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Content Adaptation, Validation, and User Experience of the Music Island App for Chinese Elementary Music Education

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Abstract

Background/purpose. This study examined the adaptation and user experience of the Chinese version of the Hungarian music teaching software Music Island, addressing the need for localized digital tools to support elementary music education in China. The objective was to assess its user experience for both teachers and young learners within the national curriculum context.

Materials/methods. Over the course of a year, the adaptation retained core gamification elements while integrating translated text, localized audio, and culturally relevant materials. Content and face validity were evaluated by six music education experts and three elementary school teachers. Additionally, 124 elementary students participated in a one-month, one-group, posttest-only user experience study.

Results. Expert review indicated I-CVI ≥ .78 across items and modified kappa (k*) ≥ .74 after revisions, supporting clear and culturally appropriate content. Student feedback reflected high perceived ease of use and engagement. The adapted content was considered linguistically clear, pedagogically appropriate, and culturally aligned with Chinese aesthetic values, supporting its use in classroom-based music instruction. Major revisions focused on translating and localizing textual and audio components, and integrating culturally relevant materials aligned with national curriculum standards.

Conclusion. The findings support the feasibility of adapting international music software to align with local curricular goals and learner needs, offering insights into future cross-cultural educational technology development. However, the study was limited by its short-term, posttest-only design. Future research should incorporate longer and more rigorous interventions.

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1. Introduction

Digital tools, including hardware (e.g., mobile devices) and software (e.g., applications) (Rice, 2003; Yihan, Cuong, et al., 2025), play a crucial role in enhancing the teaching and learning experience in elementary music classrooms. In elementary music classrooms, digital tools refer to technological resources and software designed to enhance music education by facilitating various aspects of teaching and learning. Digital technology integrates a variety of media forms (e.g., text, graphics, and animation), assisting teachers and their students in gaining a deeper understanding of musical components (Ruan, 2009). These various media forms provide students with multiple modes, such as visual, auditory, and kinesthetic experiences, enhancing overall comprehension and retention (Revano & Juanatas, 2024).

While digital technologies offer various educational benefits, their use in elementary music classrooms remains limited (Förster & Lepa, 2023). There may be three key reasons for this: teachers' insufficient digital skills, limited student access to technology, and challenges related to classroom integration or usability (Yihan, Cuong, et al., 2025). These issues are also evident within the Chinese context (W. Wan, 2022). Coupled with the ongoing development of digital music education in China, there is a pressing need to develop or adapt interactive applications for elementary music education. Music Island, grounded in the Kodály method, offers a comprehensive teaching-and-learning experience (Szabó et al., 2019) and aligns with current Chinese music classroom practices. Therefore, this study aimed to develop a Chinese version of Music Island by adapting the Hungarian version to support Chinese students' musical skill development in elementary classroom settings.

2. Literature Review

2.1. Digital Tools in Music Education

Digital tools significantly enhance music education by offering various benefits, including improved student motivation, engagement, and skill mastery (Lesser, 2020; Sularso et al., 2023). These tools facilitate personalized learning pathways, provide interactive multimedia resources, and enable real-time feedback, fostering a dynamic and responsive learning environment (Chen et al., 2018). For instance, hands-on composition software like GarageBand (Lam, 2024), MIDI controllers (Kladder, 2020), and digital recordings (Chao-Fernández et al., 2020) allow students to progress at their own pace and provide models for self-correction. Also, digital tools support self-regulation and immediate feedback, crucial for self-assessment and improvement (Moldovan & Nedelcut, 2022), and promote engagement through interactive and personalized practice (L. A. Wan & Gregory, 2018). Furthermore, adaptive technologies like haptic metronomes and visual notation software ensure inclusive education by providing alternative ways for students with hearing impairments to participate in music (Lafuente & Jurado, 2018). Crucially, digital tools also cultivate social skills, such as negotiation, empathy, and verbal communication, through collaborative music-making activities (Hallam & Himonides, 2022).

2.2. Music Island Application

The Music Island app is an innovative music learning software for lower elementary students, optimized for Android and Windows operating systems (Szabó et al., 2019; Yihan, Szabó, et al., 2025). Its user-friendly interface, visuals, and language align with young learners' cognitive and developmental needs, creating an engaging educational environment (Figure 1: A - Hungarian version & B - Chinese version). Empirical studies have shown significant improvements in students' musical literacy, listening skills, and sustained motivation when integrated into regular classroom teaching (Szabó et al., 2021). Music Island is grounded in the Kodály Method — a globally recognized approach emphasizing sequential, immersive music learning rooted in cultural context (Asztalos, 2023; Gülle et al., 2021; Houlahan & Tacka, 2015; Orsovics, 2015). In China, the Kodály approach has gained significant pedagogical recognition, with studies demonstrating its effectiveness in localizing folk song materials and sight-singing training (Ren, 2011).

Structurally, the software comprises five main modules, encompassing 132 learning elements and task categories (each is referred to as an item from now on). Each module targets specific aspects of musical development: (1) Sound Forest, which focuses on environmental and instrumental sounds, forming the basis for musical perception exercises; (2) Rhythm Desert, which provides rhythm knowledge and exercises using the ULWILA (Unified Learning Through Widespread Interactive Listening Activities) method—a color-coded, multisensory system developed for students with special needs (Tóth-Bakos, 2016); (3) Music Republic, which introduces a distinctive color-notated score reading and writing system, also utilizing the ULWILA method; and (4) Music Store, where the songs found within the application are stored in alphabetical order (ABC), supplemented with songs that are not included in any of the thematic units. (5) From the Harbor, users can leave the Music Island and get acquainted with the anthems and folk songs of different nations. However, this component, which offers broad cultural songs, remains underdeveloped and was not included in the adaptation process. These five modules closely align with the four core competencies emphasized in China's music education curriculum standards: aesthetic perception, artistic expression, creative practice, and cultural understanding (Ministry of Education of the People's Republic of China, 2022). This congruence significantly enhances the tool's cultural adaptability, ensuring compliance with local curricular requirements while preserving the application's original pedagogical integrity.

Figure 1. The Entry Page of the Music Island App

2.3. Current Study

Influenced by Western pedagogical approaches, Chinese music education has increasingly explored digital tools to enhance teaching effectiveness and address limitations of traditional methods (He, 2024). However, their use remains relatively limited. Research on digital tools in Chinese classrooms is sparse, with only a few studies demonstrating positive outcomes. For example, the New Way of Music program showed promising results, highlighting the potential of digital tools in enriching music learning experiences in primary schools (Lyu & Sokolova, 2023). However, due to technical constraints on computers, such as limited multi-touch functionality, this program offers a reduced interactive experience for students compared to more flexible software such as Music Island. Meanwhile, most music apps are designed for Western curricula, often neglecting linguistic, pedagogical, or cultural nuances in contexts like China (Yue & Ba, 2024). While China's music education has evolved under Western influence, it maintains distinct characteristics, notably the emphasis on traditional Chinese instruments such as the guzheng and erhu, and a strong connection to cultural heritage through the integration of folk and classical Chinese music (He, 2024). Consequently, a localization study is essential to effectively integrate Music Island within the Chinese educational context.

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Furthermore, the Music Island app has not undergone formal usability or user experience (UX) testing. Usability, defined as the efficiency, effectiveness, and user satisfaction achieved when interacting with a product or system (Lewis & Sauro, 2021), is crucial for successful technology adoption. User experience (UX) extends beyond usability, encompassing the emotional, aesthetic, and psychological responses of users. This broader perspective aligns with the Technology Acceptance Model (TAM), focusing on perceived ease of use (PEOU) and perceived usefulness (PU) as predictors of technology adoption (Venkatesh & Bala, 2008).

This study aimed to address three research questions:

RQ1: How is the Music Island app culturally adapted/contextualized for Chinese elementary music education?

RQ2: What is the content and face validity of the Music Island app within music education?

RQ3: What are the students' experiences with the Music Island app?

Guided by Roturier's localization workflow and the TAM framework (Figure 2), we hypothesized that:

H1: The culturally adapted Music Island app will demonstrate strong alignment with the curricular standards and pedagogical requirements of Chinese elementary music education.

H2: Expert and teacher evaluations will indicate acceptable levels of content validity and face validity.

H3: Students will report generally positive user experiences.

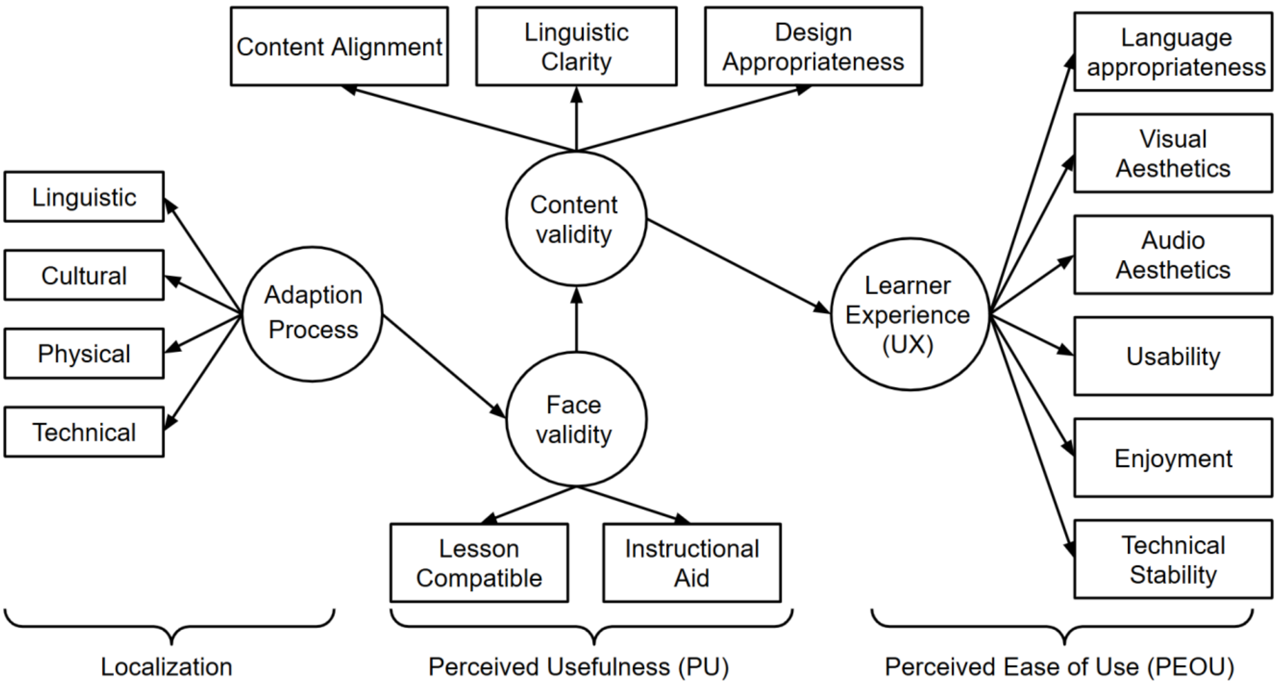

Figure 2. Flow of the Current Study

By focusing on cultural adaptation, validity assessment, and user experience, our study fills an important gap in the literature on digital tools in Chinese music education. Previous research has primarily emphasized the potential benefits of technology-enhanced programs but has not examined whether such tools align with local pedagogical traditions or cultural needs. Moreover, the absence of systematic usability and UX evaluations leaves open questions about the actual adoption and effectiveness of these tools in real classrooms. Our study directly addresses these issues by integrating both expert and learner perspectives, ensuring that Music Island is not only pedagogically relevant but also culturally resonant and user-friendly. In doing so, this research advances knowledge on how digital innovations can be meaningfully localized and scaled in non-Western educational contexts.

3. Methodology

3.1. Procedure

This study's procedure, outlined in Figure 2, was designed using the LISA framework (Jiménez-Crespo, 2024), Roturier's localization workflow (Roturier, 2015), and the TAM model (Venkatesh & Bala, 2008). The localization process was iterative and collaborative, requiring the involvement of multiple team members across various stages.

3.1.1. Localization Process

The team began with a comprehensive content audit of the original Music Island software. Elements were categorized into four domains: (1) textual components (e.g., user interface strings, terminology), (2) multimedia assets (e.g., songs, instrument sounds, visuals), (3) technical features (e.g., interactive and gamified elements), and (4) pedagogical alignment with the Chinese curriculum.

Two translators independently produced Chinese versions of all textual components, using machine translation tools (e.g., Google Translate, DeepL) as a baseline. A shared glossary database was maintained to ensure consistency. Discrepancies were resolved through bilateral cross-checking, with unresolved issues settled by a third-party arbitrator (e.g., culture-specific metaphors).

Localized content was then integrated: Hungarian folk songs were replaced with Chinese children’s rhymes, and multimedia assets were adapted for compatibility (e.g., audio format conversion). Some visual elements were also redrawn to reflect objects and scenes more familiar to Chinese elementary students. All content was embedded into the software architecture. Technical adjustments ensured the app functioned reliably within the school’s digital infrastructure.

3.1.2. Expert and Teacher Evaluation for Content and Face Validity

Expert and teacher evaluations focused on face validity (teachers) and content validity (experts). Letters of invitation were distributed via email, and participation was voluntary, with a small gift provided as compensation. Upon their agreement to participate, additional materials were shared through Google Drive, including the research objectives, a theoretical framework for assessing the employment of the Music Island app for teaching music education, and rating criteria.

The content validity of the Music Island app was evaluated using an instrument with eight criteria: one for assessing content, three for language, and four for appearance. For each criterion, a designated space was provided for experts to include comments and suggestions when necessary (Vasconcelos et al., 2019). Moreover, the experts were asked to indicate the appropriate factor or dimensionfair for each item, especially if an item is assigned to the wrong factor. For example, if an item is incorrectly categorized, they can specify the correct factor during their evaluation of the app. This assessment covered three dimensions (content, language, and design), operationalized through eight specific criteria (one for content, three for language, and four for appearance). These criteria were used to evaluate the suitability of the Music Island app for the target population, considering the participants' age and educational background.

Then, the revised Music Island app was sent to the target population, consisting of three elementary school teachers, for a face validity assessment. This assessment included two criteria (adequacy and practicality). The criterion items and rating scales are presented in Figure 3 (Bencéné Fekete et al., 2024).

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Criteria for Content Validity and Inter-Rater Reliability Assessment

Please rate the Music Island app, following the criterion items rated on a 4-point Likert scale: Totally Disagree, Disagree, Agree, and Totally Agree.

Content

- Are all text and audio elements across the four modules of the Music Island app consistent for teaching music education to primary school children?

Language

- Are the texts and visual elements clear enough?
- Are the audio elements consistent with the intended information of music education?
- Is the Music Island app suitable for the age group?

Design

- Is the Music Island app compatible with the content?
- Are the audio and visual elements appropriate for the age group?
- Is the Music Island app adequate in quantity?
- Is the Music Island app appropriate to the region or culture?

Criteria for the Face Validity Assessment

Adequacy

- Is the Music Island app appropriate for the age group?
- Is the Music Island app sufficient to achieve the objectives?
- Is the Music Island app easy to use in its entirety?

Practicality

- Is it appropriate for children to use the Music Island app practically?

Figure 3. Criteria for Assessing Content Validity, Inter-Rater Reliability, and Face Validity

3.1.3. Student Evaluation as a Measure of User Experience

A one-month, one-group, posttest-only study was conducted to assess students' user experience (UX) with the localized Music Island app. Ethical approval was obtained in advance, and informed consent was secured from teachers and parents.

The intervention was delivered by the researcher (a qualified music educator) to ensure curricular alignment. Students used the app on tablets during regular music lessons (45 minutes per session, twice weekly, for one month).

The adapted Game User Experience Satisfaction Scale (GUESS; Phan et al., 2016) was used, comprising 17 items across five factors: language appropriateness (3 items), visual aesthetics (3 items), audio aesthetics (4 items), ease of use (4 items), and enjoyment (3 items). Sample items included: *"I enjoy the sound effects in the game"* and *"I think it is easy to learn how to play the game."*

The adapted scale demonstrated strong internal consistency (Cronbach's α = 0.85). Following data collection, both descriptive and inferential analyses were conducted (see Section 3.3).

3.2. Participants

3.2.1. Research Team

The localization process involved a localization team and an expert team, with each stage assigned to at least one researcher. Each member played a distinct role in ensuring the accuracy, functionality, and cultural appropriateness of the localized software while maintaining consistency across all stages of the process (Table 1).

Table 1. Research Team Composition and Tasks

Member ID	Members' characteristics	Tasks
A1	Native Chinese speaker, Music education and performance professional	Content analysis, text translation, resource development
A2	Usability and Human-Computer Interaction specialist	Usability study plan and testing
A3	Native Hungarian speaker, Music education and performance professional	Content analysis, text translation, integration refinement, and technical adjustments
A4	Expert in Education	Coordination and general project support
A5	Expert in Education	Project management

3.2.2. Participants for the Testing Phase

Purposive sampling was used to recruit six experts for content validity, three elementary school teachers for face validity, and 124 students for UX assessment, as detailed in Table 2.

Table 2. Characteristics of Experts, Teachers, and Students

Participants	f	Female	Years of experience	M_{Age} (SD)
Experts and teachers	9	7		
Experts (music education)	2	2	7 – 11	34.5 (2.94)
Experts (pedagogy)	2	1	5 – 12	32 (3.92)
Experts (educational technology)	2	1	6 – 8	29.5 (2.94)
Elementary school teachers	3	3	3 – 12	31.3 (5.10)
Students	124	50		
Class 1	48	16	Not applicable	Not available due to institutional data policy
Class 2	36	16		
Class 3	40	18		

3.3. Data Analyses

Face validity: Following Robinson and Palmer (2017), face validity was determined by calculating the percentage of the item's rating on a binary scale (0 = inappropriate, 1 = appropriate), using the formula below.

$$\text{Face validity (\%)} = \frac{\text{Number of correct teacher ratings}}{\text{Total ratings}} \times 100$$

Content validity: An acceptable Content Validity Index (CVI) is typically ≥ 0.60. The item-level CVI, used to calculate the overall CVI and inter-rater reliability, is determined using the formula below.

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$$\text{I-CVI} = \frac{\text{Number of experts rating item as 3 or 4 (Agree \& Totally Agree)}}{\text{Total number of experts}}$$

Inter-rater reliability: IRR can be quantified using the modified kappa coefficient (k*), calculated with the following two formulae (Polit et al., 2007).

$$\text{Pc} = \left[\frac{N!}{A!(N-A)!}\right] \times 0.5^{N} \qquad k^* = \frac{\text{CVI}-\text{Pc}}{1-\text{Pc}}$$

Where I-CVI = content validity index for items, Pc = probability of chance agreement; N = the number of experts, A = number of ratings (3 or 4) agreement. Its recommended values are: fair for k* of 0.40 – 0.59; good for k* of 0.60 – 0.74; and excellent for k* >.74 (Polit et al., 2007).

Dichotomization rules. Content validity (I-CVI, k*). Experts rated each item on a 4-point scale (1 = not relevant/unclear; 2 = somewhat relevant/less clear; 3 = mostly relevant/clear; 4 = highly relevant/very clear). For computing I-CVI and the modified kappa (k*), responses were dichotomized as follows: 3–4 = "relevant" (coded 1), 1–2 = "not relevant" (coded 0). For item *i*, A_i denotes the number of experts who marked "relevant," and N_r is the number of experts who actually rated that item (missing ratings are excluded from the denominator). Thus, $\text{I-CVI}_i = A_i / N_r$; chance agreement is $P_c = C(N, A_i) \cdot 0.5^N$; and $k^* = (\text{I-CVI}_i - P_c) / (1 - P_c)$. At the scale level, S-CVI/Ave is the mean of item-level I-CVIs, and S-CVI/UA is the proportion of items with I-CVI = 1. In our sample ($N_r = 6$), I-CVI ≥ .78 is considered acceptable. Interpreting k*: < .40 = poor, .40–.59 = fair, .60–.74 = good, ≥ .74 = excellent.

For student Likert items, Agreement (%) is the share of "Agree" + "Strongly agree" responses for each item; the Overall value is the average agreement percentage across items within the subscale.

The internal consistency of the students' UX assessment was evaluated using Cronbach's alpha. Subsequently, independent samples *t*-tests were employed to examine differences in students' feedback between genders, and an analysis of variance (ANOVA) was conducted to explore variations across classes.

4. Results

4.1. The Adaptation Process of the Chinese Version of Music Island

The localized version of Music Island retains its original four modules – Sound Forest, Rhythm Desert, Music Republic, and Music Store – while integrating the LISA framework's four key elements: linguistic, cultural, physical, and technical adaptations (Jiménez-Crespo, 2024). Each element played a critical role in ensuring the software aligns with Chinese educational and cultural contexts, resulting in a seamless and meaningful learning experience.

Linguistic Adaptation: The linguistic adaptation included all text and audio elements across the four modules. This involved musical terminology, song titles, rhythm names, game task names, instructional sentences, and explanatory texts. The translation prioritized clarity, alignment with Chinese music education standards, and ease of understanding for young learners, avoiding literal or machine-generated ambiguities.

Cultural Adaptation: The cultural adaptation aimed to ensure Music Island aligns with Chinese educational and cultural contexts, going beyond mere language translation to localize musical content and teaching methods. A key adaptation was the integration of traditional Chinese music, including nursery rhymes, folk songs, and environmental sounds from daily life and nature. These familiar elements create a relatable and engaging experience, fostering an emotional connection to the music. Figure 4 compares the original and adapted versions of Natural Sound, illustrating a part of these cultural adjustments. Additionally, traditional Chinese instruments such as the guzheng, pipa, and erhu were incorporated into musical tasks. Interactive, game-based activities allow students to explore unique tonal qualities and enhance their auditory memory, creating an immersive

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learning experience. Figure 5 highlights the original and newly integrated content featuring these traditional instruments.

Music theory content was adapted to build on the foundation of Chinese Numbered Musical Notation (Jianpu) while integrating Western Staff Notation, offering students a comprehensive approach to music learning. This integration bridges traditional and modern pedagogies, enhancing students' notation, reading, and writing skills and fostering a deeper understanding of both musical systems.

Furthermore, game tasks were carefully designed to feature musical pieces familiar to students from school music textbooks. The software ensures strong alignment with local teaching objectives by using recognizable melodies, rhythm patterns, and harmonies, enhancing student engagement and motivation. Meanwhile, some visual designs of the app, such as in the 'Musical Train' task, remained unchanged, as they were not deemed cultural barriers (Figure 6).

These adaptations collectively create a culturally immersive and educationally relevant experience, ensuring Music Island resonates deeply with Chinese students while achieving pedagogical goals effectively.

Figure 4. Comparison of the Hungarian and Chinese Versions of Natural Sound

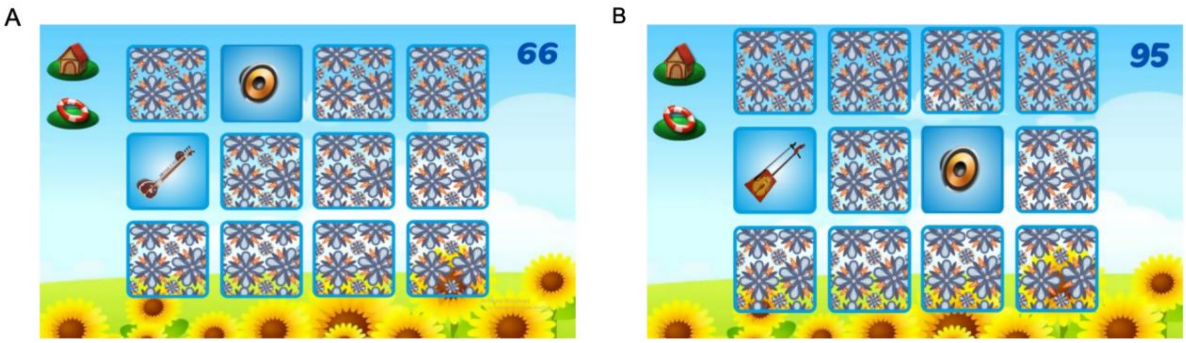

Figure 5. Comparison of the Two Versions of the Instruments' Game Task

Note. Picture A: Original Hungarian version displaying various plucked string instruments from the memory-matching game task. Picture B: Adapted Chinese version featuring additional traditional Chinese instruments from the memory-matching game task.

Physical Adaptation: The interface was redesigned to incorporate cultural symbols, familiar imagery, and child-friendly visuals inspired by Chinese daily life and nature. The layout of digital sheet music was optimized for readability, while the user interface was streamlined for intuitive navigation. These refinements enhance visual clarity and user engagement, making the tool more accessible to young learners.

Technical Adaptation: The focus of the technical adjustments was on optimizing the application's performance to ensure smooth operation across devices and seamless compatibility with Windows systems. Audio quality and synchronization were rigorously tested, and the interactive rhythm feedback module was fine-tuned to minimize latency and errors. Additionally, notation and playback functionalities were optimized for fluid performance, while music composition features were refined to enhance accuracy and responsiveness. These technical improvements ensure efficient operation across all modules, reduce technical barriers, and enhance the overall user experience.

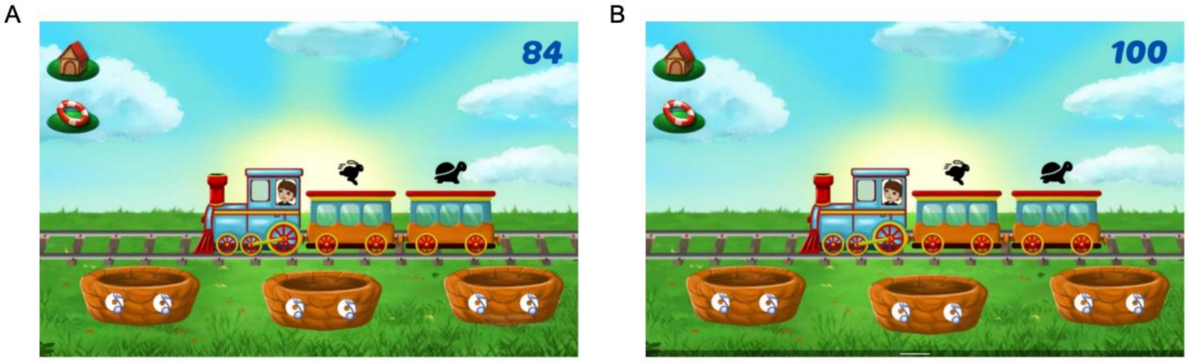

Figure 6. Comparison of the Hungarian and Chinese Versions of the Game Task “Musical Train”

4.2. Face Validity

The face validity (FV) of the Music Island app was also verified with three Chinese music teachers using a 2-point scale (where 0 = inappropriate, 1 = appropriate for each component of the app). All teachers gave minor suggestions for improvement. After revising these minor suggestions, all teachers rated the FV of all four components – Sound Forest, Rhythm Desert, Music Republic, and Music Store as 4 for both total and correct ratings, reflecting their high level of appropriateness (Table 3). Face validity indicated that the app’s components were appropriate and clear for classroom use.

Table 3. Face Validity Assessment by Teachers

Raters	Components of the Music Island App				No. of correct ratings	Total ratings	Face validity (%)
	Sound Forest	Rhythm Desert	Music Republic	Music Store			
Teacher 1	1	1	1	1	4	4	4/4 = 1 (100%)
Teacher 2	1	1	1	1	4	4	4/4 = 1 (100%)
Teacher 3	1	1	1	1	4	4	4/4 = 1 (100%)

4.3. Content Validity and Inter-Rater Reliability

In the testing phase, six experts evaluated the Chinese-adapted version of the Music Island app for its content validity. Findings showed major revisions in translating and localizing texts, as well as replacing audio content with Chinese narration and songs. We revised the texts and re-recorded the necessary audio content based on the experts’ suggestions. Then, the revised version was sent to the experts again to rate the adapted Music Island application. At this time, the content validity index (CVI) was greater than 0.78, the recommended value (Hua et al., 2019), revealing that the adapted content is linguistically clear, comprehensive, and relevant to Chinese culture and aesthetic preferences.

The inter-rater reliability (IRR) was also explored based on the agreement among the experts to show the representativeness of the Music Island app. The IRR was computed with the use of the modified kappa coefficient (k^*). The inter-rater reliability (IRR) also showed the representativeness of the Chinese elementary school curriculum, with the value of modified kappa, $k^* > 0.40$ for all items except for five items with lower k^* values. Therefore, we revised them in accordance with the experts' suggestions. Then, we computed the results again, and finally, the Music Island app indicated a good level of agreement based on cut-off scores: fair (0.40–0.59), good (0.60–0.74), or excellent ($k^* > 0.74$) (Bencéné Fekete et al., 2024). The I-CVI and IRR values of some items from the Music Island app are shown in Table 4 as a sample.

Table 4. Inter-rater agreements among experts for the representativeness of the instrument

Items	Agreements by Experts						No. of agree ments	I-CVI	IRR (k^*)
	Expert 1	*Expert 2*	*Expert 3*	*Expert 4*	*Expert 5*	*Expert 6*			
Task 1 (instrument)	4	4	4	3	4	4	6	6/6 = 1	0.98
Task 2 (human voice)	3	3	4	4	3	4	6	6/6 = 1	0.98
Task 3 (animal)	4	4	4	4	3	4	6	6/6 = 1	0.98
Task 4 (nature)	2	4	4	4	3	4	5	5/6 = 0.83	0.72
Task 5 (festival)	2	3	4	4	4	3	5	5/6 = 0.83	0.72

4.4. Students' Experience

Students provided feedback on the app's usability and user experience. Student feedback was collected regarding the app's operational stability (Figure 7). Results indicated that 68.60% of students reported the app ran smoothly without crashes or errors (strongly agree = 49.20%, agree = 19.40%), while 8.90% were neutral, and 22.50% disagreed. This suggests that a minority of students (22.50%) experienced initial difficulties, potentially due to their limited prior experience with the app's technology. These challenges are likely to diminish with increased app usage.

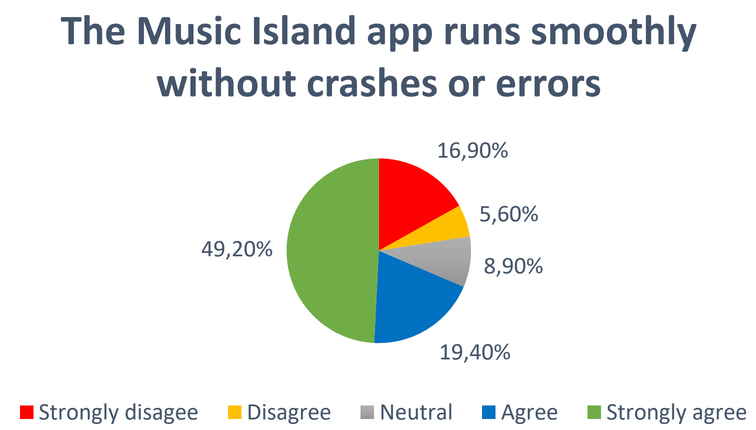

Figure 7. Distribution of Student Agreement on Application Stability

The highest agreement among students was for app enjoyment (91.13%), followed by visual aesthetics (90.75%), audio aesthetics (89.03%), usability (86.73%), and language appropriateness (84.73%). Individual agreement rates ranged from 84.19% to 92.42%, indicating strong positive perceptions of Music Island in terms of linguistic appropriateness, audiovisual consistency, user enjoyment, and ease of use (Table 5).

Table 5. Students' Ratings of App Usability and Experience

Factor	Question	Agreement (%)	
		Individual	Overall
Language appropriateness	• The text is easy to understand.	84.68	84.73
	• I think the information provided in the game (e.g., onscreen messages, help) is clear.	85.32	
	• I feel the game provides me with the necessary information to accomplish a goal within the game.	84.19	
Visual aesthetics	• I enjoy the game's graphics.	91.61	90.75
	• I think the graphics of the game fit the mood or style of the game.	88.87	
	• I think the game is visually appealing.	91.77	
Audio aesthetics	• I enjoy the sound effects in the game.	85.16	89.03
	• I enjoy the music in the game.	86.61	
	• I am satisfied with the quality of audio (e.g., audio recording).	91.93	
	• I think the game's audio fits the mood or style of the game.	92.42	
Usability	• I think it is easy to learn how to play the game.	86.45	86.73
	• I find the controls of the game to be straightforward.	89.19	
	• I always know how to achieve my goals/objectives in the game.	85.96	
	• I find the game's interface to be easy to navigate.	85.32	
Enjoyment	• I think the game is fun.	91.77	91.13
	• I enjoy playing "Music Island."	89.84	
	• If given the chance, I want to play this game again.	91.77	

4.4.1. User Experience Between Genders

Independent samples *t*-tests were conducted to examine gender differences in ratings for UX dimensions of the app. Only visual aesthetics showed a significant gender difference, $t(\approx 105.5) = -4.26$, $p < .001$, $d = -0.68$ (girls > boys); all other subscales and the composite were non-significant. Additionally, no significant gender differences were found in overall app UX (Table 6). The data suggest that both boys and girls found the app to have high usability, clear and age-appropriate language, effective audio feedback, and that it generated a positive affective response.

For the Total UX mean, there was no significant gender difference ($M_{boys} = 87.50$, $SD = 8.72$; $M_{girls} = 89.90$, $SD = 6.14$). Separately, a clear majority in both groups agreed that the app runs smoothly.

Table 6. Gender Differences in the User Experience (UX) of the Music Island App

UX	Gender	*N*	*M (SD)*	*t* (df)	p	Cohen's *d*
Language appropriateness	Boys	74	83.78 (13.11)	-1.08 (116.61)	.281	-0.19
	Girls	50	86.13 (10.93)			
Visual aesthetics	Boys	74	87.92 (12.61)	-4.26 (105.52)	<.001	-0.68
	Girls	50	94.93 (5.31)			
Audio aesthetics	Boys	74	88.38 (10.85)	-0.97 (121.45)	.336	-0.17
	Girls	50	90.00 (7.82)			
Usability	Boys	74	85.74 (13.49)	-1.21 (122.00)	.227	-0.21
	Girls	50	88.20 (9.07)			
Enjoyment	Boys	74	91.71 (8.72)	0.88 (101.85)	.380	0.16
	Girls	50	90.26 (9.15)			
Total UX rating	Boys	74	87.50 (8.72)	-1.80 (121.76)	.075	-0.31
	Girls	50	89.90 (6.14)			

Note. Welch two-sample t-tests (two-tailed). Cohen's d computed with pooled SD. Positive t and d indicate higher scores for Boys relative to Girls; negative values indicate higher scores for Girls.

4.4.2. User Experience Across Classes

A one-way ANOVA was conducted to examine class differences in student agreement regarding the app's UX across three classes. Results indicated no significant differences in overall app UX ($F(2, 121) = 0.37$, $p = .69$). However, there were statistically significant variations among classes in perceived ease of use and user satisfaction. Effects were small for usability ($\eta^2 = 0.05$) and moderate for enjoyment ($\eta^2 = 0.15$). This suggests that students from all three classes perceived the app as practically usable, with specific agreement on its linguistic appropriateness and audiovisual aesthetics (Table 7).

An ANOVA was performed to determine if app stability varied across three classes. The analysis revealed no significant differences in perceived app stability ($F(2, 121) = 2.29$, $p = .105$), suggesting that a majority (over 60%) of students in each class reported the app ran smoothly, free of crashes

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and errors. Games–Howell post-hoc tests showed that for Usability Class 1 scored higher than Class 3 (Δ = 6.25, p = .026), and for Enjoyment Class 3 scored higher than both Class 1 (Δ = 5.66, p < .001) and Class 2 (Δ = 8.07, p < .001); no other pairwise differences were significant.

Table 7. The Differences in the User Experience (UX) of the Music Island App Across Classes

UX	Class	*N*	*M (SD)*	*F*	*p*	*SE [95% CI]*	η^2
Language appropriateness	Class 1	48	86.66 (12.83)	1.10	.336	1.85 [83.03, 90.29]	0.02
	Class 2	36	84.26 (11.51)			1.92 [80.50, 88.02]	
	Class 3	40	82.83 (12.25)			1.94 [79.03, 86.63]	
Visual aesthetics	Class 1	48	91.52 (11.23)	0.32	.724	1.62 [88.34, 94.70]	0.01
	Class 2	36	90.92 (10.46)			1.74 [87.50, 94.34]	
	Class 3	40	89.66 (10.88)			1.72 [86.29, 93.03]	
Audio aesthetics	Class 1	48	88.22 (10.74)	0.79	.457	1.55 [85.18, 91.26]	0.01
	Class 2	36	88.33 (9.78)			1.63 [85.14, 91.52]	
	Class 3	40	90.62 (8.41)			1.33 [88.01, 93.23]	
Usability	Class 1	48	89.37 (9.65)	3.15	.047	1.39 [86.64, 92.10]	0.05
	Class 2	36	87.22 (9.96)			1.66 [83.97, 90.47]	
	Class 3	40	83.12 (15.00)			2.37 [78.47, 87.77]	
Enjoyment	Class 1	48	90.00 (8.58)	10.36	<.001	1.24 [87.57, 92.43]	0.15
	Class 2	36	87.59 (8.75)			1.46 [84.73, 90.45]	
	Class 3	40	95.66 (6.50)			1.03 [93.65, 97.67]	
Total UX rating	Class 1	48	89.16 (8.41)	0.38	.687	1.21 [86.78, 91.54]	0.01
	Class 2	36	87.66 (8.23)			1.37 [84.97, 90.35]	
	Class 3	40	88.38 (6.85)			1.08 [86.26, 90.50]	

Note. One-way ANOVA (k=3). Reported η^2 = SSB/SST. '*SE [95% CI]*' refers to class-wise mean estimates (SE = SD/√n; 95% CI via normal approximation). Post-hoc: Games–Howell.

5. Discussion

This study adapted the Hungarian version of the Music Island app for Chinese elementary school students to enhance their musical skills in classroom settings. The adaptation process, content and face validity confirmation, and student user experience (UX) feedback were assessed to evaluate the app's usability and UX following the perceived ease of use and perceived usefulness of the TAM 3 model (Venkatesh & Bala, 2008). Three main findings emerged: (a) the adaptation process produced a culturally appropriate and technically reliable version of the app; (b) expert validation confirmed its content and face validity; and (c) students reported positive user experiences, indicating that the software was usable, engaging, and pedagogically meaningful. Together, these findings underscore the potential of localized digital music tools to support classroom-based music learning.

The adaptation process followed established localization models (Jiménez-Crespo, 2024; Roturier, 2015) and illustrated how educational technologies can be systematically aligned with national curricula. Beyond linguistic translation, the adaptation embedded culturally familiar musical elements—such as traditional melodies and instruments—while preserving the pedagogical structure of the original app. Prior research suggests that such cultural grounding strengthens learners' emotional and cognitive engagement, and the present study provides empirical support for this principle in the context of music education. Technical refinements further ensured compatibility with classroom devices, demonstrating that effective localization must account not only for cultural meaning but also for infrastructural realities in schools.

Expert evaluations provided strong evidence of validity. Teachers' and specialists' feedback confirmed that the content was appropriate, age-relevant, and aligned with curricular standards, yielding high indices of content validity and inter-rater reliability. These results extend previous validation studies in educational technology (Tejada & Fernández-Villar, 2023; Thompson et al., 2023) by demonstrating how content and face validity can be rigorously established during localization. Moreover, this study makes a unique contribution by integrating validity testing with a cross-cultural adaptation process, offering a methodological model for future educational technology adaptation projects.

Students' feedback confirmed that Music Island provided a usable and engaging learning experience, with positive ratings across language, visual, and auditory domains. These results align with prior research demonstrating that well-designed digital music applications enhance engagement, enjoyment, and learning outcomes (Vlachogianni & Tselios, 2022). Minor operational difficulties reported by a subset of students were primarily linked to limited prior digital experience (Camilleri & Camilleri, 2019), highlighting the importance of considering learners' technological familiarity during implementation. Gender comparisons indicated that girls exhibited slightly higher aesthetic sensitivity, yet both genders perceived the app as valuable and effective, consistent with evidence that digital tools support creativity, collaboration, and engagement across sexes (Kim & Kim, 2020). Similarly, minimal differences among experimental classes suggest that the app's usability and appeal are robust across varied classroom contexts (Szabó et al., 2021), reinforcing its potential for broad integration into elementary music curricula.

Furthermore, the findings also have implications for curriculum adaptation and teacher education. The intervention demonstrates that culturally localized software can be effectively aligned with national curricula when implemented by an instructor highly familiar with the application, maximizing the integration of its digital features with lesson objectives and learning outcomes. To achieve comparable results more broadly, teachers unfamiliar with new digital tools should receive comprehensive and structured training, covering both technical operation and pedagogical strategies for embedding such applications into classroom instruction.

6. Conclusion

This study demonstrates that the localized Music Island application can serve as a culturally responsive and pedagogically aligned digital tool for Chinese elementary music education. The project highlights two key contributions. Theoretically, it offers a replicable framework for cross-cultural localization of educational technology, combining validity testing with systematic cultural adaptation. Practically, it provides music educators with a flexible resource that supports engagement and usability in classroom contexts. While findings affirm the app's feasibility and positive user experience, confirmation of its impact on long-term musical learning requires further empirical evidence.

7. Limitations

Several limitations should be acknowledged. First, although the adaptation process was systematic, it relied heavily on expert judgment and self-reports from students, both of which may have introduced subjectivity and response bias, particularly among younger learners. Second, the study was limited to a short-term, posttest-only intervention with a relatively small and context-specific sample, restricting both generalizability and conclusions about long-term effects. Third, differences in device performance and other technical issues (e.g., variable processing power, audio latency) may have affected students' experience and performance.

8. Suggestions for Future Research

Future studies should employ longitudinal and larger-scale designs to examine the app's sustained impact on musical development, creativity, and motivation. Broader sampling across diverse school contexts could enhance generalizability. Teacher preparedness will be critical: professional development should extend beyond technical training to include pedagogical integration of digital tools into curriculum design. In addition, systematic evaluation of technological factors—such as device type, stability, and accessibility—will be essential for scaling digital music applications effectively.

Declarations

Author Contributions.
Y.L.: Conceptualization, Investigation, Data Curation, Writing - Review & Editing
C.T.V.: Conceptualization; Methodology, Writing - Review & Editing
O.T.Z.: Writing - Original Draft, Formal analysis, Writing - Review & Editing
S.N.: Methodology, Resources, Software
J.K.: Conceptualization, Writing - Review & Editing, Methodology, Funding acquisition, Supervision
All authors have read and approved the published version of the article.

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Ethical Approval. This study was approved by the Institutional Review Board (IRB) of the Doctoral School of Education, University of Szeged (Approval No. 5/2025). Informed consent was secured from teachers and parents. All participants' privacy and data confidentiality were strictly protected following ethical guidelines.

Data Availability Statement. The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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