

Original Research Article

Research on the training model of applied talents in smart tourism for computer science majors in private undergraduate colleges under the context of cultural-tourism integration

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Abstract: Smart tourism development imposes new competency requirements for applied computer science talents. Private undergraduate colleges, as applied talent trainers, play a key role in supplying regional digital cultural-tourism professionals. However, traditional computer science training suffers from homogeneous objectives, curriculum disconnection from industry, and shallow industry-education integration. Taking Changchun University of Tourism as a case, this paper, based on OBE, constructs a "technology + industry" cross-integrated training model across six dimensions: Objectives, curriculum, teaching, practice platforms, evaluation, and faculty. Phased reforms show initial success in strengthening technical foundations and cultural-tourism application abilities, offering a reference for differentiated development of computer majors in private colleges.

Keywords: cultural-tourism integration; computer science; smart tourism; talent training model; OBE

1. Introduction

The digital transformation of cultural-tourism is accelerating. AI, VR, and big data are widely used in scenic smart operations, cultural-tourism data mining, and smart platform construction. In 2026, the Ministry of Education added Digital Cultural Tourism as a new undergraduate major, signaling a new stage. The New Engineering Education initiative calls for breaking disciplinary barriers, and the State Council's Opinions on Deepening Industry-Education Integration promotes demand-oriented training—Providing policy guidance for reform.

Changchun University of Tourism, a private applied institution with cultural-tourism features, offers computer-related majors (AI, Data Science, Network Engineering, IoT) all within the "Tourism Information and Smartization Professional Cluster." Yet in practice, the curriculum still follows a general science-engineering model, with weak integration of cultural-tourism content, limited practical scenarios, and insufficient cross-disciplinary collaboration. How to leverage the university's characteristics to cultivate smart tourism-oriented computer talents is an urgent issue.

Several researchers have examined the use of computer technologies in smart tourism contexts^[1-6], and some have proposed a three-tier framework for cultivating digital cultural-tourism talents^[7]. The bulk of this literature, however, concentrates either on the tourism management side or on specific technical applications. What remains largely unexplored is a systematic approach to reorienting computer science programmes at private undergraduate institutions specifically for the smart tourism sector. The present study attempts to fill that void.

2. Realistic challenges in cultivating computer talents in private undergraduate colleges

2.1. Undifferentiated training objectives

At most private colleges, the stated objectives for computer majors tend to shadow those of comprehensive public universities—Aiming at turning out general-purpose software developers or IT operations staff. These goals seldom reflect the institution's unique identity or the regional industrial landscape. Changchun University of Tourism, despite its strong cultural-tourism branding, has not fully

capitalised on this distinctive advantage within its computing curricula. Consequently, its graduates end up competing head-to-head with those from conventional engineering schools, offering little that distinguishes them. At the same time, the smart tourism industry is crying out for interdisciplinary professionals who can straddle technology and tourism, yet only a tiny proportion of these graduates actually move into cultural-tourism tech roles^[8]. This reveals a clear structural mismatch between what the job market demands and what the programmes deliver.

2.2. Curriculum disconnected from industry needs

Existing course structures remain heavily fixated on traditional computer science pillars—Programming, data structures, database systems, and networking—With almost no systematic integration of smart-tourism content. Although smart tourism hinges on technologies like the Internet of Things, cloud infrastructure, and intelligent data mining, the elective catalogue rarely features dedicated modules such as Smart Tourism Technologies, Cultural-Tourism Data Analytics, or Digital Operations for Scenic Areas. As a result, students find it hard to apply their technical know-how to genuine cultural-tourism problems, falling into the all-too-common trap of "knowing the technology but not the domain."

2.3. Monotonous teaching methods

Instruction is still dominated by the conventional lecture-plus-case-demonstration model, and the cases themselves are mostly borrowed from generic Internet projects rather than realworld cultural-tourism settings. Building effective technical solutions for tourism requires a sophisticated grasp of on-the-ground operational realities—An insight that current teaching practices seldom impart. Moreover, while private-college students typically have a strong practical bent and learn best by doing, they are given too few immersive, project-based opportunities that would connect their skills to authentic scenarios.

2.4. Shallow industry-education integration

Practical training is largely confined to on-campus laboratories, where exercises are mostly verification-oriented and bear little resemblance to the challenges faced in the workplace. Collaborative ties with local smart scenic spots and cultural-tourism technology firms are precarious, lacking standing frameworks for co-developing projects, hosting interns, or placing graduates. Students therefore rarely get their hands on real operational data or live system maintenance work. In effect, industryeducation collaboration exists more in formal agreements than in substantive practice.

2.5. Incomplete evaluation methods

Student assessment currently hinges almost entirely on final written exams and basic computerbased operations—Essentially summative measures that test memory and rudimentary skills. Broader competencies, such as cross-disciplinary project design, teamwork, innovative thinking, and problem-solving within cultural-tourism contexts, are left out of the equation. This narrow approach not only fails to capture the full spectrum of students' abilities but also offers scant actionable feedback for instructional improvement. Hence, a comprehensive overhaul of the evaluation system is urgently needed, in tandem with the other reforms outlined above.

3. Construction of a cultural-tourism-oriented training model

Based on OBE, we adopt backward design from industry needs to learning outcomes, adjusting across six dimensions to build a "core computer competencies + cultural-tourism application scenarios" integrated model.

We first surveyed local smart scenic areas and cultural-tourism tech firms in Changchun, identifying four core competencies: Smart tourism system development, cultural-tourism data analysis and mining, digital scenic operation, and cross-disciplinary communication. These serve as endpoints for backward-designing objectives, courses, teaching, and evaluation.

3.1. Adjusting training objectives (OBE-based)

The objective shifts from "general technical talent" to "interdisciplinary applied talent for smart tourism." Three levels: Knowledge—Master AI, big data, software, plus basic cultural-tourism operations; ability—Solve real smart tourism problems through engineering practice; literacy—Cross-disciplinary thinking, industry awareness, and continuous learning. Graduates aim for positions in smart cultural-tourism project development, data O&M, and digital scenario design, forming a "small but refined"

distinctive direction.

3.2. Restructuring the curriculum

Backward-designed four-tier system: Foundation (programming, data structures, databases, networks) for solid technical grounding. Core—Integrate cultural-tourism cases into AI, big data, etc., to build industry awareness. Cross-disciplinary—Add electives like Smart Tourism Technology, Cultural-Tourism Digital Design, Smart Scenic O&M, Tourism Big Data Analytics. Practice—Offer specialized training on real smart tourism projects. At Changchun University, we have added two electives and embedded four cultural-tourism cases (e.g., scenic flow forecasting, tourist profiling) into "Introduction to AI." The four tiers progress logically.

3.3. Transforming teaching methods

Reduce pure lecture hours and increase project-based learning. Introduce real tasks such as cultural-tourism big data analysis, virtual roaming system development, and smart scenic management platform construction. Students work in groups from requirement analysis to system delivery. Pilot projects in "Big Data Technology" and "Software Engineering" have produced 12 smart tourism projects (e.g., visitor flow prediction, public opinion analysis). Teachers act as guides, not transmitters. This "learning by doing" suits student profiles and enhances application abilities.

3.4. Building practical platforms

Three-tier platform: On-campus—A smart cultural-tourism simulation lab for tasks like flow analysis and digital scenario construction. Off-campus—Partnerships with 2 local smart scenic areas and 1 tech firm; 16 students participated in real project development/O&M in 2025–2026. Competition—Encourage participation in digital cultural-tourism contests and innovation projects, promoting learning through competition. The three tiers form a complete chain from basic training to real projects to innovation.

3.5. Improving evaluation methods

Replace summative evaluation with comprehensive, multi-dimensional, whole-process assessment. Three modules: Process assessment (class performance, assignments, lab reports, self-study). Cross-disciplinary project assessment—Focus on design rationale, technology selection, implementation, problem-solving; weights: 50% industry scenario understanding, 50% technical implementation. Comprehensive literacy—Industry awareness, teamwork, innovation. Introduce self-, peer-, and enterprise-mentor evaluations for objectivity.

3.6. Strengthening faculty support

Faculty are key. Encourage computer teachers to gain industry experience through placements and training—2 teachers have completed 3-month placements at partner enterprises. Hire technical backbone from cultural-tourism firms as external mentors—Currently 3, involved in teaching, project guidance, and graduation design. Establish cross-disciplinary teaching-research mechanism between computer and tourism management—A team of 4 computer and 2 tourism teachers meets monthly for joint lesson planning and observation, overcoming single-discipline limitations.

4. Analysis of reform outcomes

We conducted a one-year teaching experiment with the 2025 cohort. Experimental class (42 students) adopted the new model (cultural-tourism cases, project-based learning, industry scenarios) on top of foundational courses. Control class (40 students) followed the original program (lectures, general Internet cases). Both classes had comparable backgrounds, same teaching team, resources, and duration.

4.1. Learning interest and participation

Experimental class attendance was 96.2% vs. 91.5% in control. After-class discussions on project issues averaged 3.7 times per student per semester vs. 1.2 times. Experimental students proactively explored scenic operation and data collection, shifting from "pure technical" to "scenario-based" thinking.

4.2. Project practical ability

Final comprehensive project: Both classes completed a data analysis report and prototype system design for a smart tourism scenario based on given data. Anonymous review by three teachers, scoring: Technical Implementation (50%) and Industry Understanding & Scenario Adaptation (50%). Inter-rater consistency 0.87.

Results: Experimental average 83.6 vs. control 74.2; excellence rate (above 85) 38.1% vs. 17.5%. The largest gap was in Industry Understanding (41.7 vs. 33.5 out of 50). In defense, experimental students showed better awareness of the correspondence between technical solutions and cultural-tourism scenarios.

4.3. Competition participation

During the year, experimental class had 28 participations (66.7%) in digital cultural-tourism competitions/innovation projects, vs. 14 (35.0%) in control. Experimental won 3 provincial and 2 national awards (including 2nd prize in National College Students Service Outsourcing Innovation Competition East China regional, and 1st prize in China College Students Computer Design Competition provincial); control won 2 provincial awards, no national. Preliminary data indicate positive effect on innovation engagement.

4.4. Preliminary conclusions and limitations

The cross-integrated model shows initial success in improving project practice, industry awareness, and innovation willingness. However, sample size is small (82), long-term effects need follow-up, and course resources and industry cooperation require strengthening. Continuous adjustment and graduate tracking are needed.

5. Conclusion

Taking Changchun University of Tourism as a case, this paper explores a training model for smart tourism-oriented computer talents in private undergraduate colleges under cultural-tourism integration. We argue that private colleges should not follow a "large and comprehensive" path but differentiate based on institutional characteristics and regional needs. Our OBE-based "technology + industry" model, with concrete adjustments in objectives, curriculum, teaching, platforms, evaluation, and faculty, has shown feasibility through phased data.

Future work: (1) enrich cross-disciplinary teaching resources by incorporating new smart tourism technologies; (2) deepen cooperation with local cultural-tourism enterprises—Changchun, as a National Model City for Culture and Tourism Consumption, has pioneering cases like the Puppet Emperor's Palace and Changying Century City, offering strong potential for pedagogical utilization; (3) expand pilot scope and extend follow-up, focusing on graduate employment and employer feedback to validate long-term effectiveness.

About the author

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References

- [1] Zhao Xinxin. Application research of computer technology in enhancing tourist cultural-tourism experience under the background of smart tourism[J]. Zhongyuan Culture and Tourism, 2026(10): 47-49.
- [2] Lamucac. Exploration of the integration of smart tourism virtual reality technology and real tourism industry development in the digital age[J]. High Technology and Industrialization, 2026, 32(2): 61-63. DOI:10.26927/j.cnki.hitech.2026.02.016.
- [3] Liang Wenlin. Analysis of the application of artificial intelligence technology in smart tourism[J]. Tourism Overview, 2025(14): 22-24.
- [4] You Xiaolin, Shi Xiyuan. Research on the application of artificial intelligence technology in smart tourism[J]. Tourism Overview, 2025(11): 142-144.
- [5] Zhao Jialiang. Analysis of the application of artificial intelligence technology in smart tourism[J]. Tourism Overview, 2025(6): 194-196.
- [6] Chen Muhua. Research on the application of computer technology in smart tourism[J]. Tourism and Photography, 2025(11): 31-33.
- [7] Zhu Yuanzheng. Innovation and practice of digital cultural-tourism talent training mode in colleges and universities under the background of digital transformation[J]. Journal of Hebei Tourism Vocational College, 2026, 31(2): 106-112.
- [8] Feng Chaosheng. Research on AI-driven high-quality development strategy of smart tourism in Guangxi[J]. Tourism Overview, 2025(14): 168-170.