Research on the Cultivation of Cultural Understanding Literacy in Primary and Secondary Schools Music Disciplines Empowered by Technology

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Abstract

With the advancement of the digital transformation of education and the implementation of educational goals oriented to core competencies, cultural understanding, as one of the four core competencies of the music discipline in compulsory education, has become a focus of music education reform. As a cultural carrier, music undertakes the mission of cultural inheritance and aesthetic cultivation, and cultural understanding serves as the core link connecting music skills and cultural inheritance. At present, primary and secondary school music teaching still faces bottlenecks such as the overemphasis on skills over culture and the insufficient integration of technology and literacy. Artificial intelligence provides a new path to break through these bottlenecks and promote the cultivation of cultural understanding literacy. Based on the requirements for cultivating the core competencies of the music discipline, this study clarifies the connotation and value of cultural understanding literacy, analyzes its correlation with other music core competencies and artificial intelligence technology. It explores practical cultivation strategies from four dimensions in combination with the current situation and predicaments of the integration of technology and cultural understanding literacy in teaching, thereby constructing a systematic integration system and realizing the transformation of music education from skill teaching to literacy cultivation.

Keywords

Primary and secondary school music, Cultural understanding literacy, Core competencies, Artificial intelligence, Technology empowerment

Introduction

Core competencies have become a research and practice focus in the global education field, and all countries around the world have constructed adaptive core competency frameworks around talent cultivation goals. The Organization for Economic Co-operation and Development (OECD) emphasized in its research report that cultural understanding and identification are among the essential key competencies for future citizens. As an important cultural carrier, the educational value of music lies not only in skill teaching, but also in cultural inheritance and aesthetic cultivation. Music is both a cultural carrier and a form of emotional expression. Its educational value goes beyond skill imparting, and it also undertakes the missions of cultural inheritance, aesthetic cultivation and the shaping of humanistic literacy. Cultural understanding is the core link connecting skill learning and cultural inheritance, and also the key for music education to realize the goal of nurturing people through beauty and culture [1]. In China, to implement the fundamental task of fostering virtue through education, the overall framework of *Core Competencies for Chinese Students' Development* clarifies the requirements for the all-round development of students. On this basis, the *Compulsory Education Art Curriculum Standard (2022 Edition)* lists cultural understanding together with aesthetic perception, artistic expression and creative practice as the four core competencies of the music discipline. It covers all stages from primary to junior high school.

The digital transformation of education has promoted the in-depth integration of information technology and art curricula, which has become an important path to improve the quality and efficiency of aesthetic education [2]. In 2023, the *Opinions on Strengthening*

School Aesthetic Education in the New Era issued by the Ministry of Education clearly proposed promoting the in-depth integration of information technology and art curricula. This provides policy support for the application of artificial intelligence technology in music education [3]. At the same time, relevant research and teaching practices have shown that primary and secondary school music teaching are still facing multiple practical bottlenecks. Liu Huaijie's (2025) research pointed out that primary and secondary school music teaching is generally faced with problems such as unbalanced allocation of teaching resources and single teaching methods. Artificial intelligence technology provides new possibilities for breaking through these bottlenecks through intelligent solutions [4].

Based on this, this study, grounded in the requirements for cultivating the core competencies of the music discipline, first clarifies the core connotation and value orientation of cultural understanding literacy. It analyzes its internal correlation with other music core competencies such as aesthetic perception, artistic expression and creative practice, as well as its integration mechanism with artificial intelligence technology. On this basis, combined with the current situation and problems of the integration of technology and cultural understanding literacy in primary and secondary school music teaching, it explores the cultivation paths and practical strategies of cultural understanding literacy.

It aims to provide theoretical support and practical reference for the effective implementation of cultural understanding literacy cultivation in primary and secondary school music classrooms. It also promotes the transformation of music education from skill teaching to literacy cultivation and truly exerts the cultural inheritance and humanistic education value of music education.

The connotation, value and internal correlation of cultural understanding literacy in the music discipline

The core competencies of the music discipline are the core orientation of music education in the new era, and their cultivation aims to achieve the educational goal of nurturing "a well-rounded person". As an important dimension of music core competencies, cultural understanding not only undertakes the mission of cultural inheritance and identification, but also is closely integrated with such literacy as aesthetic perception, artistic expression and creative practice. Meanwhile, a new integration path has been formed against the backdrop of the rapid development of artificial intelligence technology. Combining relevant research results, this paper systematically expounds the core connotation and value of cultural understanding literacy in the music discipline. It analyzes the literacy's internal correlation with various relevant elements, thereby providing theoretical support for the cultivation of cultural understanding literacy in the music discipline during compulsory education.

Core connotation and value

The educational value concept of China's music discipline has undergone three important transformations. It has shifted from the "double base" concept focusing on foundational knowledge and skills, to the "three-dimensional" concept covering knowledge and skills, processes and methods, and emotional attitudes and values. Finally, it has evolved into the "four-core" concept targeting the cultivation of "a well-rounded person". This transformation process has also promoted the continuous enrichment and improvement of the connotation of music core competencies [5].

Internationally, music core competencies are deemed to include four dimensions: cultural cognition, aesthetic experience, creative expression and social responsibility. This viewpoint is highly consistent with the concept of China's new curriculum standard, which confirms the diverse compositional characteristics of music core competencies [6]. Core competencies are the focus and focal point of school education, permeating the entire mind of individuals and covering their entire spiritual world, a statement that points out the core direction for the cultivation of music core competencies [7]. Specifically, the core competencies of the music discipline in primary and secondary schools refer to the essential qualities and key abilities formed by students gradually through music learning at different stages. These qualities and abilities are adaptive to lifelong development, covering four dimensions: aesthetic perception, artistic expression, creative practice and cultural understanding. The four competencies interpenetrate and form an organic unity. Among them,

the primary school stage focuses on cultivating students' interest in music and basic cultural perception, while the junior high school stage emphasizes deepening students' understanding of music culture and their awareness of inheritance, forming a gradient cultivation system.

As an important component of music core competencies, the connotation of cultural understanding literacy features distinct educational attributes and contemporaneity, and its cultivation runs through the entire process of basic education. Kobakhidze (2021) proposed that cultural understanding literacy is an individual's ability to cognize, respect and tolerate their own culture and diverse cultures, a definition that clarifies the core essence of cultural understanding literacy [8]. Combined with China's educational reality, the "cultural understanding" literacy in the *Compulsory Education Art Curriculum Standard* focuses on the learning, cognition, understanding and comprehension of advanced socialist culture, revolutionary culture and excellent traditional Chinese culture.

This clearly defines the core orientation of cultural understanding literacy in the music discipline of primary and secondary schools in China. Cultural understanding literacy not only has the most extensive realistic foundation and the most universal educational demands, but also is the educational focus of cultivating new people of the era. It is also one of the core competencies for talents in the 21st century, highlighting its important educational value [9].

Based on this, cultural understanding literacy in the music discipline of primary and secondary schools can be defined as students' ability to cognize, appreciate and interpret musical works from a cultural perspective. It involves understanding the historical background, ethnic characteristics and humanistic connotation behind music, forming identification with and love for the Chinese national music culture. It also means establishing an aesthetic value that respects the diversity of world cultures. Based on the advancement of school stages, the cultivation goals of cultural understanding literacy show distinct gradient development characteristics. The core of the primary school stage is "cultural perception", guiding students to initially understand the connection between music and ethnicity, regions and life. The core of the junior high school stage is "cultural understanding and identification", helping students deeply explore the cultural connotation of musical works and enhance cultural confidence. In addition, the goal of "cultural tolerance" runs through the entire compulsory education stage, enabling students to gradually understand the diverse music cultures of the world and form profound humanistic feelings. These gradient and penetrating goals correspond to the overall cultivation goals of music core competencies.

Correlation mechanism between cultural understanding and other elements

Cultural understanding literacy is not independent of other core competencies, but interpenetrates and complements aesthetic perception, artistic expression and creative practice. They jointly form a complete core competency system of the music discipline and serve as an important core leading the comprehensive improvement of students' music literacy. The four form an organic whole of mutual support and coordinated development. First, cultural understanding and aesthetic perception form a mutually reinforcing relationship of cognitive deepening. Aesthetic perception is students' intuitive experience of the formal elements of music and the foundation for understanding music culture, while cultural understanding provides a deep cultural context for aesthetic perception [10].

The two jointly promote the deepening of aesthetic cognition. Different cultures nurture unique musical aesthetic qualities, and only by grasping the national culture and historical context carried by music can students truly improve their aesthetic acumen and deepen their aesthetic experience, high-quality aesthetic perception. In turn, will further drive students to actively explore the cultural connotation behind music, forming a positive cognitive cycle of "perception - understanding - re-perception". Second, cultural understanding is the internal foundation of artistic expression, and artistic expression is the external presentation of cultural understanding. The two realize the unity of "internal cognition" and "external expression". Artistic expressions convey the understanding of music through specific forms such as singing and playing, and the depth of cultural understanding directly determines the accuracy of style grasp and emotional expression [11]. Only by deeply comprehending the cultural implication and emotional

core of a work can artistic performance break away from pure skill display and be more infectious and culturally valuable. At The same time, the process of music interpretation is also a practical transformation process of cultural understanding, which helps to realize the effective transmission and living inheritance of music cultural connotation. Third, cultural understanding provides a rich source of inspiration for creative practice, and creative practice promotes the innovative interpretation and development of culture; the two realize the coordination of "cultural inheritance" and "innovative development". Excellent traditional Chinese culture and diverse world music cultures are important material libraries for music innovation practice [12].

On the basis of fully understanding the characteristics of different cultures, carrying out the integration of musical elements and creative practice can effectively improve students' creative practice ability. It also helps to realize the development and reconstruction of music culture and forms a cultural expression with both inheritance and innovation. This highlights the educational value of music core competencies.

Against the backdrop of the rapid penetration of artificial intelligence technology into the education field, it provides new paths and methods for the cultivation of cultural understanding literacy in the music discipline. It promotes an innovative breakthrough in the cultivation mode of cultural understanding literacy and also puts forward clear requirements for the rational application of technology. Wang's (2025) research shows that intelligent technology can break the temporal and spatial limitations of traditional teaching through personalized recommendation, immersive experience and other methods. It can significantly enhance students' in-depth understanding of diverse cultures [13]. Combined with the actual situation of primary and secondary school music teaching in China, Liu's research pointed out that intelligent music recommendation systems can accurately push adapted traditional music works. It can also provide supporting cultural interpretations according to students' cognitive level and interest preferences. This helps students achieve personalized learning. Virtual Reality (VR) technology can realistically reproduce ancient music performance scenes and ethnic music inheritance sites, allowing students to intuitively experience the music culture atmosphere of different historical periods and ethnic groups. It also deepens their understanding of cultural connotation. Intelligent composition tools have effectively lowered the threshold of music creation, enabling students to flexibly integrate traditional and modern musical elements into practice. They can further deepen their cognition and application of music culture. However, it should be clearly stated that artificial intelligence technology should always serve as a tool for auxiliary teaching rather than a substitute. Its application must be closely combined with teachers' humanistic guidance to avoid algorithmic bias affecting the comprehensiveness of students' cultural cognition. This can ensure the correct direction of cultural understanding literacy cultivation. As Fitria (2023) put it, teachers and students should make full use of the intelligence and convenience of artificial intelligence tools. They should actively adapt to the teaching reform brought by artificial intelligence and realize the organic unity of technology empowerment and humanistic cultivation. In this way, artificial intelligence technology can truly serve the cultivation goal of cultural understanding literacy [14].

Current situation of the integrated development of technology and cultural literacy cultivation in music teaching

Against the backdrop of the digital transformation of education and the improvement of aesthetic education quality, the integration of technology and cultural literacy cultivation in the music discipline has become an important path of music education reform. At present, the integration has broken through the shallow auxiliary mode and deepened into "technology empowering literacy cultivation", forming a pattern of coordinated development of policies, technology and practice. However, there are still problems such as regional imbalance and insufficient integration, and the overall development is in a stage of "wide application, uneven levels and great potential".

Main progress in the integration of technology and music cultural literacy cultivation

The top-level policy design has been continuously improved, and the literacy orientation has become clearer. The *2022 Edition of the Compulsory Education*

Music Curriculum Standard established the core music discipline such as aesthetic perception, artistic expression and cultural understanding. It provides a value follow for the integration of technology and cultural literacy cultivation and promotes the transformation of aesthetic education evaluation to "literacy-based". Education departments at all levels have successively issued relevant policies on digital aesthetic education. "Technology empowering music literacy cultivation" has gradually become an industry consensus, with integrated practice moving from spontaneous exploration to standardized promotion [15]. The application scenarios of technology have been continuously expanded, and the empowerment paths have become increasingly diverse. Technologies such as artificial intelligence, VR/Augmented Reality (AR), big data and motion capture have been widely applied in music teaching. AI-assisted teaching and intelligent composition systems have promoted personalized learning and the excavation of cultural connotation. VR/AR immersive scenes have effectively enhanced students' cultural perception and emotional experience. Digital resources and real-time audio analysis have realized the accurate diagnosis of literacy development. Motion capture and generative technologies have provided a new path for the living inheritance of intangible cultural heritage (ICH) music.

The teaching paradigm and the relationship between teaching subjects have been continuously reconstructed. Technology has promoted the transformation of classrooms from teacher-led to human-machine collaboration and students' active inquiry [19]. Teachers have become learning designers and cultural guides, and students deepen their cultural understanding in practice and creation. The teaching mode has gradually transformed into project-based and immersive models, which is in line with the development concept of the integration of traditional music culture and modern technology.

Practical predicaments in the integration of technology and music cultural literacy cultivation

The depth of integration is insufficient, and there is an obvious disconnect between technology applications and literacy cultivation. Most practices still stay at the level of shallow tool use, only a small number of teachers can deeply combine technology with the core literacy goals such as cultural understanding and aesthetic perception. Some classrooms overemphasize form over connotation and skills over culture, making it difficult to truly improve students' cultural literacy. The dual constraints of resource supply and teachers' capabilities have led to a prominent problem of unbalanced development. There is a shortage of high-quality localized digital music resources, with obvious gaps between regions and schools. The digital divide has further widened development differences. Teachers lack the ability of technology application and cultural integration and systematic training, making it difficult to support high-quality integrated teaching. The teaching mode and evaluation system are relatively rigid, with insufficient innovation motivation.

Traditional classrooms still dominate, leaving limited space for students' independent inquiry, over-reliance on technology has instead weakened the aesthetic interaction between teachers and students. Evaluation is mostly based on summative assessment, lacking process and diversified evaluation of such literacy as cultural understanding and innovative expression, and the advantages of digital evaluation have not been fully exerted [20]. In addition, there is a disconnection between theoretical research and teaching practice; most existing achievements focus on the possibility of technology application, lacking localized and operable integration models and empirical support. The practical application is fragmented and unsystematic, making it difficult to realize the systematic improvement of students' music cultural literacy.

In the future, we should take literacy cultivation as the core and solve existing predicaments in a targeted manner. We need to promote the transformation of the integration of technology and music cultural literacy cultivation from shallow integration to in-depth empowerment. It is also essential to build a systematic and balanced integrated development system, so as to give full play to the important role of technology in music cultural inheritance and the improvement of students' core competencies.

Practical strategies for the integration of technology and cultural understanding literacy cultivation in music teaching

Based on the current situation and predicaments of the integration of technology and cultural understanding

literacy, combined with the music core competency goals and students' cognitive laws, we should adhere to the principle of "culture as the foundation, technology as the tool, and literacy as the essence". We should construct practical paths from content construction, teaching implementation, teacher development and evaluation innovation. This promotes the transformation of technology from tool assistance to literacy empowerment and realizes the precise, immersive and sustainable development of cultural understanding literacy cultivation.

Constructing a literacy-oriented digital music and culture resource system

With the gradient cultivation goals of cultural understanding literacy as the core, integrate high-quality digital resources to solve the problems of fragmented resources and insufficient localization. The primary task is to construct a hierarchical, school stage-adapted music and culture resource database. It should focus on excellent traditional Chinese music, revolutionary music, ethnic and folk music as well as diverse world music cultures. Resources should be classified and labeled according to the "cultural perception" goal of primary schools and the "cultural understanding and identification" goal of junior high schools.

Meanwhile, supporting interpretation materials should be provided, including work background, humanistic connotation, regional characteristics and historical context. For example, we can push animated interpretations of classic works such as "Jasmine Flower" and "The East Is Red" for the primary school stage. For the junior high school stage, we can push historical background documentaries and melody analysis materials of "Ambush from Ten Sides" and "Butterfly Lovers". This forms an integrated resource package of "audio + video + graphics and text + interactive scenes" to provide stable content support for cultural understanding. On this basis, it is necessary to strengthen the digital transformation of localized and ICH music, use digital means to collect and record characteristic music cultures such as local folk songs, operas and ethnic musical instruments. For example, we can collect singing audio and performance videos of local flower drum operas and shadow puppetry. We can restore the performing techniques of ICH inheritors playing suona and pipa through motion capture technology and reproducing folk music performance scenes with virtual scenes. These vivid folk music works are transformed into teachable, experiential and communicable digital resources, enhancing the intimacy and locality of cultural understanding. To achieve precise empowerment, big data technology can be relied on to achieve precise resource push, intelligently matching music works and cultural interpretation content of corresponding difficulty according to students' interest preferences, cognitive level and learning progress. For example, we can push cultural materials related to guzheng and erhu for students who like ethnic musical instruments. For students with a higher cognitive level, we can provide cross-cultural music comparison content. This avoids a one-size-fits-all resource supply and helps students deepen their cultural cognition step by step.

Creating an immersive cultural understanding teaching mode empowered by technology

Based on the main position of classroom teaching, the in-depth integration of technologies such as artificial intelligence, VR/AR and interactive experience with cultural understanding cultivation is the key. It helps solve the problems of disconnection and shallow application. We can start with immersive situational teaching, use VR/AR technology to restore the historical scenes, folk activities and performance environments in which musical works were created. For example, when teaching "Spring Festival Overture", we can use VR technology to restore the lively scene of the Spring Festival temple fair.

This allows students to personally experience the festival culture and national emotions conveyed by the work. When teaching the Tibetan folk song "Jinshan in Beijing", we can restore the scene of Tibetan people singing and dancing. It helps students understand the ethnic cultural connotation behind the work, moving from intuitive experience to in-depth understanding and strengthening cultural perception and emotional identification. At the same time, by constructing an inquiry-based cultural interpretation path, use AI-assisted analysis tools to guide students to independently explore the internal connection between music melody, rhythm, timbre and cultural context. For example, with the help of AI audio analysis tools, students can compare the rhythmic differences between

northern Shaanxi folk songs and Jiangnan folk songs. They can explore the correlation between such differences and the geographical environment and living customs of the two regions. The technical analysis results are transformed into the basis for cultural understanding rather than simply displaying technical effects. This realizes a closed loop of "perception - analysis - understanding - identification". In addition to situational experience and inquiry analysis, the integration of creative practice and cultural inheritance should be promoted. With the help of intelligent composition and arrangement tools, lower the threshold of creation, and guide students to carry out adaptation, compilation and cross-cultural integration practice on the basis of understanding the connotation of traditional music culture. For example, we can guide students to use intelligent arrangement tools to combine the melody of the traditional folk song "Jasmine Flower" with modern pop music rhythms for compilation.

They can also form groups to create short pieces by integrating musical elements of different ethnic groups. In this way, students externalize cultural understanding through creative expression and promote the living inheritance and innovative development of music culture. In this process, we must adhere to the coordination of humanistic guidance and technology application. Teachers should take cultural interpretation and value guidance as the core and use technology to break through temporal and spatial limitations. However, technology should not replace teacher-student interaction and aesthetic experience, so as to ensure that it serves the cultivation of cultural understanding and humanistic literacy.

Improving a dual-dimensional teacher development support system of technology and culture

To address the predicament of teachers' insufficient ability in technology application and cultural integration, it is necessary to construct a hierarchical and classified development mechanism integrating research and training to solve the core constraints at the teacher level. On the one hand, we should carry out literacy-oriented integrated teaching training. The training should combine the connotation of cultural understanding literacy, traditional music culture knowledge with the operation of intelligent teaching tools and digital teaching design. In this way, it can systematically improve teachers' integrated design ability of "technology + culture + literacy". For example, we can organize teachers to carry out special training on "the application of VR technology in traditional music teaching". During the training, we guide teachers to design immersive cultural inquiry classrooms combined with specific pieces such as "Moon over the Colored Clouds". At the same time, we supplement the cultural background knowledge of Cantonese music, helping teachers realize the deep combination of technology application and cultural interpretation. On the other hand, we should build a teaching practice and research community. We can encourage teachers to carry out lesson case research, open classes and research projects around technology-empowered cultural understanding. They can summarize and form replicable and promotable teaching models and operational paradigms. For example, we can carry out regionally integrated teaching open classes. Excellent teachers can demonstrate lesson cases of "folk song culture inquiry assisted by AI". We can also organize teachers to conduct discussions and exchanges, effectively connecting theoretical research and teaching practice and solving the problem of their disconnection. In addition, regular technical support and resource services are indispensable.

By establishing a school-level or regional digital teaching support team, we can timely solve practical problems encountered by teachers in technology use, resource development and classroom implementation. For example, we can help teachers solve problems such as VR equipment operation, digital resource editing and the use of intelligent teaching systems. This effectively lowers the threshold of technology application and provides a guarantee for the smooth progress of integrated teaching.

Establishing a diversified and collaborative digital literacy evaluation mechanism

Breaking the limitations of traditional summative evaluation and constructing a process-based, diversified and literacy-oriented evaluation system is an important path to realize the goal of promoting learning and teaching through evaluation. First, we should implement process-based data tracking evaluation. We can use big data to record the entire process of students' classroom participation, work appreciation, interactive

inquiry and creative practice. We focus on the development changes of cultural perception, cultural understanding, cultural identification and cultural tolerance, and form a dynamic literacy development file. For example, record students' interaction duration in VR scenarios, speech content of music culture interpretation, and the cultural integration degree of music creation works, comprehensively capturing the trajectory of students' improvement. Second, we should implement diversified performance evaluation. We can combine various tasks such as singing and playing, cultural explanation, group inquiry and music creation.

This comprehensively evaluates students' ability to understand and express the connotation of music culture, highlights the practicality and comprehensiveness of cultural understanding, and avoids the simplification and superficiality of evaluation. For example, we can ask students to complete the task of "traditional music culture explanation" in groups. They can show their cultural interpretation of "Moon Reflected on Second Spring" with the help of multimedia tools. We can also evaluate the pieces created by students that integrate traditional musical elements, focusing on their grasp of cultural connotation.

Finally, we should construct a human-machine collaborative evaluation model [22]. We can use technology to achieve objective data collection and quantitative analysis. Humanistic and qualitative judgment can be realized through teacher evaluation, student peer evaluation and parental participation. This takes into account both the scientificity and educational nature of evaluation. For example, we can use intelligent evaluation tools to analyze objective indicators such as intonation and rhythm of traditional songs sung by students. Combining teachers' evaluation of students' cultural interpretation ability and peer evaluation, we can comprehensively assess students' cultural understanding literacy. This gives full play to the guiding role of digital evaluation in the cultivation of cultural understanding literacy and promotes the resonance between the evaluation system and literacy development goals.

Conclusion

Through systematic analysis, this study draws the following conclusions: The cultural understanding literacy of music discipline has a clear connotation and distinct progressive levels. It runs through the entire process of compulsory education, showing developmental characteristics of "cultural perception" in primary schools and "cultural understanding and identification" in junior high schools. It is a key ability for students to recognize and appreciate music from a cultural perspective. It helps them enhance their identification with Chinese national music culture and respect the diverse cultures of the world, while supporting and developing in coordination with aesthetic perception, artistic expression and creative practice. The cultivation of cultural understanding literacy can be empowered personally, immersively and creatively with the help of artificial intelligence.

However, we must adhere to the principle of "technology as auxiliary and humanism as the core" to prevent technological alienation. At present, in primary and secondary school music teaching, the integration of technology and the cultivation of cultural understanding literacy has achieved positive progress at the policy, technology and teaching levels, forming an initial collaborative development pattern.

However, there are still prominent problems: insufficient depth of integration between technology and cultural teaching, shortage of high-quality digital resources related to traditional music culture, weak digital literacy and cultural literacy of some teachers, and a single and rigid evaluation method. These issues directly affect the actual effect of cultural understanding literacy education.

To this end, it is necessary to construct a systematic integration path from four dimensions: Building a literacy-oriented digital music and culture resource system to solve the problems of fragmented resources and insufficient localization. Creating a technology-impowered immersive teaching mode to break the disconnect between technology and teaching. Improving a dual-dimensional support system for the improvement of teachers' digital ability and cultural literacy to make up for the shortage of teachers. Establishing a diversified and collaborative digital evaluation mechanism to realize the promotion of learning and teaching through evaluation. Only by adhering to the principle of "culture as the foundation, technology as the tool, and literacy as the essence" can we truly give full play to the role of technology in cultural inheritance

and literacy cultivation. In this way, we can effectively implement the educational value of music education - to nurture people through beauty and culture.

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Conflict of Interest

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References

[1] Shliakhovchuk, E. (2021) After cultural literacy: new models of intercultural competency for life and work in a VUCA world. *Educational Review*, 73(2), 229-250.

[2] Erişti, S. D. B., Freedman, K. (2024) Integrating digital technologies and AI in art education: pedagogical competencies and the evolution of digital visual culture. *Participatory Educational Research*, 11, 57-79.

[3] Yu, H., Zou, Z. (2023) The music education and teaching innovation using blockchain technology supported by artificial intelligence. *International Journal of Grid and Utility Computing*, *14*(2-3), 278-296.

[4] Liu H. (2025) Research on the application of artificial intelligence in music education and teaching in primary and secondary schools. *Global Education Bulletin*, 2(6), 29-40.

[5] Yang, Y., Welch, G. (2023) A systematic literature review of Chinese music education studies during 2007 to 2019. *International Journal of Music Education*, 41(2), 175-198.

[6] Andreu Duran, M., Godall Castell, P., Amador Guillem, M., Castro Morera, M. (2017) Study of the results in the acquisition of core competencies in schools that integrate primary education and music. *International Journal of Music Education*, 35(4), 554-564.

[7] He, Y., Suttachitt, N. (2024) The development of music teaching strategies for promoting music learning competency for elementary school students under the core literacy of music academic subjects. *Journal of Ecohumanism*, 3(8), 3049-3061.

[8] Kobakhidze, G. (2021) Theoretical background for a strategy of development of cultural literacy in schools. *The Journal of Education, Culture, and Society*, 12(1), 48-58.

[9] Lin, C. (2025) Research on the implicit disciplinary mechanism of ethnic identity in primary and secondary school music education: from the perspective of the core competency of “cultural understanding” under the new curriculum standards. *Human Resources, Education and Public Policy*, 1(1), 21-40.

[10] Savoie, A. (2017) Aesthetic experience and creativity in arts education: Ehrenzweig and the primal syncretistic perception of the child. *Cambridge Journal of Education*, 47(1), 53-66.

[11] Fernandez, M. A. (2025) Art as a mirror of cultural values: a philosophical exploration of aesthetic expressions. *Cultura: International Journal of Philosophy of Culture and Axiology*, 22(3),245-261.

[12] Zhu, Y. (2020) Comparing the effects of different types of cultural inspiration on design creativity. *The Design Journal*, 23(6), 919-930.

[13] Wang, D., Huang, X. (2025) Transforming education through artificial intelligence and immersive technologies: Enhancing learning experiences. *Interactive Learning Environments*, 33(7), 4546-4565.

[14] Fitria, T. N. (2023) The use of artificial intelligence in education (AIED): Can AI replace the teacher’s role? *Epigram*, 20(2), 165-187.

[15] Zheng, N. (2025) The current status and optimization strategies of popular music education in Chinese universities under the context of technological transformation. *Journal of Contemporary Art Criticism*, 1(1), 40-43.

[16] Li, P., Liang, T. M., Cao, Y. M., Wang, X. M., Wu, X. J., Lei, L. Y. (2024) A novel Xi’an drum music generation method based on Bi-LSTM deep reinforcement learning: P. Li et al. *Applied Intelligence*, 54(1), 80-94.

[17] Sun, F. (2024) Analysis of virtual reality-based music education experience and its impact on learning outcomes. *Scalable Computing: Practice and Experience*, 25(6), 4755-4762.

[18] Yang, X. (2025) Research on interactive optimization technology in music education games based on EMD-RNN. *Systems and Soft Computing*, 7, 200305.

[19] Cheng, D., Qu, X. (2025) Intelligent generation and optimization of resources in music teaching reform based on artificial intelligence and deep learning. *Scientific Reports*, 15(1), 30051.

[20] Wen, L., Ding, P. (2025). Evaluationof core competenciesin music discipline during compulsory education stage-research on weighting basedon delphi method. *Journal of Teacher Education*, 12(2), 87-97.

[21] Li, Y., Cheng, H., Qin, Q. (2025) Evaluations and improvement methods of deep learning ability in blended learning. *International Journal of e-Collaboration (IJeC)*, 21(1), 1-17.

[22] Deng, Z., Xiang, H., Tang, W., Cheng, H., Qin, Q. (2024) BP neural network-enhanced system for employment and mental health support for college students. *International Journal of Information and Communication Technology Education (IJICTE)*, 20(1), 1-19.