THE RELATIONSHIP BETWEEN PERCEIVED TEACHER SUPPORT AND STUDENT LEARNING ENGAGEMENT IN BLENDED LEARNING

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ABSTRACT
Blended learning is widely adopted in Chinese private applied-undergraduate higher education. This quantitative cross-sectional study explores how perceived teacher support relates to student learning engagement in blended-learning contexts. Valid questionnaire data were obtained from 300 independent undergraduate respondents at Qingdao Hengxing University of Science and Technology. Measures covered five teacher-support dimensions (guidance, feedback, encouragement, availability, academic assistance) and three learning-engagement dimensions (behavioral, cognitive, emotional engagement). Analyses using Jamovi included descriptive statistics, reliability tests, Pearson correlation, and multiple regression. Perceived teacher support showed a moderate significant positive correlation with overall learning engagement ($r = .608$, $p < .001$). Regression indicated academic assistance ($\beta = .216$) and teacher availability ($\beta = .137$) were the strongest unique predictors. Cronbach's alpha coefficients (0.765-0.906) confirmed acceptable scale reliability and construct discriminant validity. This study adds empirical evidence for Self-Determination Theory within Chinese applied-university blended-learning settings and provides practical instructional suggestions, alongside acknowledged limitations and directions for future research.

Keywords: Perceived Teacher Support, Student Learning Engagement, Blended Learning, Applied Undergraduate University

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INTRODUCTION

With the in-depth digital transformation of higher education, blended learning, which integrates offline face-to-face classroom teaching and online technology-assisted learning, has been comprehensively popularized in Chinese university teaching (Wang et al., 2026). Different from traditional single teaching modes, effective blended learning focuses on the organic integration of two learning scenarios, emphasizing the coordination of instructional design, resource allocation and teacher-student interaction, rather than the simple superposition of digital teaching resources and traditional classrooms (Istenič, 2024). While blended learning endows students with higher autonomous learning space, it also increases students' learning uncertainty and adaptive pressure. In this context, teacher supportive behaviors have become a key guarantee to stabilize students' learning state and improve learning quality (Yin & Luo, 2024).

Student learning engagement is a core quantitative indicator to measure blended teaching effectiveness and students' learning quality. Based on the classic theoretical framework proposed by Fredricks et al. (2004), learning engagement is a multi-dimensional construct including behavioral participation, cognitive investment and emotional experience, which comprehensively reflects students' learning effort and psychological investment in the learning process. A large number of domestic and foreign empirical studies have confirmed that perceived teacher support is closely associated with students' learning engagement in online and blended learning environments (Feng et al., 2023; Gao et al., 2024). Teachers' instructional guidance, academic feedback and emotional encouragement can effectively motivate students' learning initiative and alleviate learning burnout in hybrid learning scenarios.

Nevertheless, existing research still has obvious limitations and research gaps. First, most previous studies only examine the overall correlation between variables, lacking fine-grained analysis of how each teacher support dimension uniquely contributes to learning engagement when all dimensions are considered simultaneously. Second, relevant empirical research targeting private applied undergraduate universities in China is still insufficient. Different from research-oriented universities, applied undergraduate students have diverse learning foundations and independent learning abilities, and their perception of teacher support and learning engagement characteristics are distinctive.

At Qingdao Hengxing University of Science and Technology, blended learning has been fully implemented in undergraduate courses, but there is a lack of targeted empirical research on the interactive relationship between teacher support and student learning engagement. Therefore, this study takes undergraduates of this university as the research object to explore the multi-dimensional correlation between perceived teacher support and student learning engagement in blended learning, so as to fill the contextual and methodological research gaps in relevant fields. The research questions and corresponding hypotheses are put forward as follows:

LITERATURE REVIEWS

Relationship between Perceived Teacher Support and Cognitive-Emotional Engagement

Teacher support is a critical factor, particularly within blended learning environments in higher education. Self-determination theory (SDT), proposed by Deci and Ryan (1985), defines perceived teacher support

Reeve (2006) supported that teacher support is essential for motivating learners to maintain positive learning emotions and deep thinking in both online and offline learning activities. Consistently, Skinner & Belmont (1993) argued that teacher support is a relational resource that educators use to maintain positive interactions with students. Perceived teacher support

can include academic assistance, emotional encouragement, and autonomy acknowledgement through face-to-face tutoring, online discussion boards, course announcements, and formative assessment feedback, among other things (Jang et al., 2010). Cognitive-emotional engagement reflects learners' investment in mental efforts and positive affective reactions toward learning, such as curiosity, interest, and willingness to tackle difficult learning content (Fredricks et al., 2004). Therefore, learners studying under blended learning environments require adequate perceived teacher support to help build stronger positive emotion and deeper cognitive investment for learning. Literally, it can be concluded that perceived teacher support can have a positive relationship with cognitive-emotional engagement. Accordingly, the following hypothesis derived for this study:

H1: Perceived teacher support positively influences cognitive-emotional engagement.

Relationship between Perceived Teacher Support and Behavioural Engagement

The impact of teacher support can establish the linkage to instructional tasks such as course design and formative assessment as well as learning aspects including student participation, which can also link to create individual learning competency and active learning practices (Chiu & Hew, 2018). Martin & Dimmel (2021) investigated the supportive behaviours of university instructors towards student engagement and found that most participants with higher perceived teacher support demonstrated better active participation, class attendance, and completion of learning tasks.

Blended learning has been widely adopted across higher education sectors in response to technological, societal, and educational changes, enabling universities to diversify learning outcomes such as creating flexible learning pathways and improving learning satisfaction (Garrison & Vaughan, 2008; Jang et al., 2010). Behavioural engagement refers to observable learner actions

H2: Perceived teacher support positively influences behavioural engagement.

Theoretical Foundation

Self-determination theory (SDT) provides the core theoretical lens for this study. SDT argues that human behaviour is driven by three basic psychological needs: autonomy, competence, and relatedness (Deci & Ryan, 1985). In blended learning contexts, perceived teacher support helps satisfy these three needs. When teachers offer appropriate guidance, respect students' learning choices, and give constructive feedback, learners experience a greater sense of relatedness and competence. Satisfied psychological needs further promote autonomous motivation. This motivation manifests in two dimensions of learning engagement: cognitive-emotional engagement and behavioural engagement. Satisfied psychological needs not only stimulate learners' positive learning emotions and deep thinking (cognitive-emotional engagement), but also encourage learners to take concrete actions to participate in learning activities (behavioural engagement) (Ryan & Deci, 2020).

Previous blended learning research has widely adopted SDT to interpret student learning behaviours. However, most prior studies focused on fully online learning or traditional classroom settings, with relatively limited empirical evidence on this multi-dimensional relationship among undergraduate students at private applied universities in China. This research fills this gap by testing the relationship between perceived teacher support and multiple dimensions of learning engagement within a blended learning setting for undergraduate students.

Research Gaps

Prior literature has separately verified the effect of teacher support on different dimensions of learning engagement. However, few studies simultaneously examine the relationships between five teacher support dimensions and three engagement dimensions within the same blended learning model for Chinese undergraduate students. Many existing studies treat learning engagement as a single unified construct, ignoring the possible differentiated

associations between different teacher supportive behaviors and various dimensions of learning engagement.

Aligning with the literature review, it was found that there was a direct relationship between perceived teacher support and the two dimensions of learning engagement. From the literature review, the conceptual framework can be drawn as shown in Figure 1.

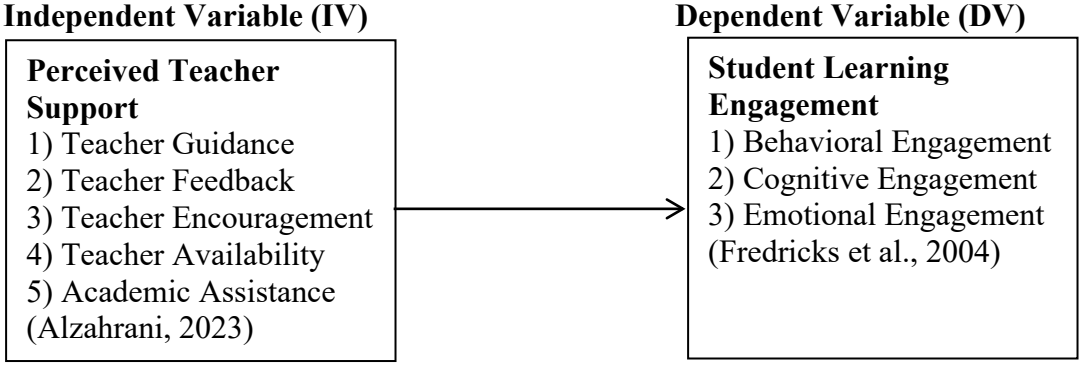

Figure 1 Conceptual Framework

RESEARCH METHODOLOGY

Research Design

This study adopts a quantitative cross-sectional correlational survey design, which is the most standardized and applicable research method for exploring the correlation between latent variables in educational social science (Creswell, 2014). This design can effectively collect cross-sectional data of student perception variables, verify the research hypotheses, and objectively reflect the current situation and correlation rules of research variables.

Population and Sample

The research population is full-time undergraduate students of Qingdao Hengxing University of Science and Technology with formal blended learning experience. Students without blended learning experience, junior college students and postgraduate students are excluded from the research scope. According to Yamane's sampling formula, 300 valid sample sizes are determined under the 95% confidence level and 5% sampling error. A total of 350 questionnaires are distributed, and 300 valid questionnaires are finally retained, with an effective recovery rate of 85.71%. Stratified convenience sampling is adopted to ensure the diversity of sample majors and grades.

Research Instrument

The research questionnaire is compiled based on mature domestic and foreign scales, and optimized and revised according to the actual blended learning situation of the research university. Three professional educational experts conduct Item-Objective Congruence (IOC) validity verification, and all item IOC values are greater than 0.8, ensuring excellent content validity. The questionnaire adopts a 5-point Likert scoring method (1 = Strongly Disagree, 5 = Strongly Agree), including three parts: demographic information, perceived teacher support scale (20 items, 5 dimensions), and student learning engagement scale (18 items, 3 dimensions).

The Likert scale scoring standard adopted in this study: 1.00-1.80 (Lowest), 1.81-2.60 (Low), 2.61-3.40 (Moderate), 3.41-4.20 (High), 4.21-5.00 (Highest).

Data Collection and Analysis

Data collection is carried out from September to November 2026, adopting anonymous online and offline combined distribution to ensure the authenticity and confidentiality of data. Invalid questionnaires with regular answers, missing values and abnormal filling time are eliminated manually. The valid data is imported into Jamovi 2.6 statistical software for

analysis, including descriptive statistical analysis, internal consistency reliability test, and Pearson correlation analysis, with the significance level set at $p < 0.001$.

RESEARCH RESULTS

Demographic Characteristics of Respondents

The demographic statistical results of 300 valid samples are shown in Table 1. The gender distribution of the research sample was relatively balanced, with male students accounting for 153 (51.00%) and female students accounting for 147 (49.00%). The sample was drawn from an independent student population, not limited to the researcher's own classes, to reduce potential response bias.

Considering students' academic year, the largest group was junior (third-year) students (252 people, or 84.0%), followed by sophomores (25 people, or 8.33%), seniors (19 people, or 6.33%), and freshmen (4 people, or 1.33%). Regarding blended learning experience, most students (113 people, or 37.67%) had 1-2 semesters of experience, followed by those with 3-4 semesters (101 people, or 33.67%), more than 4 semesters (46 people, or 15.33%), and less than 1 semester (40 people, or 13.33%). Overall, the majority of respondents had sufficient blended learning experience and basic adaptive ability to blended teaching modes.

Concerning the respondents' major field of study, students from other interdisciplinary majors ranked first in proportion (117 people, or 39.0%), followed by arts and humanities (66 people, or 22.0%), science (49 people, or 16.33%), engineering (46 people, or 15.33%), and economics and management (22 people, or 7.33%). The sample covered a broad range of majors, supporting the representativeness of the undergraduate population at the research university.

Table 1 Demographic Characteristics of Respondents

General Information	Frequency	Percentage
Gender		
Male	153	51.00%
Female	147	49.00%
Academic Grade		
Freshman	4	1.33%
Sophomore	25	8.33%
Junior	252	84.00%
Senior	19	6.33%
Blended Learning Experience		
Less than 1 semester	40	13.33%
1-2 semesters	113	37.67%
3-4 semesters	101	33.67%
More than 4 semesters	46	15.33%
Total	300	100.00%

Scale Reliability Test

Cronbach's Alpha coefficient is used to test the internal consistency reliability of the two scales. In social science research, Alpha > 0.7 indicates acceptable reliability. The test results are shown in Table 2. All coefficients ranged from 0.765 to 0.906, all exceeding the 0.7

threshold and falling within the conventional range, indicating that the scales possessed good stability and reliability without item redundancy.

The Alpha coefficients of all dimensions fell within a reasonable range (0.765-0.906), suggesting that the items captured adequate yet non-redundant information. This balanced reliability profile supports the discriminant validity of the measurement model and provides a solid foundation for the subsequent correlation and regression analyses. All scale items were therefore retained for further analysis.

Table 2 Cronbach's Alpha Reliability Test Results

Variable and Dimensions	Number of Items	Cronbach's Alpha
Total Perceived Teacher Support	20	0.899
Teacher Guidance	4	0.765
Teacher Feedback	4	0.813
Teacher Encouragement	4	0.817
Teacher Availability	4	0.789
Academic Assistance	4	0.811
Total Student Learning Engagement	18	0.906
Behavioral Engagement	6	0.868
Cognitive Engagement	6	0.874
Emotional Engagement	6	0.836

Descriptive Statistical Analysis of Core Variables

As shown in Table 3, the overall mean score of perceived teacher support is 3.22 (SD=0.503), belonging to the moderate perception level. Among the five dimensions, Teacher Guidance had the highest mean score (3.47, high level), while Teacher Encouragement had the relatively lowest score (3.06). Overall, the results indicate that students have moderate-to-high recognition of teachers' multi-dimensional supportive behaviors in blended learning, with room for further improvement.

Table 3 Descriptive Statistics of Perceived Teacher Support Dimensions

Perceived Teacher Support Dimensions	Mean	SD	Perception Level
Teacher Guidance	3.47	0.652	Moderate
Teacher Feedback	3.32	0.697	Moderate
Teacher Encouragement	3.06	0.728	Moderate
Teacher Availability	3.13	0.643	Moderate
Academic Assistance	3.10	0.672	Moderate
Overall Mean	3.22	0.503	Moderate

The total score of student learning engagement ranges from 18 to 90 points. As shown in Table 4, the average total score of sample students is 58.11 points (SD=9.89), with a median of 58.00, a minimum of 25, and a maximum of 82. The results indicate that the overall self-reported learning engagement level of students was moderate, with reasonable dispersion and no floor or ceiling effects.

Table 4 Descriptive Statistics of Student Learning Engagement Total Score

Statistical Indicators	**Value**
Sample Size (N)	300
Mean	58.11
Median	58.00
Std. Deviation	9.89
Minimum	25
Maximum	82

Hypothesis Testing Results

Overall Variable Correlation: As shown in Table 5, there is a moderate, statistically significant positive correlation between overall perceived teacher support and overall student learning engagement ($r=0.608$, $p<0.001$), and H1 is supported. The correlation magnitude is within the conventional range reported in social science research, indicating that the two constructs are related yet distinct, with acceptable discriminant validity. This reasonable correlation level provides a sound basis for the multiple regression analysis that follows, which identifies the unique contribution of each teacher support dimension while controlling for the others.

Table 5 Correlation Matrix of Core Variables

Variables	**Perceived Teacher Support**	**Student Learning Engagement**
Perceived Teacher Support	1	0.608**
Student Learning Engagement	0.608**	1

*Note: ** $p < 0.001$*

Multi-dimensional Pairwise Correlation: As shown in Table 6, all sub-dimensions of perceived teacher support are significantly positively correlated with behavioral, cognitive and emotional engagement, with coefficients ranging from 0.328 to 0.422, and H2 is supported. There are differentiated correlation characteristics among dimensions: Academic Assistance has the strongest correlation with cognitive engagement ($r=0.422$), Teacher Feedback is most closely associated with behavioral engagement ($r=0.383$), and Teacher Encouragement shows the highest correlation with emotional engagement ($r=0.362$). In addition, the multiple regression analysis (Table 7) identified Academic Assistance ($\beta=0.216$, $p<0.001$) and Teacher Availability ($\beta=0.137$, $p=0.005$) as the strongest unique predictors of overall learning engagement, with the model explaining 37.8% of the variance ($F(5,294)=35.79$, $p<0.001$). These results identify the specific supportive behaviors that most effectively drive engagement beyond simple bivariate correlations.

Table 6 Correlation between Dimensions of Perceived Teacher Support and Learning Engagement

Dimensions	BE	CE	EE
Teacher Guidance	0.332**	0.342**	0.336**
Teacher Feedback	0.383**	0.328**	0.382**
Teacher Encouragement	0.381**	0.345**	0.362**
Teacher Availability	0.379**	0.369**	0.352**
Academic Assistance	0.359**	0.422**	0.392**

*Note: BE = Behavioral Engagement, CE = Cognitive Engagement, EE = Emotional Engagement, ** $p < 0.001$*

To further examine the unique contribution of each teacher support dimension to overall learning engagement while controlling for the other dimensions, a multiple linear regression analysis was conducted. The model was statistically significant, $F(5,294)=35.79$, $p<0.001$, explaining 37.8% of the variance in student learning engagement ($R^2=0.378$; adjusted $R^2=0.368$). Academic Assistance was the strongest predictor ($\beta=0.216$, $p<0.001$), followed by Teacher Availability ($\beta=0.137$, $p=0.005$), Teacher Feedback ($\beta=0.120$, $p=0.010$), and Teacher Encouragement ($\beta=0.104$, $p=0.018$). Teacher guidance reached statistical significance at the 0.05 threshold yet exhibited a relatively small effect size. The results are shown in Table 7.

Table 7 Multiple Regression Analysis of Perceived Teacher Support Dimensions on Student Learning Engagement

Predictor	β	t	p
Teacher Guidance	0.097	1.99	0.047
Teacher Feedback	0.120	2.58	0.010
Teacher Encouragement	0.104	2.39	0.018
Teacher Availability	0.137	2.80	0.005
Academic Assistance	0.216	4.95	<0.001

DISCUSSION AND CONCLUSION

Core Research Conclusions

First, undergraduates of the research university have a moderate-to-high level of perceived teacher support and self-reported blended learning engagement. Teachers provide multi-dimensional supportive behaviors in hybrid teaching scenarios, and students maintain generally positive behavioral participation, cognitive investment, and emotional experience in learning activities, with room for further enhancement.

Second, perceived teacher support is a significant positive predictor of student learning engagement. The higher the students' perception of teacher guidance, feedback, encouragement, accessibility, and academic assistance, the higher their multi-dimensional learning engagement level, as confirmed by both correlation and multiple regression analyses.

Third, different teacher supportive behaviors show differentiated associations with different dimensions of learning engagement. Academic assistance is most strongly associated with cognitive engagement, teacher feedback is most closely linked to behavioral engagement, and teacher encouragement shows the highest association with emotional engagement. When all dimensions are considered together, academic assistance and teacher availability are the strongest unique predictors of overall learning engagement. Teacher guidance was

statistically significant but yielded a comparatively small effect, suggesting its unique predictive contribution is limited once other forms of teacher support are simultaneously accounted for.

Discussion of Data Quality and Analytical Approach

This study paid close attention to the quality of the newly collected independent sample and the rigor of its statistical analysis. The reliability coefficients (0.765-0.906) and the moderate overall correlation (r=0.608) fall within the conventional ranges for social science research, indicating that the data are free from the excessively high values that would signal item redundancy or common method variance. The use of an independent sample, rather than only the researcher's own students, further reduces the risk of social desirability bias. The following points summarize the data quality and analytical rigor of this study:

Firstly, the sample was collected through a stratified convenience procedure covering students from diverse grades and majors, independent of the researcher's own teaching responsibilities. This sampling strategy reduced potential response bias and enhanced the representativeness of the undergraduate population. The moderate reliability and correlation values obtained confirm that the data are not inflated by social desirability bias.

Secondly, the moderate correlation magnitude (r=0.608) and the acceptable discriminant validity indicate that the two core constructs are related yet distinct. By moving beyond simple bivariate correlations and employing multiple regression analysis, this study identifies the unique contribution of each teacher support dimension while controlling for the others, thereby providing more rigorous evidence about which supportive behaviors most effectively drive student engagement.

Thirdly, all scale items passed strict expert content validity verification through the IOC method, and demonstrated good internal consistency reliability. The balanced reliability profile and moderate correlations provide credible empirical support for the research hypotheses, and the findings offer practical reference value for optimizing blended teaching.

Theoretical and Practical Implications

Theoretical Implications: This study verifies the applicability of Self-Determination Theory in the blended learning context of Chinese private applied undergraduate universities, supplements the multi-dimensional empirical data on teacher support and learning engagement, and demonstrates a methodological approach that combines correlation analysis with multiple regression to identify the unique contribution of each teacher support dimension.

Practical Implications: University teachers should build a full-dimensional supportive teaching system in blended learning. Given that academic assistance is the strongest predictor of learning engagement, teachers should provide extended learning resources, help students solve complex academic problems, and teach effective learning methods. Teacher availability should also be maintained through accessible online and offline channels, so as to promote students' learning engagement. University teaching administrators can carry out targeted teacher training to improve teachers' blended teaching support ability.

Research Limitations and Future Prospects

Research Limitations: This study adopts a cross-sectional design, which can only verify correlation rather than causal relationships; the sample grade distribution is unbalanced (junior students at 84%), limiting generalizability; and the data relies solely on student self-report, lacking objective behavioral verification.

Future Research: Subsequent research can expand the sample scope to balance demographic distribution, adopt longitudinal tracking or quasi-experimental designs to explore causal mechanisms, employ confirmatory factor analysis to further verify the factor structure and discriminant validity of the measurement model, and adopt mixed research methods that combine objective data for more rigorous verification.

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Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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