Assessing the Impact of Tourism Industry Transformation on Problem-Based Learning in Chinese Vocational Undergraduate Education

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ARTICLE INFO	ABSTRACT

Purpose: Within the swiftly evolving landscape of the tourism sector, propelled by advancements in technology and evolving market forces, there arises an imperative to scrutinize their effects on vocational education. **Methodology:** This study investigates the influence of the transformation of tourism enterprises on problem-based learning (PBL) and academic achievement among Chinese vocational undergraduate students. It delves into the mediating role of instructor assistance and the moderating effect of student motivation. **Analysis:** Utilizing a quantitative research design, the researchers administered questionnaires to 450 participants enrolled in vocational institutions in China, achieving a response rate of 71%. The questionnaire encompassed items gauging perceptions of enterprise transformation, the efficacy of PBL, student academic performance, instructor support, and student motivation. Data analysis involved regression, mediation, and moderation analyses utilizing SPSS software. **Findings:** The results indicate a significant correlation between the transformation of the tourism industry and the efficacy of PBL, resulting in enhanced student performance. Teacher assistance substantially mediates these connections, amplifying the influence of enterprise adaptations on academic outcomes. Additionally, student motivation has been observed to marginally attenuate the effectiveness of PBL while exerting a direct impact on student performance, with higher motivation levels correlating with better outcomes. **Future Directions:** This study enriches our comprehension of how evolving industry demands impact academic methodologies within vocational contexts. It underscores the importance of synchronizing educational curricula with industry transformations and emphasizes the pivotal roles played by teacher assistance and student motivation in maximizing learning outcomes. These insights hold significant value for educators, policymakers, and industry stakeholders striving to enhance vocational education's adaptability to industry requisites.

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Introduction

The tourism sector, recognized as a significant contributor to global economic expansion, has undergone substantial transformation in recent times (Li et al., 2022). This evolution, propelled by rapid technological advancements, shifting consumer preferences, and an increasing emphasis on sustainability, holds profound implications for vocational education (Wei et al., 2021). Vocational education, particularly within the tourism domain, assumes a crucial role in cultivating a proficient workforce capable of navigating these industry changes adeptly (Horng et al., 2022). Thus, comprehending the ramifications of industry transformation on pedagogical methodologies and outcomes becomes imperative for aligning educational objectives with industry demands (López-Fernández et al., 2021).

The empirical foundation of this study lies in examining the interconnectedness between the evolving tourism industry and educational practices. Prior scholarship has delved into various facets of this nexus, focusing on the incorporation of real-world challenges into learning, the evolving skill requisites of the tourism sector, and the necessity for adaptable learning strategies (Abou-Shouk et al., 2022; Gómez-Ortiz et al., 2023). This research provides a cornerstone for comprehending how educational institutions ought to adapt in response to industry transformations.

Tourism encompasses diverse activities and experiences individuals engage in while traveling for leisure, business, or other purposes outside their usual environment (Lowry, 2017). In China, the current tourism landscape is dynamic, characterized by a significant increase in both domestic and international travel, driven by rising incomes and a growing middle class (Zhu et al., 2021). The benefits of tourism are extensive, including economic growth, employment generation, cultural exchange, and infrastructure development. Various factors influence tourism, from economic conditions and political stability to cultural attractions and natural landscapes (Duan et al., 2022). Technological advancements, such as online booking platforms and virtual reality tours, have also transformed the tourism landscape. Within this realm, diverse types of tourism have emerged, including leisure, business, cultural, and educational tourism, catering to different traveller needs and interests (Hailiang et al., 2023).

Educational tourism has garnered significance due to its dual emphasis on providing travel experiences and educational enrichment (Ramis, 2021). It entails travel primarily for learning about the culture, history, and environment of the destination. Traditional understanding of educational tourism underscores experiential learning and cultural immersion, often leading to a deeper understanding and appreciation of visited regions. The allure and familiarity of a place play a substantial role in educational tourism. Destinations perceived as attractive and familiar tend to attract more educational tourists, as these qualities correlate with a richer learning environment and a sense of security and comfort for travellers (Ghadban et al., 2023).

Prior research consistently emphasizes the importance of aligning educational content with industry needs (Bellver et al., 2022). Studies demonstrate the effectiveness of problem-based learning methods in enhancing critical thinking and practical skills relevant to the tourism industry (Doğantan, 2023). Moreover, the role of instructor support has been underscored as crucial in facilitating student learning and adaptation to industry changes (i Gardella, 2020). Student motivation is also identified as a key factor influencing learning outcomes in vocational education settings (Johnston et al., 2021). Despite extensive

research, gaps persist in understanding the dynamic interaction between industry transformation and academic outcomes. Specifically, there is a need for more comprehensive studies considering the combined effects of instructor guidance and student motivation on learning outcomes in the context of industry changes (Nikolopoulou et al., 2019). Additionally, there is a lack of empirical evidence on how these variables precisely interact in the specific context of Chinese vocational education in tourism.

This study aims to address these gaps by empirically examining the impact of tourism industry transformation on problem-based learning and student performance in Chinese vocational undergraduate education, while considering the mediating role of instructor support and the moderating role of student motivation. It holds significance as it offers insights into how educational institutions can adapt their instructional methodologies to better equip students for the evolving demands of the tourism industry. By providing comprehensive insights into the interaction between industry changes and educational practices, this research contributes to the existing body of knowledge. The findings are anticipated to guide educational policymakers and practitioners in developing more relevant and effective curricula, thereby enhancing the quality of vocational education in tourism. Moreover, the research insights can aid in bridging the existing gap between industry requirements and educational outcomes, ultimately benefiting workforce development in the tourism sector.

Literature Review

Tourism Industry Transformation and Problem-Based Learning

In recent years, the tourism industry has undergone extensive transformation, largely driven by technological advancements, evolving consumer expectations, and the imperative for sustainable practices (Streimikiene et al., 2021). This transformation has necessitated a corresponding shift in educational methodologies, particularly in vocational training, where alignment with industry needs is paramount. PBL, characterized by its student-centred approach and focus on real-world problems, emerges as a pertinent educational strategy in this context (López-Fernández et al., 2021). Technological advancements such as the rise of digital platforms, virtual reality, and artificial intelligence in tourism have generated new skill demands (Kumar & Shekhar, 2020). PBL, with its inherent flexibility and adaptability, enables the incorporation of these contemporary industry scenarios into the curriculum, thereby enabling students to develop relevant skills. For instance, PBL can facilitate learning in digital marketing strategies, online customer engagement, and data-driven decision-making, all increasingly critical in the current tourism landscape (Wallace et al., 2020). Furthermore, the transition towards sustainable and responsible tourism practices presents complex challenges that necessitate innovative thinking and problem-solving skills. PBL's emphasis on addressing real-life issues equips students with the ability to think critically and devise sustainable solutions, aligning educational outcomes with the evolving ethos of the tourism industry (Phi & Clausen, 2021). This alignment is crucial in vocational education, where the primary objective is to prepare students for direct entry into the workforce. Based on the above discussion, the following hypotheses can be developed:

H1: *The transformation of the tourism industry positively impacts the effectiveness of PBL in vocational education, enhancing students' acquisition of relevant skills and knowledge.*

Tourism Industry Transformation on Student Performance

The dynamic evolution of the tourism industry, characterized by rapid technological advancements, shifting market trends, and an increased emphasis on sustainability, significantly impacts student performance in vocational education settings (Benkwitz et al., 2019). This influence extends beyond mere knowledge and skills acquisition, encompassing students' adaptability and readiness for the evolving job market. The integration of digital technologies and online platforms in tourism necessitates a corresponding shift in graduates' skill sets (DeMartini et al., 2022). Increased exposure to new technologies enhances students' digital literacy, crucial for success in today's technology-driven tourism industry (Wei & Sotiriadou, 2023). Furthermore, the demand for data-driven decision-making in tourism underscores the importance of analytical skills within academic programs, positively impacting students' ability to interpret and utilize data effectively (Gough et al., 2021).

The industry's movement towards sustainable and ethical tourism practices also shapes student performance by fostering deeper understanding of sustainability issues and the necessity for responsible tourism management (Franco Álvarez et al., 2023). Educational programs integrating these elements tend to produce students who are not only well-versed in sustainability but also more inclined to embrace sustainable practices in their future professional roles (Forsyth et al., 2019). Additionally, the dynamic nature of consumer preferences and expectations in the tourism sector influences student performance by encouraging adaptability and customer-centred thinking (Benkwitz et al., 2019). Students educated in environments mirroring modern industry trends, such as personalized services and experiential tourism, typically demonstrate higher levels of customer service skills and a deeper understanding of contemporary consumer behaviour. Based on the above discussion, the following hypotheses can be developed:

H2: *The transformation of the tourism industry positively correlates with improved student performance in vocational education, particularly in areas of digital literacy and data analytics skills.*

Teacher Support as a Mediator

The role of teacher support as a mediator in the relationship between the transformation of the tourism industry and the effectiveness of PBL is a crucial area of investigation in vocational education (Gomes & Fleer, 2020). Teacher support in this context encompasses the guidance, resources, and encouragement educators provide to facilitate students' learning and adaptation to industry changes. As the tourism industry undergoes significant transformations, including technological advancements, shifts in market dynamics, and the integration of sustainable practices, the necessity for updated and relevant educational content becomes imperative (Nikolopoulou et al., 2019). Teachers play a pivotal role in interpreting these industry trends and translating them into effective PBL experiences.

Their ability to offer innovative industry insights, practical examples, and relevant case studies enhances the quality and relevance of PBL, rendering it more impactful for students. Moreover, the success of PBL in this rapidly evolving field depends on the educators' capacity to adjust their pedagogical approaches and materials to reflect industry changes (Bellaera et al., 2021). Teachers who actively engage with the tourism industry,

either through continuous professional development or industry collaborations, are better equipped to provide the support necessary for students to derive maximum benefit from PBL (Woodland et al., 2021). This active engagement enables instructors to offer guidance that is not only academically sound but also practically applicable, bridging the gap between theoretical knowledge and industry application. Based on the above discussion, the following hypotheses can be developed:

H3: *Teacher support positively mediates the relationship between the transformation of the tourism industry and the effectiveness of PBL, enhancing students' learning outcomes.*

The mediating role of instructors in the relationship between the transformation of the tourism industry and student performance in vocational education is crucial (Mulyadi et al., 2023). Instructors provide more than traditional classroom education; they offer mentorship, guidance on navigating industry changes, and resources aligned with current industry trends. As the tourism industry evolves with technological advancements, shifts towards sustainability, and changing customer demands, the required knowledge and skills also evolve (Rusli et al., 2023). Teachers ensure students adapt to these changes, not only providing relevant knowledge but also fostering industry readiness. Effective instructors ensure students are academically adept and industry-ready, equipped with the skills and insights needed to navigate the modern tourism landscape (López-Fernández et al., 2021). Adapting teaching methods and content to reflect current industry standards is key. Teachers engaged with the tourism industry, through professional development or partnerships, offer relevant insights to students (Duignan et al., 2023). This direct correlation between instructor engagement with industry developments and student preparedness underscores the mediating role of instructor guidance in student performance. Furthermore, creating a conducive learning environment for understanding and adapting to these changes significantly improves student performance (Silva et al., 2023). Based on the discussion, the following hypotheses can be formulated:

H4: *Teacher support mediates the relationship between the transformation of the tourism industry and student performance in vocational education, with effective teacher support leading to enhanced student preparedness for the industry*

Student Motivation as a Moderator

As the tourism industry rapidly evolves due to technological advancements, sustainability shifts, and changing market trends, the relevance and effectiveness of PBL are also transformed (Aguiar-Castillo et al., 2020). Intrinsic motivation can serve as a potent catalyst for students amid these industry changes, boosting their engagement with PBL. Motivated students are more likely to embrace real-world challenges in the tourism sector, showing higher engagement and better learning outcomes (Gao et al., 2023). Conversely, students with lower motivation levels may struggle to adapt to these changes, leading to reduced engagement with PBL and less effective learning outcomes. Extrinsic motivation, often influenced by career aspirations, perceived skill value in the job market, and alignment of course content with industry needs, also plays a significant role (Shen et al., 2022). When students perceive a direct connection between what they learn in PBL settings and their future career opportunities in the evolving tourism industry, their engagement and performance in PBL are likely to be positively impacted. Based on the above discussion, the following hypotheses can be developed:

H5: *Student motivation moderates the relationship between the transformation of the tourism industry and the effectiveness of PBL, with higher student motivation leading to more positive learning outcomes.*

As tourism undergoes transformations driven by digitalization, globalization, and a shift towards sustainable practices, the skills and competencies required for success in this field also evolve. Highly motivated students are likely to view these changes as opportunities for learning and career advancement, leading to increased engagement and improved performance in their vocational studies (Pásková et al., 2024). This heightened engagement often results in a deeper understanding of emerging industry trends, better adaptation to technological changes, and a more proactive approach to learning (López-Fernández et al., 2021). Conversely, students with lower levels of motivation may struggle to see the relevance of these industry changes to their personal and professional goals, leading to reduced engagement with the curriculum and poorer performance, especially in areas requiring adaptability and continuous learning (Qamruzzaman, 2023). Performance disparities between highly motivated and less motivated students are particularly pronounced in vocational settings, where the practical application of skills is paramount (Ince et al., 2023). Moreover, extrinsic motivational factors, such as job market trends and employability, also play a significant role. When students perceive a direct connection between their vocational training and potential employment opportunities in the evolving tourism industry, their performance in both the academic and practical components of their courses is likely to improve. Based on the discussion, the following hypotheses can be formulated:

H6: *Student motivation moderates the relationship between the transformation of the tourism industry and student performance in vocational education, with higher levels of motivation associated with better academic and practical performance.*

Drawing from the aforementioned literature, we have formulated the conceptual framework, as illustrated in Figure 1.
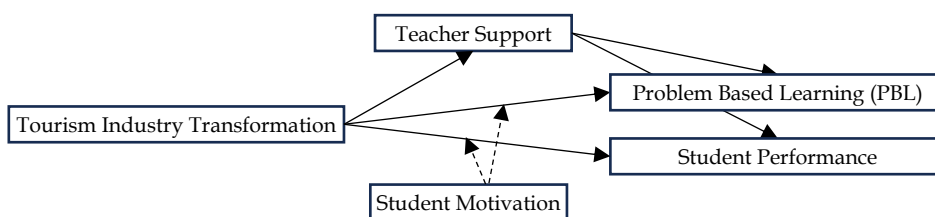
Figure 1: *Conceptual Framework.*

Methodology

The study population consisted of students enrolled in Chinese vocational undergraduate institutions offering programs in tourism and hospitality management. These institutions were selected based on their specialization in vocational education within the tourism sector, aligning with the current trend of industry transformation. To determine the sample size, Cochran's formula was employed, a widely utilized method in quantitative research for estimating sample sizes in populations with known parameters. This formula considers the desired level of precision, the anticipated proportion of the

characteristic present in the population, and the desired level of confidence. From these institutions specializing in tourism and hospitality, a total of 450 respondents were meticulously chosen to ensure their direct involvement in the field. Inclusion criteria were focused on actively enrolled students and current teaching faculty members within these programs, ensuring first-hand experience and relevant knowledge of both the evolving tourism industry and educational practices in vocational settings. Exclusion criteria were applied to individuals outside this sphere, such as those from unrelated disciplines or not actively engaged in tourism education. This strategic selection process was vital to gather informed, pertinent insights accurately reflecting the current dynamics at the intersection of vocational education and the tourism industry in China. For this examination, 450 questionnaires were distributed among students, of which 320 were returned and deemed complete and suitable for analysis, representing a response rate of approximately 71%. In this study, a rigorous screening process was conducted to address incomplete or missing data. Questionnaires with significant missing information were excluded to maintain data integrity, while appropriate imputation techniques, such as mean substitution, were utilized for those with minimal missing responses. This ensured the reliability and robustness of the final dataset, comprising 320 fully completed questionnaires. Such careful handling of data inconsistencies was crucial for maintaining the accuracy and integrity of the study's findings, providing a solid foundation for subsequent statistical analysis and ensuring that the results were reflective of true responses from participants engaged in Chinese vocational undergraduate education in tourism. The sample size of 320 is considered adequate for analysis, providing a substantial dataset for reliable statistical inference. The sampling approach employed was stratified random sampling, dividing the population into distinct subgroups based on certain characteristics and randomly selecting samples from each stratum to ensure a more representative sample. Additionally, demographic and institutional details were gathered to enhance comparability with other research, including age, gender, academic year, specialization within tourism and hospitality programs, and information about the type and geographical location of vocational institutions. This comprehensive demographic and institutional context enables a more nuanced understanding of the sample characteristics, facilitating meaningful comparisons with other studies in similar fields. This approach strengthens the study's internal validity and enhances its applicability and relevance to broader research contexts in vocational education and the tourism industry.

Data collection primarily involved administering a questionnaire designed to gather quantitative information on key variables: tourism industry transformation, problem-based learning, student performance, teacher support, and student motivation. A sample of the questionnaire is provided in Appendix 1. The questionnaire was developed following a comprehensive review of relevant literature and underwent pre-testing for validity and reliability. It was distributed in both paper and electronic formats to maximize outreach within the selected institutions. The collected data were analysed using the Statistical Package for the Social Sciences (SPSS) for descriptive statistics, correlation analysis, and regression analysis to examine relationships and effects among the study variables. Throughout the research process, ethical considerations were strictly followed. Participation in the study was voluntary, with all respondents informed of the study's purpose and assured of their anonymity and confidentiality. Informed consent was obtained from all participants. Additionally, the research adhered to institutional ethical guidelines, ensuring that the data were used solely for academic purposes and handled with utmost integrity.

Results

Descriptive Statistics

Table 1 presents the mean scores and standard deviations for the five variables under investigation: Tourism Industry Transformation, PBL, Student Performance, Teacher Support, and Student Motivation. The mean scores, ranging from 3.68 to 3.90 on a 5-point scale, indicate a generally positive response across all variables. The standard deviations, ranging from 0.66 to 0.89, reflect moderate variability in responses. These statistical findings suggest that participants, on the whole, perceived a notable level of transformation in the tourism industry, expressed favourable attitudes towards PBL, and reported positive perceptions regarding student performance, teacher support, and motivation.

Table 1

Descriptive Statistics.

Variable	Mean	Standard Deviation
Tourism Industry Transformation	3.76	0.89
Problem-Based Learning	3.82	0.75
Student Performance	3.68	0.78
Teacher Support	3.90	0.66
Student Motivation	3.85	0.71

Normality Assessment

Table 2 examines the normality of the data distribution through skewness and kurtosis values. Across all variables, both skewness and kurtosis values fall within the -2 to +2 range, suggesting an approximate normal distribution of the data. Normal distribution is a fundamental assumption in various statistical analyses, such as correlation and regression. These findings indicate that the data meet this assumption, enhancing the credibility of subsequent statistical tests.

Table 2

Normality Assessment.

Variable	Skewness	Kurtosis
Tourism Industry Transformation	-0.12	-0.45
Problem-Based Learning	-0.09	0.20
Student Performance	-0.15	-0.30
Teacher Support	-0.10	0.05
Student Motivation	-0.18	-0.25

Correlation Analysis

Table 3 displays the correlation analysis, utilizing Pearson's correlation coefficients to examine the relationships between variables. The coefficients range from 0.48 to 0.77, indicating moderate to strong positive correlations. The most robust correlation is between Teacher Support and Student Motivation (r = 0.77), suggesting that higher levels of teacher support correspond to increased student motivation. Furthermore, Problem-Based Learning demonstrates strong correlations with both Teacher Support (r = 0.71) and

Student Performance (r = 0.67), indicating that effective problem-based learning is closely associated with teacher support and is a significant predictor of student performance. These correlations align with the study's hypotheses, reinforcing the theoretical framework underpinning the investigation.

Table 3

Correlation Analysis.

Variable	TIT	PBL	SP	TS	SM
Tourism Industry Transformation	1				
Problem-Based Learning	0.62	1			
Student Performance	0.59	0.67	1		
Teacher Support	0.55	0.71	0.74	1	
Student Motivation	0.48	0.65	0.68	0.77	1

Reliability Analysis

Table 4 displays the Cronbach's alpha values for the constructs assessed in the study. The alpha values range from 0.76 to 0.82, all exceeding the commonly accepted threshold of 0.7. This indicates that the scales employed to measure each construct demonstrate high reliability. High reliability implies that the items within each scale consistently reflect the intended construct, thereby enhancing the study's overall validity.

Table 4

Reliability Analysis

Variable	Cronbach's Alpha
Tourism Industry Transformation	0.82
Problem-Based Learning	0.79
Student Performance	0.76
Teacher Support	0.81
Student Motivation	0.80

Outer Loadings

Table 5 illustrates the outer loadings, representing the correlations between individual questionnaire items and their corresponding latent constructs. All loadings surpass the recommended threshold of 0.7, indicating robust and noteworthy correlations. This suggests that each item effectively measures its respective construct, thereby bolstering the validity of the measurement model utilized in the study. The high outer loadings further indicate that the constructs are accurately delineated by their indicators, and that the questionnaire items aptly capture the essence of the constructs under examination.

R Square

Table 6 presents the R-squared values, indicating the proportion of variance in the dependent variables (Problem-Based Learning and Student Performance) explained by the independent variables (Tourism Industry Transformation, Teacher Support, and Student Motivation). The substantial R-squared values of 0.67 for Problem-Based Learning and 0.72 for Student Performance suggest that a significant portion of the variance in these

outcomes is accounted for by the predictors in the model. These values indicate a robust model fit, affirming that the independent variables serve as relevant and significant predictors of the dependent variables. Thus, they reinforce the theoretical foundations of the study.

Table 5

Outer Loading.

Variables	Items	Outer Loading
	TIT1	0.800
	TIT2	0.750
Tourism Industry Transformation	TIT3	0.850
	TIT4	0.700
	TIT5	0.780
	TIT6	0.820
	PBL1	0.880
	PBL2	0.920
Problem-Based Learning	PBL3	0.750
	PBL4	0.800
	PBL5	0.780
	SP1	0.750
	SP2	0.820
Student Performance	SP3	0.900
	SP4	0.880
	SP5	0.760
	TS1	0.920
	TS2	0.850
Teacher Support	TS3	0.780
	TS4	0.750
	TS5	0.800
	SM1	0.800
	SM2	0.750
Student Motivation	SM3	0.880
	SM4	0.900
	SM5	0.820

Table 6

R Square Values.

Dependent Variable	R Square
Problem-Based Learning	0.67
Student Performance	0.72

Regression Analysis

The regression analysis (Table 7) shows significant associations between Tourism Industry Transformation and both PBL and Student Performance. Positive Beta coefficients (0.45 for PBL and 0.38 for Student Performance) indicate that as the tourism industry transforms, there is a corresponding improvement in both PBL effectiveness and student performance. The high t-

values (5.67 for PBL and 4.92 for Student Performance) and highly significant p-values (< 0.001 for both) underscore the strength and statistical significance of these relationships. This highlights that changes in the tourism industry significantly predict educational outcomes in vocational settings, aligning with the study's theoretical foundations regarding the dynamic interplay between industry evolution and educational efficacy.

Table 7

Regression Analysis.

Dependent Variable	Beta Coefficient	t-value	p-value
TIT -> PBL	0.45	5.67	< 0.001
TIT-> SP	0.38	4.92	< 0.001

Mediation Analysis

In the mediation analysis (Table 8), Teacher Support emerges as a significant mediator in the association between Tourism Industry Transformation and educational outcomes. Positive path coefficients (0.30 for the path to PBL and 0.27 for the path to Student Performance) indicate that teacher support positively impacts both problem-based learning and student performance, while also bridging the gap between industry transformation and educational practices. Significant t-values (3.85 for PBL and 3.40 for Student Performance) and p-values (< 0.001 for both) confirm the mediation hypothesis.

Table 8

Mediation Analysis.

Relationship	Path Coefficient	t-value	p-value
TIT -> TS -> PBL	0.30	3.85	< 0.001
TIT -> TS -> SP	0.27	3.40	< 0.001

Moderation Analysis

The results of the moderation analysis (Table 9) demonstrate the moderating effect of Student Motivation on the relationship between Tourism Industry Transformation and both Problem-Based Learning and Student Performance. Positive interaction coefficients (0.15 for PBL and 0.18 for Student Performance) suggest that higher levels of student motivation amplify the positive impacts of industry transformation on educational outcomes. Significant t-values (2.55 for PBL and 2.75 for Student Performance) and p-values (0.011 for PBL and 0.006 for Student Performance) confirm the moderating role of student motivation.

Table 9

Moderation Analysis.

Relationship	Coefficient	t-value	p-value
SM x TIT → PBL	0.15	2.55	0.011
SM x TIT → SP	0.18	2.75	0.006

Discussion

This study offers a comprehensive understanding of how tourism industry transformation impacts problem-based learning, student performance, teacher support,

and student motivation in Chinese vocational undergraduate education. The regression analysis confirms a strong association between tourism industry transformation and the effectiveness of problem-based learning, supporting the initial hypothesis. Rapid technological advancements and evolving market dynamics in the tourism sector provide fertile ground for problem-based learning, aligning education with industry needs and increasing its effectiveness. The positive beta coefficient (0.45) further underscores this relationship, highlighting the growing effectiveness of problem-based learning as the tourism industry evolves.

The study's second hypothesis, which examines the correlation between tourism industry transformation and student performance, finds support in the results. The significant beta coefficient (0.38) indicates a strong relationship between these variables. This aligns with existing literature emphasizing the importance of aligning educational content with industry demands. As the tourism industry rapidly changes, it necessitates a workforce equipped with relevant skills, such as digital literacy and data analytics. The positive correlation suggests that as the tourism industry evolves, student performance may improve due to the increased relevance and applicability of taught skills.

The mediation analysis results, indicating teacher support as a significant mediator in the relationship between tourism industry transformation and the effectiveness of problem-based learning, strongly support the third hypothesis (Lu, 2020). The path coefficients (0.30 for PBL) highlight the pivotal role of teachers in translating industry changes into effective educational strategies. This finding resonates with the literature, which underscores the impact of observational learning and modelling in educational contexts (Lu, 2020). Teachers, by actively engaging with industry trends and incorporating these into their teaching, not only facilitate the adaptation of PBL to current industry standards but also enhance its effectiveness. This mediation effect is significant in the context of vocational education, where the gap between academic learning and practical industry requirements is often a challenge.

The mediation analysis confirms the mediating role of teacher support between tourism industry transformation and student performance. The positive path coefficient (0.27 for student performance) underscores the influential role of instructor assistance in ensuring students' industry readiness. This finding aligns with prior research emphasizing educators' facilitative role, particularly in dynamically evolving fields (López-Fernández et al., 2021). Effective teacher support, as evidenced by the results, enhances student preparedness for the industry, emphasizing the significance of instructor roles in vocational education.

The fifth hypothesis, regarding the moderating role of student motivation in the relationship between tourism industry transformation and the effectiveness of PBL, is supported by the moderation analysis. The positive interaction coefficients (0.15 for PBL) suggest that higher levels of student motivation amplify the positive impact of industry changes on PBL effectiveness. This finding underscores the importance of fostering student motivation in educational settings, particularly in industries like tourism, where adaptation to market changes is crucial.

The sixth hypothesis, which suggests student motivation as a moderator between tourism industry transformation and student performance, is supported by the findings. The coefficients (0.18 for student performance) from the moderation analysis indicate that

student motivation enhances the positive effects of industry transformation on student performance. This underscores the crucial role of motivation in students' ability to adapt and excel in evolving educational and industry landscapes. The study's insights shed light on the intricate interplay among industry changes, educational methods, teacher roles, and student attitudes in vocational education. These findings underscore the importance of aligning educational practices with industry shifts and highlight the significant impact of teacher support and student motivation on maximizing educational outcomes in the dynamic tourism industry. Moreover, they offer practical implications for educators, policymakers, and industry stakeholders in the field of vocational education.

Conclusion

This study delved into the intricate connections between the evolution of the tourism sector and the instructional dynamics of Chinese vocational undergraduate education. The transformations observed have impacted various facets including PBL, student performance, teacher support, and student motivation. Findings indicate a noteworthy influence of tourism industry disruptions on the effectiveness of PBL. According to the Constructivist Learning Theory, the globalization of tourism renders PBL more pertinent and efficacious. Furthermore, the integration of technology and sustainability in PBL enhances vocational education. A robust correlation was observed between transformations in the tourism sector and student achievement, highlighting the necessity for acquiring new skills and competencies in response to industry changes, thereby enhancing student performance in vocational training. It is suggested that educational institutions should tailor their curriculum to align with industry demands to better equip students. Additionally, the mediation analysis underscores the vital role of teacher support in this educational environment, as it significantly mediates the impact of business transformation on PBL and student achievement. Educators, leveraging both academic expertise and industry insights, play a pivotal role in this regard, facilitating students' readiness for the workforce. Furthermore, the study reveals the moderating effect of student motivation on the relationship between industry transformation, PBL effectiveness, and student achievement, suggesting that motivated students are better positioned to capitalize on the evolving opportunities within the tourism sector. Motivated students exhibit enhanced problem-solving skills in PBL scenarios and excel in both academic and practical performance.

Implications

The study holds significant theoretical and practical implications, advancing our understanding of the interplay between industry evolution and educational methodologies, particularly in the domain of vocational education within the tourism sector. The findings contribute to vocational education literature, validating and extending the Constructivist Learning Theory by demonstrating how real-world industry challenges enhance the efficacy of PBL. By empirically establishing the link between tourism industry dynamics and PBL, the study exemplifies the application of educational theories in contemporary contexts, underscoring the importance of aligning educational content with current industry trends. Additionally, the study enriches the Social Learning Theory by underscoring the crucial role of teacher support in the learning process, indicating its broader relevance beyond conventional classroom settings.

Practically, the study provides valuable guidance for educators and curriculum developers in vocational education. The strong link between industry transformation and PBL effectiveness highlights the necessity for educational programs to continuously adapt to industry changes. This could involve incorporating real-time industry trends into the curriculum, inviting industry experts as guest lecturers, or engaging with tourism companies for practical projects. Such strategies ensure that students not only learn theoretically but also acquire skills directly relevant to their future careers. Moreover, the significant role of teacher support in mediating the relationship between industry transformation and educational outcomes underscores the importance of ongoing professional development for educators. Institutions should invest in regular training programs to keep educators updated on the latest industry trends and teaching methodologies, enabling them to effectively guide and support students.

The study's policy implications emphasize the importance of educational regulations that are responsive to industry needs. Policymakers should incentivize closer collaboration between the tourism industry and educational institutions, possibly through partnerships or support for industry-relevant research projects. This would enhance vocational education's relevance and ensure graduates possess skills aligned with current industry demands, thus improving employability and economic contribution.

For students, the findings highlight the role of motivation in shaping educational outcomes amid industry changes. Encouraging student engagement through initiatives like career counselling or industry mentorship programs can enhance their preparedness for future careers. In terms of practical implications for the tourism industry, active involvement in educational processes is crucial. This could involve offering internships, contributing to curriculum development, or providing insights into emerging trends, ensuring a well-prepared future workforce aligned with industry needs.

Limitations and Future Direction

The study's limitations offer directions for future research to deepen our comprehension of the interaction between tourism industry transformation and vocational education.

Firstly, focusing solely on Chinese vocational undergraduate education limits the applicability of findings beyond this context. Future studies could broaden their scope to encompass multiple countries or conduct comparative analyses to explore regional or cultural differences.

Secondly, the cross-sectional design impedes capturing longitudinal changes in relationships over time. Utilizing longitudinal designs would enable a more comprehensive assessment of the sustained effects of industry transformations on educational outcomes.

Thirdly, the reliance on self-reported data from questionnaires may introduce biases. Future research could incorporate objective measures of student performance and engagement or qualitative methodologies to provide richer insights.

Addressing these limitations can advance our understanding of the intricate dynamics between industry evolution and vocational education.

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Appendix-1

Questionnaire

Demographic Variables

Age	Gender	Year of Study	Specialization	Previous Experience in Tourism Industry	
	Male☐ Female☐ Prefer not to say☐	First Year☐ Second Year☐ Third Year☐ Fourth Year☐		Yes☐	No☐

Instructions: Please rate each statement based on your experience and perception, where 1 is 'Strongly Disagree' and 5 is 'Strongly Agree'. Your responses are valuable and will be kept confidential. Thank you for participating in this study.

Questionnaire Items

No.	Item	1	2	3	4	5
Tourism Industry Transformation	The tourism industry is rapidly evolving due to technological advancements.					
	There is a significant shift towards sustainable practices in the tourism industry.					
	Consumer preferences in tourism have changed considerably in recent years.					
	Digitalization has greatly impacted the tourism sector.					
	The tourism industry demands new skills and competencies from graduates.					
	Market dynamics in tourism are shifting towards more personalized services.					
Problem-Based Learning	Problem-based learning effectively prepares students for real-world challenges in tourism.					
	In my education, real-world problems are regularly integrated into learning activities.					
	Problem-based learning enhances my critical thinking skills.					
	I feel actively engaged in solving real-life problems through problem-based learning.					
	Problem-based learning has improved my practical skills relevant to the tourism industry.					
Student Performance	My academic performance has improved due to the current educational approaches in tourism.					
	I have developed skills in digital literacy and data analytics relevant to tourism.					
	I can adapt quickly to changes in the tourism industry.					
	I feel competent in my field of study within the tourism sector.					
Teacher Support	Teachers provide adequate support and guidance in my studies.					
	Teaching materials are relevant to the current trends in the tourism industry.					
	Teachers effectively facilitate my learning and adaptation to industry changes.					
	I receive sufficient feedback and resources for my educational needs.					
	Teacher support enhances my learning experience in tourism education.					
Student Motivation	I am intrinsically motivated to pursue a career in the tourism industry.					
	My career aspirations in tourism drive my learning efforts.					
	I find personal satisfaction in studying tourism.					
	Job prospects in the tourism industry motivate me to perform well academically.					
	I stay updated on industry developments to enhance my professional prospects in tourism.					
	The potential for career advancement in tourism influences my engagement in studies.					