Journal of Artificial Intelligence Practice (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/jaip.2025.080303
ISSN 2371-8412 Vol. 8 Num. 3

Construction and Planning of Smart Tourism Laboratories in Tourism Colleges under the Background of Artificial Intelligence

Xuewei Zhang

School of Tourism Data, Guilin Tourism University, Guilin, Guangxi, 541006, China

Keywords: Artificial Intelligence; Tourism Colleges; Smart Tourism; Laboratory Construction

Abstract: With the rapid advancement of artificial intelligence technology, smart tourism has emerged as a new trend in the tourism industry. As a key institution for training tourism professionals, tourism colleges and universities play a crucial role in this trend. Establishing smart tourism laboratories is vital for enhancing students practical skills and innovation capabilities, and for meeting the evolving demands of the tourism industry. This paper explores the construction and planning of smart tourism laboratories in tourism colleges and universities within the context of artificial intelligence. It analyzes the necessity of such laboratory construction, outlines the goals, principles, and specific plans for the laboratorys development, including hardware facilities, software systems, faculty teams, and curriculum frameworks. Additionally, it offers recommendations for the management and operation of these laboratories, aiming to provide a reference for the establishment of smart tourism laboratories in tourism colleges and universities, thereby promoting the improvement of talent cultivation quality and the intelligent development of the tourism industry.

1. Introduction

The advent of artificial intelligence technologies, including machine learning, natural language processing, and computer vision, has brought significant changes to the tourism industry. Smart tourism, a result of the deep integration of the tourism sector with information technology, enhances the quality of tourism services and the visitor experience through intelligent methods. As the cradle for nurturing tourism professionals, tourism colleges face the crucial task of training talents that meet the demands of smart tourism development. The establishment of smart tourism laboratories can provide students with practical and innovative platforms, enabling them to better grasp the relevant technologies and concepts of smart tourism. Many tourism colleges have now recognized the importance of building smart tourism laboratories and have started exploring and practicing related initiatives. However, issues such as unclear construction goals and a lack of systematic planning still exist during the construction process. Therefore, in the context of artificial intelligence, conducting in-depth research on the construction and planning of smart tourism laboratories in tourism colleges is of great practical significance.

2. The necessity of building a smart tourism laboratory

The introduction of artificial intelligence technology has brought unprecedented opportunities for transforming tourism talent education[1]. The application of machine learning algorithms in predicting tourism demand and developing intelligent recommendation systems, along with the optimization of crowd monitoring and safety warnings in scenic areas through computer vision technology, have driven the industry transition from information management to intelligent decision-making. This transformation places higher demands on tourism professionals not only requiring them to master traditional tourism management knowledge but also to possess the ability to apply digital technologies and innovate in various scenarios. Kuang (2023) highlighted in her research on the demand for smart tourism talents that the shortage of versatile talents has become a critical factor hindering the industry intelligent upgrade[2].

However, the current tourism education system is significantly disconnected from industry needs. The practical teaching facilities and equipment in tourism colleges are relatively outdated, failing to provide students with an intelligent practice environment that mirrors real-world work scenarios[3]. This teaching model makes it difficult for students to adapt to the digital transformation of the industry, and companies often report that graduates lack technical knowledge and practical application skills.

The construction of smart tourism laboratory is an adaptive measure for the tourism education system to adapt to the industry change. Its core value is reflected in three aspects:

In terms of the cultivation of practical ability, the Tourism Practice Teaching Center of Beijing Union college uses the Internet of Things, virtual simulation and other technologies to build a comprehensive experimental environment where the experimental site is the scenic spot, which can significantly improve students operational proficiency in intelligent ticketing system and environmental monitoring equipment[4].

In terms of teaching mode innovation, He (2024) integrated real projects such as tourism big data analysis and intelligent marketing into the course through laboratory project-driven teaching[5], which has effectively improved students problem solving ability.

In terms of scientific research transformation, college laboratories have become an important carrier for the research and development of intelligent tourism technology. The tourist flow prediction model and tourist satisfaction model developed based on the big data of tourism in the laboratory can be applied to scenic spots and achieve good results.

These examples confirm the key role of smart tourism laboratories in bridging the gap between education and industry and promoting the innovation of tourism talent training mode. Their construction has become an inevitable choice for tourism colleges to cope with the changes in the industry.

3. The goal of the construction of smart tourism laboratory

The construction of the Smart Tourism Laboratory aims to achieve the following core objectives: Firstly, it can cultivate professionals with innovative thinking and practical skills by creating a cutting-edge experimental environment that enhances students critical thinking and original solution design capabilities, thereby providing essential intellectual capital for the industry paradigm shift. Secondly, this study through a high-fidelity technology platform [6], integrates multi-source teaching resources, deeply optimizes the quality system of practical teaching, enhances students' technical operation and problem-solving abilities in simulating real industry scenarios, and significantly improves teaching effectiveness. Thirdly, it can also establish a deep integration of industry, academia, and research through strategic participation from enterprises and research institutions, promoting the two-way flow of technology, talent, and resources. This not only

provides customized technical outputs and talent supply to the industry but also broadens students career development opportunities. Lastly, it can drive the iterative upgrade and application deepening of smart tourism technology, focusing on key technology validation, application model innovation, and trend analysis. Through controlled experimental environments, this accelerates the transformation of technological achievements, providing theoretical support and practical models for large-scale industrial technology implementation. These goals collectively form the strategic foundation for the laboratory to support the tourism industry innovative development.

4. Principles for the construction of smart tourism laboratories

The construction of smart tourism laboratory should follow the principle system of system to achieve a dynamic balance between technology adaptation and educational needs.

The principle of advancement requires the use of cutting-edge artificial intelligence technologies and equipment, such as 5G+AR navigation systems and AI models for analyzing tourist behavior. By strategically deploying these technologies, the laboratory ensures that its facilities and the tourism industry intelligent transformation are in sync, thereby fostering students ability to apply advanced technology and develop innovative thinking. The principle of practicality emphasizes the close alignment with teaching and research needs. Experimental projects and facility designs should balance the practicality of student operations (such as the operational module of an intelligent scenic area management system) and the data support requirements for teachers research (such as a big data analysis platform for tourism). This approach avoids the pitfalls of technical redundancy and disconnection from practical applications. The principle of openness breaks down the physical boundaries of the campus by opening up laboratory resources to other institutions, enterprises, and society. For example, co-building a Joint Research and Development Center for Smart Tourism can help create an ecosystem of academic exchange-technical cooperation-industrial service, enhancing equipment utilization and strengthening social services. The principle of safety is integrated throughout the laboratory construction process. It involves establishing safe operating procedures for equipment, data encryption mechanisms (such as anonymizing tourist information), and personnel access systems, forming a three-dimensional protection system that covers physical security, data security, and operational standards, ensuring the smooth conduct of teaching and research activities. This principle not only meets the technological upgrade needs of the tourism industry in the AI era but also ensures that the laboratory serves as a multifunctional platform for integrating technological innovation, practical teaching, and research transformation through systematic design [7].

5. Planning scheme of smart tourism laboratory

The planning of smart tourism laboratory needs to build a four-dimensional collaborative system of hardware foundation-software empowerment-teacher support-course implementation, forming an innovative carrier of deep integration of technology and education.

In terms of hardware infrastructure, a three-dimensional framework should be established: smart devices-network infrastructure-simulation scenarios. This includes equipping the area with advanced devices such as intelligent tour guide robots, AI scenic area management terminals, and tourism big data analysis servers. Simultaneously, 5G+Wi-Fi 6 hybrid network infrastructure should be constructed to ensure high-speed and stable data transmission. Following the concept of a miniature model of smart scenic areas, a simulated environment should be created, featuring intelligent entry gates, virtual attractions, and digital hotels. The authenticity of the scene will be restored through IoT sensors and environmental simulation systems. The software system should focus on three key functional modules: management-analysis-experience. A smart tourism

management system integrating ticket management, crowd monitoring, and resource scheduling should be deployed. A tourism data analysis center should be built using Python data mining tools and SPSS statistical analysis platforms. Additionally, virtual tourism scenes based on VR/AR technology (such as a 360° holographic scenic area navigation system) should be developed to provide students with an immersive technical experience platform. For faculty team building, a three-dimensional development strategy of introduction-cultivation-collaboration should be implemented. Talents with both artificial intelligence and tourism management backgrounds should be introduced. Teachers should regularly participate in smart tourism technology training(such as workshops on the application of machine learning in tourism) and promote enterprise practice[8]. Technical experts from scenic areas and managers from OTA platforms should also be hired as external mentors to form a dual-teacher teaching team. The course system follows a spiral logic of theory-practice-innovation: theoretical courses such as Principles of Smart Tourism Technology and Tourism Big Data Mining lay the foundation for knowledge, while practical modules like Intelligent Scenic Area Operation Training and VR Tourism Scene Design enhance skill application. Project-based courses such as Comprehensive Design of Smart Scenic Area Planning foster students innovative capabilities in integrating artificial intelligence technology with tourism management theory. This plan integrates hardware and software technologies and aligns faculty and curriculum to create a comprehensive ecosystem that supports the development of smart tourism talents.

6. Management and operation of smart tourism laboratory

The sustainable development of smart tourism laboratory needs to constuct a closed loop management system of institutional guarantee resource integration student participation valuation and optimization.

In terms of management system construction, a comprehensive system should be established that includes safety regulations, such as equipment operation procedures, data privacy protection policies, equipment maintenance (including regular inspections and calibration mechanisms), and project management (standardized experimental process documents). This system should draw on the hierarchical management model of college laboratories, ensuring equipment safety and teaching order through institutional design [9]. Resource sharing and collaboration should transcend organizational boundaries, such as co-building a Smart Tourism Joint Laboratory with enterprises and sharing experimental data with research institutions. The concept of a resource pool can be adopted to enhance the efficiency of scientific research transformation through cross-unit resource scheduling. Establishing a student self-management mechanism aims to foster practical skills, such as forming a student-led laboratory management committee responsible for daily equipment maintenance and experimental project coordination. The performance evaluation system should include assessing the equipment renewal rate and faculty investment, monitoring the quality of experimental projects during the process, and evaluating students practical outcomes and industry service contributions. This can be done by referring to the Laboratory Efficiency Evaluation Model, forming an evaluation-feedback-improvement PDCA cycle through annual assessments to continuously optimize laboratory functions. This management and operation system ensures basic operations through institutional rigidity, promotes innovation through flexible resource allocation, activates the ecosystem through student participation, and enhances quality through performance evaluations, ultimately forming a sustainable development mechanism for the smart tourism laboratory.

7. Conclusion

In the context of artificial intelligence, the construction of smart tourism laboratories in tourism

colleges is crucial for cultivating professionals who can meet the demands of smart tourism development and for advancing the intelligent transformation of the tourism industry. By setting clear goals, adhering to principles, formulating practical plans, and enhancing management and operations, these laboratories can be developed into advanced, practical, and open systems. Tourism colleges should prioritize the construction of smart tourism laboratories, continuously optimizing their functions and services to provide students with better platforms for practice and innovation. This will enhance the quality of talent cultivation and social service capabilities, contributing more significantly to the industry growth. As AI technology continues to evolve, smart tourism laboratories must also be regularly upgraded and refined to keep pace with the industry evolving needs. Additionally, tourism colleges should strengthen collaboration with businesses and research institutions to jointly promote the innovation and application of smart tourism technologies, ensuring the sustainable development of the tourism sector.

Acknowledgements

"Four New Disciplines" Research and Practice Project of Guilin Tourism University in 2024: One Core, Three Levels, Three Dimensions: Building a Big Data Education and Teaching Resource System Based on Discipline Knowledge Graph in the Background of New Engineering, Project Number: 2024XGK03

References

[1] Wang Jinwei, Deng Aimin, Yan Rong, et al. AI-driven Restructuring of the Tourism Discipline System: New Opportunities, New Issues, and New Paradigms [J/OL]. China Ecotourism, 1-14 [2025-06-17]. http://kns.cnki.net/kcms/detail/10.1008.N.20250417.1609.004.html.

[2] Kuang Huixia. Research on the Training Model of Applied Tourism Talents in Higher Vocational Colleges under the Background of Smart Tourism [J]. Tourism and Photography, 2023, (10): 124-126.

[3] Guo Ximei, Li Qinglei, Yin Xiaoyin, et al. Research on the Practice Teaching Model of Tourism Management Based on the Cloud Class Platform [J]. Experimental Technology and Management, 2020, 37(01): 176-180. DOI:10. 16791/j.cnki.sjg.2020.01.043.

[4] Yu Ping, Zhu Wei, Gao Jiangjiang. Construction of a Tourism Laboratory Based on the 'Smart Scenic Spot' Model [J]. Experimental Technology and Management, 2016, 33(07): 237-240.

[5] He Xiaofen. Application of Project-based Teaching Method in Tourism Education in Secondary Vocational Schools [J]. Contemporary Tourism, 2021, 19(17): 88-89.

[6] Gao Mengdi. A Discussion on the Path of Strategic Human Resource Development and the Development of Emerging Industries [J]. Talent Resource Development, 2023: 74-76. DOI:10.3969/j.issn.1003-1073.2023.17.034.

[7] Shan Minglei, He Xin, Zhu Lin. New Exploration of Comprehensive Experimental Teaching Construction in Tourism [J]. Contemporary Education Practice and Teaching Research, 2020, (14): 103-104. DOI:10. 16534/j.cnki.cn13-9000/g.2020.1584.

[8] Yu Fei. Research on Teaching Strategies of Business Administration Courses in Higher Vocational Colleges from the Perspective of Digital Economy [J]. China Management Informatization, 2024, (14): 229-231.

[9] Zhao Yilin. Research on the Evaluation Model and Application of Safety Risks in University Laboratories [D]. China University of Geosciences(Beijing), 2023. DOI:10.27493/d.cnki.gzdzy.2023.000356.