

IMPACT OF FACULTY SUPPORT ON STUDENT ENGAGEMENT IN ONLINE LEARNING BEHAVIOR

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Abstract

This paper classifies teacher support into two dimensions, professional support and emotional support, based on the theories related to teacher support and its connotations, and designs six support strategies such as diagnosis, explanation, questioning, guidance, encouragement and criticism, as well as eight specific teacher support methods such as assigning learning quizzes, providing personalized guidance and pushing pre-reading courseware, based on the purpose of promoting students' behavioral engagement in learning. Among them, the professional support dimension includes four categories of diagnostic strategies, explanation strategies, prompting strategies and guidance strategies, and the emotional support dimension includes two categories of encouragement strategies and criticism strategies. A twelve-week quasi-experimental study was conducted on the intervention of teacher support in the first-year college course of Advanced Mathematics in the Qingdao campus of Texas Institute of Technology and Vocational Studies as an example. The intervention and observation weeks were six weeks each, and twenty-three learning behavior data such as students' learning visits, average task completion rate, and average video viewing time, as well as eleven teacher support implementation forms such as the time, type, content, and effect level of the intervention provided by the teacher, were recorded on a daily basis. The data were used to quantitatively analyze the variability of the three major types of learning behavior inputs: engagement, persistence, and interaction before and after the intervention, as well as to analyze the correlations between the six strategies of teacher support and the types of engagement, persistence, and interaction and their sub-dimensions.

The results showed that the types of interaction and engagement of students' behavioral engagement were significantly different before and after the intervention, and there were significant positive correlations between teachers' instructional strategies, prompting strategies, explanation strategies, and encouragement strategies and students' behavioral engagement in learning. The findings provide suggestions for optimizing the implementation of support strategies by frontline teachers and open up new paths for improving the quality of online learning.

Keywords: motivation theory, teacher support, emotional support, professional support, engagement in learning

Research Questions

Students' engagement in learning is an important indicator of the quality of education and has a positive impact on both students' academic performance and personal development. Therefore, it is crucial to explore the intrinsic mechanisms and external conditions that promote student engagement in learning. Learning engagement is a variable state and can be influenced by teacher support in the learning environment. At the same time, with the rapid development of information technology, the construction and application of online courses are in full swing in major universities in the context of "Internet + education", especially in the context of the epidemic, online learning has become the main learning mode in special times.

The online learning environment is a double-edged sword, providing convenient access to teaching and learning, but also creating a temporal and spatial separation between teachers and students and difficult to control teaching and learning situations. How can teaching support be implemented in this situation to weaken the disadvantage of teacher-student separation? Does teacher support perceived by students during the online learning process affect their learning behavioral engagement? How does teacher support affect students' engagement in learning behaviors?

The Research Objectives

The purpose of this study is to explore and analyze the specific effects of teacher support on learning behavior engagement in an online learning environment through quasi-experimental research based on the design of teacher support strategies supported by motivation theory and expected value theory in an online learning environment, and on the basis of generalizing the dimensions of learning behavior engagement that have been studied. Based on the theoretical basis of teacher support, the experimental data and its quantitative analysis results, the two relationships between teacher support and learning behavior engagement in the online learning environment are clarified. On the one hand, it provides a reference value for the research on the role of teacher support on learning behavior engagement in online learning environment; on the other hand, the research findings can provide optimization strategies for teachers' teaching in online learning environment. In order to provide new ideas for teachers to implement teaching support in the online teaching process and promote students' learning behavior engagement in the online learning environment.

The Research Hypotheses and Conceptual Framework

The types of learning behavior inputs used in this study were engagement, interaction, and persistence. Therefore, three research hypotheses on teacher support and learning behavioural engagement are proposed, based on a combination of motivation theory and literature research.

H1: The type of engagement in students' behavioral inputs to learning is significantly different before and after the teacher support intervention

H2: The types of interactions in students' behavioral inputs to learning were significantly different before and after the teacher support intervention

H3: Types of persistence in students' behavioral inputs to learning differed significantly before and after the teacher support intervention

A total of six teacher support strategies were designed for this study: instruction, explanation, prompting, diagnosis, encouragement, and criticism. Six research hypotheses on teacher support strategies and behavioral engagement in learning are proposed in conjunction with literature research and theoretical foundations.

H4: There is a positive correlation between teacher explanation, prompting, diagnosis, guidance and encouragement strategies and the type of engagement in learning behavioral inputs

H5: Teachers' critical strategies are negatively associated with the type of engagement in learning behavioral inputs

H6: There is a positive correlation between teacher explanation, prompting, diagnosis, guidance and encouragement strategies and the type of interaction in learning behavioral inputs

H7: There is a negative correlation between teachers' critical strategies and the type of interaction in the input of learning behaviors

H8: Teacher explanation, prompting, diagnosis, guidance, and encouragement strategies are positively associated with the type of persistence in behavioral engagement in learning

H9: Teachers' critical strategies are negatively related to the type of persistence in learning behavioral inputs

It can provide a supplement to theories such as motivation theory, learning behavior engagement, teacher support strategies and the research content of the relationship between teacher support and learning behavior engagement, which is important to enrich and improve the relevant theories of teacher support, provide new means to promote learning behavior engagement in online learning environment, and provide an effective and optimized way for the majority of front-line teachers to carry out online teaching.

At the same time, information technology tells us that online learning is becoming more and more involved in teaching and learning, while the learning engagement of university students has become a central topic within the field of higher education in recent years. In the context of the epidemic, the learning engagement of college students in online learning practices is very unsatisfactory, and it is not uncommon for students to skip classes, not pay attention to lectures, cope with classes, and not do homework. Therefore, an optimized way of teacher support strategies is proposed to provide new ideas to cope with the current thorny problems such as teachers' incompetence and students' isolation in online learning. After a thorough study of the dimensions and measures of learning behavior engagement, the strategy design of teacher support is cut into measuring the before and after changes of students' learning behavior engagement in the online learning context and clarifying the specific relationship between the two. On the one hand, it is beneficial for teachers to fully understand the importance of teacher support to students and educational activities; on the other hand, it can provide optimized strategies and ways for teachers to implement rationalized support, thus promoting students' learning behavior engagement in online learning contexts and improving the quality of online learning.

The Benefits of the Research

The model of this dissertation was designed through the research of motivation theory, ARCS motivational model of professional identity, self-determination theory and basic psychological needs theory, expected value theory, and learning behavior input theory, and the literature review was conducted through the current status of domestic and foreign research on teacher support and the current status of domestic and foreign research on learning behavior input.

Research design

Study Subject

This study was carried out in the first semester of the academic year 2021-2022, and the experimental subjects were 32 students of Computer 1 class of 2021 in Qingdao campus of Texas Institute of Technology and Vocational College, because they were freshmen, their initial understanding of the course content was more similar, the operation level of online learning was also similar, and they had just entered school, their learning style and study habits were more stable, and they were sensitive to their experimental responses, so the selection of The research subject is representative, and at the same time, I am a mathematics teacher, so the experimental study was carried out based on the example of the course of "Advanced Mathematics Upper Class". The distribution of each basic information of the research subject is shown in Table 1.

Experimental cycle	weeks	number of people	Ratio of men to women	grade
intervention week	6 weeks	32	Male 1: Female 2.2	first-year university student
observation week	6 weeks	32	Male 1: Female 2.2	first-year university student

Table 1 Distribution of information on the study population

Study design

According to previous research, teacher support can be divided into professional support and emotional support. Professional support can include diagnosis, prompting, explanation, and instruction. Emotional support can include encouragement and criticism. Among them, diagnosis can take this means of implementation, prompting can take these two means of implementation, and so on, thus, a total of six teacher support strategies and specific eight means of implementation are divided. And the eight-implementation means can be divided into two types: proactive and triggered. As shown in Table 2

Table 2 Table of teacher support strategies and implementation plan

We simplified the six support strategies and eight teacher support implementation specifics from Table 2 to Table 3.

Table 3 Teacher support strategies and implementation components

Based on previous research, learning behavior engagement can be classified into six assessment dimensions: interaction, engagement, persistence, concentration, academic challenge, and self-monitoring. Due to the less observable nature of concentration, academic challenge, and self-monitoring, this study used three learning behavior input assessment dimensions of interaction, engagement, and persistence. Seven behavioral engagement measures were also identified based on the features of the online teaching platform used in this study. As shown in Table 4

Type of behavioural input	subdimensionality	Examples of Platform indicators
interactivity	Teacher-student and student-student interaction	Platform discussion volume
participate in	show up on time for work	Number of sign-ups
	investment time	Platform visits
	Resource Access	Post the number of chapter quizzes, assignments completed
persevere with	Task adherence	Course assignment completion rate
	High investment is maintained	Maximum number of tasks completed by students
	overcoming difficulties	Number of students unlocking all learning tasks

Table 4 Analytical framework for learning behavioral inputs in online learning environments

Data collection.

During the experiment, students' behavioral input data were counted through the Umoja Learning online platform, which required recording the time of collection, cycle type, learning content, learning tasks, learning visits, daily visits, total number of tasks, average number of tasks completed, task completion rate, list of students who completed all tasks, number of students who completed all tasks, fastest completing students, highest number of tasks completed by students, highest number of tasks completed by students task rate, list of slowest completing students, number of slowest completing students, longest viewing time, shortest viewing time, average viewing time, number of chapter quizzes completed, number of assignments submitted, number of daily discussions, and number of check-ins for a total of twenty-three online learning data items. Also, a total of eleven items of teacher support implementation data need to be recorded for the time of the teacher intervention, the problem targeted, the target of the intervention, the support method, the type of support, the content of the intervention, the student's response, the feedback or effect, the timing of the feedback or effect, the level of effect, and the implementation description.

In this case, the first week served as a buffer period to record the initial behavioral inputs of the students, in order to avoid behavioral input data being influenced by the personality characteristics of the student population. Therefore, the first week was an observation week in which no intervention was implemented, and the observation weeks were cumulative for one week. A six-week teacher support strategy intervention was conducted from the second week until the end of the seventh week, with a cumulative total of six weeks of intervention. The intervention was targeted according to the pre-determined teacher support strategies, frequency, and content. Teacher support strategies were implemented through the end of week seven, with weeks eight through twelve being observation weeks. In order to examine the change in students' learning status after the loss of online support from the teacher, this intervention was cumulative for five weeks. The total study cycle was twelve weeks, with a total of six observation weeks and six intervention weeks, beginning on September 6, 2021 and ending on November 26, 2021. During the observation cycle the teacher taught normally, taking the necessary instructional organization and guidance to allow the students to learn the course in their natural state, while recording data on learning behavior.

Research result

Variance analysis of learning behavioral inputs

The learning behavior input contains three types: interaction, engagement, and persistence, with multiple sub-dimensions under each type. The engagement type includes three sub-dimensions of attendance, time invested, and resource access; the interaction type includes one sub-dimension of amount of discussion; and the persistence type includes three sub-dimensions of task persistence, high engagement retention, and overcoming difficulties. After six weeks of teacher-supported intervention, the results of the pre-post analysis of variability of the data collected under each type and its dimensions are now shown in Tables 5 and 6.

paired-sample test	types	average value	(statistics) standard deviation	T-value	df	Sig (bilateral)
Observation week - Intervention week	participate in	-0.663	0.836	-5.323	44	0.000
	interactivity	-6.019	11.051	-3.928	51	0.000
	persevere with	-0.184	0.827	-1.492	44	0.143

Table 5 T-test results for each type of learned behavioral input

Table 6 T-test results for each type of sub-dimension of learning behavior input

It can be found that at the 0.001 level, the engagement and interaction types of the learning behavior inputs have significant differences between the intervention week and the observation week, while the persistence type has non-significant differences before and after the intervention. Among them, the sub-dimension of time invested and resource access in the engagement type, the sub-dimension of amount of discussion in the interaction type, and the task persistence dimension in the persistence type had significant differences before and after the intervention, while the sub-dimension of attendance and the sub-dimension of high engagement retention and overcoming difficulties in the persistence type had insignificant differences before and after the intervention. It can be seen that the most significant changes before and after the intervention were in the engagement and interaction types of learning behavior engagement, and that the amount of discussion dimension, task persistence dimension, time invested dimension, and resource access dimension had significant changes before and after the intervention, with the intervention week outperforming the observation week and students' online learning behavior engagement significantly improving.

Effects of teacher support strategies on behavioral engagement in learning.

A total of six teacher support strategies of diagnosis, prompting, instruction, explanation, encouragement, and criticism were implemented in this study during the intervention, and t-tests revealed significant differences in the types of interaction and engagement in students' behavioral engagement in online learning, as well as in the four dimensions of time invested, resource access, amount of discussion, and task adherence before and after the intervention. Although other influencing factors were controlled for, it was not possible to ensure whether changes in behavioral engagement were influenced by individual differences in students' own moods and states. Therefore, the correlations between the six strategies of teacher diagnosis, explanation, instruction, prompting, encouragement, and criticism and the three types of engagement and the four sub-dimensions were analyzed to test for significant correlations as a way to determine the relevant effects of teacher support strategies on behavioral engagement in learning. Since the implementation of teacher support strategies was based on frequency statistics and the types of learning behavior inputs and the indicators of each dimension were not uniform, the data of teacher support and each data of learning behavior inputs were still normalized and the values of the dimensions were measured uniformly. The results of the correlation analysis of each type and its sub-dimensions with teacher support strategies are shown in Tables 7 and 8.

kind type (e.g. blood type)		account for strategy	tuition strategy	prompt strategy	diagnosis strategy	encourage strategy	critique strategy
participate in	Pearson correlation	0.608**	0.376*	0.092	0.171	0.105	0.099
	Significance (bilateral)	0.000	0.011	0.547	0.263	0.492	0.518
	N	45	45	45	45	45	45
interactivity	Pearson correlation	0.273	0.412**	0.379*	0.087	0.416**	-0.177
	Significance (bilateral)	0.069	0.005	0.010	0.572	0.004	0.444
	N	45	45	45	45	45	45

persevere with	Pearson correlation	0.333*	0.584**	0.134	-0.083	-0.008	0.035
	Significance (bilateral)	0.025	0.000	0.380	0.588	0.961	0.817
	N	45	45	45	45	45	45

In summary, it can be seen that teachers' explanatory strategies were significantly related to engagement and persistence types of learning behavior engagement, teachers' instructional strategies were significantly related to engagement, persistence, and interaction types of learning behavior engagement, teachers' prompting and encouragement strategies were significantly related to interaction types of learning behavior engagement, and teachers' diagnostic and criticism strategies were not statistically significant with learning behavior engagement. Overall, teachers' explanatory, instructional, encouragement, and prompting strategies had significant effects on students' engagement in online learning behaviors, while diagnostic and criticism strategies had insignificant effects.

Discussion and conclusions

After a series of analyses on the design of teacher support strategies, the construction of an analytical framework and measures of learning behavior engagement, the implementation of a quasi-experimental study, and statistical data. We can conclude that: teacher support has a positive impact on promoting students' behavioral engagement in online learning; professional support from teachers is more effective than emotional support; teacher support strategies can serve as a guide for students to form good learning habits; and teachers' criticism strategies can reduce students' interactive engagement. Therefore, in future teaching, we should: provide timely guidance and support can effectively promote students' engagement in online learning; communicate and interact more with students; and effectively promote students' continuous learning through teacher support.

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