social support	12	3.916	0.459	.530**	.642**	1	
4.Learning effectiveness	12	4.249	0.433	.578**	.761**	.613**	1

Note 1: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

As can be seen from Table 3, the mean value of online learning behavior is 3.466 (the scale level is neutral attitude), and the standard deviation is 0.498. The mean value of online learning self-efficacy is 3.999 (scale level is uncertain), and the standard deviation is 0.512. The mean value of social support is 3.916 (the scale level is neutral), and the standard deviation is 0.459. The mean value of learning effectiveness is 4.249 (the scale level is agree), and the standard deviation is 0.433.

The results show that there is a significant correlation between online learning behavior and online learning self-efficacy ($r=0.759, p<0.01$), and there is a significant correlation between online learning behavior and social support ($r=0.530, p<0.01$). Online learning There is a significant correlation between behavior and learning effectiveness ($r=0.578, p<0.01$), there is a significant correlation between online learning self-efficacy and social support ($r=0.642, p<0.01$), and there is a significant correlation between online learning self-efficacy and learning effectiveness. There is a significant correlation ($r=0.761, p<0.01$), and there is a significant correlation between social support and learning effectiveness ($r=0.613, p<0.01$).

The mediating effect of online learning self-efficacy between online learning behavior and learning effectiveness

The results of the mediation effect test are shown in Table 4. Online learning behavior significantly and positively predicts learning effectiveness ($\beta=0.579$, $t=25.701$, $p<0.001$). Online learning behavior significantly and positively predicts online learning self-efficacy ($\beta=0.759$, $t=42.236$, $p<0.001$), and when the mediating variable is put in, online learning self-efficacy has a significant predictive effect ($\beta=0.751$, $t=26.384$, $p<0.001$), and the predictive effect of online learning behavior decreases significantly, with no significant prediction effect shows that online learning self-efficacy plays a complete mediating role.

Table 4: Mediation model test

regression equation		fit index			coefficient significance	
dependent variable	independent variable	R ²	adj R ²	F	β	t
Learning effectiveness		0.376	0.374	21.15		
	online learning behavior				0.579	25.701***
online learning self-efficacy		0.603	0.602	21.315		
	online learning behavior				0.759	42.236***
Learning effectiveness		0.600	0.598	16.506		
	online learning behavior				0.009	0.316
	online learning self-efficacy				0.751	26.384***

Note 1: * $p<0.05$ ** $p<0.01$ *** $p<0.001$

Test of moderating effect

In order to avoid multicollinearity problems caused by excessive correlation between predictor variables and interaction terms, refer to Aiken, West and Reno (1991) used the method of linearly shifting the values of the independent variable and the adjusting variable to 0, then calculating the product, and using the variation inflation factor (VIF) as the multicollinearity test index. If the VIF

value is greater than 10, which means there is an obvious multicollinearity problem among variables (Myers, 1990).

The results of the mediating effect test are shown in Table 5. Online learning behavior has a significant regression coefficient on learning effectiveness ($\beta=0.579$, $P<0.001$). At the same time, when online learning behavior and social support are added to the regression model, social support is significantly positive. To predict learning effectiveness ($\beta=0.450$, $P<0.001$); and then simultaneously add the interaction terms of online learning behavior, learning effectiveness, online learning behavior and social support to the regression model, and the interaction term of online learning behavior and social support has a significant impact on There is a significant regression coefficient for learning effectiveness ($\beta=-0.90$, $P<0.001$). In this hierarchical regression model 3, VIF ranges from 1.034 to 1.375, all less than 10, indicating that online learning behavior, social support, online learning behavior and social support interaction terms are not collinear with each other. Therefore, it is judged that the moderating variable has a moderating effect.

Table 5: Moderation model test

variable	model1	model2	model3	VIF
	dependent variable : Learning effectiveness			
	β	β	β	
online learning behavior	0.579***	0.343***	0.312***	1.606
social support		0.450***	0.421***	1.678
online learning behavior*social support			-0.90***	1.500
R ²	0.376	0.51	0.516	
adj R ²	0.374	0.508	0.513	
ΔR^2	-	-	0.14	
F	21.15	29.089	29.223	
df	-41,244	-41,243	-41,242	

Note 1: * $p<0.05$ ** $p<0.01$ *** $p<0.001$

DISCUSSION AND SUGGESTIONS

This study examines the relationship between online learning behavior and learning effectiveness, as well as the mediating role of online learning self-efficacy and the moderating role of social support. The results show that there is a significant positive correlation between online learning behavior and learning effectiveness, in which online learning self-efficacy plays a mediating role and social support plays a moderating role.

First, online learning behavior positively predicts learning effectiveness. Higher vocational students with active online learning behaviors have more frequent interactions with content, teachers, and classmates, and their absorption and understanding of learning content is deeper, and they have gained more in basic knowledge, ability improvement, practical skills, and emotional cultivation. Thus, learning results will be better. The findings of this study prove that having positive online

learning interactive behaviors can better understand and master knowledge, skills and better cultivate emotional development. This finding is consistent with previous research. The results of this study support hypothesis H1, that is, the online learning behavior of Chinese higher vocational students has a significant positive impact on learning effectiveness.

Secondly, the online learning self-efficacy of Chinese higher vocational students plays a mediating role in the impact of online learning behavior on learning effectiveness. The social triadic interactive determinism (Bandura, 1977) believes that the three factors of personal factors (Person), behavioral factors (Behavior) and environmental factors (Environment) continue to influence each other. The results of this study confirmed that during the online learning process, students online Learning behavior has a direct impact on online learning self-efficacy and is an important factor in the formation of learning effectiveness. Positive online learning behaviors can stimulate an individual's internal self-efficacy for online learning, including self-efficacy for completing online course learning, self-efficacy for using online course management tools, self-efficacy for interacting with teachers during online course learning, and interacting with classmates. The self-efficacy of interactive communication and learning promotes students to achieve better learning results. The results of the mediation effect test support hypothesis H2, that is, the online learning self-efficacy of Chinese higher vocational students has a mediating role in the impact of online learning behavior on learning effectiveness.

Finally, social support has a moderating effect. Specifically, higher vocational students with high levels of social support enhance their learning effectiveness by enhancing their online learning behavior. That is, if there is a lack of social support, the impact of students' online learning behavior on learning effectiveness will be weakened; if they obtain higher social support, students will have more active and in-depth online learning interaction behaviors, and the transformation in learning effectiveness will be more obvious. Therefore, social support, as a factor that affects individual behavior, can be used as a moderating variable to affect the relationship between online learning behavior and learning effectiveness. The results of the moderation effect test verified hypothesis H3: The social support of higher vocational students has a moderating effect on the impact of online learning behavior on learning effectiveness.

This research has important practical significance. First of all, at the teacher level, teachers must first improve the quality of online learning resources, have a clear and accurate understanding of the differences between online learning and offline learning, and the problems students may encounter in online learning, and select and organize online learning resources well. Secondly, it is necessary to strengthen interactive communication with students, respond to students' questions in a timely and effective manner, actively participate in students' discussions, give timely and personalized feedback to students' speeches, enhance students' sense of presence and belonging through quality communication and interaction, and enhance their interest in online learning. Finally, teachers can form learning groups based on the teaching content. Through group cooperative learning, discussion and summary, all students can be mobilized to participate, experience and share the joy of learning together, enhance students' sense of achievement, and stimulate students' enthusiasm for long-term learning. At the student level, students themselves must strengthen the breadth and depth of their participation in online learning behaviors, actively participate in online interactions with teachers, classmates, and teaching content, and strengthen their personal online learning abilities, cooperative communication skills, and teamwork abilities to participate in personalized learning. Students should focus on tapping their own inner potential. During the online learning process, they should be good at discovering problems, asking questions, analyzing and solving problems, realizing self-supervision of the independent learning process, and improving and cultivating their own comprehensive qualities. At the school level, a multi-party evaluation mechanism should be

established for online learning, combining multi-dimensional cross-comprehensive judgments such as course evaluation, teacher evaluation and student evaluation. Make full use of the online learning interactive data of the learning platform, include students' basic knowledge, ability improvement, practical skills and emotional literacy as evaluation indicators, combine teacher evaluation, group evaluation, etc., and combine diagnostic evaluation with formative evaluation. Create a positive and motivating learning evaluation atmosphere, enhance the effectiveness of online teaching, and improve the quality of online teaching.

In conclusion, this study explores the relationship between online learning behavior and learning effectiveness and its mechanism by constructing a moderated mediation model. The study draws the following conclusion: Online learning behavior positively predicts learning effectiveness. Online learning self-efficacy plays a mediating role in the relationship between the two, and social support plays a moderating role. A high level of social support enhances the positive effect of online learning behavior on learning effectiveness, while a low level of social support weakens the positive effect of online learning behavior on learning effectiveness.

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