Development and Effectiveness Evaluation of an OBE-WebQuest Blended Learning Model for Undergraduate Management

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Abstract

This study aimed to develop and validate a context-adaptive blended learning model (BLM) that integrates Outcome-Based Education (OBE) and WebQuest in undergraduate management education. Through a three-phase mixed-methods design: Phase 1 diagnosed the current status of BLM implementation via surveys (173 students) and interviews (10 teachers); Phase 2 developed an BLM (Version 2.0) with expert validation (IOC=0.89), featuring OBE-driven backward design, WebQuest-based inquiry tasks, and tiered support for diverse student readiness; Phase 3 evaluated its effectiveness via a quasi-experiment (60 students, 30 per group). Results showed the model significantly improved learning outcomes: the experimental group achieved a mean score gain of 12.00, exceeding the control group (8.67) with statistical significance (t=2.476, p=0.016) and a medium effect size (Cohen's d=0.64). This study presents a validated,

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scalable blended learning model (BLM) and practical guidelines to optimize its implementation. Not only does this model effectively enhance learning outcomes, but it also offers actionable insights to inform reform in management education.

Keywords: Blended Learning Model (BLM); Undergraduate Students; Outcome-Based Education (OBE); WebQuest; Learning Effectiveness; Mixed-Methods Research; Educational Technology

1. Introduction

Global efforts to advance educational modernization, as reflected in international frameworks such as UNESCO's Education 2030 Agenda, emphasize accelerating educational transformation through intelligent higher education platforms to cultivate high-quality, competent talent. Rapid IT and AI development are reshaping student learning, enabling resource sharing and diverse platforms.

Mobile learning enhances flexibility and personalization (Huang & Zhao, 2021), shifting education from teacher-centered to learner-focused models. Blended Learning Models (BLMs) allow flexible learning choices, increasing satisfaction and effectiveness (Baker & Jeffries, 2019). Successful BLMs should be student-centered, leveraging online advantages for personalized learning and autonomy (Dziuban et al., 2020; Graham & Vick, 2021). They also enhance interaction and engagement through digital tools, improving outcomes (Zhao et al., 2021).College students transitioning from exam-oriented education require stronger self-management skills, making autonomy enhancement a research priority. BLMs effectively improve engagement and self-directed learning (Tan, 2021). However, students in Henan Province face challenges like low motivation and resource selection difficulties in blended environments.

Therefore, this study systematically analyzes the status of college students' use of blended learning in Henan. It develops a BLM that integrates Outcome-Based Education (OBE) and WebQuest—a structured online inquiry method that fosters collaboration, critical thinking, and autonomy. This model provides clear tasks and resources, meeting demands for active participation and collaborative learning in the information age. An experimental study will evaluate its effectiveness in enhancing undergraduates' autonomous learning, deepening their understanding of the impact of BLM, and informing future course design.

2.Research Questions

1: What is the current status of the Blended learning model(BLM) implementation among undergraduate students in management disciplines?

2: How to develop a context-adaptive Blended learning model(BLM) integrating OBE and WebQuest for undergraduate management education?

3: To what extent does the developed Blended learning model(BLM) enhance undergraduate management students' learning effectiveness?

3. Literature Review

3.1 Blended learning model(BLM)

The Blended Learning Model (BLM) is a systematic integration of online learning and offline teaching, whose definition has undergone iterations from technology integration and instructional design restructuring to ecological adaptation. Its core lies in achieving personalized learning by optimizing teaching time, space, and resource allocation. Supported by theories such as constructivism and social presence theory, the model follows principles like combining teacher-led instruction with student-centered learning, encompassing processes including needs identification,

plan formulation, implementation, evaluation, and dynamic improvement, aiming to enhance learning effectiveness through the synergy of teaching elements.

3.2 Blended learning model(BLM)

WebQuest, a student-centered inquiry-based learning method proposed by Dodge et al., relies on online resources and adopts a structured design through six frameworks: introduction, task, process, resources, evaluation, and conclusion. It emphasizes task-driven learning, collaborative inquiry, and the integration of in-class and out-of-class learning, with two formats, aiming to enhance students' autonomous learning, critical thinking, and problem-solving skills. Its inquiry orientation and task authenticity align closely with the online-offline synergy logic of the Blended Learning Model (BLM) and the outcome-based principles of OBE, effectively supporting the construction of personalized learning paths and the achievement of deep learning.
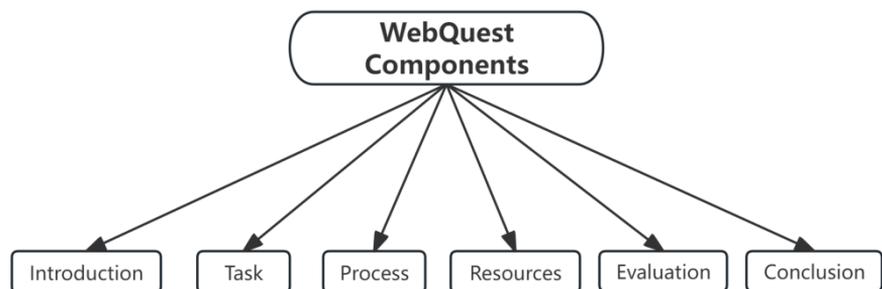

Figure 1 Components of WebQuest

3.3 OBE Educational Philosophy

The Outcome-Based Education (OBE) philosophy, proposed by American scholar William Spady in the 1980s, is an outcome-oriented and learner-

centered educational approach. Having evolved over four decades, it has developed into a comprehensive system, achieving three key transformations: from course-oriented to outcome-oriented, teacher-centered to student-centered, and quality monitoring to continuous improvement. Its core principles include clear focus, expanded opportunities, higher expectations, and backward design. Implemented through steps such as defining learning outcomes, constructing curriculum frameworks, adopting personalized teaching, and conducting continuous evaluation, OBE has been widely applied in countries like the United States and New Zealand, as well as in fields such as engineering and medical education, providing significant guidance for addressing the challenges of higher education popularization and enhancing teaching quality.

3.4 Related Research

Existing studies confirm individual merits of BLM, WebQuest, and OBE in improving learning, but few explore their synergistic integration, particularly in contexts with distinct educational characteristics and resource distributions. This study addresses this gap by developing an integrated BLM combining OBE and WebQuest to enhance undergraduate students' learning effectiveness.

3.5 Principles of this study's model

This study focuses on learning effectiveness, BLM, WebQuest, and OBE. Learning effectiveness, shaped by personal, behavioral, and environmental factors, is assessed through cognitive achievement and skill development (with test scores as key metrics). BLM integrates online and offline learning, grounded in constructivism and related theories, and involves need identification, planning, and related activities. WebQuest, a student-centered inquiry method with six frameworks, fosters higher-order thinking. OBE, emphasizing clear outcomes, expanded opportunities, and

backward design, guides teaching.Together, they form a closed loop of "outcome definition $\longrightarrow$ inquiry-based learning $\longrightarrow$ multi-channel support $\longrightarrow$ outcome evaluation $\longrightarrow$ continuous improvement" to maximize learning effectiveness.

4. Objectives of the Research

1.To examine the current status of blended learning models (BLM) among undergraduate students in management disciplines.

2.To develop a context-adaptive blended learning model integrating OBE and WebQuest for undergraduate management education.

3.To evaluate the effectiveness of the developed BLM in enhancing undergraduate management students' learning outcomes.

5. Research Framework

This mixed-methods study, structured in three sequential phases aligned with its research objectives, first examined the current state of blended learning adoption among university undergraduates. Subsequently, it developed an innovative blended learning model for undergraduate education and ultimately assessed its effectiveness in improving learning outcomes. The resulting blended learning model (BLM), which integrates Outcome-Based Education (OBE) principles and the WebQuest approach, showed marked improvements in learning outcomes when compared to baseline scenarios. The research framework is illustrated in Figure 2.

Figure 2 Research Framework
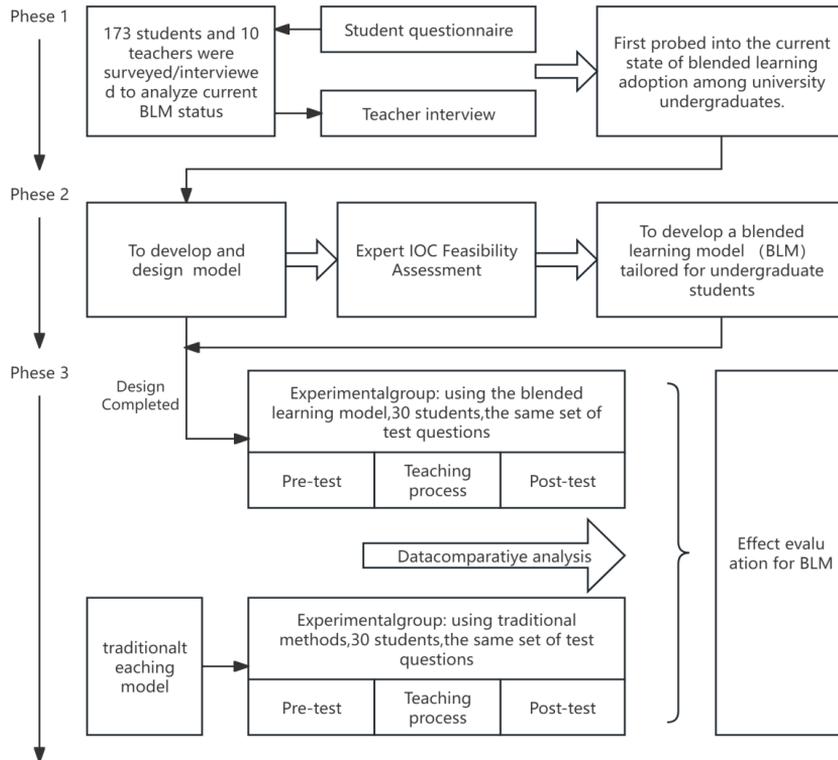
6. Research Methodology

6.1 Phase 1: Diagnostic Analysis of Blended Learning Status

Phase 1 focused on the current status of blended learning among undergraduate students in business fields. Using cluster random sampling, 173 Business Administration majors and 10 teachers were selected. Existing items were refined based on the literature review, and the questionnaire and interview outline were revised to align with research needs. The questionnaire was administered after being validated by experts using the Index of Content Validity (IOC), with data analyzed through descriptive statistics, Kaiser-Meyer-Olkin (KMO) test, and Bartlett's Test of Sphericity.

Interview results were analyzed through methods such as keyword frequency analysis. The findings provided a basis for model development.

6.2 Phase 2: BLM Development

Phase 2, drawing on prior findings and the literature, developed a blended learning model integrating OBE and WebQuest, encompassing outcome definition, backward design, WebQuest tasks, and personalized pathways. 60 undergraduates were selected and divided into groups. Validated by experts via IOC, items with IOC < 0.5 were revised based on feedback; the final model (IOC ≥ 0.5) was confirmed, completing model development.

6.2 Phase 3: Quasi-Experimental Validation

Phase 3 evaluated the model's effectiveness. 60 undergraduates were randomly assigned to an experimental group (using a blended model integrating OBE, WebQuest, and the Micro-Teaching Assistant platform, with personalized tasks and collaborative activities) and a control group (using traditional lecture-based methods via the Learning Pass platform, focusing on chapter-based instruction and basic practice without online inquiry or differentiation). Both groups took pre-tests and post-tests using the same set of test questions validated via IOC. By comparing score differences using descriptive statistics, independent t-tests, and effect-size analysis, the model's rationality and scientific validity were confirmed. The program was selected for its representativeness of undergraduate management—covering core curricula, student demographics, and teaching resources common in similar institutions—thereby ensuring that the findings could be generalized to comparable educational contexts.

7. Results of Analysis

7.1 Analysis results serving objective 1

This phase of the study employed a questionnaire survey, distributing the Questionnaire on the Current Status and Learning Effect of Blended Learning Models for Undergraduates (see Appendix for details), adapted from established scales, to undergraduates majoring in Business Administration. A total of 173 valid questionnaires were returned, yielding a 100% response rate. The questionnaire used a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree): the first part consists of basic information, which is used to comprehensively understand students' demographic characteristics and basic conditions and habits of online learning; the second part focuses on the current status of blended learning (5 items), mainly involving resource utilization, activity participation, satisfaction, interaction frequency, and knowledge mastery; the third part studies the influencing factors of learning effect, including three aspects: individual factors (learning goals, attitudes, time management, and resource integration ability), behavioral factors (interaction participation, reflection habits, assignment completion, problem-solving, and learning investment), and environmental factors (platform operability, resource richness, and resource accessibility).

Table 1: *Summary of Reliability and Validity Analysis Data for BLM*

Analysis Type	Indicator	Statistical Value	Result Interpretation
Reliability Analysis	Overall Cronbach's α	0.854	High internal consistency and strong reliability of the scale

Range of Dimension Cronbach's α	0.841-0.857		
Number of Items	19		
Validity Analysis	KMO Value	0.851	Strong correlation between variables, suitable for factor analysis
Bartlett's Test of Sphericity χ^2	781.971		
Degrees of Freedom	171		
Significance Level (p)	0.000		

This study used SPSS 26.0 to analyze the data, presenting the current status and distribution characteristics of key variables through descriptive statistics (frequency, percentage, mean, and standard deviation). The reliability test results showed that the overall Cronbach's α coefficient of the scale was 0.854, and the Cronbach's α coefficients of each dimension were all greater than 0.8 (see Table 2), indicating that the scale had high internal consistency. In the validity test, the KMO value was 0.851, and the Bartlett's test of sphericity yielded χ^2=781.971 (p<0.001), suggesting that the data were suitable for factor analysis and the scale had good construct validity. The analysis of 173 valid questionnaires revealed that blended learning had problems such as insufficient participation (passive resource utilization, with 52.6% holding a neutral attitude, M=3.49; low interaction

frequency, with 50.3% being inactive, M=3.34; weak autonomous learning, with 49.1% having insufficient time, M=3.51), significant shortcomings in key abilities (53.8% having difficulty integrating resources, M=3.47; 46.2% lacking regular summary, M=3.60; 50.3% having average time management, M=3.53), and inadequate environmental support (45.7% considering platform guidelines unclear, 43.9% feeling resource acquisition inconvenient, both M=3.51). These data provide an empirical basis for accurately identifying the "participation-ability-environment" bottlenecks, designing resource integration tools, constructing hierarchical interaction mechanisms, simplifying platform operations, and developing the subsequent "goal anchoring-task design-environment adaptation" optimization framework.

Interviews with 10 teachers indicated that case teaching, project-driven approaches, and practical tasks were commonly used in blended learning for management majors and were significantly correlated with learning outcomes. Students actively used online resources (mentioned 10 times) but lacked depth. Teachers believed that learning behavior factors had a greater impact, especially interaction quality and task completion. The commonly used platform was Xuexitong, with a preference for online Q&A and offline discussions. It was suggested to deepen case and project teaching, optimize platform and resource adaptability, enhance interaction incentives, and improve the diversified evaluation system.

7.2 Analysis results serving objective 2

Phase 2 developed a blended learning model integrating OBE and WebQuest. Based on the literature and prior findings, a blended learning model (Version 1.0) comprising steps such as outcome definition and backward design was developed. It was validated by 5 experts using 18 indicators, with the Index of Item-Objective Congruence (IOC)≥0.5. For two

indicators with IOC <0.5 (resource differentiation and personalized tasks), revisions were made in response to expert recommendations (e.g., by adding pre-assessments and resource stratification). Key innovations include tiered objectives, localized WebQuest tasks with tripartite assessment, and role-differentiated teams. After optimization, all IOC values exceeded 0.6, resulting in a blended learning model framework (Version 2.0) incorporating OBE backward design and adaptive pathways.
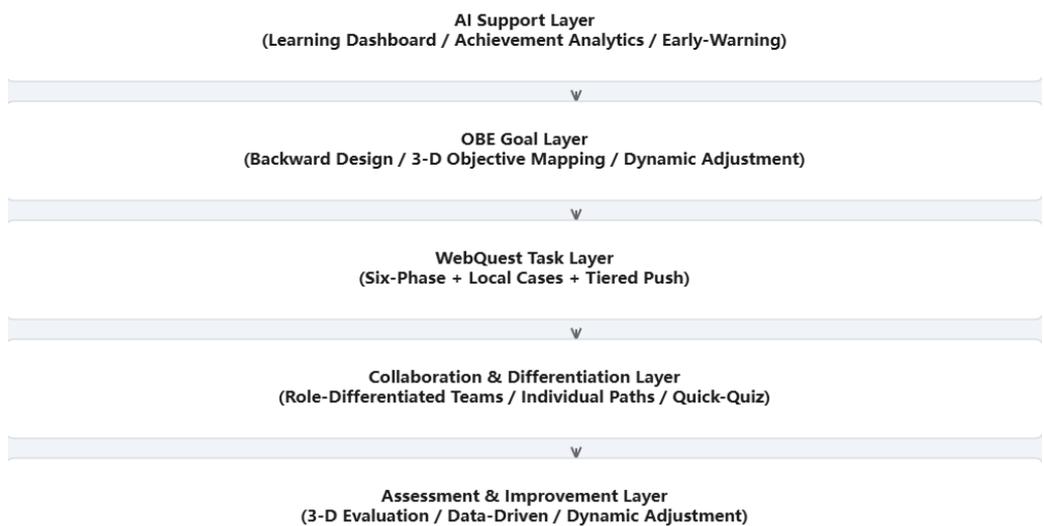

AI Support Layer
(Learning Dashboard / Achievement Analytics / Early-Warning)

∨

OBE Goal Layer
(Backward Design / 3-D Objective Mapping / Dynamic Adjustment)

∨

WebQuest Task Layer
(Six-Phase + Local Cases + Tiered Push)

∨

Collaboration & Differentiation Layer
(Role-Differentiated Teams / Individual Paths / Quick-Quiz)

∨

Assessment & Improvement Layer
(3-D Evaluation / Data-Driven / Dynamic Adjustment)

Figure 3 *Blended learning model Framework(2.0)*

7.3 Analysis results serving objective 3:

7.3.1 Pretest Results: Validation of Initial Equivalence Between Groups

To ensure scientific validity, a pretest (December 2024) assessed initial academic levels using identical tests for both the experimental (blended learning) and control (traditional learning) groups. Results showed:

Table 2: *Descriptive Statistics of Pre-test Scores Between Experimental Group and Control Group*

Group	Number of Cases	Mean	Standard Deviation	Standard Error of the Mean
Pre-test scores (1 - Experimental Group)	30	76.33	8.401	1.534
Pre-test scores (2 - Control Group)	30	76.67	8.644	1.578

Descriptive Statistics: Experimental group mean = 76.33 (SD = 8.401), control group mean = 76.67 (SD = 8.644). Similar means and dispersion indicated comparable baseline proficiency.

Independent Samples t-test: Levene's test confirmed homogeneity of variance (F = 0.082, *p* = 0.776 > 0.05); mean difference test yielded *t* = -0.151, *p* = 0.880 > 0.05, 95% CI [-4.738, 4.072] included 0.

Conclusion: No statistically significant pretest difference was observed, confirming group equivalence and establishing a foundation for intervention comparisons.

7.3.2 Instructional Differences: Core Distinctions Between Models

Key pedagogical divergences directly influenced outcomes:

Experimental Group (Blended Learning Model):

OBE objective-oriented, WebQuest task-driven, implemented via Micro-Teaching Assistant (MTA) platform.

Featured graded tasks, tripartite assessment, and authentic enterprise scenarios (e.g., "Designing stress-tolerance assessments for sales positions," "Debugging AI interview systems").

Emphasized application cycles (learn-practice-apply) through peer reviews, industry expert feedback, and automated grading.

Control Group (Traditional Model):

Lecture-based theoretical instruction with limited practice (e.g., resume design, mock interviews).

Relied on instructor-led scoring without task-driven design or real-world context.

7.3.3 Posttest Results: Validation of Blended Learning Effectiveness

1. Overall Intervention Effect

Paired samples *t*-test of all participants (*n* = 60) revealed:

Posttest mean (86.83) significantly exceeded pretest (76.50), mean difference = +10.333.

Statistical significance: *t*(59) = -14.725, *p* < 0.001, 95% CI [-11.738, -8.929] excluded 0.

Interpretation: Both models improved scores, but blended learning demonstrated superior gains.

2. Intergroup Comparison of Improvement Magnitude

Using score gain (posttest – pretest) as the key metric:

Descriptive Statistics:

Table 3: *Descriptive Statistics of Score Differences (Post-test - Pre-test) Between Experimental Group and Control Group*

Group	Number of Cases	Mean (M)	Standard Deviation (SD)	Standard Error (SE)
Experimental Group (1)	30	12.00	5.663	1.034
Control Group (2)	30	8.67	4.722	0.862

Experimental group: ΔM = 12.00 (SD = 5.663)

Control group: ΔM = 8.67 (SD = 4.722)

Difference: +3.33 points (38.4% greater gain).

Independent Samples *t*-test:

Homogeneity of variance: F = 0.516, *p* = 0.475 > 0.05.

Mean difference: *t*(58) = 2.476, *p* = 0.016 < 0.05, 95% CI [0.639, 6.028] excluded 0.

Effect size: Cohen's *d* = 0.64 (medium effect).

Table 4 *Results of Independent Samples t-test for Score Differences between Experimental Group and Control Group*

Test Type	t Value	Degrees of Freedom(p) (df)	Significance	Mean Difference	Standard Error	95% Confidence Interval
Assuming Equal Variances	2.476	58	0.016	3.333	1.346	[0.639, 6.028]

7.3.4 Conclusion: Significant Efficacy of Blended Learning Model

Baseline Equivalence: Pretest confirmed comparable initial proficiency.

Intervention Efficacy:

Both models enhanced scores, but blended learning yielded significantly greater improvement (ΔM = 12.00 vs. 8.67, *p* = 0.016).

Medium effect size (*d* = 0.64) confirms practical significance.

Advantage Attribution:

The blended model's objective-driven tasks, multidimensional assessment, and authentic enterprise integration (e.g., assessment design and data analysis) effectively strengthened knowledge application, operational skills, and problem-solving competencies.

Final Verdict: The blended learning model demonstrates statistically and practically significant effectiveness in Personnel Quality Assessment Theory and Practice, supporting its adoption for enhanced educational outcomes.

Figure 4 *Comparison of average score increments before and after the test*

Group 1 improved from a mean pre-test score of 77.0 to a post-test score of 89.2.Group 2 improved from 77.3 to 85.9.Both groups showed noticeable gains, with Group 1 achieving a slightly larger increment.
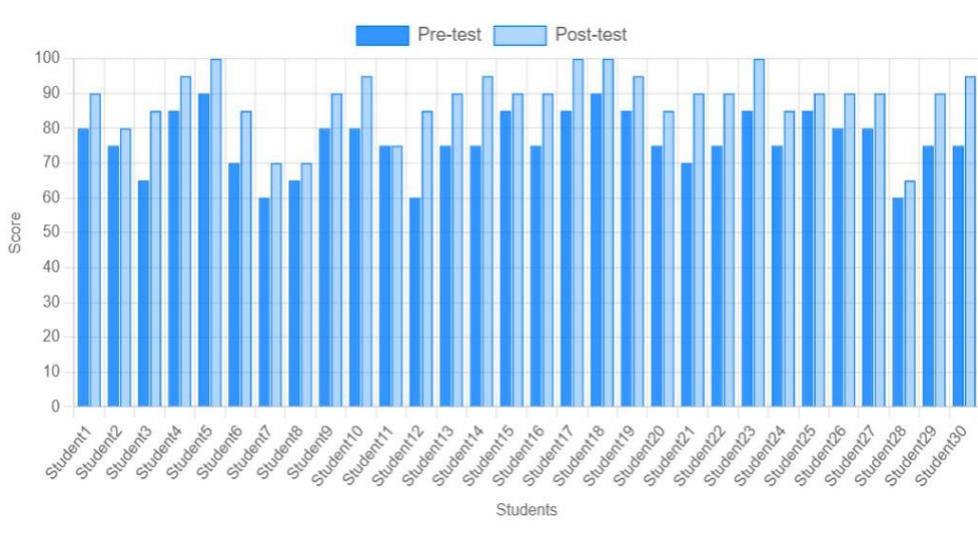
Figure 5 *Pre- and Post-Test Scores for Experimental Group*

Figure 5 presents a grouped bar chart comparing pre-test (dark blue) and post-test (light blue) scores of 30 students in the experimental group. Post-test scores consistently exceeded pre-test scores across all participants, indicating consistent learning gains following the OBE-WebQuest blended model intervention.
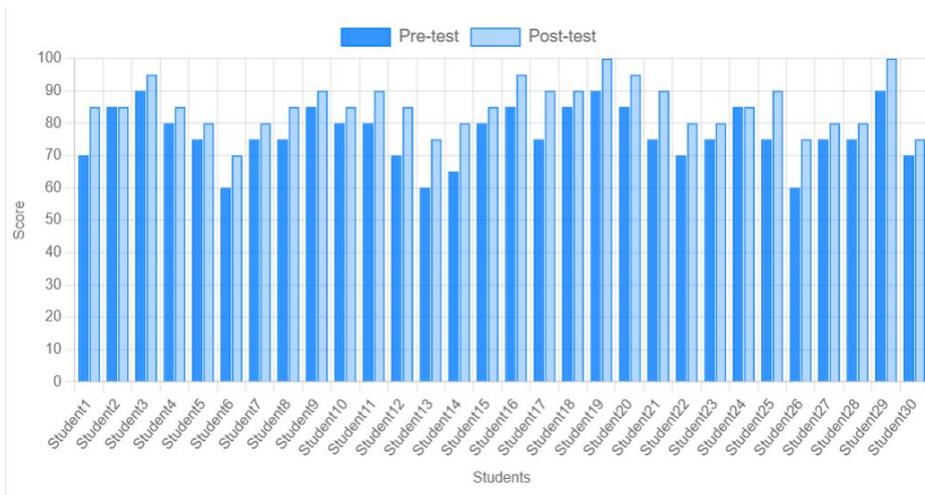

Figure 6 *Pre-Test and Post-Test Scores for Control Group*

Figure 6 presents a comparison of pre-test (dark blue) and post-test (light blue) scores among 30 students in the control group.

8. Conclusion and Discussion

8.1 Conclusions

This study aimed to explore, develop, and evaluate a blended learning model suitable for undergraduate students majoring in Management . Through three phases of data collection and analysis, it systematically addressed three core research objectives, yielding the following conclusions:

8.1.1 Conclusions on the Current Status of Blended Learning (Objective 1)

In the first phase, a questionnaire survey and teacher interviews were conducted to investigate the blended learning status of 173 undergraduate students majoring in Business Administration . Key findings include:Demographic and Basic Online Learning Characteristics: The sample covered three grades (31.8% freshmen, 33.5% sophomores, 34.7% juniors), with 74.6% being female. Mobile phones (50.9%) were the primary device for online learning, and nearly half (47.4%) of students used electronic devices for more than 2 hours daily. 69.4% relied on the campus network, but the weekly arrangement of blended learning days was scattered, showing insufficient regularity.Blended Learning Participation: Students' participation in blended learning was at a moderate level (mean scores of 3.49-3.61 on a 5-point Likert scale). Major shortcomings included passive use of resources (52.6% neutral), low interaction frequency (42.8% neutral), and moderate overall satisfaction (mean 3.59). Although knowledge acquisition effectiveness was slightly higher (mean 3.61), nearly half (48.0%) of students remained neutral, indicating significant room for improvement.

Individual Factors: Students had clear learning goals and motivation (mean 3.71) but weak resource integration abilities (mean 3.47).Learning Behaviors: Classroom interaction participation was the lowest (mean 3.34), with over half (50.3%) of students participating passively, but their performance in coping with learning difficulties was better (mean 3.73).Environment and Resources: Platform operation guidelines and resource accessibility scored moderately (mean 3.51), with 45.7% of students rating platform usability as average, citing issues such as vague guidance and insufficient stability.Teacher Perspectives: Interviews with 10 teachers revealed that case-based teaching and project-driven strategies were the most frequently used (mentioned 8 and 7 times respectively) and significantly correlated with learning outcomes (correlation coefficients of 0.68 and 0.55). Teachers generally expressed concerns about platform stability (mentioned 7 times) and insufficient resource personalization (mentioned 6 times).

8.1.2 *Conclusions on the Development of Blended Learning Model (Objective 2)*

Based on the status analysis, an blended learning model integrating Outcome-Based Education (OBE) and WebQuest methods was developed and optimized through expert validation:Model Design (Version 1.0): The initial model included six steps - defining learning outcomes, backward curriculum design, WebQuest task design, organizing collaborative learning, considering individual differences, and evaluation and improvement. It integrated functions of the micro-teaching assistant platform to ensure operability.Expert Validation: Five experts evaluated the model using 18 content validity indicators (IOC). The initial average IOC score was 0.82, but two indicators, "diversified resources" and "personalized task selection," failed to meet the standard (<0.5). Revisions were made based on expert feedback, adding pre-knowledge assessment and resource classification (basic/advanced/extended).

Optimized Model (Version 2.0): The revised model had an average IOC score of 0.89, with key optimizations including:Dynamically adjusting learning goals based on pre-assessment;Incorporating localized cases (e.g., regional enterprise cases);Designing role-differentiated collaborative tasks to deepen interaction;

Building a multi-source data-driven evaluation system (combining automatic grading, peer review, and teacher assessment), verifying the model's effectiveness and practicality.

8.1.3 *Conclusions on the Effectiveness Evaluation of Blended Learning Model (Objective 3)*

In the third phase, a quasi-experiment was conducted to evaluate the model's effectiveness, comparing an experimental group (30 students using the blended model) with a control group (30 students using the traditional model). Results are as follows:

Pre-test Homogeneity: Independent sample t-test showed no significant difference in pre-test scores between the two groups (experimental group mean 76.33, control group mean 76.67, p=0.880), indicating consistent baseline levels.

Post-test Improvement Effects:Experimental Group: Paired sample t-test showed a significant improvement in scores (pre-test mean 76.50 vs. post-test mean 86.83, mean difference -10.333, t=-14.725, p=0.000).

Control Group: The average improvement was 8.67 points, significantly lower than the experimental group's 12.00 points.

Inter-group Differences: Independent sample t-test on score differences (post-test - pre-test) showed that the experimental group's improvement was significantly higher than the control group (mean difference 3.333,

t=2.476, p=0.016) with a moderate effect size (Cohen's d=0.64), confirming the model's practical effectiveness.

8.2 *Discussion*

8.2.1 *Discussion on the Current Status of Blended Learning*

The findings on the current status of blended learning are consistent with global trends in higher education - while technology-integrated teaching holds great promise, it faces challenges in implementation (Garrison et al., 2010). The moderate participation level (mean 3.49-3.61) indicates that although students accept blended learning, its potential is not fully realized, which aligns with research conclusions that passive resource utilization and low interactivity restrict effectiveness (Bliuc et al., 2012).

The dominance of mobile phones (50.9%) as learning devices reflects the popularity of smartphones in students' lives, highlighting the need for mobile-optimized learning resources (Traxler, 2018). However, scattered learning schedules (28.3% studying 4 days a week, 23.1% 2 days a week) indicate insufficient self-regulation ability among students, a common issue in self-directed learning environments (Zimmerman, 2002).

The frequent mention of case-based teaching and project-driven strategies in teacher interviews aligns with the core view of constructivist theory, which emphasizes "active knowledge construction through real application" (Piaget, 1970). The high correlation between case teaching and learning outcomes (r=0.68) underscores its value in connecting theory and practice - crucial for management education (Kolb, 1984).

Issues such as platform instability and insufficient resource personalization are consistent with research findings in the field of technology-enhanced learning: technical failures and generic content reduce engagement (Bao, 2020), indicating that infrastructure improvement and resource customization are prerequisites for successful blended learning.

8.2.2 *Discussion on the Development of Blended Learning Model*

The OBE-WebQuest integrated model addresses the limitations of traditional blended learning by combining "outcome orientation" and "inquiry-based tasks." OBE's backward design ensures all teaching activities focus on preset goals (Spady, 1994), while WebQuest's six-stage framework (introduction, task, process, resources, evaluation, conclusion) effectively cultivates critical thinking and autonomy (Dodge, 2001).

The need to optimize the "support for individual differences" indicator in expert validation led to the addition of pre-knowledge assessment and resource classification, consistent with Vygotsky's (1978) "zone of proximal development" theory - that teaching scaffolding should match students' ability levels. The integration of localized cases (e.g., Pang Donglai) enhances situational relevance, and contextualized learning has been proven to improve knowledge transfer (Lave & Wenger, 1991).

The model's reliance on the micro-teaching assistant platform reflects the core role of user-friendly technology in scaling blended learning. However, experts' suggestions to integrate external tools (e.g., Wenjuanxing for personalized task delivery) highlight the importance of system interoperability - an emerging trend in educational technology development (Spector, 2016).

8.2.3 *Discussion on the Effectiveness of Blended Learning Model*

The significant improvement in the experimental group's post-test scores (average 12.00 points) confirms the model's role in promoting learning outcomes, consistent with meta-analyses showing that blended learning outperforms traditional teaching (Means et al., 2010), especially when combining online autonomous learning with offline collaboration.

The moderate effect size (Cohen's d=0.64) indicates the model's practical significance - that the difference is valuable in real teaching scenarios

(Cohen, 1988). The smaller improvement in the control group (8.67 points) reflects the limitations of traditional lecture-based teaching in stimulating active participation (Bonwell & Eison, 1991).

The larger standard deviation in the experimental group's score improvement (5.663 vs. 4.722) suggests that blended learning may better adapt to diverse learning styles, consistent with research on differentiated instruction (Tomlinson, 2001), but also indicates the need for further optimization to support low-performing students.

8.2.4 *Research Limitations*

Contextual Specificity: The study was conducted within a specific higher education context, which may limit the direct generalization of conclusions to other educational systems with distinct institutional cultures, resource endowments, or curricular structures.

Short-term Evaluation: The 4-month intervention period may not fully reflect long-term effects on knowledge retention and real-world skill application, particularly in dynamic fields like management.

Platform Adaptability: While the model was tested using a mainstream learning management system, its compatibility with diverse local platforms (e.g., region-specific LMS widely used in Southeast Asia) requires further verification.

9. Recommendations

9.1 Recommendations for Educational Institutions

Infrastructure Investment: Upgrade campus networks and learning platforms to enhance stability and user experience. Allocate funding for virtual simulation resources to support innovative teaching strategies (e.g., virtual enterprise scenarios).Faculty Training: Develop workshops on OBE and WebQuest methodologies, focusing on case design and project-based

learning. Partner with edtech companies to train instructors in data-driven teaching using platform analytics.Curriculum Reform: Integrate blended learning requirements into program syllabi, mandating inquiry-based tasks and collaborative components. Establish resource development guidelines to ensure quality and relevance.

9.2 Recommendations for Teachers

Strategy Optimization: Expand case-based and project-driven teaching using localized, industry-specific examples. Design role-differentiated group tasks to deepen collaboration.Student Support: Implement pre-knowledge assessments to identify learning gaps and provide tiered resources (basic/advanced/extended). Offer time-management workshops to improve self-regulation, especially for freshmen.Feedback Mechanisms: Utilize platform tools to deliver timely personalized feedback on assignments and discussions. Integrate peer review to cultivate critical evaluation skills.

9.3 Recommendations for Platform Developers

Function Enhancement: Improve platform stability and add interactive features (e.g., real-time collaborative editing, AI-driven resource recommendations). Develop APIs for seamless integration with external tools (e.g., Wenjuanxing, SPSS).Personalization Tools: Create algorithms to analyze student performance and automatically push tailored tasks/resources. Build customizable dashboards for progress monitoring and intervention adjustment.Accessibility Improvements: Simplify navigation and provide video tutorials. Ensure cross-device compatibility (desktops/tablets/smartphones) for diverse learning environments.

9.4 Recommendations for Future Research

Longitudinal Studies: Extend interventions to assess long-term knowledge retention and real-world skill application.Cross-Institutional Validation:

Test the model across diverse institutions (e.g., vocational colleges, comprehensive universities) to evaluate scalability.Technological Innovations: Explore emerging technologies (e.g., VR simulations, AI chatbots) to enhance the model's efficacy.

Conclusion: This study confirms that a blended learning model grounded in OBE and WebQuest principles significantly improves learning outcomes. By addressing infrastructure gaps, advancing teacher training, and refining platform functionality, institutions can fully leverage blended learning to equip students for 21st-century challenges.

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