



Implementation Paths of Vocational Education Empowering AI + Science Popularization Tourism in the Context of Rural Revitalization

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Abstract. The research aims to provide a reference for vocational education serving digital rural construction and promoting the high-quality development of rural science popularization tourism, so as to realize the coordinated development of vocational education improvement, rural income increase and science popularization benefiting the people.

Keywords: rural revitalization; vocational education; artificial intelligence; science popularization tourism; digital cultural tourism

1 Introduction

In the process of comprehensively promoting rural revitalization, industrial digitalization, cultural tourism integration and inclusive science popularization have become the core orientations of high-quality rural development. Driven by digital technologies such as artificial intelligence, big data, AIGC and AR/VR, traditional rural sightseeing tourism is accelerating its transformation to immersive, experiential and intelligent science popularization tourism. The deep integration of artificial intelligence and science popularization tourism can effectively activate rural ecological, agricultural and local cultural resources, enrich science popularization carriers with digital scenarios, and improve tourism service quality with intelligent means, which has become a new track for rural three-industry integration and collective economic growth.

However, the development of rural AI + science popularization tourism in China is still in the initial stage, with obvious shortcomings. Rural digital infrastructure is weak, intelligent technology application is costly and difficult to maintain; practitioners' digital literacy is generally low, and there is a serious shortage of compound talents who master AI application, science popularization explanation and cultural tourism operation; science popularization products are single in form, technical application is superficial, and it is difficult to form differentiated competitiveness combined with rural local characteristics; school-local cooperation is loose, and it is difficult for technology, talents and educational resources to sink to the countryside, which restricts the long-term development of new business formats.

As an education type closely connected with regional economy and industrial needs, vocational education has the characteristics of cross-major integration, complete practical training, close school-enterprise cooperation and strong grass-roots service. Relying on majors such as artificial intelligence technology application, digital media, tourism management and research travel service, vocational education can accurately make up for the shortcomings of rural digital cultural tourism development, promote the deep integration of artificial intelligence technology and rural science popularization tourism through talent empowerment, technology empowerment, content empowerment and industrial empowerment, help rural industrial revitalization and national scientific literacy improvement, and expand the social service boundary of vocational education to realize school-local mutual empowerment and coordinated development.

2 The Coupling Foundation of Vocational Education Empowering AI + Science Popularization Tourism

2.1 Policy Synergy and Strategic Orientation

A number of national strategies, including Digital China construction, vocational education digital transformation, national scientific literacy improvement and rural cultural tourism empowerment, are implemented in a superposition manner, which clearly requires vocational education to actively sink services to rural areas and promote digital technology and science popularization resources to extend to rural areas. The state encourages the deep integration of artificial intelligence and cultural tourism industry, supports rural areas to build intelligent science popularization and research tourism new formats with characteristic resources, and provides policy support and institutional guarantee for vocational colleges to participate in rural AI science popularization tourism construction.

2.2 Demand Matching and Short-Supplementing Orientation

AI + science popularization tourism is a cross-integrated new industry, which needs both technical talents engaged in intelligent equipment operation and maintenance, digital scene construction and AI content creation, and skilled talents engaged in science popularization curriculum design, research activity organization and cultural tourism service operation. Rural local talent reserve is insufficient and digital ability is weak. Vocational colleges can continuously deliver compound skilled talents to rural areas through major adjustment, targeted training and short-term training, so as to accurately match the post needs of industrial development.

2.3 Resource Complementarity and Win-Win Cooperation

Vocational colleges have professional teachers, training equipment, curriculum research and development and school-enterprise cooperation resources in artificial in-

telligence, digital media, tourism management and other fields, and have comprehensive capabilities in technology research and development, content creation and activity planning. Rural areas have primitive tourism scenes, local culture, natural science resources and broad practical application space. The two sides realize resource interaction and complementary advantages. Rural areas provide practical teaching bases for vocational colleges, and vocational colleges provide technology, talents and services for rural areas, forming a win-win situation of teaching value, industrial value and social value^[1].

3 Realistic Dilemmas of Rural AI + Science Popularization Tourism Development

3.1 Serious Shortage of Compound Talents

Most rural tourism practitioners are local villagers, who lack skills in basic AI operation, intelligent equipment maintenance and digital marketing. Science popularization explanation stays at a shallow level and cannot carry out systematic science popularization combined with intelligent scenes. Meanwhile, it is difficult to introduce and retain compound talents with technology application, science popularization education and cultural tourism operation capabilities, which has become the core bottleneck restricting industrial development.

3.2 Shallow and Homogeneous AI Application Scenes

Most rural intelligent tourism construction is limited to basic functions such as intelligent guide, online ticket buying and simple voice explanation, while in-depth applications such as AR immersive experience, digital twin, AI interactive science popularization and virtual digital human are less. Technology is disconnected from science popularization content, intelligent equipment is blindly piled up, rural local culture and science popularization core are ignored, products are highly homogeneous, and tourist experience is insufficient.

3.3 Weak Digital Content Creation Ability

Rural areas lack professional teams to carry out science popularization content research and development. Science popularization materials are old and single in form, mostly copying general science popularization knowledge, and failing to dig into local resources such as farming culture, folk customs and ecological characteristics. There is a shortage of digital science popularization products such as short videos, animations, digital picture books and interactive courses, which is difficult to meet the diverse and personalized experience needs of tourists in the new era.

3.4 Imperfect School-Local Cooperation Mechanism

The cooperation between vocational colleges and rural areas is mostly short-term internships and voluntary activities, lacking a long-term and stable cooperation platform and linkage mechanism. The government, colleges, technology enterprises and village collectives have unclear rights and responsibilities, insufficient resource integration, slow technological achievement transformation and discontinuous talent transmission, so it is difficult for vocational education to effectively play a long-term empowering role.

4 Implementation Paths of Vocational Education Empowering AI + Science Popularization Tourism

4.1 Optimize Professional Cluster Construction and Cultivate Compound Digital Cultural Tourism Talents

Firstly, promote cross-integration of majors. Vocational colleges should integrate artificial intelligence technology, big data technology, digital media, tourism management, research travel service and other majors to build a smart cultural tourism professional cluster and break professional barriers. Add characteristic directions such as AI science popularization design, rural smart tourism operation and digital research and development to adapt to the post needs of new business formats^[2].

Secondly, reconstruct modular curriculum system. Integrate core contents such as artificial intelligence foundation, AIGC content creation, immersive scene design, rural science popularization practice, smart scenic spot operation and new media marketing, develop localized and project-based loose-leaf textbooks, take real rural cultural tourism projects as carriers, carry out integrated teaching of theory and practice, and improve students' practical operation ability.

Thirdly, implement hierarchical talent training. Carry out order-type training for students in school, and cooperate with technology enterprises and cultural tourism scenic spots to directly deliver talents such as AI operation and maintenance, digital explanation and research planning; carry out short-term skill training for rural cadres, homestay operators and returning youths, popularize practical skills such as intelligent equipment operation, short video creation and AI tool application, and comprehensively improve rural local digital literacy.

4.2 Deepen School-Local-Enterprise Cooperation and Jointly Build AI Intelligent Science Popularization Scenes

Firstly, build school-local co-construction training bases. Relying on rural natural landscape, local culture and ecological resources, cooperate with local governments, technology enterprises and village collectives to build an integrated "AI + science popularization tourism" practice base, which integrates teaching training, science popularization, tourism experience and technology research and development, realiz-

ing the sharing and utilization of teaching resources and rural cultural tourism resources.

Secondly, create lightweight intelligent experience scenes. Combined with rural construction cost and operation and maintenance capacity, college teachers and students design low-cost and easy-to-maintain AI application scenes, including AR local science popularization exhibition hall, AI virtual guide, intelligent interactive science popularization device, digital farming experience space, panoramic intelligent guide system, etc. Transform static rural resources into dynamic, interactive and digital science popularization experience products to enhance tourism fun and science popularization.

Thirdly, help upgrade rural digital infrastructure. Assist rural areas in improving 5G networks, IoT terminals, intelligent monitoring and other basic supporting facilities, optimize rural digital operation environment, provide hardware support for the stable landing of AI scenes, and break through the “last mile” of digital technology going to the countryside.

4.3 Empower by Digital Technology and Build Localized Science Popularization Content System

Firstly, set up a digital science popularization creation team. Integrate teachers and students of artificial intelligence, digital media and cultural tourism majors in colleges to form a special creation team, deeply dig into rural farming civilization, folk culture, ecological protection, local technology and other local resources, use AIGC technology to produce science popularization short videos, digital picture books, animated short films, voice explanations, virtual human stories and other diverse contents, and build a rural-specific digital science popularization resource library.

Secondly, develop hierarchical research and science popularization courses. Design step-type AI science popularization research courses for primary and secondary school students, parent-child families, social tourists and other groups, covering AI basic cognition, digital rural experience, ecological science exploration, local culture popularization and other modules, forming standardized and characteristic research products to enhance the core competitiveness of rural science popularization tourism.

Thirdly, build an online-offline interactive science popularization model. Carry out immersive experience science popularization offline relying on intelligent scenes; build cloud exhibition halls, virtual research spaces and science popularization live broadcast platforms online, expand communication scope through short videos and new media matrices, and realize a closed-loop development of online drainage, offline consumption and full-domain science popularization^[3].

4.4 Strengthen Intelligent Operation Empowerment and Extend Rural Cultural Tourism Integration Industry Chain

Firstly, build an intelligent operation management platform. Vocational college technical teams help rural areas build an integrated intelligent cultural tourism management system, integrating passenger flow monitoring, intelligent scheduling, online

marketing, ticketing management, emergency early warning and other functions. Through big data analysis of tourist preferences, optimize business layout and realize refined and intelligent management of rural tourism.

Secondly, promote AI precision marketing and brand building. Use AI and big data to analyze market demand and customer characteristics, accurately target tourist markets, use AIGC to generate characteristic promotional copy, short videos and posters, and create rural AI science popularization cultural tourism IP. Relying on live broadcast and short video platforms to carry out normalized publicity and enhance the popularity and influence of rural cultural tourism.

Thirdly, promote the integrated development of multiple business formats. Taking AI science popularization tourism as a link, connect rural homestays, ecological agriculture, intangible cultural heritage creativity and rural e-commerce, create an integrated business format of “intelligent science popularization + farming experience + intangible cultural heritage research + agricultural products sales”, rely on tourism flow to drive the sales of agricultural products and cultural and creative products, extend the industrial chain, broaden villagers’ income channels and strengthen the village collective economy^[4].

4.5 Improve Collaborative Support Mechanism and Consolidate Long-Term Development Foundation

Firstly, build a multi-party linkage mechanism. Establish a multi-party collaboration mechanism of “government overall planning and guidance, vocational college technical talent support, technology enterprise technology empowerment, cultural tourism enterprise market operation, village collective landing implementation”, clarify the division of rights and responsibilities of all parties, coordinate funds, venues, technology, talents and other resources, and form a joint development force.

Secondly, improve two-way communication incentive mechanism. Promote double-qualified teachers in colleges to go to rural areas for technical services and guidance, and introduce industry technicians to teach in schools; incorporate rural services, science popularization volunteer services and technical assistance into the assessment and evaluation of teachers and students to stimulate participation enthusiasm; establish a normalized mechanism for students’ rural internships and social practices to stabilize talent supply channels.

Thirdly, establish a dynamic optimization mechanism. Regularly investigate the development needs of rural cultural tourism, timely adjust the direction of talent training, technical services and content research and development, continuously optimize AI application scenarios and science popularization products, ensure that the empowerment model fits the rural reality and realize sustainable development^[5].

5 Support Measures

5.1 Policy Support

Integrate special policies such as rural revitalization, digital cultural tourism, vocational education and national science popularization, and strive for special financial support. Local governments introduce supporting policies, simplify project approval processes, and provide preferences in land use, electricity use and taxation to provide policy support for scene construction, curriculum development and technological transformation.

5.2 Talent Support

Strengthen the construction of double-qualified teachers in vocational colleges, and cultivate compound teachers with both artificial intelligence and cultural tourism science popularization capabilities; employ industry experts and technical backbones to set up think tanks to provide professional guidance for project construction. Carry out digital skills training for rural practitioners continuously to stabilize the local talent team.

5.3 Funding Support

Build a diversified investment and financing model of “financial investment + enterprise investment + social capital + village collective self-financing”. Guide technology and cultural tourism enterprises to participate in project co-construction, encourage social capital to invest in intelligent scene transformation and cultural and creative development, and ease the financial pressure of rural development.

5.4 Security Support

Standardize the application of artificial intelligence technology, strengthen rural data security and network security management, and protect tourists' personal information. Strictly review science popularization content, adhere to the bottom line of scientific rigor, standardize the use of AIGC content, avoid copyright and content risks, and ensure the healthy and orderly development of the industry.

6 Conclusion

Under the background of the integrated development of rural revitalization and digital economy, artificial intelligence provides a new driving force for the transformation and upgrading of rural science popularization tourism. Vocational education is the key force to solve the problems of rural digital talent shortage, insufficient technology application and weak science popularization content. Through professional integration to cultivate talents, school-local cooperation to build scenes, digital creation to shape

content, intelligent operation to strengthen industries, and multi-party collaboration to ensure long-term effectiveness, vocational education comprehensively empowers the innovative development of rural AI + science popularization tourism. It not only enriches rural cultural tourism formats, improves science popularization service capacity, and drives villagers to increase income and become rich, but also promotes vocational education to deepen industry-education integration and expand social service functions. In the future, continuing to deepen the multi-party cooperation of government, school, industry, enterprise and village, and continuously optimizing digital technology application scenarios and science popularization product systems will further release the empowering value of vocational education and inject digital power and educational vitality into the comprehensive revitalization of rural areas.

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1. In 2024, the key scientific research platform and project of Guangdong Province's ordinary universities, titled "Research on the Implementation Path of Popular Science Tourism in Guangdong Province to Assist Rural Revitalization" (Project No. 2024ZDZX4076).

2. In 2024, the "Research Travel Planning and Management" course was recognized as a demonstration course for ideological and political education in higher vocational colleges in Guangdong Province (Project No. KCSZ2024173).

3. Zhuhai City Polytechnic Project: Research on Vocational Education Empowering Rural Revitalization (Project No. KY2024Y03S).

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