

Dissemination and EdTech of Yunnan Border Ethnic Music: Integrating Culture and Ecological Sustainability

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ABSTRACT

This study explored the dissemination and educational technology of ethnic music in Yunnan border areas within the dual context of cultural heritage preservation and ecological sustainability. As a region rich in ethnic musical traditions, Yunnan faces challenges such as declining youth engagement, cultural marginalization due to globalization, and environmental degradation. Through a mixed-methods approach, including a questionnaire survey ($n = 487$) and the development of the Yunnan Ethnic Music Sight-Singing Training System, this research analyzed current dissemination practices, public exposure, and understanding of ethnic music. Findings reveal that 58% of respondents had only occasional exposure to ethnic music, primarily through internet platforms (32%), while traditional folk transmission remains limited (4%). The sight-singing system, tested via 500 iterations, demonstrated 93.2% accuracy in pitch and rhythm, with an average response time of 1.33 seconds, highlighting its efficacy in blending modern technology with traditional pedagogy.

KEYWORDS

Cultural Heritage, Ecologically Sustainable Development, Ethnic Music, Educational Technology, Cross-Regional Dissemination

INTRODUCTION

In the context of cultural heritage and ecologically sustainable development, the dissemination and educational technology of ethnic music in Yunnan's border areas hold significant importance. Ecological sustainability refers to the long-term maintenance of environmental health and biodiversity. Ecologically sustainable development extends this concept to integrate environmental preservation with socio-cultural advancement, ensuring cultural traditions (e.g., ethnic music) thrive without compromising ecosystems. These definitions guide the research framework, emphasizing the need to preserve cultural traditions such as ethnic music without compromising the ecological systems that support them.

Yunnan is one of the regions in China with a rich and diverse tradition of ethnic music (Chen et al., 2022; Wei et al., 2023). However, with modernization and globalization, ethnic music in Yunnan's border areas faces various challenges, including cultural heritage discontinuity (Cheng et al., 2022; Li et al., 2023; Zhu et al., 2023). Influenced by modern lifestyles, the younger generation's interest

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in traditional music has diminished, leading to transmission difficulties (Liang et al., 2023; Wang et al., 2023).

Globalization introduces external cultural influences that may marginalize or displace traditional music (Fan et al., 2023). Therefore, it is crucial to safeguard and revitalize Yunnan's ethnic music, making it both culturally relevant and environmentally conscious. This involves leveraging modern elements and technologies to support its survival while ensuring alignment with principles of ecologically sustainable development.

Environmental degradation further threatens the survival of ethnic music, especially given Yunnan's rich biodiversity. Music venues, materials, and dissemination methods must be harmonized with ecological sustainability principles (He & Liu, 2022;). The present study explores dissemination strategies and educational technologies that protect, promote, and pass on ethnic music traditions in ways that respect and preserve both cultural and ecological integrity.

LITERATURE REVIEW

Currently, research on the dissemination and educational technology of ethnic music in Yunnan's border regions within the context of cultural heritage and ecological sustainability has received extensive attention and active exploration both domestically and internationally. With the popularity of internet technology, some music platforms and social media have begun to focus on the dissemination of ethnic music in Yunnan's border regions.

Regarding the dissemination of ethnic music in the context of cultural heritage and ecological sustainability, researchers from both domestic and international backgrounds have made significant research achievements. Dang et al. (2021) identified the research hotspots, frontiers, and trends in the field of intangible cultural heritage in China from 2003 to 2020 using the CiteSpace application, showing a steady increase in the number of published literatures over different periods. Ning et al. (2023) proposed a perspective based on the protection of intangible cultural heritage, exploring the value of folk music heritage for mental health and protection measures. Liu et al. (2023) pointed out that disaster risk assessment based on remote sensing technology, response mechanisms of mountain floods to heavy rainfall in the high-altitude regions of the Himalayas, and the construction of hydrological models will become research hotspots in China. Yu et al. (2023) conducted a study on 22 cultural sites in western China, investigating the adaptive evolution patterns of cultural landscapes along the Silk Road and the modes of modern cultural tourism dissemination. Hong et al. (2021) discussed the possibilities of using augmented reality (AR) in the protection of ethnic and cultural arts, popularizing Chinese musical instruments among young people, and meeting the interest of tourists in Chinese cultural heritage through engaging interactive forms. Song et al. (2022) explored the impact of creative representations of agricultural heritage systems on the cultural identity of Chinese tourists through a questionnaire survey of 406 Chinese tourists based on social identity theory. Li et al. (2022) investigated the physical and socio-economic transformations of the urban form of the Lijiang Ancient Town under the influence of local tourism-oriented development and (international) heritage conservation standards. Platforms like massive open online courses (e.g., Coursera) and learning management systems (e.g., Moodle) enable scalable ethnic music courses. Virtual reality (VR)/AR applications (e.g., Google Arts & Culture) offer immersive instrument simulations, while social media (TikTok, Bilibili) drive youth engagement.

Jiang et al. (2021) proposed that research on traditional music education technology is gradually emerging within cultural heritage and ecological sustainability, aiming to protect and inherit traditional music and integrate it into modern education and social environments. Guo et al. (2021) mentioned that traditional music education has begun to utilize digital technology and online platforms to bring traditional music education to more learners. Learners can access and learn traditional music anytime and anywhere through music learning applications, online courses, and virtual communication platforms. Huang and Westman (2021) highlighted that VR and AR technologies had brought new

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