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Academic administration factors affecting blended learning system for colleges in Henan province

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Abstract: This study investigates academic administration factors affecting the implementation of blended learning systems in colleges across Henan Province, China. Blended learning, which integrates face-to-face instruction with online components, is gaining traction as a flexible and personalized educational approach. However, challenges such as faculty preparedness, resource disparities, and system inconsistencies necessitate robust administrative strategies. Using a mixed-methods design, the study surveyed 502 teachers and administrators across 60 colleges and conducted semi-structured interviews with nine experts. Quantitative analysis revealed moderate overall levels of academic administration factors (M=3.49) and blended learning systems (M=3.54). Learning participation (M=3.63) and teaching methods (M=3.59) were rated highest, while teacher evaluation (M=3.24) and external environment (M=3.28) scored lowest. Regression analysis identified teaching effectiveness (β=0.24) and learning participation (β=0.42) as key predictors, explaining 65% of the variance in the learning system. Qualitative findings highlighted infrastructure disparities, faculty training gaps, and overreliance on summative assessments. Recommendations include upgrading technological infrastructure, implementing faculty development programs, and redesigning assessment systems to enhance equity and learning quality. The study contributes to blended learning literature by contextualizing these challenges within Henan's educational landscape and offers actionable guidelines for improving system effectiveness.

Keywords: *Academic administration, Blended learning, Learning system.*

1. Introduction

In the contemporary educational landscape, the integration of technology into learning environments has given rise to blended learning as a transformative pedagogical approach. Blended learning, which combines traditional face-to-face classroom instruction with online learning components, has gained significant traction in recent years [1]. This modality leverages the strengths of both in-person interactions and digital resources to create a more flexible and personalized learning experience. However, the effective implementation of blended learning necessitates robust academic administration frameworks. Despite its potential, blended learning faces challenges such as inconsistent learning system, varying levels of faculty preparedness, and disparities in student engagement [2]. These issues highlight the need for comprehensive administrative strategies that can optimize resource allocation, enhance faculty development, and ensure equitable access to quality learning opportunities.

The context of Henan Province in China further accentuates these challenges. As one of the most populous provinces with a diverse educational landscape, Henan has witnessed rapid expansion in higher education enrollment. However, this growth has not been matched by corresponding advancements in administrative frameworks. The existing academic administration factors in many institutions within the province are still largely rooted in traditional paradigms, struggling to adapt to the dynamic requirements of blended learning environments. There is a pressing need to develop

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academic administration factors that can effectively support blended learning initiatives, ensuring they meet educational objectives and address the diverse needs of students in this digital age.

1.1. Research Objectives

1. To study the level of Academic Administration factors for Colleges in Henan Province;
2. To study the level of Blended Learning system for Colleges in Henan Province;
3. To study the relationship between Academic Administration factors and Blended Learning system for Colleges in Henan Province;
4. To study Academic Administration factors affecting Blended Learning system for Colleges in Henan Province;
5. To propose the guidelines for developing Blended Learning system for Colleges in Henan Province.

1.2. Scope of the Research

The research area covers 60 colleges in Henan Province with first-class hybrid courses in 2024. Henan Province is a significant agricultural and mineral resource province in China, with Zhengzhou as its capital. Variables include factors affecting hybrid learning, learning system. The study population consists of 25,200 students in hybrid courses, with a sample of 520 teachers. Semi-structured interviews target experienced teachers and administrators in Henan Province, focusing on their insights into blended learning.

2. Literature Review

The integration of technology into education has given rise to blended learning, a pedagogical approach that combines traditional face-to-face instruction with online learning components. This approach has gained significant traction in recent years, offering a more flexible and personalized learning experience. However, the effective implementation of blended learning necessitates robust academic administration frameworks. The literature reviewed here provides valuable insights into the factors that influence the effectiveness of blended learning systems, particularly in the context of Henan Province's colleges. Transformational leadership has been emphasized as a crucial factor in educational settings, focusing on providing vision and motivation [3]. This aligns with the findings of the current study, where leadership was found to have a significant positive impact on the technical infrastructure and student experience in blended learning systems. Effective leadership is essential in championing blended learning initiatives, providing resources, and fostering a culture of innovation and collaboration. The importance of self-regulation strategies in blended learning environments has also been highlighted, confirming that adequate resources are essential for effective implementation [4]. This underscores the need for strategic resource allocation in educational institutions. Additionally, a comprehensive analysis of blended learning tools and practices has emphasized the technical infrastructure requirements and the need for continuous improvement through data-driven decisions [5]. The distinction between emergency remote teaching and online learning has been noted, emphasizing that blended learning requires careful planning and integration of technological and pedagogical elements [6]. This distinction is crucial for understanding the dynamic requirements of blended learning environments and the need for adaptable policies. Furthermore, the use of evidence of student learning to improve higher education has been discussed, reinforcing the importance of data collection and analysis in monitoring blended learning system [7].

In conclusion, the literature supports the findings of this research, indicating that leadership, resource management, policy making, decision making, and stakeholder participation are pivotal in shaping the effectiveness of blended learning systems. These factors not only directly influence technical infrastructure and student experience but also indirectly enhance system through improved teacher teaching ability and student learning investment. Future research could explore additional variables and contextual factors to further refine the understanding of blended learning management.

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3. Conceptual Framework

According to the literature review and interview feedback, the researchers identified some dimensions across main areas: the experts agreed that the Teaching-Related Factors encompasses dimensions such as: Teaching Methods, Teaching Effectiveness, and Teacher Evaluation; Learning-Related Factors includes Learning Participation, Learning Motivation, Intrinsic Cognition, and External Environment; and Learning system covers Knowledge Acquisition, Ability Acquisition, Learning Quality, Learning Experience, and Academic Performance. After data collection, the researchers conducted data coding, analysis, statistics, and discussion using both questionnaire and interview data. They analyzed the current status of the sample across these dimensions and examined significant differences under various background variables such as school, gender, grade, major, online learning equipment, learning place, number of hybrid learning courses, comprehensive score ranking, and weekly online learning time. Finally, they analyzed the current status of learning influencing factors and learning system and explored the correlation and predictive power of each influencing factor on learning system.

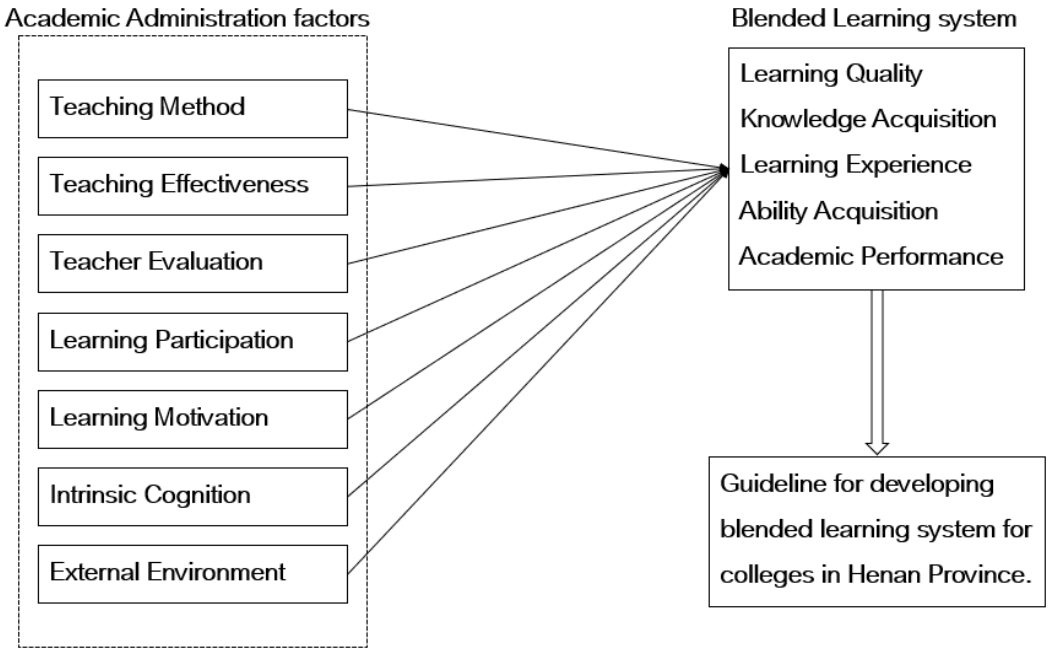

Figure 1.
Conceptual framework.

4. Methodology

4.1. Population and Sample

(1) Population used in the research

The population used in this research was administrators and teachers in colleges in Henan Province. As of March 20, 2024, there are a total of 72 colleges in Henan Province.

(2) The sample used in the research

The sample group used 60 colleges in Henan Province. were which the researcher has determined the sample size by using the schedule of the sample size of Krejcie and Morgan [8].

(3) Research respondents

The researcher assigned including about 9 respondents, 6 teachers and 3 administrators from each college, for a total of 520 respondents, using simple random sampling method.

(4) Key informants in the focus group

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The interview samples for this study include 9 educational administrators and teachers.

4.2. Research Tools

The research tools used in this study included a self - developed questionnaire and semi - structured interviews. The questionnaire was designed based on literature reviews and expert consultations, aiming to collect quantitative data on the academic administration of blended learning management in Henan Province's colleges. It covered aspects such as Teaching methods, Teaching Effectiveness, Teacher evaluation, Learning participation, Learning motivation, Intrinsic Cognition, External Environment. The semi - structured interviews were used to gather qualitative insights, allowing for a deeper understanding of the factors influencing the implementation of blended learning systems. Both tools underwent rigorous development processes, including pre - testing and expert validation, to ensure their reliability and validity for the research objectives.

4.3. Data Collection

The primary data collection involved semi-structured interviews with educational administrators and teachers who had experience with blended learning in colleges within Henan Province. The data collection method was a questionnaire survey targeting administrators and teachers who had participated in blended learning courses recognized by the Henan Provincial Department of Education in 2024. The sample group consisted of 502 respondents from 60 colleges, using simple random sampling method. The questionnaire covered three main aspects: Teaching-Related Factors, Learning-Related Factors, and learning system, and was designed to measure the factors influencing blended learning and its system.

4.4. Data Analysis

The data analysis process in this research involved a combination of quantitative and qualitative methods to explore the academic administration factors of blended learning management in Henan Province's colleges. Quantitative data were analyzed via descriptive statistics, Pearson correlations, and stepwise regression. Qualitative data from interviews was coded and thematically analyzed to provide contextual insights. The analysis aimed to assess the reliability and validity of the research instruments, explore of academic management factors on blended learning implementation.

5. Results

The research results are derived from a mixed-methods approach, integrating quantitative data from 502 respondents and qualitative insights from 9 expert interviews. The findings address the study's objectives, including the level of academic administration factors, the status of blended learning systems, and their interrelationships.

The research results show that the gender distribution of the sample is almost balanced (51.39% male and 48.61% female). The respondents are mainly middle-aged, with 61.56% of respondents aged between 30 and 49 years. Most participants hold a master's degree (51.39%), followed by a doctoral degree (25.10%), indicating a high level of education in the sample. Most of the work experience is concentrated between 11 and 20 years (63.75%), indicating considerable professional skills.

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Table 1.
Levels of Academic Administration Factors Affecting Blended Learning.

Dimensions	Mean (M)	Standard Deviation (S.D.)	Interpretation	Ranking
Teaching Methods	3.59	0.92	High	2
Teaching Effectiveness	3.45	0.88	Moderate	5
Teacher Evaluation	3.24	1.03	Moderate	7
Learning Participation	3.63	0.85	High	1
Intrinsic Cognition	3.54	0.91	High	3
Learning Motivation	3.48	0.97	Moderate	4
External Environment	3.28	1.04	Moderate	6
Overall	3.49	0.95	Moderate	–

Table 1 shows that Learning Participation (M=3.63, S.D.=0.85) and Teaching Methods (M=3.59, S.D.=0.92) were rated highest, indicating strong student engagement and instructional design. In contrast, Teacher Evaluation (M=3.24, S.D.=1.03) and External Environment (M=3.28, S.D.=1.04) scored lowest, highlighting gaps in feedback systems and infrastructure. The overall moderate mean (3.49) suggests room for improvement in blended learning integration.

Table 2.
Learning system of Blended Learning Systems

Dimensions	Mean (M)	Standard Deviation (S.D.)	Interpretation	Ranking
Knowledge Acquisition	3.55	0.93	High	2
Ability Acquisition	3.53	0.97	High	4
Learning Quality	3.58	0.89	High	1
Learning Experience	3.55	0.95	High	2
Academic Performance	3.48	1.02	Moderate	5
Overall	3.54	0.94	High	–

Table 2 indicates that Learning Quality (M=3.58, S.D.=0.89) and Knowledge Acquisition (M=3.55, S.D.=0.93) were the highest-rated system, reflecting positive perceptions of course relevance and content delivery. Academic Performance (M=3.48, S.D.=1.02) scored lowest, suggesting challenges in translating blended learning into tangible academic gains. The overall moderate mean (3.54) mirrors the academic administration factors, indicating consistent perceptions across dimensions.

Table 3.
Pearson Correlation Coefficients Between Academic Administration Factors and Learning system.

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	Y_{tot}	Relationship Level
X_1	1.000							0.683	MODERATE
X_2	0.687***	1.000						0.720	HIGH
X_3	0.623***	0.734***	1.000					0.554	MODERATE
X_4	0.455**	0.521***	0.589***	1.000				0.424	LOW
X_5	0.654***	0.708***	0.765***	0.498***	1.000			0.610	MODERATE
X_6	0.712***	0.789***	0.634***	0.552***	0.792***	1.000		0.393	LOW
X_7	0.756***	0.723***	0.698***	0.487**	0.751***	0.773***	1.000	0.650	MODERATE
X								0.576	MODERATE

Note: ***$p < 0.001$, **$p < 0.01$.

Table 3 demonstrates strong positive correlations between academic administration factors and learning system. Learning Participation (X_2) showed the highest correlation with total learning effect (Y_{tot}, r=0.720), followed by Teaching Methods (X_1, r=0.683) and Intrinsic Cognition (X_5, r=0.610***). Teacher Evaluation (X_4) and External Environment (X_6) exhibited weaker correlations (r=0.424* and r=0.393*), indicating indirect effects on system.

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Table 4.
Academic Administration Factors in the Regression Analysis of Hybrid Blended Learning System in Henan Province Colleges

Variable	b	S.E.b	β	t	Sig.t
Intercept	-1.41	0.40	-	-3.53	< 0.001
X1 (TMD)	0.20	0.06	0.18	3.33	0.001
X2 (LPT)	0.40	0.05	0.42	8.00	< 0.001
X3 (LMT)	0.12	0.07	0.09	1.71	0.087
X4 (TET)	0.08	0.06	0.07	1.33	0.183
X5 (ICT)	0.25	0.06	0.23	4.17	< 0.001
X6 (EEM)	0.08	0.05	0.08	1.60	0.110
X7 (TEN)	0.25	0.06	0.24	4.17	< 0.001

Table 4 shows that regression results show that Learning Participation (X_2) is the dominant driver of blended learning system in Henan colleges ($\beta = 0.42$, $p < 0.001$), followed by Intrinsic Cognition (X_5) and Teaching Effectiveness (X_7) ($\beta = 0.24$, $p < 0.001$). Teaching Methods (X_1) contribute moderately, while Motivation (X_3), Teacher Evaluation (X_4) and External Environment (X_6) exert weak or non-significant effects. Together the model explains 64 % of system variance, indicating that student engagement, self-regulation and high-quality instruction—not infrastructure or formal evaluation—are the levers that matter most for improving hybrid learning in the province.

Expert interviews highlighted disparities in technological infrastructure, with rural institutions facing hardware shortages and network instability. Faculty training in blended pedagogy was identified as a critical gap, with only 23% of faculty reporting formal training. Students in rural areas struggled with limited access to high-fidelity simulations and reliable devices, affecting practical skill development.

Interviews also emphasized the need for integrated assessment system, as current practices over-relied on summative evaluations. Formative feedback mechanisms, such as AI-driven quizzes and real-time progress tracking, were recommended to enhance learning engagement. Additionally, industry-academia partnerships were proposed to bridge the gap between theoretical knowledge and practical application, particularly in vocational fields like welding and engineering.

2. Reflection

This research reflection highlights the complex relationship between academic administration factors and blended learning system, emphasizing both methodological strengths and limitations. The mixed-methods design, integrating quantitative data from 502 respondents and qualitative insights from 9 experts, offers a thorough understanding. However, concerns arise regarding sample representativeness, methodological constraints, and theoretical implications.

First, the sample composition, while diverse in terms of age and educational background, primarily focused on institutions in Henan Province, potentially limiting generalizability to broader Chinese higher education contexts. The urban-rural divide in infrastructure access, highlighted in interviews, suggests that findings may not fully apply to regions with more equitable technological resources. For instance, the low mean scores for External Environment (M=3.28) and hardware disparities noted by experts indicate that rural students faced significant barriers, yet the sample may have underrepresented these populations, potentially skewing results.

Methodologically, the reliance on self-reported questionnaires introduced subjectivity, as respondents' perceptions of teaching methods or learning system might differ from objective observations. While the questionnaire demonstrated high reliability (Cronbach's α=0.94), social desirability bias could have influenced responses, particularly in evaluations of institutional support or faculty performance. The semi-structured interviews mitigated this by capturing nuanced insights, but the small sample of experts (n=9) might not fully represent the diversity of academic administration roles across colleges.

Theoretical reflections reveal that the study's focus on constructivist and self-determination theories aligned with existing literature, but it could have deeper integrated emerging frameworks, such as connectivism, to address the digital nature of blended learning. The regression models identified

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Intrinsic Cognition and Learning Participation as key predictors, reinforcing the importance of student agency, yet the theoretical framework might have overlooked the role of social capital or institutional culture in shaping system.

Additionally, the study's cross-sectional design limited its ability to capture longitudinal changes in blended learning effectiveness. For example, the impact of sustained faculty training or technological upgrades over time remains unaddressed, limiting conclusions about long-term sustainability. The experts' emphasis on evolving faculty attitudes toward blended learning highlighted this gap, as resistance from tenured staff or shifting institutional priorities could influence system beyond the study's scope.

Practically, the findings underscore the need for balanced policy interventions. While the quantitative results prioritized intrinsic student factors, qualitative data emphasized systemic barriers like infrastructure and evaluation systems. This dichotomy suggests that future research should employ mixed methods more iteratively, perhaps using action research cycles to test interventions and adjust strategies dynamically.

In summary, this research contributes to the literature by empirically validating the interplay between academic administration and blended learning, but its limitations highlight avenues for improvement. Future studies should prioritize diverse sampling, longitudinal designs, and deeper theoretical integration to enhance both rigor and relevance in evolving educational landscapes.

3. Consistent

The study's findings align with existing literature and theoretical frameworks, validating the importance of student engagement and intrinsic cognition in blended learning. Quantitative results show a strong correlation between Learning Participation and learning system ($r=0.720^{***}$), and identify Teaching Effectiveness as a key predictor ($\beta=0.24$, $p<0.001$). Qualitative insights reinforce these patterns, emphasizing structured goal-setting and industry-academia partnerships. However, discrepancies exist, such as lower Teacher Evaluation scores ($M=3.24$) and inconsistent implementation, possibly due to contextual factors. The study's mixed-methods approach ensures consistency between quantitative and qualitative data, supporting constructivist principles and institutional theory. Methodological rigor is maintained through Pearson correlations, stepwise regression, and IOC assessments. Yet, some inconsistencies, such as underemphasizing social influences and the limitations of a cross-sectional design, suggest areas for future research. Overall, the study contributes to cumulative knowledge by highlighting context-specific challenges and validating established theories.

4. Contributions

The study validates self-determination and constructivist theories in blended learning, emphasizing student agency and participation. It calls for systemic reforms, including equitable technological infrastructure, faculty development in blended pedagogy, and formative evaluation system with AI tools. Future research should expand samples, use longitudinal designs, and explore institutional culture and guideline effectiveness.

6. Conclusion

The study's objectives were met through a comprehensive analysis: (1) Academic administration factors operated at moderate to high levels, with Learning Participation and Teaching Methods as strengths; (2) Blended learning system showed moderate effectiveness, with Learning Quality and Knowledge Acquisition as bright spots; (3) Strong correlations existed between administration factors and system, particularly for participation and cognition; (4) Intrinsic Cognition and External Environment were key influencers; and (5) Guidelines for improvement were developed, emphasizing infrastructure upgrades, faculty training, and assessment reform. The mixed-methods approach revealed that while blended learning system demonstrate moderate overall effectiveness, significant gaps persist in teacher evaluation, external infrastructure, and equitable resource distribution.

This research investigates academic administration factors affecting blended learning systems in Henan Province's colleges, integrating quantitative data from 502 respondents and qualitative insights

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from 9 experts. Findings reveal moderate overall effectiveness of blended learning, with strengths in Learning Participation (M=3.63) and Teaching Methods (M=3.59), but gaps in Teacher Evaluation (M=3.24) and External Environment (M=3.28). Regression analysis identifies Teaching Effectiveness (β=0.24) and Learning Participation (β=0.42) as key predictors of learning system, explaining 65% of variance in the full model.

Qualitative insights from experts complemented these findings, exposing systemic barriers such as rural-urban digital divides, faculty resistance to technology, and outdated evaluation systems. The disparity in hardware access—with 43% of rural students lacking high-speed Wi-Fi—directly impacted participation and practical skill development, particularly in STEM fields. Experts emphasized that while technology can enhance learning, its effectiveness depends on integrated training and supportive policies.

Recommendations include upgrading technological infrastructure, implementing tiered faculty development, and redesigning assessments to prioritize formative feedback. The study contributes to literature by validating the role of student agency and contextualizing blended learning challenges in a Chinese provincial context. Future research should explore longitudinal impacts and institutional culture's role, while policymakers must address resource inequities to maximize blended learning's potential for educational excellence.

7. Discussion

7.1. Contextualization and Consistencies

The study contextualizes empirical findings within blended learning literature, revealing a complex interplay between academic administration factors and system. High ratings for Learning Participation (M=3.63) and Teaching Methods (M=3.59) align with international studies emphasizing student engagement and instructional design. These findings echo Arnidah, et al. [9] and Liu and Yodmongkol [10] highlighting the importance of active learning strategies and diverse teaching methods.

7.2. Disparities and Systemic Gaps

Low scores for Teacher Evaluation (M=3.24) and External Environment (M=3.28) reflect systemic gaps observed in Ansari, et al. [11] and contrast with formative feedback recommendations from Gaffas [12]. Expert interviews highlight infrastructure disparities, echoing Lu, et al. [13] on rural-urban digital divides.

7.3. Learning system and Theoretical Alignments

Moderate overall learning system (M=3.54) align with domestic research by Wei, et al. [14] showing improved knowledge acquisition but struggles with practical skill transfer. The highest-rated dimension, Learning Quality (M=3.58), mirrors Meric-Bernstam, et al. [15] while lower Academic Performance (M=3.48) reflects a gap between theoretical understanding and applied skills, consistent with Song, et al. [16].

7.4. Regression Analysis and Constructivist Principles

Regression models identify Teaching Effectiveness (β=0.24) and Learning Participation (β=0.42) as key predictors, supporting self-determination theory Deci, et al. [17] and constructivist principles (Piaget, 1970). This underscores the importance of student agency and active knowledge construction.

7.5. Methodological Strengths and Limitations

The mixed-methods design triangulates quantitative findings with qualitative insights, reinforcing result validity. For instance, the correlation between Teaching Methods and Learning system (r=0.683***) aligns with expert calls for faculty training in blended pedagogy. However, the cross-

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sectional design limits causal inferences, and the urban bias in the sample may underrepresent rural challenges.

7.6. Practical Reforms and Future Research

Findings inform practical reforms: (1) Provincial infrastructure upgrades to address access inequities; (2) Faculty training programs prioritizing blended pedagogy; (3) Evaluation systems shifting toward formative feedback. Future research could adopt action research cycles to test interventions and address rural challenges.

8. Recommendation

8.1. Technological Integration

Implement a unified provincial cloud-based learning platform and provide hardware subsidies and network upgrades for rural institutions to bridge the digital divide. Equip regional hubs with immersive technologies and deploy mobile learning units to enhance practical skills in underserved areas.

8.2. Faculty Development and Policy

Revamp faculty capabilities through tiered training programs, from basic LMS operation to advanced AI-driven analytics. Foster cross-institutional collaboration and incentivize innovative teaching methods. Shift to formative assessments with real-time feedback. Establish a provincial taskforce to coordinate policy implementation, link funding to performance metrics, and promote industry-academia partnerships.

8.3. Student Support

Offer learning strategy workshops and mental health initiatives to address digital fatigue. Redesign assessments to value process-oriented engagement and practical competencies. Develop quality benchmarks and a shared resource library. These efforts will enhance technological equity, instructional excellence, and learning system.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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