

Research on Composition and Improvement of Teachers' Comprehensive Competences in Tourism Management Major Based on the Integration of AI and Educational Scenarios

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Abstract: The iteration of AI technology is reshaping the interaction pattern of tourism industry chain and education chain. Teachers in tourism management major need to make a great change from “imparting knowledge” to “designing intelligent education”. This study redefines the core competence demand on teachers in four dimensions: cognition, technology, data, and ethics from the view of embedding AI technology to the entire process of tourism education. In addition, it proposes an AI-teaching dual circulation path, providing theoretical framework and practical guidelines for building a future-oriented faculty system in tourism management major.

1. Introduction

The application of generative AI in tourism industry has transformed industry chain into instant closed loop of “data-algorithm-experience”. Such application in the field of education has overturned teaching structure and teaching relationships of traditional teaching model[1]. Nowadays, knowledge authority is dissolved by algorithms. Teaching scenarios are disconnected from the industry. Therefore, it is necessary to redefine teachers' core competitiveness. This paper proposes a four-dimensional capability matrix named AI-Tourism Educator Tetrad (AI-TET) featured on “cognition intelligence-technology intelligence-data intelligence-ethic intelligence”. It may be a paradigm leap. Moreover, it may help teachers in tourism management major make great changes from “experience relies” to “intelligent education designers”.

2. Paradigm Shift on Tourism Education in AI Era

2.1. Teaching Logic: From “Experience-driven” to “Algorithm-driven”

The internal logic of tourism education was experience-authority in the past. Now it is turned to be “algorithm-collaboration” by exponential evolution of generative AI. Some AI models, such as ChatGPT-4, Claude 3 and Midjourney V6, can generate a study tour plan on Silk Road including market survey, cost calculation and risk contingency within 30 seconds. And its fineness and creativity is better than group homework which usually needs two or three weeks in traditional classroom. Such case tells us that teachers are no longer monopolists of correct answers. They need to know how to utilize AI effectively. Teaching focus needs to be cognitive curation rather than knowledge transference. Therefore, teachers may transform the fragmented solutions generated by AI into verifiable experimental hypotheses. Then they conduct A/B test with the help of real-time data interfaces, for example Ctrip API or Amap LBS. Finally, a closed loop of “data-feedback-relearning” may be formed.

2.2. Capability Boundaries: From Discipline Connotation to Scenarios Integration

The application of AI changed teachers' power structure in class as well. The professional authority that was built based on years of industry experience could be overturned by a simulation

model, which the students has just trained for ten minutes. Taking the course of teaching “Hotel Dynamic Pricing” as an example. When the teacher follows traditional method of presenting the revenue management formula, students have already executed and verified prediction script based on XGBoost on their mobile phones. And they have found that the cases in the textbook ignored nonlinear interaction effects of holidays and weather. This kind of technological generation prompts teachers to become scenario designers in order to teach the course better. For instance, the teacher may simulate virtual Jiuzhaigou scenic spot with 5,000 people online simultaneously in metaverse sandbox. Then he could ask students to adjust AI-recommended gate opening strategy and observe game relationship between the congestion index and revenue curve in real time.

2.3. Professional Role: From Authority to Data Curator

The profound revolution embodies in the aspect of Educational ethic too. When AI made indistinguishable restoration of live stream on digital Dunhuang mural, teachers need to teach the students how to use StyleGAN to generate innovative preservation plans for intangible cultural heritage. At the same time, they also need to tell the students that it is necessary to use explainable artificial intelligence (XAI) to mark cultural basis for each generation result. The ethical audit should be done according to “Recommendation on Ethics of AI” issued by UNESCO. As a result, the core value of teachers in tourism management major may be rewritten completely as the following: Among uncertain algorithms, building cognitive scaffolding which is verifiable, reflective and evolutive for the students.

3. Construction of AI-Tourism Educator Tetrad (AI-TET) for Teachers in Tourism Management Major

3.1. Construction Mechanism

3.1.1. Requirements of Policies and Standards

Interpretability, fairness and privacy protection have been listed as core principles of AI education for the first time in “Recommendation on Ethics of AI” issued by UNESCO in 2021. Moreover, the following were the highest requirements for teachers in Chinese educational standard, namely, “Digital Literacy of Teachers” issued by Ministry of Education (2022): data-driven decision-making, technological integration innovation and ethical security governance. They set institutional legitimacy for our four-dimensional capability matrix, covering cognition intelligence, technology intelligence, data intelligence and ethic intelligence respectively.

3.1.2. Demands for Industrial Job Skills

The job descriptions of “AI Product Manager” and “Smart Tourism Marketing Specialist” from top 6 enterprises (including Ctrip, Tongcheng, Meituan etc.) in 2024 showed the importance of the following four new skills: Shapley/LIME explanations, low-code workflow, multimodality data control and fairness test. The term frequency was more than 80% and showed a strong clustering feature (TF-IDF cosine similarity > 0.76). This result indicated that AI-Tourism Educator Tetrad (AI-TET) is the demands of quantified human capital.

3.1.3. Needs for Empirical Basis of Scientific Learning

In 2023, a meta-analysis published in “Computers & Education” studied 42 kinds of multimodal learning models and revealed the results as the following: The index of learning effectiveness (R^2) was 0.63 for combined ways of eye gaze, voice and behaviour logs while it was just 0.21 for any other single way. The teaching experiment demonstrated that embedding explainable AI (XAI) in class led to a 27% increase in students’ trust in the model and a 34% decrease in error attribution in Massachusetts Institute of Technology. These cases verified that the function of measurable learning and cognition intelligence.

3.2. Constructing AI-TET Matric

In AI era, teachers will quickly be marginalized by technological tide if they remain repeating experiences in class. Generative AI has reshaped the entire tourism industry. The following matrix is AI-Tourism Educator Tetrad (AI-TET). It is not a linear list but rather a dynamic compass. Cognition refers to judgement while technology refers to construction. Data means governance while ethic means protection. AI-Tourism Educator Tetrad (AI-TET) provides an immediate and visual action blueprint for teacher transformation. As shown in Table 1.

Table 1 AI-Tourism Educator Tetrad (AI-TET)

| Dimension | Traditional capability | Enhanced capability by AI | Typical application scenario |
|-------------------------|----------------------------------|--|--|
| Cognition intelligence | Industry experience judgment | Explainability verification of AI prediction results | Hotel price prediction by Shapley |
| Technology intelligence | PPT/Excel application | Construction of low-code AI workflow | Building public opinion monitoring system by Make platform |
| Data intelligence | Questionnaire statistic analysis | Processing multimodal educational data | Evaluation teaching effectiveness by eye gaze data & affective computing |
| Ethic intelligence | Academic integrity education | Alignment on AI bias identification and values | Identifying cultural stereotypes of AI guides |

3.3. Application of AI-Tourism Educator Tetrad (AI-TET)

In class, teachers may utilize tangible, measurable and controllable data and scenarios instead of traditional theoretical teaching content with the assistance of AI-Tourism Educator Tetrad (AI-TET).

3.3.1. Analysing Scenario with Cognition Intelligence

The teacher could use explainable AI tool to acquire real-time dynamic pricing of OTAs, such as Ctrip or Fliggy. Let us suppose, for example, the waterfall chart demonstrated that the contribution margin of “short video popularity index” to room rent at the weekends was as high as 0.34 while traditional “star rating” was just 0.18. And the students found that a video in Douyin with 100,000 likes could increase 300 yuan premium of the same sea-view room. In such a case, the teacher could ask the students to think about what if the popularity of this video decreased by 20%? And what would the loss be for RevPAR? By using DoWhy setting causal inference model, the students could obtain an accurate answer as 12%. Therefore, the students knew that “taking place of star rating premium by getting someone hooked on a hotel” has become an unwritten rule. And this rule was analysed as a reproducible, debatable and arguable cognition path for the students.

3.3.2. Verifying Scenario with Technology Intelligence

The teacher might lead the students to simulate real scenarios on business operations by Make platform. For instance, the students constructed a real-time assembly line on popularity and passenger flow by Make. And the monitoring data showed that more than 50,000 travellers would visit the scenic spot tomorrow because the popularity of “city walk” topic soared by 300%. Thus, the teacher might ask the students to group and discuss how to solve this problem. After the discussion, Group A increased ticket prices by 15% by revenue management simulator, Group B added 6 temporary channels by queuing theory model and Group C designed NFT commemorative badges to stimulate secondary consumption. Two hours later, the real-time ROI curve showed that the average consumption per person increased by 18% and the number of sentiment value of public opinion remained at 0.82. In this way, the students completed a real operation experience in class.

3.3.3. Predicting Scenario with Data Intelligence

As to teaching the way of predicting consumption upgrade, the teacher could let the students experience it in metaverse sandbox. The students entered 1:1 remastered virtual world called “Dunhuang Night Market” with eye trackers and EEG bands. Their fixation trajectory, electrodermal response, electroencephalography and POS consumption records were collected for modelling by GNN. And the data showed that when the user stayed at immersive node of “Hu Xuan Dance” for 1 more minute, the average order value of the offline derivative products increased by 3.7% while the re-purchase probability increased by 5.2%. Using LSTM to predict GMV for next three months, the curve showed that such immersive experience section would contribute 42% of the total scenic revenue. So the abstract concept of “immersive consumption upgrade” became investable, intervenable and traceable operational indicators for the students.

3.3.4. Managing Scenario with Ethic Intelligence

AI ethic is also an important and necessary teaching content. For example, if the students input their marketing plan on ethnic style generated by AI into ethical sandbox, some cultural stereotypes might be pointed out after system scanning: Tibetan minority is good at singing and dancing while Miao minority wears silver ornament from head to foot. Then revision guidelines would be popped out according to “Recommendation on Ethics of AI” issued by UNESCO. Therefore, the students needed to rewrite the script, replace symbols, retrain the visual model and pass the second audit by Fairness 360 before it was launched in the virtual scenic area. During this process, the students might deeply realize that technology-driven culture consumption would quickly destroy destination brand without ethical oversight. Thus, they may internalize “sustainable and inclusive growth” as their career criterion.

4. Enhancement of AI-Teaching Dual Circulation Path

AI-Tourism Educator Tetrad is a four-dimensional close-loop with cognition, technology, data and ethic. It is also a dual circulation on AI and teaching. We should enhance such dual circulation in the following three aspects in order to improve talent cultivation quality and enhance China’s soft power in global competition of digital culture and tourism.

4.1. Amendment to National Institution

The Ministry of Education should amend “National Standard of Teaching Quality for Undergraduate Specialties in Ordinary Institution of Higher Education” promptly. AI cognition, data governance and ethical auditing could be listed as mandatory indicators of Teacher Qualification Certificate for teachers in tourism management major. Additionally, accompanying standards should be released to establish a unified “capability baseline” for all institutions in China. And “AI Capability Clouds of Teachers in Tourism Management Major” may be constructed based on Chinese smart education online platform. This will gather various regional real-time data of training, certification and competition, forming dynamic monitoring and early warning mechanisms to prevent widening of regional and institutional disparities.

4.2. Data Support of Industry Alliance

Ministry of Culture and Tourism may try to establish “Tourism Education Trend Radar Alliance” with leading OTAs, scenic spots group, digital technology enterprises and ordinary institutions of higher education. The alliance could release “Technology Maturity Curve of AI Tourism” and “Report on Consumer Behaviour Transfer” annually, breaking through the barriers between tourism industry data and tourism education resources. For instance, the visitor behaviour data of Zhangjiajie or Fenghuang Ancient Town could be used in smart management teaching after being deidentified. It will cultivate students’ ability to make decisions based on real data [2].

4.3. In-depth Reform of Universities

Universities may bring AI teaching innovation achievement into professional title assessment,

performance appraisal and funding allocation. They should encourage teachers in building laboratories, conducting research and sharing patents with enterprises by setting up “Tourism AI Innovation Fund”. In addition, they should standardize AI usage boundaries in the teaching and establish feedback channels for AI ethic issues [3].

5. Conclusion

This study constructs AI-Tourism Educator Tetrad (AI-TET) and proposes AI-Teaching Dual Circulation Path based on it. With institution guarantee, platform resources and capability standards, the course of teaching and business operation are in real time and on the same wavelength. Thus, tourism education and the industry define the future jointly, providing a sustainable talent foundation to global competition for Chinese digital tourism industry.

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