Virtual Reality as an Applied Safeguarding Tool for Sri Lankan Traditional Music Heritage

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Abstract

n Sri Lanka, traditional musical practices embedded in agricultural, ritual, and occupational contexts are rapidly declining due to modernization, generational discontinuity, and the erosion of performance environments. Existing safeguarding initiatives largely emphasize documentation and archiving, often failing to engage younger generations or to communicate the experiential and contextual dimensions of musical traditions. Addressing this gap, this study explores how emerging technologies particularly Virtual Reality (VR) can be effectively integrated into efforts to sustain and promote Sri Lankan traditional music heritage. Grounded in applied ethnomusicology and UNESCO's safeguarding principles, the research combines ethnographic fieldwork, archival research, and digital application development. Audio recordings from early ethnomusicologists such as Arnold Bake, W. B. Makulloluwa, and C. de S. Kulatillake, alongside contemporary field recordings, informed the creation of a multi-domain VR application. The application focuses on endangered musical forms including bullock-cart songs, boatman songs, Kamath gee, and watch hut songs, reconstructing their original cultural and environmental contexts through immersive 3D environments. Developed using Agile methodology, Unity, and Blender, the application was piloted with university students to evaluate usability, engagement, and learning outcomes. The findings demonstrate that VR offers a powerful tool for safeguarding by enabling participatory, multisensory, and context-rich

encounters with traditional music. Rather than functioning solely as an archival medium, the VR application supports social sustainability, intergenerational transmission, and cultural agency. The study argues that safeguarding must move beyond preservation toward experiential and community-centered models that recognize traditional music as a living and evolving practice within contemporary Sri Lankan society.

Keywords: Applied Ethnomusicology, Digital Preservation, Safeguarding Intangible Cultural Heritage, Traditional Music Heritage, Virtual Reality (VR)

Introduction

Music reflects human creativity and cultural diversity as an integral element of the Intangible Cultural Heritage (ICH). Traditional music serves as a medium for storytelling, historical preservation and community bonding worldwide. According to the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) 2003 Convention, ICH refers to "the oral traditions and expressions, performing arts, social practices, rituals and festive events, knowledge and practices concerning nature and the universe" that are transmitted across generations (UNESCO, 2023a, p.6). The list of UNESCO's ICH has grown to include new inscriptions since 2008. The UNESCO ICH inscribed element list includes 788 elements representing 150 countries across five regions (UNESCO, 2023b). The terms music and song appear in 304 of the 584 entries on the list (52%), referring to music alone or in combination with other qualities such as dance and poetry (De-Miguel-Molina et al., 2021).

ICH Item	Category	Inscribed Year in the List	Country	Related Sustainable Development Goals (SDG)
Wosana ritual and associated practices	Rainmaking Ritual	2024	Botswana	2, 3, 5, 16
Mangwengwe traditional dance	The performance involves a lead singer or dancer, supporting singers and dancers, hand clappers, and musicians.	2024	Zambia	4, 5, 8, 16
Sevdalinka, a traditional urban folk song	Form of traditional urban singing	2024	Bosnia and Herzegovina	3, 4, 5, 8, 16
Mek Mulung	Traditional Malaysian performance involving acting, dialogue, singing, and dancing	2023	Malaysia	4, 16
Bolero:	Latin	2023	Cuba and	4, 5, 16, 17

identity, emotion, and poetry turned into song	American sentimental song		Mexico	
Hiragasy	The performing arts comprise of songs, dances, and speeches.	2023	Madagascar	4, 5, 16
Malhun	A popular form of poetic expression	2023	Morocco	4, 5, 16
Sadeh/Sada celebration	Seasonal festival involves singing, dancing, and praying around a fire and offering blessings	2023	Iran and Tajikistan	2, 16, 17
Raï	Popular folk song	2022	Algeria	5, 8, 10, 16
Dutar making craftsmanship and traditional music performing	Turkmen music and singing	2021	Turkmenistan	4, 5, 12, 16

arts combined with singing				
Inuit drum dancing and singing		2021		4, 16, 17

Table 1: Examples of Musical Heritage on the UNESCO List
Source: https://ich.unesco.org/en/lists

Traditional music plays a universally recognized role in fostering identity, belonging, and continuity within communities. Furthermore, it is a deeply ingrained element of cultural expression in most countries, especially China. It also serves as a cornerstone for defining and maintaining cultural identity and connecting individuals to their roots in the community. Traditional music conveys cultural values, collective histories, and shared experiences through its melodies, rhythms, and lyrics. After analyzing the table of UNESCO-listed musical heritage samples, it is interesting to note that traditional songs in many countries serve as vehicles for moral lessons, historical events, and for conveying collective wisdom. It has also been incorporated into unofficially documented narratives. For example, ritual music strengthens bonds during social and religious ceremonies. Lullabies and work songs have been used to teach children cultural norms and behaviors. This musical transmission strengthens the sense of belonging by fostering social and emotional ties within groups.

An interesting example is the Wosana ritual and practice in Botswana. Music plays an important role in Wosana rituals. It helps build a strong sense of community and belonging, bringing people together and strengthening their feelings of connection to each other and their culture. This communal tradition involves the participation of everyone in the community. It includes conventional leadership, practitioners (the Ntogwa

family), a high priest, men, women, and children as part of the audience (UNESCO, 2023a). In the Wosana Ritual and Associated Practices, music plays an important role and is at the heart of this practice, binding participants together and strengthening collective cultural identities. Human emotions such as happiness, sadness, and anger are profoundly affected by music. Music plays a positive role in developing a sense of belonging and self-confidence (Berthelot, 2017). Furthermore, Berthelot (2017) emphasizes its capacity to strengthen communal ties and individual identity. The music of these rituals and the collective participation of the community highlight the indispensable role of traditional music in promoting social cohesion and cultural continuity in the community. Associated songs and dance practices are transmitted through observation, regular practice, and mentoring. In addition, the enactment of the element is an opportunity for practitioners to produce and share food. Traditional music is more than just the preservation of cultural identity. It brings people together to share their experience. For example, in some communities, farming depends on rain rather than irrigation systems. Consequently, music often serves as a binding element that promotes unity among community members. Traditional music not only helps maintain cultural heritage but also serves as a catalyst for unity and continuity across generations (Liu et al., 2024).

Zambia's Mangwengwe Dance was added to UNESCO's representative list of Intangible Cultural Heritage of Humanity in 2024 (UNESCO, 2023a). This dance form has been practiced by both men and women among the Mambwe and Namwanga people of Zambia, exemplifying the role of music and dance in fostering community identity and unity (UNESCO, 2023a). The performance involves a lead singer or dancer, supporting singers and dancers, hand clappers, and musicians.

Women and girls take on roles as dancers, singers, and instrument players, while some men join in to support them by dancing, singing, and clapping. The Mangwengwe Dance holds profound cultural and social significance and is performed at significant communal events such as weddings, funerals, and traditional ceremonies. Notably, it is the only dance performed at the funeral and burial of a chief, highlighting its deep connection to the community traditions. Men actively participate in these dances during the celebrations. Beyond its ceremonial functions, the dance also serves as a medium of communication during political gatherings, where participants compose songs to praise or critique political and civic leaders, effectively voicing community challenges and achievements in the process. Over time, the Mangwengwe Dance has evolved to encompass both historical and contemporary themes, reflecting the community's dynamic cultural landscape. By bringing people together in celebration or reflection, dance fosters a sense of belonging and shared identity, extending its unifying power to occasions such as welcoming or bidding farewell to visitors and guests.

Traditional music is a vibrant repository of cultural knowledge and values. It retains its core elements while adapting to changing circumstances (Liu et al., 2024). As a dynamic tradition, it connects past and present (Makulloluwa, 2000). Furthermore, it offers a sense of continuity, despite rapid social changes. This resilience in music encourages communities to preserve their identity while promoting unity, harmony, and solidarity in an increasingly interconnected world (Kulatillake, 1976). Considering the above facts, it is important to preserve traditional and folk music for future generations, as music is an integral aspect of human culture. UNESCO's (2003) convention states that cultural practices across the world are under serious threat from a range of local and

global forces, and the music of minority groups, Indigenous peoples, and other marginalized or minorities groups is particularly at risk.

The extinction of musical and other cultural expressions occurs due to technological advancements, cultural homogenization, rapid urbanization, detaching younger generations from music practices (decline in transmission), and the displacement of traditional musical instruments and performance practices with digital and synthetic alternatives. Furthermore, cultural practitioners often face financial hardships. It is difficult for them to sustain their livelihoods through traditional music alone. Consequently, they may abandon their practice altogether. Grant (2024) emphasized that the diminishing ability of people to engage in rich cultural and social experiences contributes significantly to the fading of musical expression. War, political unrest, and natural disasters have disrupted communities. Policy gaps and insufficient support for safeguarding initiatives further accelerate the decline in cultural expression. Most of these factors are interrelated.

Considering the above facts, it is important to preserve traditional music for future generations, as music is an integral part of human culture. Many countries are actively working to develop comprehensive applications to safeguard traditional music. A graded music examination application was developed to preserve traditional Malay music in Malaysia (Shah & Saidon, 2017). This application assists in improving the sustainability of traditional Malaysian music, specifically the Malay Gamelan. This application involves the consideration and mechanism needed to assess the musical achievements of musicians included in Malaysian traditional music. This application also involves viva voce components, which analyze music in terms of the background, instruments, repertoire, music style, understanding of the aesthetics of the specific genre,

and performance practice. A quantification method was developed to preserve and promote Chinese musical and cultural heritage on the Internet (Wang, 2021). This method examines the global popularity of Chinese music using purposive sampling and content analysis.

The percentage alteration across the number of views concerning time was calculated, and a sample t-test with a normal distribution of data was performed using the Shapiro-Wilk criterion. Wang's (2021) application for the preservation and promotion of China's musical cultural heritage suggests that Chinese musical heritage is popularized through the Internet and improved by new developments. Music Computer Technologies (MCT) are applied to preserve and transmit traditional music in the Far East of Russia and China (Alieva et al., 2019). Alieva et al. (2019) developed MCT application that understands the traditional musical folklore beneficial for saving the national musical culture, preservation, development, and popularizing traditional cultural heritage. Kan (2022) developed an application to maintain the sustainability of traditional music and the ecological environment.

Kan's (2022) method analyzes the characteristics of traditional music by limiting the weight of the lyrics and semantic information. Koukopoulos et al. (2016) implemented a web-based application to digitize, manage, and disseminate musical and cultural heritage. This web-based application is designed to safeguard Ionian Islands' folk music using an architecture with a digitization layer and an information system layer. The digitization layer imparts all mandatory digitization services and an information system layer that assists effective multimedia management and a digital dissemination environment, which is beneficial for enhancing the heritage of Greek Ionian music. Folklore is created by combining the life customs and thoughts of common people (Makulloluwa, 2000). It arises

from people's historical events, daily lives, and environment. Traditionally, it has been passed down orally from generation to generation. People have shared and preserved their collective heritage through storytelling, singing, and performances. Over time, each retelling may introduce variations, leading to rich diversity of expressions.

Sri Lanka's traditional music heritage is a living reflection of the island's identity, embedded in rituals, agriculture, and occupations. Songs such as *kamath gee, nelum gee, goyam gee* and *bethi gee* have shaped social and spiritual life for generations. However, due to modernization and changing cultural values, many traditions are vanishing, and younger generations have limited connection to these musical practices. Sri Lankan government and civil society has done a very poor job at preserving its rich traditional music heritage. The country did suffer from the civil war for several decades; the state of archiving in the country (and digitization) has lagged behind other countries for several reasons.

Despite growing recognition of the need to safeguard Sri Lanka's traditional music heritage, existing preservation efforts largely rely on documentation and archival methods that often fail to engage younger generations or convey the lived, performative contexts of musical traditions. This raises the research question: How can emerging technologies particularly Virtual Reality (VR) be effectively integrated into safeguarding strategies to sustain and promote Sri Lankan traditional music heritage in ways that are culturally grounded, participatory, and sustainable. The aim and objective of the study is to integrate innovative technologies, particularly Virtual Reality (VR), to sustain and promote Sri Lankan traditional music heritage. This involves researching Virtual Reality technologies, testing their applicability, and integrating them into preservation and promotion efforts.

Methodology

This study used purposive sampling to select the music forms. VR application development focuses on four specific musical forms: bullock-cart songs, boatman songs, Kamath gee, and watch hut songs. This study focused on traditional songs that are rarely performed in contemporary environments, with the objective of safeguarding endangered musical forms. The criteria for selection were primarily based on,

(1) the historical significance of the music forms within Sri Lankan culture,

(2) their current level of practice and performance within traditional settings, and

(3) the availability of practitioners or knowledge holders.

These criteria were operationalized by consulting with ethnomusicologists, reviewing archival records at the National Archives of Sri Lanka, and preliminary field interviews with cultural practitioners in rural areas. This approach ensured that the selected music forms represented a broad spectrum of Sri Lanka's musical heritage, while also prioritizing those at greatest risk of fading from cultural memory. The Agile development methodology was selected for its flexibility and iterative approach, allowing for continuous user feedback and rapid incorporation of changes into the VR application. This approach was deemed necessary due to the exploratory nature of developing an educational VR experience, where user feedback could lead to significant adjustments in content presentation and interaction design. Blender was used for custom 3D models due to its powerful modeling tools and compatibility with Unity.

Results and Discussion

Figure 1 and **2** illustrate the user interface for engaging with Karaththa Kavi, and **Figure 3** and **4** provide boatmen songs boat design stages within the VR environment, showcasing intuitive controls, spatial navigation cues, and embedded cultural annotations.

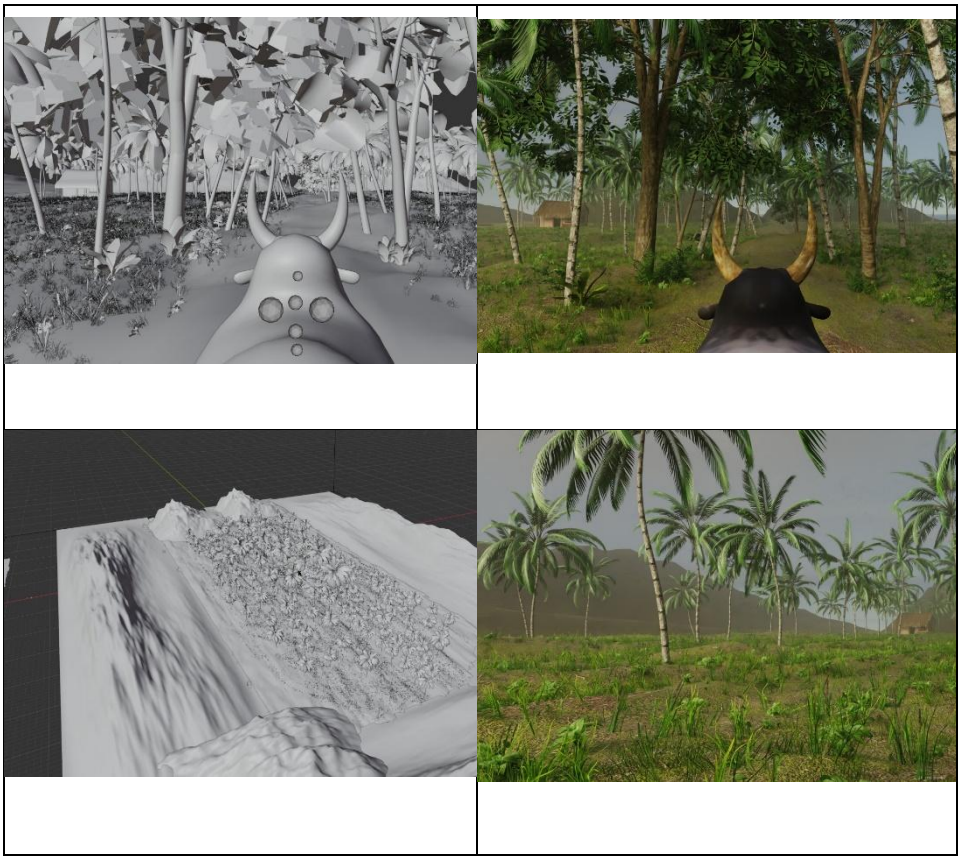

Fig.1:Developed interface for Karaththa kavi

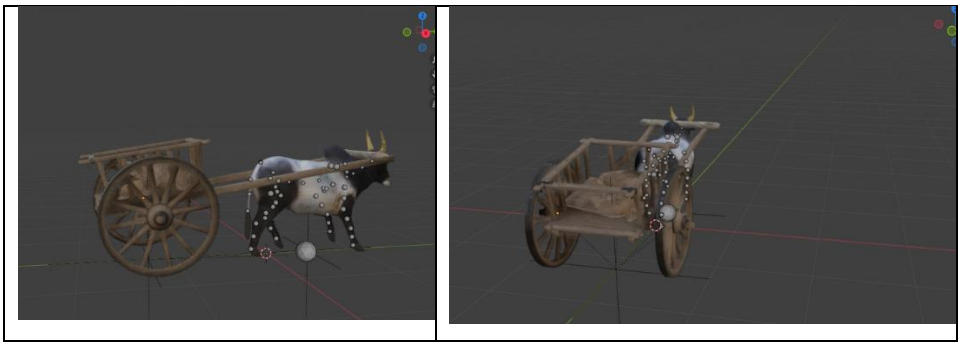

Fig. 2:Bullock Cart Design Stages

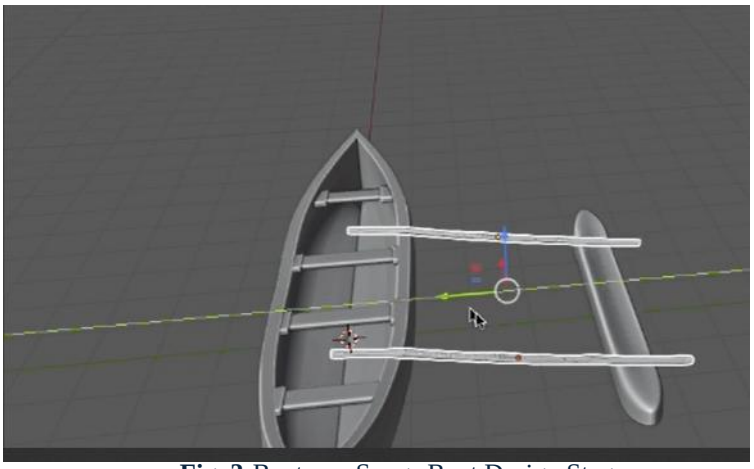

Fig. 3: Boatmen Songs Boat Design Stages

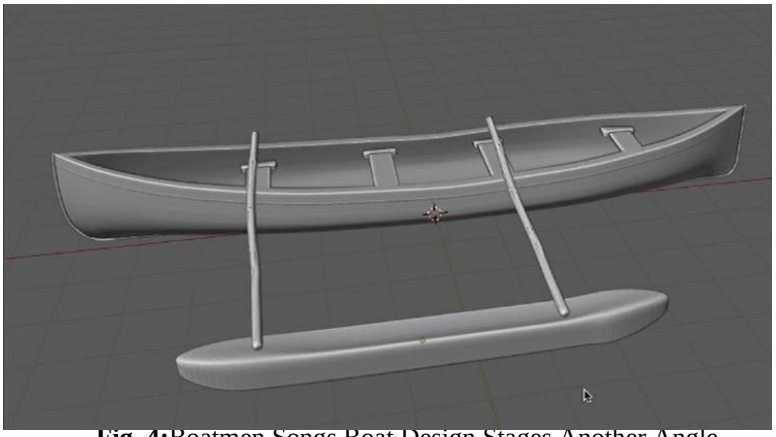

Fig. 4: Boatmen Songs Boat Design Stages Another Angle

The initial development of the VR application was conducted with

students from the Department of Ethnomusicology at the University of the Visual & Performing Arts as a pilot study. This provided an academically grounded environment for preliminary testing and iterative refinement.

Traditional music is not just auditory; it's a multisensory experience that often involves specific cultural and environmental contexts. VR's immersive nature could be uniquely suited to replicating these aspects, allowing users not just to hear the music but to feel present in its original context. Zhao et al. (2025) stated the potential of Virtual Reality (VR) for a range of cultural heritage preservation applications. This technology has the "ability to create three-dimensional representations of real or imagined locations, provides a compelling sense of realism, illustrating its potential for various applications in cultural heritage preservation, such as 3D historical reconstruction, enhanced tourism engagement, gamified learning, and pedagogical cultural heritage programs" (Zhao et al., 2025, p. 1). VR's immersive capabilities surpass those of other digital technologies, such as 2D video or audio recordings, by providing a three-dimensional, interactive experience that more closely mimics attending a live performance. VR's interactivity differentiates it from other technologies in capturing the communal aspects of traditional music performances.

Traditional music often involves audience participation or a communal setting that is difficult to replicate through passive viewing or listening. VR's interactive potential allows users to not only observe but participate in these performances, perhaps by playing an instrument or following the movements of a dance, thus more fully capturing the communal spirit of these traditions. VR can engage multiple senses simultaneously, a feature that is particularly relevant for traditional music performances. For example, beyond auditory and visual stimuli, VR could potentially incorporate tactile feedback (through haptic technology) to

simulate the sensation of playing an instrument or the feeling of dancing.

This multisensory engagement is something that other digital technologies, which might only engage sight and sound, cannot fully provide. VR environments can be designed to include educational elements, such as textual information about the history and significance of the music, interviews with musicians, or scenes depicting the music's role in community events. This aspect of VR could be highlighted as a unique affordance, as it allows for a more enriched learning experience compared to simply listening to music or watching a performance. VR allows for the recreation of no longer accessible experiences, serves as a powerful tool for the preservation of intangible cultural heritage. This is especially crucial for traditions at risk of being lost over time. VR's ability to archive these experiences in an engaging and accessible manner could be argued as superior to traditional methods of preservation, which may not capture the full experiential richness of the cultural practices.

Sri Lanka’s traditional music forms, such as bullock-cart songs, boatman’s songs, and watch hut songs, have historically been integral to the nation’s cultural identity. These musical expressions were not merely artistic performances but were deeply embedded in daily life, agriculture, and community activities. However, with rapid modernization, urbanization, and shifts in occupational structures, these traditions have witnessed a significant decline. The environments and contexts that once nurtured these musical forms have transformed or vanished, making live performances increasingly rare and documentation challenging in the present day. In this sense, the younger generation has limited exposure to traditional musical experiences. The absence of firsthand encounters and the scarcity of accessible video recordings have created a cultural disconnect, posing a risk to the continuity of this heritage in the future. To

fill this gap, innovative approaches are needed to preserve and revitalize these musical traditions. VR technology is an effective tool for achieving this purpose. VR can reconstruct the settings and environment in which traditional songs were originally performed by creating an immersive and interactive environment (Latta & Oberg, 1994). This technology facilitates the creation of interactive educational programs in which users can learn about the history, theory, and cultural significance of Sri Lankan traditional music through engaging simulations and virtual tutorials (Zhao et al., 2025). Users can virtually experience the ambiance of a watch hut in the paddy fields or the rhythmic journey of a bullock cart, accompanied by authentic musical renditions. This immersive approach preserves auditory elements and contextualizes them within cultural and environmental settings (Paolanti et al., 2023). Moreover, VR facilitates experimental learning (Crogman et al., 2025) and allows users, especially young people, to engage with cultural content in a manner that is both educational and emotionally resonant.

According to Multimedia Learning Theory, people learn more deeply from words and pictures than from words alone (Mayer, 2005). The VR application leverages this by providing rich visual and auditory stimuli to represent traditional music contexts. The Mayer's (2005) theory emphasizes the importance of reducing extraneous cognitive load. The VR environment can help focus attention on relevant stimuli by recreating authentic settings without distractions. The VR application integrates visual and auditory information in a cohesive 3D space, which may enhance learning compared to separate presentations. By presenting information through visual and auditory channels simultaneously, the VR experience may reduce cognitive load compared to text-heavy presentations.

According to Dandeniya's (2016) Temple Gateway and Transcultural Passage model, the VR environment functions as a virtual gateway through which users pass from their own cultural context into Sri Lanka's traditional music. When using a VR environment for traditional music in SL, if the user is unfamiliar with the music types, sounds, and environment, they may encounter a sense of disempowerment and disorientation. This is normal because they are in an unfamiliar cultural setting with unique practices. However, through the utilization of carefully constructed preorientation modules, interactive guides, and contextual narratives, the application fosters a progression that gradually enables users to transition from novice to informed observer and ultimately participate in the cultural performance (Dandeniya, 2016).

The pre-orientation module aligns with Multimedia Learning Theory's (Mayer, 2005) emphasis on providing prior knowledge to enhance learning from multimedia. It also addresses Technological Access Models (TAM)'s (Davis, 1989) focus on perceived usefulness by framing the experience's value. This theoretical lens underscores the importance of structuring VR experiences as a liminal journey that acknowledges the initial cultural distance but leads to meaningful engagement and empathy. Additionally, complementing this, the concept of proximal simulation learning (Nethsinghe, 2013) highlights that learning effectiveness increases when virtual environments closely mirror the real-world contexts they represent.

By pre-orienting the layout of watch huts, the rhythmic ways of bullock carts, the ambient sounds of the chena environment, and boat paddling, the VR application minimizes the psychological distance between the user and tradition. Interactive elements such as handing virtual elements or adjusting ambient conditions reinforce embodied cognition,

allowing users to not only observe but also learn by doing within a high-fidelity simulation (Nethsinghe, 2013).

This alignment with proximal simulation theory ensures that the VR tool not only captivates attention but also embeds lasting cultural knowledge through an immersive situated learning experience. Additionally, studies have highlighted the efficacy of VR in enhancing cultural education by providing multisensory experiences that foster deeper understanding and retention (Andonova et al., 2023; Crogman et al., 2025; Latta & Oberg, 1994). Integrating VR into cultural preservation strategies ensures that traditional musical forms are archived and revitalized, making them accessible and relevant to contemporary audiences.

In conclusion, the use of VR technology offers a transformative approach to sustaining Sri Lanka's traditional musical heritage. It addresses the challenges posed by modernization and generational shifts, ensuring that these invaluable cultural expressions resonate with and inspire future generations to come.

Conclusion

This study demonstrates that Virtual Reality can play a transformative role in the safeguarding of Sri Lanka's traditional music heritage by extending preservation beyond static documentation into immersive, experiential engagement. By reconstructing the cultural, environmental, and social contexts in which traditional songs were originally performed, the VR application addresses key challenges posed by modernization, loss of transmission, and limited youth engagement. Grounded in ethnographic research and informed by archival materials, the application aligns with UNESCO's safeguarding framework while advancing an applied, community-centered approach. The findings suggest

that VR is not merely a technological tool for archiving, but a medium capable of supporting social sustainability, embodied learning, and intergenerational continuity. While this research focused primarily on audio-based traditions, it also highlights future directions for integrating textual archives and deeper ethnographic analysis. Ultimately, the study argues that safeguarding traditional music requires adaptable, participatory, and innovative strategies that recognize cultural heritage as living, evolving, and meaningful for present and future generations.

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