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The Influence of Teacher Factors on Online Learning Outcomes: The Mediating Effect of Online Learning Engagement

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Abstracts

Background and Aim: Learning outcome is an important indicator to measure students' learning cognitive ability and test their learning effect, which is significantly influenced by teacher factors and learning involvement, etc. Previous studies have investigated the mechanism of the interaction of these two factors on learning outcomes, but the strength of the relationship between teacher factors and learning outcomes in traditional teaching situations is unclear. The influence of mediating effect on the relationship between the two is still unclear. Therefore, based on the special situation of current online teaching, this study aims to investigate a linear structural relationship model of online learning outcomes and examine the goodness of fit of the linear structural relationship model with empirical data

Materials and Methods: The questionnaire survey was reliable at 0.98 and the discrimination index ranged from 0.40 to 0.82 which was used as a research instrument. Based on the survey results of 400 social science majors participating in online learning at Zhoukou Normal University, the structural equation model was analyzed through a statistical program for linear structural relationship analysis.

Results: According to the investigation of the goodness of fit of the model with the empirical data, when taking into account the goodness of fit index and the criteria indicating that the model fitted with the empirical data, (Chi-square = 52.19; p-value = 0.089, Chi-square/df = 2.61, AGFI = 0.94, CFI = 0.99, RMSEA= 0.064)

Conclusion: （1）Teacher factors were positively correlated with learning outcomes, but the effect value was small, that is, there was a weak correlation between the two. (2) Teacher factors positively predicted online learning engagement, and the effect size on learning engagement was significantly higher than that on learning outcomes. (3) There is a significant positive correlation between learning engagement and learning outcomes. (4) Learning engagement plays a completely mediating role in the perceived influence of teacher support on learning outcomes.

Keywords: Teacher Factors; Online Learning Engagement; Online Learning Outcomes

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Introduction

School closures have impacted over one billion students—more than 98 percent of the world's student population—as a result of the COVID-19 pandemic (UNESCO. 2020). Facing unprecedented chaos and challenges, most educational systems around the world ensured continuity of learning through online teaching and learning (Hu, 2022; Pokhrel & Chhetri, 2021). However, during the global pandemic, the majority of students felt that online teaching was more affected and the effect of online teaching was not good, such as low participation of students, insufficient online teaching of teachers, and poor network quality. Thus, online learning is an important research theme worth studying in the educational field during COVID-19 (Corell-Almuzara, López-Belmonte, & Moreno-Guerrero, 2021).
The core connotation of the quality of higher education is the quality of personnel training. It is the core of higher education service quality to promote the ability of college students and make universities obtain good learning achievements through higher education (Hu, 2008). Therefore, during the COVID-19 epidemic, people pay more attention to whether students' abilities are improved under the condition of online teaching.

Previous research on the quality of learning has shown that the effectiveness of learning depends mainly on student engagement. Student participation is defined as students' psychological input and efforts in learning, understanding, or mastering knowledge and skills. It is a social psychological structure within individual learners that includes emotional input, behavioral input, and cognitive input in three dynamic-related dimensions (Fredricks, Blumenfeld, & Paris, 2004). It is an important indicator to observe the learning process, predicting academic achievement, and measure learning persistence and satisfaction(Li, Li, & Yu, 2018). It is also an important variable to promote deep learning, influencing the effectiveness of teaching reform, and ensuring the quality of learning (Lawson & Lawson, 2013). For online learning, due to weak learning monitoring and lack of face-to-face emotional stimulation, the influence of learning engagement on the learning effect is more critical (Liu, Zhang, & Liu, 2017).

Fredricks et al. (2004) discussed the relationship between teacher support and students' learning engagement in the traditional teaching environment and found that students tend to show higher involvement when they perceive teacher support. Shea and Bidjerano (2009) found that teachers provide support and help to learners in terms of behavior, strategies, and other aspects, which can help enhance learners' sense of social existence and improve their learning involvement. Yin and Xu (2016)found that students perceived teachers' behavior, attitude and expectation, teaching method selection, learning task design, and learning feedback would all affect online learners' learning involvement, and further influence their learning achievement by combing domestic and foreign literature.

Through the above analysis, it can be found that although existing studies have confirmed that teacher support has a significant positive predictive effect on learning achievement (Dixson, 2010), there are only a few studies. At present, relevant researches mainly focus on the influence of teachers on learning achievement in the traditional environment. What is the relationship between teacher support and online learning outcomes in online learning environments, and what is the mediating role of online learning engagement? It remains to be seen which aspect of teacher support has the greater impact on online learning outcomes.

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As for the research on the relationship between teacher factors and learning outcomes, most of the research results prove that teacher factors are factors that cannot be ignored in students' learning outcomes. The results show that when students perceive more attention from teachers, they are more willing to adjust their learning methods actively, so as to make progress and achieve better learning outcomes (Zhang, Li, Zhang, Zhao, & Si, 2019), It also showed that students who perceived higher teacher support had significantly higher learning outcomes than students who perceived lower teacher support (Zhang, Fu, Liu, & Liu, 2018). Teacher factors can significantly predict learning outcomes (Qiao, Zhang, Liu, & Lin, 2013). Perceived teacher support behavior can positively predict students' learning outcomes (Chen & Guo, 2016). In short, teacher factors play a good role in promoting students' learning outcomes.

In two similar but different studies conducted in traditional and modern online education Settings that compared the relationship between teacher factors and learning engagement, most results were that the more supportive behaviors students received from teachers, the deeper their engagement in learning. For example, a study on online education showed that if teachers were able to provide behavioral and methodological support to students, they became more positive, and their level of engagement in learning increased (O' Shea, 2015). By examining the relationship between teacher factors and learning engagement, we find that the more teachers support students perceive, the more times they participate in learning (Chen, Guo, & Hu, 2015). When students perceive the teacher's behavior of supporting them in learning, skills, and emotions, their level of learning engagement will be significantly improved, and it can be obviously found that teacher factors have an extremely significant positive influence on students' learning engagement (Yang, Chen, & Lu, 2016).

Some studies have also proved that a higher level of learning engagement in students will make them feel the achievement and satisfaction of learning, and they will be more willing to independently explore and explore more difficult cognitive strategies, and their learning outcomes will be better (Kiuru et al., 2014). There is a significant positive correlation between learning engagement and learning outcomes, that is, the more learning engagement, the higher learning outcomes (Li, 2019). Therefore, we can find that learning engagement can not only reflect students' learning process but also positively predict students' learning outcomes. At the same time, learning engagement plays an intermediary role in the effect of teacher factors on learning outcomes (Chen & Guo, 2016). In teacher factors, we can improve teaching ability and strengthen teacher-student interaction, so as to promote learning outcomes (Yang, Chen, & Lu, 2016). To sum up, teacher factors have a significant impact on students' learning outcomes, and students' learning engagement can also predict learning outcomes, while teacher factors also affect students' learning engagement.

Therefore, this study attempts to further explore the specific relationship among teacher factors, learning engagement, and learning outcomes, and demonstrate the indirect effect of learning engagement on the path of teacher factors affecting learning outcomes. Through the evaluation, the perception and characteristics of college students' teachers' support during the epidemic period and the basic situation of students' online learning investment were investigated, and the mechanism and effect of online learning teacher factors on students' online learning outcomes were explored, and some specific suggestions were put forward to promote students' online learning investment and guarantee the teaching quality on the line.

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Research Question

Do teacher factors affecting the online learning outcomes through online learning engagement as mediating variables fit with empirical data?

Research Objectives

To investigate teacher factors affecting online learning outcomes through online learning engagement as mediating variables with empirical data.

Literature Review and Conceptual Framework

Online learning engagement

Engagement is critical to learning outcomes; It is a key site for interventions to improve academic performance, reduce dropout rates, and develop personal and cognitive skills(Vilkova, 2022). Learning engagement is widely recognized as central to understanding and improving student learning. With the deepening of the connotation of learning engagement, recent studies believe that learning engagement is a complex, multi-faceted, and multi-dimensional meta-structure (Ribeiro, Pereira, & Pedro, 2019). Due to theoretical differences, researchers have used different methods to characterize and measure engagement. Li, Zhang, and Liu (2020)built an automated evaluation model of online learning engagement based on the shortcomings of online courses such as MOOCs, and comprehensively evaluated college students' learning engagement through a series of relevant data such as videos and pictures generated during students' online learning. Wang, Li, Song, Zheng, and Xun-Xun (2020)guided by the concept and principle of index system construction, absorbs the opinions of experts, determine the weight of the evaluation index system through an analytic hierarchy process, and then build a complete evaluation index system of college students' online learning engagement. In summary, the idea that cognitive, emotional, and behavioral engagements are the three main dimensions or sub-types of student engagement is now widely accepted. In our research model, online learning engagement refers to the learners' active participation in various activities, in-depth thinking, and active response to challenges and setbacks in the learning process, accompanied by positive emotional experiences. It is the integration of cognitive participation, behavioral participation and emotional participation.

Online learning outcomes

The term "learning outcomes" was first put forward in 1979 by Eisner, who believed that “learning outcomes is the individual's result of some form of participation in an activity, whether intentional or not ”. Since then, researchers have defined the concept of learning outcomes from different perspectives. One view is to analyze learning outcomes from the perspective of output. For example, Ewell（2001）proposed that learning outcomes are the various gains achieved by students, representing the progress and growth of students, including the development of knowledge, skills, and attitudes as well as their performance after graduation. Another perspective is to analyze students' expectations. For example, Chang et al.（2020） believe that learning outcomes are defined as the knowledge and skills that students are expected to acquire and apply to practice after learning a certain course or major. College students learning outcomes to evaluate can generally by two ways; one is direct standardized tests, such as the United States Education funding council (CAE) of college students' learning evaluation (Collegiate Learning Assessment, CLA). Second, the study adopts the form of a

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questionnaire for students to self-evaluate their learning results. In our study, online learning outcomes refer to what learners gain in knowledge and understanding, practical skills, attitudes and values, and personal behaviors through online learning. It is mainly concerned with the development of knowledge, skills, and attitudes. (Ewell, 2001).

Teacher factors

Whether in the traditional face-to-face teaching environment or the distance learning environment, teachers play a key role in the learning process of students. Domestic and foreign scholars have studied the relationship between teacher factors and academic outcomes from different perspectives based on social cognitive theory, The empirical study was carried out.

In particular, to deeply explore the relationship between teacher factors and academic outcomes, Zhao, Wang, Wei, Wang, and Zuo (2020) divided teacher factors into autonomous support, emotional support, and academic support, and further investigated the influence mechanism of teacher autonomous support on academic outcomes. Therefore, based on Bronfenbrenner and Urie (1986) ecosystem theory, this study classifies the sources of teacher factors by referring to the Social Support Rating Scale (SSRS), the Perceived Social Support Questionnaire (PSSS)(Xiao & Yang, 1987). Zimet, Dahlem, and Zimet (1988)developed the perceptual teacher questions of the questionnaire. However, from the perspective of the content of the scale, they all reflect students' evaluation and perception of the support from teachers in three aspects: teacher efficacy, teaching ability, and teacher-student interaction.

Teacher Factors and online learning engagement

Teacher factors play a central role in the motivational dynamics of engagement(Skinner, Furrer, Marchand, & Kindermann, 2008). Zhang (2003) also proposed that the level of teaching efficacy will affect the whole teaching process including student participation. Xu (2021)found that in the online teaching environment, the higher the teachers' information teaching ability is, the more proficient they are in the use of teaching methods, teaching design, teaching interaction, and teaching tools, and the more attractive the courses are to students, indicating that teachers' online teaching ability is positively correlated with online learning outcomes. Through analysis, Dong (2016)argued that the value of social interaction for online learners is reflected in enhancing social presence, improving learning enthusiasm, promoting social learning participation, and optimizing learning effects.

Teacher factor and learning outcomes

Guo (2020) believed that teacher efficacy is the specific expression of self-efficacy in the teaching field, and also the internal motivation of teacher development. It affects teachers' teaching strategy and teaching method reform, teachers' attribution to the success or failure of teaching behavior, teachers' teaching attitude and emotion control, and it also has a great impact on students' learning results through teaching activities. Pellman, Schuessler, Tellakat, and Kim (2017) found in their research that if teachers do not have the support of online teaching-related software and hardware, or do not have the ability to use high-speed Internet services, many online teaching tools will not work normally. Interaction between teacher and student is the most important factor determining learning outcomes (Wu, 2017). Shea and Bidjerano (2009) took a cross-sectional, questionnaire-based investigation of 1,504 Chinese university students and found a significant positive relationship between learner-instructor interaction and learning outcomes.

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The mediating role of online learning engagement

Online learning engagement refers to students' continuous and positive emotions towards their academic activities in the school context. It not only reflects students' learning ability but also predicts students' learning outcomes. It is also an effective way to improve poor academic performance and high dropout rates (Wang & Eccles, 2013). In recent years, with the development of positive psychology, researchers have gradually paid attention to the relationship between teacher factors and learning engagement and found that teacher factors have a positive impact on learning engagement (Oda, Konishi, Oba, Wong, & Onge-Shank, 2021). To this end, a large number of empirical studies have explored the mediating role of learning engagement in the relationship between teacher factors and learning outcomes. According to the self-determination theory(Ryan & Deci, 2000) and the self-systematic processing theory(Connell & Wellborn, 1991), the higher the teacher factors, the more beneficial it is to meet the needs of students' ability development and interpersonal relationship, and the more motivated and engaged they are in learning and also increased learning confidence and thus improved student learning outcomes. However, current studies differ on the strength of the mediating effect of learning engagement. Some studies believe that learning engagement does not play a mediating role in the perceived influence of teacher support on learning outcomes (Cirik, 2015). Some studies have also found that there is no significant correlation between teacher factors and academic achievement after controlling the variables of learning engagement, and learning engagement plays a completely mediating role(Guo & Hu, 2022). In addition, Lam et al. (2012) investigated 12 countries and found that teacher factors indirectly affects academic outcomes through learning engagement, and learning engagement partially mediates the relationship between the two.

Conceptual Model

As noted above, previous research has explored the impact of teacher factors on learning outcomes in traditional models. However, with the change in an online learning environment, there are few types of research on the relationship. This study aims to investigate teacher factors affecting online learning outcomes through online learning engagement as a mediating variable. Consistent with the above studies, in this study, we believed that teacher factors have a significant impact on both learning engagement and learning outcomes, and there is also a positive correlation between learning engagement and learning outcomes. In addition, we suggest that online learning engagement mediates the impact of teacher factors on online learning outcomes. Based on the literature review discussed above, we provide a basic conceptual framework as follows (Figure 1):

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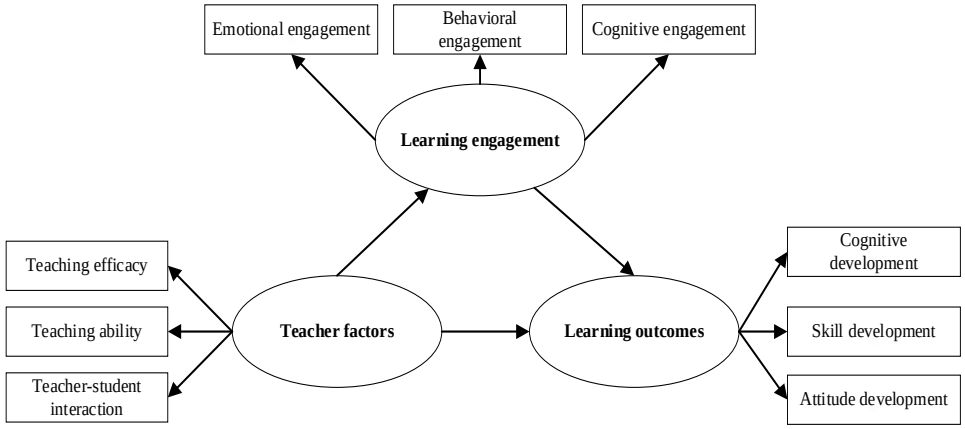

Figure 1. Linear structural model diagram

Research Methodology

Populations, Samples, and Data Collection

The populations were 3148 students majoring in social sciences at Zhoukou Normal University, Henan Province. The samples were proportional and randomly selected from 7 social science colleges at Zhoukou Normal University, Henan Province. Kline (1998) argues that the optimal sample size should be 20 times the number of observed variables. This study had a total of 15 observation variables. According to this requirement, the sample size is estimated around 300. Then, data collection was conducted by delivering anonymous online questionnaires to students via Questionnaire Star. To maximize the representation of the overall situation of online learning, 414 questionnaires were distributed and 400 questionnaires were returned (96.6%), and also were valid questionnaires. Of the valid responses, 50 (12.5%) were male and the remaining 350 (87.5%) were female.

Instruments

Based on the basic principles of questionnaire compilation and the variable dimension analysis of this study, In this study, students' questionnaire on teacher factors behavior developed by Ouyang Dan, compiled by Schaufeli, translated and revised Learning Engagement Scale by Fang Laitan and Shi Kan, and Dr. Zhu Lianhua's thesis adopted the Learning Outcomes Scale for College Students, drawing on NSSE and NSSE-China. The empirical research project of Professor Shi Aiheng's team and other scholars of Xiamen University. Some of the projects were moderately modified and independently developed. Finally formed the college students' online learning questionnaire.

"College students online learning questionnaire" is divided into questionnaire title, guidance, and specific questionnaire items. The specific questionnaire item consists of four parts, namely, the teachers' factors, the online learning engagement, the online learning outcomes of college students, and the background information of students. The questionnaire is based on the above four parts, with a total of 48 questions. Specific information was as follows:

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A total of 16 items were included in the teacher factors questionnaire, which asked the subjects about the teacher support they experienced in the process of online learning. Five-point Likert scale was adopted, in which 1 was "completely inconsistent" and 5 was "completely consistent".

A total of 16 items were included in the online learning engagement questionnaire. Participants were asked about their involvement in online learning. Five-point Likert scale was adopted, in which 1 was "completely inconsistent" and 5 was "completely consistent".

A total of 12 items were included in the online learning outcome questionnaire, and the subjects were asked how much they improved their knowledge and skills after online learning. Five-point Likert scale was adopted, in which 1 meant "very little improvement" and 5 meant "very much of improvement". The background information of the subjects was included in 4 items. The subjects were asked about their gender, college, major, and daily online learning time.

Then, a College student's online learning questionnaire was administered to 40 students to validate the quality in terms of reliability and discrimination index. The result of quality was as follows;

Variables	Components	Reliability	Discrimination index
Teacher factors	TE	0.82	0.47 - 0.78
	TA	0.71	0.71 - 0.77
	TSI	0.89	0.59 - 0.75
Learning engagement	CE	0.92	0.62 - 0.78
	BE	0.80	0.51 - 0.78
	EE	0.82	0.47 - 0.72
Learning outcomes	KU	0.96	0.67 - 0.78
	PS	0.69	0.40 - 0.75
	AV	0.96	0.72 - 0.82

Note: *TE= teaching efficacy; TA= teaching ability; TSI=teacher-student interaction; CE=Cognitive engagement; BE=Behavioral engagement; EE= Emotional engagement; KU= Knowledge and understanding; PS= Practical skill; AV= Attitudes and values*

Data Analysis

For this study, we used a statistical program for linear structural relationship analysis. Firstly, confirmatory factor analysis was performed to examine the validity and reliability of the measurement model.

Table 1 showed the validity and reliability of the measurement model that standardized factor loads for all components ranged from 0.84 to 0.97, exceeding the recommended critical value of 0.7. The composite reliability (CR) values were all greater than 0.7, which proved that all constructs have good reliability. The average variance extraction (AVE) value of all constructs was more than 0.5, supporting convergence validity. In addition, all Cronbach's alpha values were greater than 0.7, indicating appropriate internal consistency for all components.

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Table 1 The result of examining the validity and reliability of the measurement model

Variables	Components	Cronbach's values	Standardized factor loads	t-value	CR	AVE
Teacher factors	TE	0.96	0.89	-	0.92	0.79
	TA	0.96	0.94	26.68**		
	TSI	0.96	0.84	22.68**		
Learning engagement	CE	0.96	0.92	-	0.93	0.82
	BE	0.96	0.89	27.12**		
	EE	0.96	0.92	28.87**		
Learning outcomes	KU	0.96	0.94	-	0.94	0.83
	PS	0.96	0.97	37.61**		
	AV	0.96	0.86	27.40		

Finally, the investigation of teacher factors affecting online learning outcomes through online learning engagement as mediating variable with empirical data was analyzed by using path analysis with the latent variable method.

Research Results

Result of investigation of teacher factors affecting online learning outcomes through online learning engagement as mediating variable with empirical data

Chi-square values were used to evaluate the structural models for freedom ($\chi 2/df$), approximate root mean square error (RMSEA), and comparative fit index (CFI), adjusted goodness of fit index (AGFI). The specific results are shown in Table 2. SEM results showed that the hypothesis model and data fit well.

The analysis for investigating the causal relationship model's goodness of fit the finding revealed that the model developed was fit to the empirical data with all goodness of fit indices yielded a non-significant with Chi-square ($\chi 2 = 52.19$, $p = 0.089$) and Chi-square/df was 2.61. Other indices were the Adjusted Goodness of Fit Index (AGFI = 0.937), Comparative Fit Index (CFI = 0.992), and also Root Mean Square Error of Approximation (RMSEA = 0.064), and also significantly indicated that the model was congruent with the empirical data.

Table 2 The fit indices of the structural model

Goodness of fit indicies	Criterion value	Result after model refine
Chi-square	$p > 0.05$ (Kline, 2005)	52.19, p=0.089
Chi-square/df	Less than 3 (Kline, 2005)	2.61
AGFI	Greater than 0.85	.937

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Goodness of fit indicies	Criterion value	Result after model refine
	(Bentler,1983)	
CFI	Greater than 0.90 (Bentler,1983)	.992
RMSEA	Less than 0.08 (Browne & Cudeck,1993)	.064

Table 3 Path coefficients of the structural model

Dependent variables	Teacher factors			Online learning engagements		
	TE	IE	DE	TE	IE	DE
Online learning engagements	0.79**	-	0.79**	-	-	-
Online learning outcomes	0.79**	0.68**	0.11*	0.87**	-	0.87**
	Online learning engagement			Online learning outcomes		
R-Square (R^2)	0.627			0.912		

*P<0.05, **p<0.01

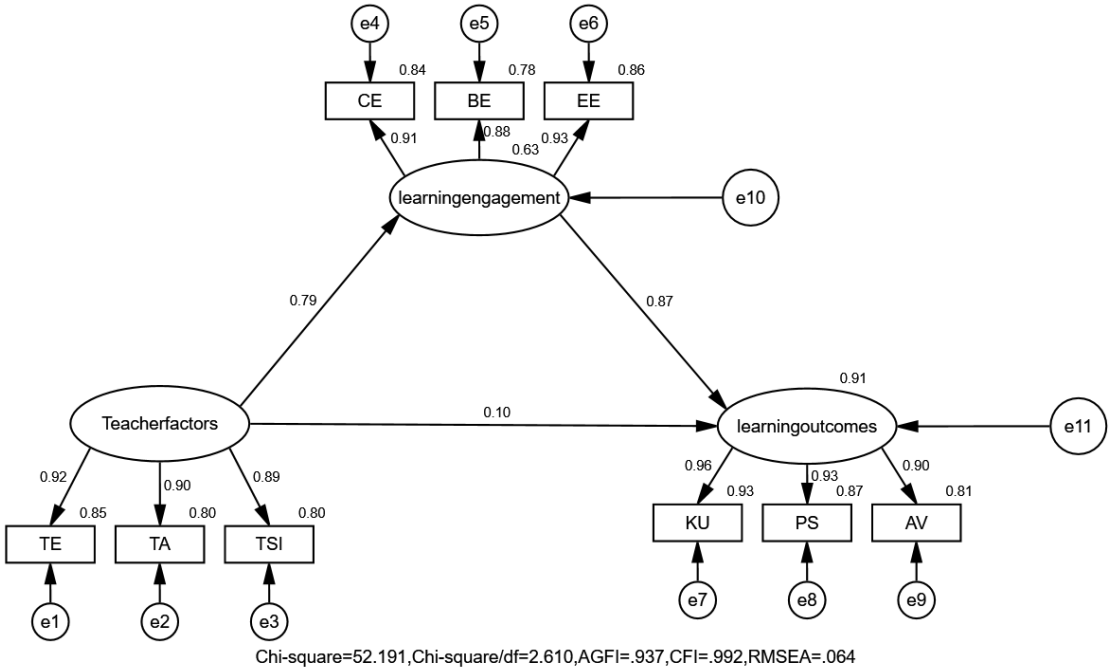

Figure 2 Path analysis of the structural model

Discussion

Based on the results presented by the research objectives, the researchers made some interesting findings during the discussion:

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2. Teacher factors showed direct influence on college students' learning engagement

Current research has found that there is a significant positive correlation between perceived teacher support factors and learning engagement in online learning environments. Specifically, in an online teaching environment, the more students perceive teacher support factors, the higher the students' learning engagement. This finding is consistent with ecosystem theory. Ecological theory (Bronfenbrenner & Urie, 1977) reports that perceived teacher support, as an important component of the school micro-system, has a significant impact on student confidence, quality, and behavioral attitudes. As a behavioral attitude, learning engagement is influenced by various factors, especially perceived teacher support (Indicated, 2017). Current research results also show that perceived teacher support factors can directly affect learning engagement (He & Qi, 2023). Teachers' behaviors, such as a high sense of teaching efficacy and good interaction with students, are significantly correlated with students' learning participation, leading to an increase in students' willingness to participate in learning activities (Liu, 2022). Both theoretical and empirical results suggest that perceived teacher factors are key factors in improving student engagement in online learning environments (Chen, 2022).

2. Teacher factors showed a direct influence on college students learning outcomes

Teacher factors have a positive impact on college students learning outcomes. The study found that perceived teacher support factors had an impact on online learning outcomes, but the two were weakly correlated before. This is consistent with the study of (Han & Wu, 2023). The reasons can be explained from the following two aspects: First, the teacher support factor is an external force, only through the students' full perception, absorption, internalization, and transformation into visible learning behavior can have an impact on their learning outcomes; Second, the influence paths of teacher support factors on learning outcomes are complex and diverse, and there are many influencing factors.

3. Teacher factors showed indirect influence through online learning engagement to the college students' learning outcomes

The results show that teacher factors have an indirect effect on college students' learning outcomes through the mediating effect of learning engagement.

Teacher factors include three dimensions: teaching efficacy, online teaching ability, and teacher-student interaction. Li, Y. and Liu, H.(2000) conducted a survey on the self-efficacy of some primary and secondary school teachers, and the results showed that teachers with different self-efficacy in teaching had differences in teaching arrangement, curriculum design, after-school help, and other aspects, as well as significant differences in students' participation. The higher the sense of teaching efficacy, the higher the learning participation. Xu (2021) found that in the network teaching environment, the higher the teacher's ability of information teaching, the more proficient in the use of teaching methods, teaching design, teaching interaction, and teaching tools, and the more attractive the course is to students, indicating that the teacher's ability of network teaching is positively correlated with the investment in network learning. Dong (2016) believes that positive teacher-student interaction is the embodiment of the value of online learners, which can enhance the sense of social presence, improve learning enthusiasm, and promote students' learning engagement. It can be seen that the direct influence coefficient of student factors on online learning engagement is 0.409 and the statistical significance was at the.05 level. This is consistent with previous studies.

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As mentioned above, there is a significant positive correlation between online learning engagement and online learning outcomes, and online learning engagement has a predictive effect on online learning outcomes. Therefore, to improve online learning outcomes, it is necessary to increase online learning engagement, and teacher factors have a direct and significant impact on online learning engagement, indicating that engagement plays a Partial mediating role between teacher factors and online learning outcomes.

Conclusions

This study is the first to explore the causal relationship among teacher factors, learning engagement, and learning outcomes. The results show that college online learning engagement plays a complete mediating role between teacher factors and learning outcomes. On this basis, we put forward the cultivation strategy of learning engagement ability, through improving students' learning engagement, further obtaining better online learning results.

Recommendation

According to the research results of the causality model of online learning outcomes, the following operations should be carried out in online learning:

1) The findings of the "guidelines for online learning outcomes" are only applicable to ordinary undergraduate universities during the pandemic, and should be applied to the post-pandemic era, or different types of universities should be appropriately adjusted to keep up with the rapid changes in the disruptive era and match the current situation.

2) Teachers, which are the leaders in online teaching, should improve the teaching effect from the following three aspects: First, strengthen the training guidance, strengthen the training of teachers and students in online teaching knowledge and technology, improve the ability of teachers and students to skillfully use online teaching information technology, so as to achieve better teaching effect. The second is to improve the teaching method. Teachers need to consider the actual effect of online teaching more and improve the teaching method according to the actual situation of each student. For example, if the online questions are not effective, the discussion topic can be posted on the learning general and communication group in advance for students to answer. In order to solve the problem that students do not take the initiative in learning, teachers can use the method of chatting with students online and focusing on guidance; In view of students' reluctance to read to expand their knowledge, teachers can assign reading materials and hold online reading sharing meetings to encourage and help more students improve their initiative in learning and thinking. The third is to deepen the communication and interaction between teachers and students. By increasing the frequency of interaction between teachers and students, setting questions to strengthen interaction, timely feedback on learning behaviors and other aspects, the effectiveness of teacher-student communication is enhanced, and the effect of teacher-student interaction is enhanced, so as to improve the quality of online teaching from multiple perspectives.

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