Study on the Factors Influencing Students' Perceived Value in Blended Courses

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Abstract: *Blended learning has gradually become a mainstream teaching method in higher education. This study explores the impact of Influencing factors and student engagement in blended courses on students' perceived value. A survey was conducted with 237 university students, improving previous teaching effectiveness models and constructing a path model for students' perceived value formation. The study confirmed that student behavioral engagement plays a significant mediating role between teacher involvement and students' perceived value. The overall fit of the model was $\chi 2/df = 2.47$, RMSEA = 0.079 (95% CI = 0.071–0.087), CFI = 0.912, TLI = 0.901, indicating good model fit.The non-parametric percentile bootstrap method also showed that students' behavioral input had a significant mediating effect between the influencing factors and students' perceived value. In blended learning, student behavioral engagement is an important factor affecting their perceived value, while teacher involvement is the main determinant. Teachers, as the main drivers of blended learning, should take on the responsibility of guiding pre-class learning, providing online and offline support, supervision, reminders, timely feedback, and encouraging interaction.*

Keywords: *Blended learning, students' perceived value, teacher involvement, student engagement, Structural Equation Modeling (SEM)*

1. Introduction

Since the beginning of the 21st century, blended learning has undergone over 20 years of development and has become a dominant teaching model in global higher education[1]. Initially, learning combined online and face-to-face teaching, but it has gradually evolved into a teaching environment that integrates mobile communication devices, online learning environments, and classroom discussions. It is not just a simple technological blend but a mix of "student-centered" learning environments and guidance methods[2]. Blended learning places higher demands on teachers, students, and the teaching environment, and measuring student learning outcomes has become a challenge in its practical application.

This study innovatively uses "students' perceived value" as a comprehensive indicator to evaluate learning outcomes, which differs from other studies that mainly focus on indicators like grades or student engagement[3-6]. This approach borrows the concept of "customer value" from marketing to evaluate students' perceived value[7-9], which provides both theoretical and practical innovation.

2. Data and methods

2.1 Research Hypothesis

Based on literature reviews and prior teaching practices, the study identified that the factors influencing student engagement affect the formation of students' perceived value through their engagement. Thus, the following hypotheses were established (see Figure 1):
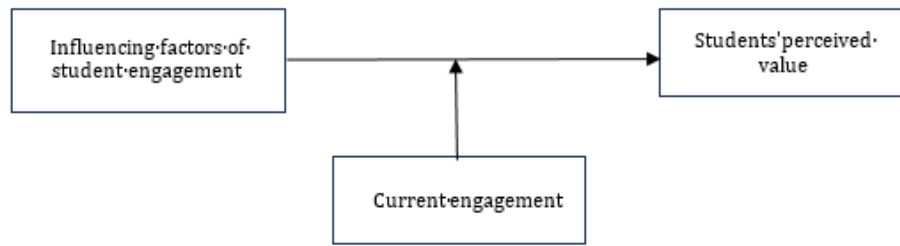
Figure 1: Path Model for Students' Perceived Value Formation (Hypothesis Model).

Where the influencing factors of student engagement include teacher factors, individual factors, peer factors, and course/environmental factors. Current engagement includes behavioral engagement and emotional engagement. Students' perceived value includes professional cognition, professional skills, positive cognition, educational benefits, career benefits, monetary cost, time cost, psychological cost, and physical cost.

2.2 Subjects

The study distributed official questionnaires to students who had participated in blended courses, including courses such as "Pharmaceutical Marketing." A total of 240 questionnaires were collected, of which 237 were valid, yielding a valid response rate of 98.75%. The sample consisted of 90 male students and 147 female students.(see Table 1)

Table 1: Demographic Characteristics Analysis.

Characteristic	Sample Size (n)	Percentage (%)	Characteristic	Sample Size (n)	Percentage (%)
School			**Gender**		
a	206	86.92	Male	90	37.97
b	26	10.97	Female	147	62.03
c	1	0.42	**Grade**		
d	2	0.84	Freshman (1st Year)	1	0.42
e	1	0.42	Sophomore (2nd Year)	76	32.07
f	1	0.42	Junior (3rd Year)	106	44.73
Major			Senior (4th Year)	50	21.10
Science & Engineering	85	37.97	Graduate and above	4	1.69
Humanities & Social Sciences	152	62.03			

2.3 Measurement Tools

The study extensively reviewed classic engagement scales and those used by various scholars. Based on the analysis of the theoretical connotations of engagement, the study adapted the "University Computer Fundamentals" blended course engagement scale by Huang Yi and others. A survey on engagement and its influencing factors was designed for this study[10], divided into four sections: (1) basic personal information (e.g., gender, major); (2) students' engagement survey (behavioral and emotional engagement); (3) Influencing factors survey (teacher, individual, peer, and course/environmental factors); and (4) perceived value, adapted from classic customer value questionnaires." The second and third sections used a Likert five-point scale, while the fourth section referenced a classic customer value questionnaire with 10 items to assess the students' perceived value."[7-9]

2.4 Data Analysis Software

The data were cleaned and analyzed using SPSS23.0. Confirmatory Factor Analysis (CFA) and

Structural Equation Modeling (SEM) were performed with MPLUS8.3.

3. Result

3.1 Reliability and Validity Testing

The results of data analysis showed that the reliability coefficient (α) for the 14 items of the engagement scale was 0.941, and for the 21 items of the influencing factors scale, it was 0.953, both exceeding 0.9, indicating high data reliability for further validity testing. The KMO value for the engagement scale was 0.950 and for the influencing factors scale, it was 0.938, both above 0.8. Bartlett's test of sphericity showed p-values less than 0.001, confirming the suitability of the data for factor analysis.

3.2 Confirmatory Factor Analysis

The CFA results for the engagement scale showed $\chi^2/df = 2.05$, RMSEA = 0.067 (95% CI = 0.051-0.082), CFI = 0.960, TLI = 0.951, indicating good model fit. However, item a1(one factor of the behavioral engagement) had a factor loading of 0.042 (p > 0.05) and was removed in the subsequent analysis.

For the influencing factors survey, the CFA results were $\chi^2/df = 2.74$, RMSEA = 0.086 (95% CI = 0.077-0.095), CFI = 0.913, TLI = 0.900, which also indicated good fit. Therefore, the CFA results of the questionnaires were satisfactory for further structural equation model research.

3.3 Structural Equation Modeling for Parallel Mediation

Based on the theoretical foundations and hypotheses, a structural equation model was built with Influencing factors as the independent variable (aa), student behavioral engagement (a) and emotional engagement (c) as mediating variables, and students' perceived value (jz) as the dependent variable(see Figure 2). Results indicated that the path coefficient for emotional engagement to perceived value was not significant (p > 0.05), while the remaining path coefficients were significant (p < 0.001). The overall model fit was $\chi^2/df = 2.47$, RMSEA = 0.079 (95% CI = 0.071-0.087), CFI = 0.912, TLI = 0.901.The fitting is good.(see Figure 2)
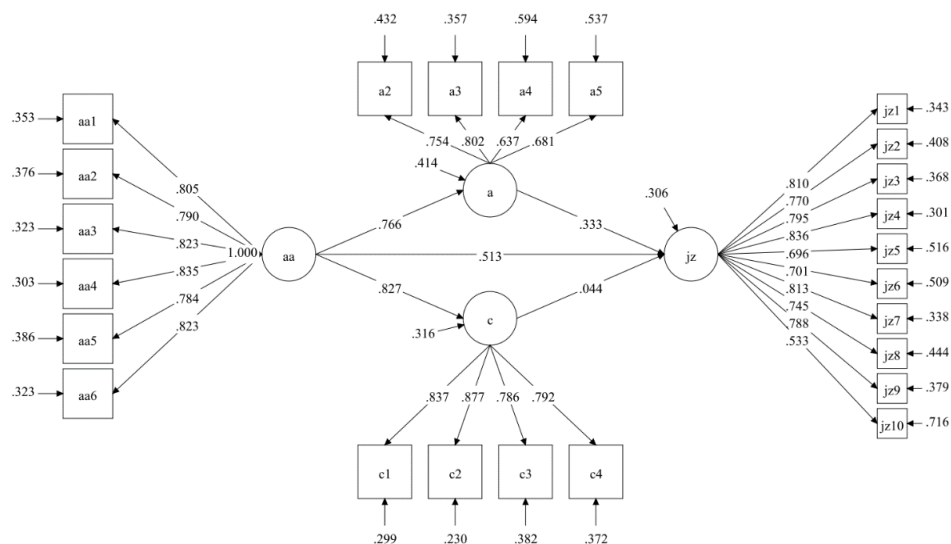

Figure 2: Parallel Mediation Structural Equation Model.
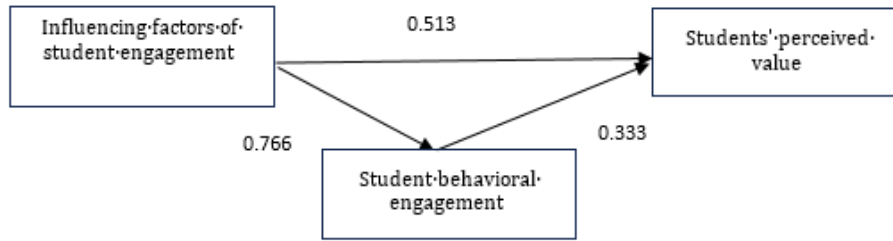
The final constructed model is (see Figure 3):

Figure 3: Formation path of students' value acquisition.

3.4 Bootstrap Test of Effect Size

A non-parametric percentile bootstrap method was used to test the significance of two indirect paths and one direct path, with 1000 resampling iterations. The results showed that the mediating effect of student emotional engagement between teacher involvement and students' perceived value was not significant, as the confidence interval included 0. In contrast, the mediating effect of student behavioral engagement between Influencing factors of student engagement and students' perceived value was significant, as the confidence interval did not include 0. Regarding the direct effect, the direct impact of Influencing factors of student engagement on students' perceived value had a confidence interval that did not include 0, indicating that the direct effect was significant. For details, see Table 2.

Table 2: Bootstrap Test of Significance for Major Effect Sizes.

Number	Path	Standardized Effect Size	95% Confidence Interval
Mediating Effect 1	Influencing factors → Student behavioral engagement → Students' perceived value	0.291	[0.113, 0.486]
Mediating Effect 2	Influencing factors → Student emotional engagement → Students' perceived value	0.037	[-0.155, 0.211]
Direct Effect	Influencing factors → Students' perceived value	0.513	[0.292, 0.712]

3.5 Synthesis and Comparison of Effect Sizes

Based on the Bootstrap test, the above effect sizes were synthesized and compared to further explore the relationship and mechanisms between Influencing factors of student engagement and students' perceived value. Although some effect sizes were small and the confidence intervals included 0, this does not imply that the effect size is completely nonexistent. Direct removal may lead to an underestimation of the effect size; therefore, it was retained when calculating the total effect size. Specifically, the estimated direct effect of Influencing factors of student engagement on students' perceived value was 0.513, the indirect effect of Influencing factors of student engagement through student behavioral engagement was 0.255, and the indirect effect of Influencing factors through student emotional engagement was 0.037. Thus, the total effect was 0.804, with the indirect effect accounting for 0.291/0.804 = 36.19% of the total effect.

4. Discussion

4.1 Behavioral Engagement is a Key Factor in Students' Perceived Value

Learning engagement is typically understood as the degree of involvement in school-related tasks, such as spending time, effort, and energy on educational activities[11]. This study found that emotional engagement had little effect on perceived value, while behavioral engagement had a larger impact. Specifically, behavioral engagement, including completing tasks, attending classes, asking questions, and engaging in discussions, plays a significant role.

This suggests that in blended learning, teachers should motivate students to complete tasks, monitor learning effectiveness in real-time, use PBL teaching methods, and create an environment for peer interaction.

4.2 Teacher Involvement is the Primary Factor Influencing Students' Perceived Value

As one factor of Influencing factors of student engagement, the study confirmed that teacher involvement is the main determinant of students' perceived value. Teacher involvement includes providing clear learning guidance, offering online or offline tutoring, supervising and reminding students of their progress, giving timely feedback on assignments, and encouraging active student engagement.

The role of teachers in blended learning is central, supporting the idea that "student-centered" does not imply neglecting the teacher's role[10]. Teachers remain the main force in teaching, whether students are highly motivated or not, and should take responsibility for both online and offline teaching.

4.3 Students' Perceived Value as a Comprehensive Indicator of Teaching Effectiveness

Students, as "social beings," are both receivers and contributors in the education process, considering the "cost-effectiveness" of the educational process. Enhancing students' perceived value involves increasing "gains" and lowering "costs." Measures such as offering school-enterprise cooperation scholarships, increasing practical hours, and promoting the use of auxiliary learning tools (e.g., ChatGPT) can reduce monetary, time, psychological, and physical costs.

This study uses perceived value as an indicator to evaluate learning outcomes, breaking away from the traditional focus on teaching satisfaction and professional cognitive ability[12-16]. It considers both costs and benefits, marking an innovative attempt in the field of educational value research.

5. Conclusions

In this study, two established scales related to blended learning were subjected to reliability and validity tests (α coefficients and KMO values were both greater than 0.9, and Bartlett's test p-values were all less than 0.001). Minor adjustments were made to the items based on the data indicators from confirmatory factor analysis (e.g., the first item from the student behavioral engagement scale was removed). Furthermore, the study used structural equation modeling to test the impact of various factors on students' perceived value and explored the mediating effect mechanisms. The final adjusted model showed good fit indices ($\chi 2/df = 2.47$, RMSEA = 0.079, CFI = 0.912, TLI = 0.901).

Acknowledgements

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