

The Impact of Blended Learning Perception on Course Engagement among Students at Zhengzhou Technology and Business University, China

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Abstract This study aimed to examine the current levels of blended learning perception and course engagement, compare differences across demographic groups, and determine the predictive effect of blended learning perception on course engagement among undergraduates at Zhengzhou Technology and Business University. The population consisted of undergraduate students enrolled in blended courses at the university. A cross-sectional questionnaire survey was conducted in February 2026. A total of 370 questionnaires were distributed, and 357 valid questionnaires were obtained, with a valid response rate of 96.5%. The questionnaire included demographic information, the Blended Learning Perception Scale, and the Student Course Engagement Scale. The pilot test showed acceptable reliability, with Cronbach's α values of 0.857 for the Blended Learning Perception Scale and 0.876 for the Student Course Engagement Scale. SPSS 26.0 was used for data analysis, including descriptive statistics, independent samples t-tests, one-way ANOVA, and regression analysis. The results showed that students' blended learning perception and course engagement were both at moderate levels. Platform functionality scored the highest among the dimensions of blended learning perception, while learning satisfaction scored the lowest. Skill engagement scored the highest among the dimensions of course engagement, while attitudinal engagement scored the lowest. Significant differences in both blended learning perception and course engagement were found by gender, grade level, and class officer experience, whereas differences by major category were not significant. Regression analysis showed that blended learning perception significantly and positively predicted course engagement, explaining approximately 62.8% of the variance. These findings provide empirical evidence for improving blended course design and student engagement in private application-oriented universities.

Keywords: Blended Learning Perception; Course Engagement; Zhengzhou Technology and Business University.

1. INTRODUCTION

With the rapid advancement of information technology, traditional classroom lectures alone could no longer meet the dual demands of learning effectiveness and learning experience in higher education. Blended learning, rooted in constructivist learning theory, social constructivism, and Community of Inquiry theory, was widely recognized as a key pathway for integrating the strengths of online and offline learning. By transcending the temporal and spatial constraints of traditional classrooms, it provided students with a more flexible, personalized, and interactive learning environment (Garrison & Kanuka, 2004). The Community of Inquiry framework proposed by Garrison and Vaughan suggested that deep and meaningful learning depended on the dynamic

balance and integration of cognitive presence, social presence, and teaching presence. Blended learning precisely provided a space where these three presences could be realized by leveraging the strengths of both online and offline environments (Garrison & Vaughan, 2008).

In recent years, international research on blended learning shifted from initial debates about whether it was effective to systematic explorations of which designs were more effective and through which mechanisms it worked. A systematic review by Ashraf et al. found that existing research mainly focused on higher education settings and generally confirmed its positive effects on academic performance, learning satisfaction, and learning motivation. However, it also pointed out limitations in contextual diversity, long-term tracking, and samples from developing

countries (Ashraf et al., 2021). The latest systematic review further focused on student engagement as a core mechanism and indicated that effective blended learning often promoted students' behavioral, cognitive, and affective engagement through the combined effects of multiple dimensions such as task design, peer interaction, and online platform functionality (De Bruijn-Smolters & Prinsen, 2024).

In recent years, research on blended learning had increased both in China and internationally. However, most of these studies still focused on which model worked better and how effective it was overall, and they commonly used macro-level indicators such as academic achievement, overall satisfaction, or technology acceptance. Students' actual experiences in blended courses, whether they perceived online and offline components as well integrated, and what problems they encountered were often compressed into a few simple items and were rarely presented in detail. There were still relatively few studies that placed students' overall perceptions of blended learning and their course engagement within the same framework and used relatively mature scales for systematic analysis, especially in the specific context of Chinese private application-oriented undergraduate institutions, where relevant evidence remained insufficient (Yu et al., 2023).

Therefore, this study used blended courses at Zhengzhou Technology and Business University as the research context and measured blended learning perception and course engagement from the student perspective based on the established scales of the BLPS and SCES, so as to address the lack of empirical evidence on the relationship between these two constructs in private application-oriented undergraduate institutions (Jiang et al., 2024; Lin & Huang, 2018; Handelsman et al., 2005).

RESEARCH OBJECTIVES

In response to the aforementioned research questions, this study aimed to achieve the following objectives.

1. To understand the current status of undergraduate students' perceptions of blended learning at Zhengzhou Technology and Business University.
2. To understand the current status of undergraduate students' engagement in

blended courses at Zhengzhou Technology and Business University.

3. To examine significant differences in undergraduate students' perceptions of blended learning across demographic groups at Zhengzhou Technology and Business University.

4. To examine significant differences in undergraduate students' engagement in blended courses across demographic groups at Zhengzhou Technology and Business University.

5. To determine the significant positive effect of undergraduate students' perceptions of blended learning on their engagement in blended courses.

LITERATURE REVIEW

Theory of Blended Learning and Course Engagement

Blended learning is an instructional model that combines online learning and face-to-face teaching within the same course. It is not only the use of online platforms, but also a systematic course design that connects objectives, content, activities, interaction, and assessment. From the perspective of constructivist learning theory, students actively construct knowledge through learning tasks, learning resources, teachers, peers, and learning environments. In blended courses, online learning provides resources and extended tasks, while face-to-face teaching provides direct explanation, discussion, and feedback. The Community of Inquiry framework also provides an important theoretical basis for blended learning. Garrison and Kanuka (2004) and Garrison and Vaughan (2008) argued that meaningful learning depends on cognitive presence, social presence, and teaching presence. These three types of presence are closely related to students' perception of course content, interaction, and instructional support. Course engagement theory further emphasizes that students' learning outcomes are related to the time, effort, emotion, and strategies they invest in learning (Astin, 1984; Fredricks et al., 2004). Therefore, blended learning perception may become an important factor affecting students' course engagement.

Measurement of Blended Learning Perception

Students' blended learning perception refers to their subjective evaluation of the

blended course environment. Early studies usually measured students' attitudes toward blended learning through satisfaction, technology acceptance, or learning motivation. However, these indicators could not fully reflect students' actual experience in blended courses. Later studies began to pay more attention to students' perception of online-offline integration, interaction quality, platform support, and learning experience. Jiang et al. (2024) developed the Blended Learning Perception Scale, which provided a more systematic tool for measuring students' perception of blended learning. The scale includes five dimensions. Content Coherence refers to the connection between online and offline content. Interaction Effectiveness reflects the quality of teacher-student and peer interaction. Platform Functionality refers to the usability, stability, and resource support of the learning platform. Learning Motivation reflects students' willingness to invest effort in blended learning. Learning Satisfaction refers to students' overall evaluation of learning gains and course experience. This study adopted this scale to measure students' blended learning perception in a specific blended course.

Measurement of Course Engagement

Course engagement refers to students' participation, effort, emotion, interaction, and learning attitude in a specific course. Compared with general student engagement, course engagement has a clearer reference object and is more closely related to teaching design, classroom interaction, assessment methods, and learning support. Fredricks et al. (2004) divided engagement into behavioral, emotional, and cognitive dimensions. Handelsman et al. (2005) further developed a course-level engagement questionnaire, including skill engagement, emotional engagement, participation or interaction engagement, and performance engagement. Lin and Huang (2018) developed the Student Course Engagement Scale and divided course engagement into five dimensions. Skill Engagement reflects students' learning strategies and sustained effort. Emotional Engagement reflects students' emotional experience and value recognition. Performance Engagement refers to students' effort in completing course tasks and pursuing academic performance. Interaction Engagement reflects students' participation in teacher-student and peer interaction. Attitudinal Engagement

reflects attendance, punctuality, responsibility, and persistence. This study adopted the Student Course Engagement Scale to measure students' engagement in blended courses. ***Research on the Relationship between Blended Learning Perception and Course Engagement***

Previous research has shown that students' perception of the learning environment is an important antecedent of engagement. When students perceive that course structure is clear, interaction is effective, and platform support is sufficient, they are more likely to participate actively and maintain learning effort (Ellis et al., 2016; Henrie et al., 2015). In blended courses, content coherence helps students understand the relationship between online learning, classroom teaching, and post-class tasks. This can reduce cognitive burden and promote skill engagement and performance engagement. Effective interaction can strengthen students' sense of support and belonging, thereby improving emotional engagement and interaction engagement. Platform functionality can also influence engagement because a stable and convenient platform allows students to access resources, complete tasks, and receive feedback more smoothly. In addition, learning motivation and learning satisfaction may further strengthen students' willingness to participate in course learning. Therefore, positive blended learning perception is generally expected to promote students' preparation before class, classroom participation, assignment completion, review, interaction, and attendance.

Research on the Differences in Blended Learning Perception and Course Engagement

Some studies have also examined differences in blended learning perception and course engagement among different student groups. Gender, grade, major category, and learning role are common demographic or background variables. In some blended learning studies, female students showed higher levels of classroom participation, learning responsibility, and emotional engagement than male students (Zhao et al., 2023). Grade differences may also exist because lower-year students are still adapting to university learning methods and online platforms, while upper-year students are usually more familiar with course requirements and self-directed learning. Major category may influence students' experience because

engagement, and attitudinal engagement. Both scales used a 5-point Likert scale, with higher scores indicating higher levels of blended learning perception and course engagement. The two scales used in this study had been validated in previous studies and showed good reliability and validity. The pilot test results showed good internal consistency, with Cronbach's α values of 0.857 for the Blended Learning Perception Scale and 0.876 for the Student Course Engagement Scale.

2.3 RESEARCH METHODS

In this study, the questionnaire data were coded, screened, and analyzed using SPSS 26.0. Descriptive statistics were used to examine the current status of students' blended learning perception and course engagement. Independent samples t-tests and one-way ANOVA were used to analyze group differences, and regression analysis was used to examine the effect of blended learning perception on course engagement. The significance level was set at $p < .05$.

3. RESULTS AND DISCUSSION

3.1 RESULTS

This study found that the overall mean score of blended learning perception among Zhengzhou Technology and Business University students was 3.33, indicating a moderate level. Scores across all dimensions ranged from 3.30 to 3.40, showing little variation. The highest score was for platform functionality ($M = 3.40$), while learning satisfaction scored the lowest ($M = 3.30$).

Regarding course engagement, the findings of this study indicated that the overall mean score of university students' course engagement was 3.27, which also fell within the moderate range. The mean scores of all dimensions ranged from 3.22 to 3.34, with skills engagement being the highest ($M = 3.34$) and attitudinal engagement the lowest ($M = 3.22$). These descriptive results are summarized in Table 1.

Table 1. Descriptive statistics of blended learning perception and course engagement ($N = 357$)

Variable	Dimension	M	SD
Blended Learning Perception	Content Coherence	3.30	0.98
	Interaction Effectiveness	3.34	0.98

Course Engagement	Platform Functionality	3.40	0.98
	Learning Motivation	3.34	0.97
	Learning Satisfaction	3.30	1.06
	Overall	3.33	0.72
	Skill Engagement	3.34	1.01
	Emotional Engagement	3.26	1.05
	Performance Engagement	3.24	1.03
	Interaction Engagement	3.28	1.06
	Attitudinal Engagement	3.22	1.10

Regarding demographic variables, the difference analysis showed that gender, grade level, and class officer experience were significantly associated with both blended learning perception and course engagement, whereas major category showed no significant difference. The detailed statistical results for blended learning perception are presented in Table 2, and those for course engagement are presented in Table 3.

As shown in Table 2, significant differences in blended learning perception were found by gender, grade level, and class officer experience. Female students reported significantly higher blended learning perception than male students. Blended learning perception also increased with grade level, with first-year students scoring the lowest and fourth-year students scoring the highest. In addition, students with class officer experience reported significantly higher blended learning perception than those without such experience. However, the difference by major category was not statistically significant.

As shown in Table 3, a similar pattern was found for course engagement. Female students showed significantly higher course engagement than male students, and course engagement generally increased with grade level. Students with class officer experience also demonstrated significantly higher course engagement than students without such experience. In contrast, no significant

difference in course engagement was found among students from different major categories. Overall, these results indicated that gender, grade level, and class officer experience were important grouping variables in this study, while major category was not a significant differentiating factor.

Table 2. Difference analysis of blended learning perception by demographic variables

Demographic variable	Test	Statistic	p
Gender	t-test	t=10.420	.000***
Grade level	ANOVA	F=49.520	.000***
Major category	ANOVA	F=1.060	.380
Class officer experience	t-test	t = 16.570	.000***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3. Difference analysis of course engagement by demographic variables

Demographic variable	Test	Statistic	p
Gender	t-test	t = -8.870	.000***
Grade level	ANOVA	F = 37.030	.000***
Major category	ANOVA	F = 0.680	.630
Class officer experience	t-test	t = 24.920	.000***

The regression analysis further showed that blended learning perception had a significant positive effect on course engagement. As shown in Table 4, blended learning perception significantly predicted course engagement, with a standardized coefficient of $\beta = 0.79$ and an explanatory power of $R^2 = 0.63$. This result supported Hypothesis H3 and indicated that students with more positive perceptions of blended learning were more likely to show higher levels of course engagement.

Table 4. Regression Analysis of Blended Learning Perception on Course Engagement

Among Undergraduates at Zhengzhou Technology and Business University

	B	SE	β	t	p
Constant	0.40	0.12	-	3.380	.000***
Blended Learning Perception	0.86	0.04	0.79	24.470	.000***
R^2	0.63				
Adjusted R^2	0.63				
F	F(1, 355) = 598.620, $p = .000***$				
D-W value	1.990				

Note: Dependent variable = Course Engagement

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

3.2 DISCUSSION

3.2.1 RESULTS OBTAINED

Compared with existing research on blended courses, the findings of this study were broadly similar to the overall positive yet unremarkable student perceptions reported by Li et al. (2023) in higher education blended learning environments. They were slightly higher than those reported in some studies conducted during emergency teaching in the pandemic context (Yu et al., 2023), but lower than the high-level perceptions reported in certain exemplary courses or Golden Course development cases (Huang & Wang, 2022; Cheng et al., 2023; Wang et al., 2024).

3.2.2 EXPLANATION OF THE RESULTS

This indicated that blended courses at Zhengzhou Technology and Business University had shifted from an emergency phase to a routine phase, with relatively stable platform conditions and course structures. However, there was still room for improvement in the depth of content integration, the quality of task design, and learning support services.

Regarding course engagement, the descriptive results showed a similar pattern. Overall course engagement remained at a moderately high level, with skills engagement scoring relatively higher and attitudinal engagement scoring relatively lower. Compared with domestic studies focusing on routine blended courses, the engagement levels found in this study were close to those reported by Chen et al. (2021) and Zhou et al. (2024), but lower than the high engagement levels reported in blended learning practices characterized by high challenge and high support (Lü & Hou, 2025; Ma et al., 2018). From the perspective of learning engagement theory, this pattern suggested that existing

across major categories were not significant. Therefore, H1 and H2 were partially supported.

The descriptive findings further showed that overall blended learning perception and course engagement were both moderately high rather than high. Platform functionality and skills engagement scored relatively higher, whereas learning satisfaction and attitudinal engagement were comparatively lower. This suggested that students were basically willing and able to participate in blended courses, but a universally high-level learning experience and deep engagement had not yet been established.

These findings not only provided evidence from a private application-oriented undergraduate university, but also suggested that blended learning research should pay closer attention to routine courses rather than only exemplary or Golden Course cases (Ashraf et al., 2021; De Bruijn-Smolters & Prinsen, 2024; Halverson et al., 2014). For practice, private application-oriented universities should distinguish between exemplary courses and routine courses when evaluating blended teaching reform, and incorporate perception and engagement into a continuous cycle of diagnosis and improvement (Boelens et al., 2017). In particular, they should strengthen content coherence, classroom interaction, and platform support, while also providing more targeted support for student groups whose engagement is relatively weaker.

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