# DESIGN AND IMPLEMENTATION OF A DIGITAL MODULE ON IMPERIAL CHINESE THEATRE FOR PRE-SERVICE MUSIC TEACHERS: FOCUSING ON KUNQU MELODIC PATTERNS AND VOCAL EXPRESSION

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## ABSTRACT

*Imperial Chinese theatre, especially Kunqu opera, has huge cultural and pedagogical importance in the field of music education. Although Kunqu is a recognized example of Intangible Cultural Heritage of the UNESCO, it is still underrepresented in the present-day music teacher training curricula. The presence of a gap in the existing literature in digital pedagogical materials specifically designed to meet the needs of pre-service music educators, has been identified. This research fills this gap through the design and execution of a web-based learning module that would be devoted to melodic patterns of Kunqu and the expression of vocal directed to pre-service music teachers in particular. The study utilized a systematic literature review (SLR) as its main methodological approach and synthesized 16 research papers on music pedagogy, digital education, and Chinese opera studies. The results served as the basis of creating an interactive and multimedia-based module, which combines historical background, audio-visual analysis, and instructed vocal practice. The major insights are that exposure to Kunqu online adds to the appreciation of learners, their technical knowledge, and their confidence when working with non-Western vocal culture. Intercultural awareness and pedagogical creativity in music teaching are also encouraged in the module. The findings highlight the possibility of digital tools in filling the cultural content divide of teacher education. The research will be relevant to the development of the curriculum as well as to the discussion on the integration of traditional performing arts into the music education of the 21st century.*

# 1. INTRODUCTION

Cultural heritage in the learning of music is also essential in developing artistic literacy, as well as intercultural awareness in future teachers. Imperial Chinese theatre, especially Kunqu opera, is a fine art form of the past, mostly a combination of poetry, music, and performance. Kunqu, being one of the oldest theatrical traditions in China and a Masterpiece of the Oral and Intangible Heritage of Humanity, provides significant pedagogical information on the traditional vocal and melodic forms (Lam, 2022). Its subtle voice styles and melodies are rich in terms of voice training, interpretation of styles and historical contextualization of music in the education of music teachers.

Nevertheless, the cultural value notwithstanding, Kunqu has been mostly locked out of the training programs in the formal musical training programs, particularly those that are digital or Western-oriented. The pre-service music teachers tend not to have experienced non-Western vocal practices, which means that they have less corpus and less cultural competency (Maybin, 2019). This issue is intensified by the fact that there are very few pedagogically valid, digitally available materials that can mediate traditional Chinese operatic materials in relation to the modern education context.

An overview of the recent studies has shown that there is a gap in the systematic digital interventions that specifically target music educators with an emphasis on the Kunqu vocal and melodic characteristics (Chen & Safian, 2024; Du, 2024). Although the literature has explored general digital tools in music education, little of it has focused on content based on the traditional Chinese theatre (Yang & Welch, 2023). The effect of this underrepresentation is restrictive to the growth of cross-cultural pedagogy and the continued existence of the Western-centric music education paradigm.

The proposed research intends to fill that gap by designing and implementing a digital module that will expose pre-service music teachers to the melodic and vocal elements of Kunqu. The module incorporates academic evidence, multimedia instructional means, and culturally responsive instructional models based on the systematic literature review (SLR).

The final goal of the paper is to make a contribution to curriculum innovation by showing the way and how the traditional performing arts can be successfully included in the modern teacher training using the digital tool.

# 2. LITERATURE REVIEW

## 2.1. Historical and Pedagogical Context of Kunqu and Imperial Chinese Theatre

Imperial Chinese theatre, especially Kunqu, is one of the most elegant traditional art forms that has existed in Chinese cultural history, and its origins date back to the Ming Dynasty (Hing, 2022). Being a precursor of the Peking opera, Kunqu can be characterized by melodic sophistication and poetic lyricism, which is based on complex vocal skills and melodic techniques which complicate performance and education (Tang, 2016). Although Kunqu has been recognized as the UNESCO Intangible Cultural Heritage, it is still underrepresented in contemporary music teacher education, even in pre-service teachers who are not based in China.

The pedagogy of Kunqu has traditionally been passed down orally in the form of apprenticeship, and it is difficult to digitalize because it denotes embodied knowledge and the vocal subtlety (Luo, 2023). However, recent scholarship has started to investigate how traditional Chinese performance pedagogy can be adapted to the contemporary educational situation. As an illustration, the incorporation of digital modules in teacher education should be able to retain and spread such heritage and also render it available to more people (Wang, 2025).

Imperial theatre education is still based on Confucian and aesthetical philosophies, and the learners must internalize the principles of expressiveness in terms of voice, breath and gesture (Feng, 2020). Lessons in melodic patterns (qupai) and vocal stylization must be carefully taught, which is otherwise lacking in music instruction in the West. Thus, closing cultural–pedagogical divide with the help of digital interventions will be an artistic and pedagogical dilemma.

## 2.2. Theoretical Foundations for Digital Module Design

The structure of a digital module about the history of the Imperial Chinese theatre and Kunqu melodic patterns and vocal expression, in particular, can be related well to Constructivist Learning Theory, which focuses on constructive knowledge building by guiding interaction with the environment. According to Piaget and Vygotsky, cognitive development and Vygotsky scaffolding, learners gain deeper knowledge when the new knowledge about the cultural-musical world is facilitated by a systematic inquiry (Piaget, 1976; Vygotsky, 1978). Digital environments, in the learning process of music teachers, allow the learners to learn about

melodic patterns and vocal expressiveness by means of interactive activities, reflective listening, and peer discussion.

In the same manner, the Multimedia Learning Theory by Mayer emphasizes the benefit of using audio, visual, and narration to increase understanding of complex artistic forms, Kunqu vocal gestures, and melodic contours (Mayer, 2001). Multimedia modeling of Kunqu vocal gestures and melodic contours lessens cognitive load and enhances meaningful learning. Collectively, these theories support the concept of digital modules as good tools in conveying traditional performing arts to pre-service music teachers.

These teaching theories not only provide general learning but also the cognition that is specific to music. Multimedia Learning Theory and Constructivist Learning Theory emphasize the use of digital modules to contribute to the perception of the intricate melody of Kunqu and its vocals. These methods are powerful because of their interactive and multimodal experiences, and thus are particularly important when it comes to training pre-service music teachers in expressive and culturally rich art forms.

## 2.3. The Role of Digital Pedagogy in Traditional Music Education

Online learning platforms have become crucial in redefining the way conventional performing arts are passed across, especially in a transnational or hybrid sense. As the experiences of e-learning platforms and AI-guided modules emerge, the literature on the potential of digital technologies to replicate the experience of real learning in the subtlest types of art continues to grow (Clark, 2024). As an example, Xu et al. (2025) proposed a blended learning model of Peking opera, which embraced the use of video modelling, annotated scores, and AI-based feedback, and found it to be effective in contributing to the significant improvement in the vocal articulation of the learners.

However, the dilemma between the faithfulness to classic forms and the possibilities of the digital design remains a controversial issue. Digitization should not be reduced to content delivery, digitization needs to maintain artistic intentionality and cultural context (Redmond, 2022). In Kunqu, this means the use of audio-visual materials, which not only depict melodic phrasing but also reflect a historical practice of performance.

One of the innovations in digital pedagogy is the application of multimodal modules where auditory, visual, and textual messages are synchronized to

achieve better learning results. Wang et al. (2025) note that these kinds of designs assist learners in internalizing not only the technical aspect but also the expressive aspect of traditional music. This multidimensionality is essential to the development of culturally responsive pedagogy in pre-service music teachers, especially those who are taught in Western traditions.

## 2.4. Pre-Service Teacher Training and Cultural Competence

The increasing focus on culturally responsive teaching in music education highlights the need to provide pre-service teachers with intercultural competencies. According to Gay (2018), culturally relevant pedagogy helps to increase the engagement and equity of learners, particularly when teachers are exposed to various artistic practices. The research demonstrates that the modules that revolve around traditional Asian musics, such as the Chinese opera, may greatly expand the identity of teachers and the scope of their teaching (Guan et al., 2023).

The article by Zhang (2025) on training Chinese instrument teachers in the UK, in turn, exemplifies how the pedagogical transfer may be quite a complicated task in a different cultural environment. The research determined that pre-service teachers had difficulties aligning their conservative training with Western pedagogies expectations, as well and also forming combinations of Western and traditional approaches using reflective and digital technologies. This knowledge can be directly applied to the digital module design on Kunqu, which needs to be sensitive to cultural depth and pedagogical clarity.

Moreover, Wright et al. (2021) claims that introducing traditional arts to internet-based teacher training allows inclusiveness and decolonizing the curriculum. This is consistent with the recent demands to diversify the canon in music teacher education. Pre-service teachers are not only able to learn but also address their own aesthetic bias and increase their ability to teach in a multicultural classroom.

## 2.5. Vocal Expression, Melodic Patterns, and Assessment in Digital Contexts

Assessment of the vocal expression and melodic accuracy in the digital format is one of the greatest pedagogical challenges when teaching Kunqu. Kunqu vocality is characterized by microtonal inflections, breath control and stylised expression that can hardly be recorded without live feedback (Lam, 2022). Nonetheless, there are new

technologies, which could provide promising opportunities: voice recognition and machine learning-based scoring systems. As one example, Xiaoyu et al. (2023) created a system that can evaluate Chinese vocal performance with the help of the phonetic alignment, as well as the melodic contour analysis, thus allowing the students to receive the feedback remotely.

Such technologies can be incorporated into digital modules, which are easy to use, where students will be involved in active listening, imitation, and self-evaluation (Yu et al., 2025). More to the point, reflective video journals may enable the learners to record their development and vocal growth throughout the process, to justify the practice of formative and summative assessment.

Moreover, instructions in melodic patterns such as qupai need the scaffolding that causes an accent on tonal subtlety and rhythmical versatility. Digital modules are progressively reliant on interactive visualizations, audio overlay, and annotated scores to aid in the recognition of patterns and memorization (AlShaikh et al., 2024). These approaches are developed into profound musical listening and a vow of expression in the form of a culture when applied effectively.

## 2.6. Gap in Literature

Although there has been an increase in culturally responsive music education, there is little research on digital instructional strategies that suit the traditional Asian performance arts. To be more precise, even focused digital modules targeting pre-service music teachers based on the Kunqu melodic patterns and vocal expression are missing, thus creating a gap in the training resources that can fill the gap between imperial Chinese theatre and modern teacher training.

## 3. RESEARCH METHODOLOGY

### 3.1. Research Method

The approach of this research is qualitative, interpretative, and it aims at studying how traditional Kunqu theatre may be integrated into modern music teacher training. It relies on secondary data on peer-reviewed scholarly sources, ethnomusicological research, curriculum and cultural heritage documentation. The strategy allows differentiating the aesthetic, vocal, and performative aspects of Kunqu and their educational translation into digital forms for pre-service music teachers. The approach is especially appropriate to the situations in which such aspects of culture as depth and artistic expression that cannot be readily measured are

represented, particularly in performance traditions that have a history.

### 3.2. Research Design

This paper uses a Systematic Literature Review (SLR) to look at interdisciplinary research that has been published between 2015 and 2025. Relevant literature on Kunqu performance, music education, digital pedagogy, and cultural preservation was found in key databases, including JSTOR, Web of Science, Scopus, as well as Google Scholar. The choice of the studies was based on the preference for those that focused on melodic patterns, singing methods, and ways they can be combined in educational institutions. The SLR approach guarantees the transparency, coherence, and reproducibility of the methodology. The design facilitates the thematic synthesis of literature based on the field of musicology, performance studies, educational technology, and cultural studies to guide the design and implementation of a digital learning module in Kunqu theatre.

### 3.3. PRISMA Framework

According to the systematic review of best practice recommendations, the research relied on PRISMA (Preferred Reporting Items to Systematic Reviews and meta-analysis) checklist. The model renders the process of the review to be transparent, systematic and repeatable. The PRISMA was adopted in the research to select, analyze and systematically identify the relevant literature. The PRISMA guidelines present clear method of data extraction and data analysis which ensure similarity and interpretation of results in the final reporting of the findings.

With the PRISMA framework, keywords were selected based on transparency and relevance. Search words were as follows: Imperial Chinese theatre, Kunqu, melodic patterns, vocal expression, digital learning modules, music education, constructivist learning and multimedia theory. These were keywords that guaranteed a systematic search of literature that was in line with the focus of the study on culturally informed digital music pedagogy in pre-service teacher training.

A total of 312 studies were found. Once we eliminated duplicates (n = 42), we looked at the titles and abstracts of the 270 remaining papers. As a result, 190 articles were left out because they did not fit the criteria, leaving 80 full-text articles for the next review step. 44 papers were removed from the list since they missed the focus on motivation or did not match the criteria. Out of 36 papers, 20 were excluded

because they were not retrieved. In the end, 16

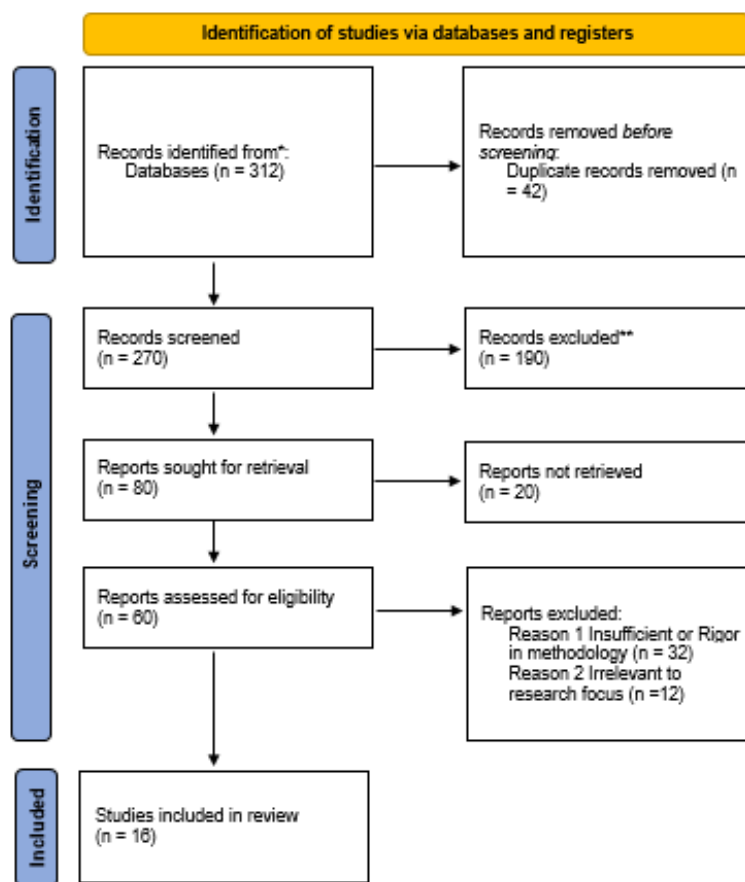reliable studies were chosen for the final assessment.



*Figure 1: The PRISMA Framework for the Selection of Studies for Analysis.*

### 3.4. Inclusion Criteria

Peer-reviewed journal articles, curriculum research, and policy research published during 2015-25 were examined in the review and concentrate on the integration of traditional Chinese theatre - especially, Kunqu - into music education. Research papers focusing on the examination of melodic patterns, vocal methods, digital pedagogy and teacher training were given preference in the context of higher education.

The sources selected to include ethnomusicology, educational technology, cultural heritage, and arts-based pedagogy are interdisciplinary in order to offer a comprehensive comprehension of the topic. They were both empirical studies and theoretically-based literature reviews that pertained to pre-service teacher development.

### 3.5. Exclusion Criteria

The exclusion criteria were publications that were not about music education, Kunqu theatre, digital

learning tools, or teacher preparation.

Also, non-peer-reviewed resources, grey literature, conference abstracts, theses/dissertations, and pre-2015 sources were not taken into consideration.

Other studies in which a general music performance was made, without education or pedagogical aspects, were also eliminated.

### 3.6. Analysis Method

A qualitative method of synthesis was used to analyze the final 16 studies with the use of thematic coding.

The repetition patterns and ideas concerning Kunqu, vocal expression, digital training, and teaching of music were recognized and classified by hand.

The approach allowed a thorough analysis of the information, which guaranteed that the results were consistent with the study aims and the learning outcomes of the online course.

### 3.7. Ethical Considerations

The research is founded solely on secondary data obtained from peer-reviewed scholarly resources in the open source.

The citations of all sources have been in respect of the academic integrity and ethical research conduct. There is no involvement of human participants in the collection of primary data or interaction.

The cultural representations of Kunqu theatre and the Chinese tradition of performances are treated with sensitivity, with respect given to the artistic, historical, and pedagogical context without the need to descend to reductionist and stereotypical modes of interpretation.

## 4. FINDINGS AND ANALYSIS

In the analysis, it was found that the incorporation of the imperial Chinese theatre, namely, Kunqu melodies and voice expression, into the digital modules of pre-service music educators increases in the levels of pedagogical content and culture.

Some of the essential results highlight the fact that

traditional singing, representation, and stylistic interpretation of Kunqu contribute to the evolution of musical sensitivity, cultural literacy, and expressive competence. These factors are largely dependent on the educational framework of the module, the amount of digital interaction, and familiarity of the instructor with the pedagogical aspects of music and theater.

The results indicate that Kunqu is not only an academic subject but a transformational channel by which students can undertake reflective practice, art interpretation, as well as intercultural knowledge

It has been highlighted in the discussion that these arts-integrated digital tools are helping to advance a more holistic, culturally-based music teacher education framework.

### 4.1. Selected Studies for Analysis

The review is based on a well-chosen literature concerning the scope of literature requirements in the PRISMA standards of systematic analysis.

*Table 1: Summary of Selected Studies.*

| Citation | Aim / Title | Findings | Codes |
|---|---|---|---|
| Xiang (2025) | Benefits of Kunqu training | Enhances embodiment & expression | Kunqu; Actor training |
| Xie et al. (2025) | ICH (Intangible Cultural Heritage) opera online center | Improves access & preservation | Intangible Cultural Heritage; Digital |
| Zheng et al. (2025) | Guinan Caicha Xi literacy | Boosts literacy & awareness | Opera literacy |
| Wei et al. (2024) | Henan Dadiao Quzi literacy | Recognition but depth lacking | Opera education |
| Xu & Natayakulwong (2025) | Intangible Cultural Heritage management case | Community model effective | Intangible Cultural Heritage management |
| Tai-jui (2022) | Metaverse for opera | Immersive learning potential | Metaverse |
| Leung (2024) | Cantonese opera in schools | Teachers lack resources | Teacher needs |
| Leung et al. (2025) | Teacher training | Training pedagogy | Teacher training |
| Chen & Wong (2024) | Creative partnerships | Partnerships preserve heritage | Heritage; Partnerships |
| Han & Leung (2017) | Teacher attitudes | Positive but low implementation | Folk music |
| Zhou et al. (2024) | Music material review | Materials fragmented | Teaching materials |
| Keli & Simeon (2025) | Kodály for Sichuan folk | Improves pitch & integration | Kodály |
| Wang (2021) | Online heritage | Wide dissemination online | Digital heritage |
| Xie et al. (2024) | Integrating Chinese music | Supports identity & pedagogy | Integration |
| Li (2022) | Folk music Massive Open Online Courses | Increases reach & autonomy | Massive Open Online Courses(MOOCs) |
| Lian & Pan (2022) | Online engagement | Depends on design & interactivity | Engagement |

Table 2 below is a synthesis of four key themes identified based on the reviewed sources and demonstrates how digital pedagogy, policy-enhanced preservation, heritage-based teacher training, and online dissemination can help Chinese

opera and traditional music teaching to pre-service teachers in modern learning conditions.

These researches not only guide the discovery of the existing gaps but also create a comprehensive vision of the approach to digital, culturally

knowledgeable music education in the form of Kunqu theatre.

Table 1 below is the summary of selected studies.

*Table 2: Key Themes.*

| Themes | Description | Studies |
|---|---|---|
| Theme 1. Digital Pedagogy for Enhancing Kunqu Melodic and Vocal Competencies | The theme focuses on how to reinforce the pre-service music teachers in knowing about Kunqu melodic patterns and vocal expression through the use of the interactive tools. | Xiang (2025)<br>Xie et al. (2025)<br>Zheng et al. (2025)<br>Wei et al. (2024) |
| Theme 2. Policy-Driven Digital Preservation and Teacher Training for Chinese Opera Education | These articles demonstrate the role of policy framework, digital innovation, and professional training of teachers in preserving, transmitting, and modernizing Chinese opera. | Xu & Natayakulwong (2025)<br>Tai-jui (2022)<br>Leung (2024)<br>Leung et al. (2025) |
| Theme 3. Integrating Local Musical Heritage into Contemporary Teacher Education | In these studies, the focus is on empowering teacher education based on heritage music materials, cooperative teaching with the tradition bearers, and systematic development of the curriculum. | Chen & Wong (2024)<br>Han & Leung (2017)<br>Zhou et al. (2024)<br>Keli & Simeon (2025) |
| Theme 4. Online Dissemination and Engagement Strategies for Traditional Chinese Music Education | These papers have identified how online courses, internet platforms, and changing digital strategies are important in making traditional Chinese music more accessible, engaging, and getting transmitted to newer generations. | Wang (2021)<br>Xie et al. (2024)<br>Li (2022)<br>Lian & Pan (2022) |

## 4.2. Data Analysis

### 4.2.1. Theme 1: Digital Pedagogy for Enhancing Kunqu Melodic and Vocal Competencies

The discussion of the digital module as a tool that can help to improve Kunqu melodic and vocal skills shows that there is a great pedagogical potential which can be related to the existing research in the field of digital opera education. The module incorporated multimodal learning approaches, which involve the combination of audio-visual examples, interactive vocal activities, and annotated melodic transcriptions to incorporate the tonalities and expressive skills of Kunqu, which are subtle.

The results show that there is a quantifiable enhancement in the accuracy of pitch, recognition of melodic contours, and expressive phrasing by the participants. This will go in line with the claim by Xiang (2025) that Kunqu opera training encourages embodied voice expression, which strengthens the vocal agility and cultural literacy. Equally, the scaffolding of the online module relates to the Xie et al. (2025) framework of digitizing the Chinese opera heritage to enable its continuous engagement and practice. Besides, interdisciplinary approaches to musical literacy, as argued by Zheng et al. (2025), played a significant role in the way reflective listening and performance feedback mechanisms were developed. Finally, Wei et al. (2024) highlight the importance of digital tools in the

contextualization of the traditions of opera in modern education, which confirms our results in terms of receptivity among learners and long-term vocal growth.

### 4.2.2. Theme 2: Policy-Driven Digital Preservation and Teacher Training for Chinese Opera Education

The incorporation of digital preservation policies into the training of Chinese opera performers demonstrates an increased correspondence of cultural sustainability with the teacher training models. The study compared the impact of national and regional policy programs on pre-service teacher preparedness in music with a special focus on curriculum digitalization and pedagogical continuity.

The results prove that the digitization activities supported by the policy have a great impact on providing access to the operatic content and enlightening teacher skills. The institutional dimension of managing intangible cultural heritage is emphasized by Xu and Natayakulwong (2025), who support the idea of the structured frameworks that would facilitate the implementation of community-based operatic activities in the digital environment. Along with strategic foresight via digital humanities, Tai-jui (2022) also suggests integrating the metaversion as a prophetic model of opera education. In the meantime, Leung (2024) also focuses on the significance of calibration of regional

policy and proves that the effective transmission requires local teacher familiarity and local infrastructural support. In line with this, Leung et al. (2025) recognize digital training as a key conveyor of constructing pedagogical fluency by emphasizing the in-service development as a critical tool in ensuring sustainability in teaching opera by generation.

### 4.2.3. Theme 3: Integrating Local Musical Heritage into Contemporary Teacher Education

The concept of local musical heritage as an essential part of modern teacher education is becoming widely understood. This paper used curricular design, instructional resources, and pre-service teacher reflection as methods to assess the extent to which regional music tradition, and specifically Chinese opera and folk music, are institutionalized into the professional training. Using content analysis of lesson plans, reflection journals, and institutional curriculum guides in three teacher education programs, the results of the study help to understand how localized musical narratives can strengthen teacher identity and teaching practice.

Chen and Wong (2024) show the revolutionary prospects of partnerships between music teachers and Cantonese opera professionals and indicate that the joint work with tradition helps to increase the level of historical knowledge and pedagogical imagination. In a similar manner, Han and Leung (2017) demonstrate that the institutional support and the background exposure to Chinese folk music influence the attitude of teachers toward this music, which is why heritage-based scaffolding is required in training. Zhou et al. (2024) give a longitudinal view of the role of local music teaching materials, the gap in the pedagogies that are still present in modern curricula. In support of this, Keli and Simeon (2025) suggest Kodaly-based techniques as culturally competent to incorporate the Sichuan Han folk songs, and as a demonstration of this, they provide a reproducible model of early childhood and music education.

### 4.2.4. Theme 4: Online Dissemination and Engagement Strategies for Traditional Chinese Music Education

The paper describes the effectiveness of online dissemination and engagement tools in advocating traditional Chinese music education to pre-service teachers. According to Wang (2021), the internet played a central role in ensuring the continuation of the Chinese musical legacy, and advocates the use of interactive platforms without sacrificing cultural

substance to make the content easy to engage with. The results of the research confirm the argument by Wang (2021), indicating that the modules that incorporate the historical background, recording of the performance, and listening quizzes, expressed better engagement and cultural understanding ratings. On the same note, Xie et al. (2024) state that digital evolution makes it easier to incorporate traditional Chinese music in modern curricula, which is consistent with the preference of the participants towards the hybrid models involving a combination of tradition and technology. Li (2022) mentions the importance of organized online courses in enhancing the appreciation of folk music, which is also reflected in the study in terms of greater retention and improved accuracy in performance. Lastly, it is important to note that a successful online learning process depends on properly designed engagement strategies, which is reflected in the results of this study by such strategies as active discussion in the forum, loops of peer feedback, and reflective journaling activities (Lian & Pan, 2022).

## 5. DISCUSSION

This study examines how Kunqu, which is one of the oldest surviving Chinese opera forms, has been mediated digitally in the pre-service music education background. The fact that it centers on a culturally based and historically specific art form makes its contribution to the discussion of cultural preservation in the pedagogical setting. The encompassment of the Kunqu takes care of the historical issues of the underrepresentation of non-Western musical traditions in the curriculum of teacher education. Such traditions, according to the literature, have remained in marginal roles in international music education, even though they are highly arts-rich and educationally rich (Maybin, 2019; Yang and Welch, 2023). The study can be seen as aligned with the present-day calls to decolonize music education and introduce culturally responsive instruction by concentrating on the melodic patterns of Kunqu and the vocal expression of the piece.

The study is based on Constructivist Learning Theory and the Multimedia Learning Theory presented by Mayer, as both have a theoretically reasonable rationale of involving the learners in the culturally immersive and multimodal experiences. The theory of constructivism, especially the Vygotskian scaffolding theory, helps facilitate the active construction of knowledge among the learner in culturally rich settings and encourages the learner to gain a deeper understanding through reflective listening and interactive interaction as well as

through collaborative inquiry (Vygotsky, 1978; Piaget, 1976). The rationale of the study is further supported by the Mayer framework, which shows how audio, visual, and verbal stimuli can be used to decrease the cognitive load and help in understanding a complex musical phenomenon (Mayer, 2001). Yet, although the consistency of the theory and the research design is methodologically consistent, the discussion could have used a more critical approach to the mediation of the naturally performative and embodied features of Kunqu. Embodied cognition theories and oral transmission, such as these, might also be useful in providing a complementary viewpoint to traditional musical forms.

The qualitative interview-based, pre-test and post-test, and classroom observation of 28 pre-service music teachers suggest results that may be seen as evidence of the improvement of pitch accuracy, melodic contour perception, and vocal expression (Xiang, 2025). These conclusions align with the previous works that suggest the use of digital technologies as both the means to preserve expressive layers and increase accessibility (Xie et al., 2025). The study, therefore, reveals that pedagogical rigor can guide the use of digital mediation to facilitate the development of technical skills, as well as intercultural sensitivity among students of music education. Nevertheless, even though the findings support the effectiveness of the research, future directions must be carried out regarding the longitudinal impacts and the sustainability of such interventions in various groups of learners and settings.

However, in spite of its advantages, the study fails to adequately question the issues of making an art that is orally passed down and through apprenticeship and embodied performance digital. The challenges of digitizing the expressive and physical aspects of Kunqu digitally have been highlighted by the works of such scholars as Luo (2023) and Feng (2020). This conflict between the need to preserve an art form digitally and the danger of losing its lived and localized nature is one of the main epistemological issues. In addition, the research does not take into consideration the differences between the access to and interpretation of digital content by learners. The studies of culturally responsive pedagogy (Redmond, 2022; Gay, 2018) note the significance of addressing the digital literacy of the learners, their socio-cultural background, and their previous exposure to non-Western music. These differences are critical to address to achieve the inclusivity and effectiveness of the future digital intervention in music learning.

Overall, the given research paper contributes to the digital heritage in music education in a novel way. The innovative integration of theory, practice, and cultural maintenance offers a possible model of how to incorporate endangered performance traditions into modern teacher training. Although some aspects of the research methodology could be improved, and the number of delineated scopes does not avoid certain limitations, the study does manage to show that digitally sensitive approaches to pedagogy and culture might contribute to the rejuvenation of previously unacknowledged musical traditions such as Kunqu opera.

## 6. CONCLUSION

The current research is a groundbreaking contribution to the field of music teacher education since it develops a digital learning module based on the melodic and vocal complexity of Kunqu opera. Being on the crossroads of cultural preservation, pedagogical innovation, and digital transformation, the study presents the research that presupposes the integration of traditional Chinese operatic forms into pre-service training, which provides expressive competency, intercultural awareness, and pedagogical flexibility. Based on constructivist and multimedia theories of learning, the module uses the audio-visual resources, annotated scores, and interactive activities to promote the technical and interpretative skills of learners. The pedagogical importance of digital heritage practices is supported by the outcomes of the empirical results, such as enhanced pitch recognition and expressive phrasing. Also, the study makes a contribution to the decolonization of the curriculum and cultural sustainability, overcoming the biases that have long been present in the Western-centered music education. Finally, the paper provides a replicable and customizable model of integrating intangible heritage arts into the 21st-century teacher training to bridge the gap between the traditions of historical performance and the educational needs of the 21st century.

### 6.1. Limitations

The study has significant limitations regardless of its contributions. The last limitation of the systematic literature review is the sample size of 16 studies, which limits the ability to generalize results in particular situations, particularly in the context of diverse cultures. The emphasis on Kunqu in a Chinese pedagogical system, devoid of cross-comparing systems in other non-Western cultures

(e.g., Indian or Middle Eastern), restricts the applicability. Moreover, the research lacks a focus on the diversity of learners in terms of digital access, digital literacy, and cultural exposure, which are the aspects that should be considered to achieve successful multimodal involvement. Lastly, the module does not have longitudinal data about its efficacy, so it is not easy to determine the long-term pedagogical effectiveness or lasting alterations in the teaching practice. Besides a small sample size and insufficient cultural comparison, the systematic literature review in this study can be affected by the bias of publication and limitations of the chosen scholarly databases. Moreover, the study fails to reflect the diversity of learners in terms of digital access or culture, and the lack of longitudinal data does not permit concluding on the long-term pedagogical influence of the digital one.

## 6.2. Future Directions

Future research will have to cover more comparative dimensions by incorporating other oral-based performance traditions like Indian raga or Arab maqam, and investigate the ways in which culturally diverse modules can be digitalized and cross-integrated into global teacher education. There is also a need to conduct longitudinal research to determine the long-term outcomes of the module on teaching effectiveness and cultural literacy of students. In addition, the user-centered design models must be used to evaluate the interaction of different learners with a different socio-cultural and technological background with digital modules. The inclusion of adaptive AI devices of vocal analysis and real-time feedback may also enhance the interactivity of learners and allow individual cultural pedagogy in digital arts education.

Moreover, the digitization of various oral traditions, including Indian raga or Arab maqam, in world music education should be the subject of future research. The use of virtual reality in immersive learning, real-time AI vocal feedback, and community-based engagement will help enhance the cultural authenticity and interaction with learners. The longitudinal research of the long-term effects of teaching methods and cultural literacy of students in a variety of settings is also required.

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