Journal of Information Technology Education: Innovations in Practice

An Official Publication of the Informing Science Institute
InformingScience.org

JITEiip.org

Volume 25, 2026

# CULTURALLY GROUNDED GAMIFICATION IN HIGHER EDUCATION: A CUSTOM AUDIO-QUIZ FOR TEACHING KAZAKH TRADITIONAL MUSIC

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| Ainur Palymbetova* | Korkyt Ata Kyzylorda University, Kyzylorda, Kazakhstan | Palymbetovaainur01@gmail.com |
| Sarash Konyrbayeva | Al-Farabi Kazakh National University, Almaty, Kazakhstan | pedsheberlik@gmail.com |
| Ruslan Akhmetov | Korkyt Ata Kyzylorda University, Kyzylorda, Kazakhstan | ruslanaxmetov@list.ru |

* Corresponding author

## ABSTRACT

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| Aim/Purpose | This study examines how a culturally embedded, gamified digital audio quiz platform can improve student engagement and learning in higher education music teaching. |
| Background | Although gamified learning is increasingly adopted in universities, its pedagogical value when based on national musical heritage and auditory learning traditions remains underexplored, particularly in non-Western contexts. |
| Methodology | A mixed-methods approach was employed with 78 undergraduate students. Quantitative survey data were analysed using SPSS 29, complemented by qualitative classroom observations and student reflections. |
| Contribution | The study offers a culturally responsive model of gamification that incorporates authentic audio materials into quiz-based learning, expanding digital gamification research from general engagement to heritage-focused pedagogy. |
| Findings | Findings indicate increased student motivation, sustained attention, and strong student perceptions of improved knowledge retention, and deeper emotional and cultural connection with traditional music content. Although minor technical issues were noted, the platform effectively supported active listening and culturally meaningful learning. |

Accepting Editor Stamatis Papadakis | Received: November 18, 2025 | Revised: February 11, March 2, March 18, 2026 | Accepted: March 24, 2026.
Cite as: Palymbetova, A., Konyrbayeva, S., & Akhmetov, R. (2026). Culturally grounded gamification in higher education: A custom audio-quiz for teaching Kazakh traditional music. *Journal of Information Technology Education: Innovations in Practice, 25,* Article 18. https://doi.org/10.28945/5750

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| Recommendations for Practitioners | Higher education educators are encouraged to incorporate culturally relevant, audio-based digital tools to enhance engagement and facilitate the transmission of national musical heritage. |
| Recommendations for Researchers | Future research should explore long-term learning effects, compare different cultural contexts, and develop broader gamification designs that include interpretive and creative activities. |
| Impact on Society | The findings emphasise the potential of digital gamification to aid in preserving intangible cultural heritage and to strengthen cultural identity among university students. |
| Future Research | Future research should investigate cross-institutional implementation, long-term outcomes, and culturally adaptable gamification frameworks. |
| Keywords | gamification in higher education**,** quiz-based learning**,** traditional music pedagogy, Kazakh folk music & *kui,* culturally responsive teaching**,** digital heritage education**,** mixed-methods study**,** music engagement and motivation |

## INTRODUCTION

In response to the increasing integration of digital technologies in education, this study investigates gamified digital quiz platforms as teaching tools in music education. Here, gamification refers to the use of game-like elements, such as points, leaderboards, time constraints, and immediate feedback, in non-game learning environments. These tools are mainly used by music educators in secondary and higher education to teach music theory, listening skills, and formative assessment. Although gamified platforms are widely promoted for boosting student engagement, their use in music education presents a specific pedagogical challenge: teaching traditional, culturally rooted musical knowledge through digital, competitive formats risks reducing musical learning to decontextualised tasks, thereby diminishing cultural significance and aesthetic richness. This tension between engagement and cultural authenticity forms the core issue examined in this study.

The rapid digitalisation of higher education has heightened interest in interactive and technology-enhanced teaching methods that promote active participation rather than passive learning. As higher education institutions increasingly utilise digital platforms to support learning, gamification has gained popularity as an instructional strategy to boost engagement, motivation, and persistence (Deterding et al., 2011; Koivisto & Hamari, 2019). Gamified learning integrates game design elements such as instant feedback, challenges, and reward systems into the learning process to shape student behaviour in educational settings (Kapp, 2012). Unlike transmissive approaches, gamification encourages active knowledge construction through participation, immediacy, and self-regulation—qualities particularly vital in disciplines that rely on experiential and performative methods of understanding, such as music education.

While the application of gamification has been widely studied in STEM education (Clark & Mayer, 2016), language learning (Zainuddin et al., 2020), and teacher training (Bai et al., 2021), its use within the domain of music pedagogy, particularly concerning national or traditional music, remains underexplored. Much of the existing research on educational gamification focuses on cognitive outcomes or student motivation broadly, without considering how gamified tools might support the transmission of cultural heritage or identity through disciplinary content. Music education offers a unique context in this regard because musical understanding is not solely cognitive or technical but also cultural and affective (Campbell & Ronfeldt, 2018). When national or traditional musical forms are taught in digital environments, the pedagogical challenge is therefore twofold: how to make learning interactive and effective, and how to ensure that cultural meaning is preserved rather than diluted through technological mediation.

This challenge closely aligns with the principles of culturally responsive pedagogy, which emphasises that learning must be rooted in students' cultural and linguistic frameworks to promote relevance, engagement, and deeper understanding (Gay, 2010; Ladson-Billings, 2021). From this perspective, culture is not an "add-on" to the curriculum but a fundamental organising principle of pedagogy. Although culturally responsive instructional design is widely recognised in traditional classroom settings, limited research exists on how it can be implemented through digital or gamified learning platforms (Wahid, 2024). Existing studies tend to view digital gamification as content-neutral, whereas culturally grounded approaches require adjustments in both format and content. To bridge this conceptual gap, digital tools should be designed not only to encourage interactivity but also to incorporate culturally meaningful content in authentic ways.

In this context, gamification provides an opportunity not only to boost engagement but also to deepen cultural resonance, especially when combined with domain-specific musical content that reflects the sonic, aesthetic, and narrative traditions of a particular cultural community. The present study builds on this pedagogical approach by developing and implementing a custom-designed quiz environment specifically tailored to Kazakh traditional music. Instead of using a ready-made set of generic questions, the authors crafted original interactive items based on folk songs and *kui* (instrumental heritage), incorporating audio fragments to ground learning in authentic musical expression. This multimodal approach enables students to engage both cognitively and sensorially, supporting arguments that cultural knowledge is often embodied and performative rather than purely textual (Nethsinghe, 2015). The inclusion of auditory elements also transcends text-based assessment, offering a closer connection between cultural form and digital representation.

Despite rising academic interest in gamification, several gaps remain in the literature. First, game-based and quiz-based digital strategies are rarely utilised in music education programs that focus on national heritage. Second, there is an almost complete lack of customised, culturally contextualised quiz platforms that incorporate indigenous or traditional musical materials instead of generic content. Third, digital pedagogy research often neglects the role of gamification as a means of cultural transmission, instead emphasising skill development or motivation without considering cultural identity and continuity (Duong & Vo, 2024). Finally, in the Central Asian context, especially Kazakhstan, there is a notable absence of empirical mixed-method studies exploring culturally responsive gamification in higher education. This study directly addresses all four aspects of this gap.

Accordingly, this research aims to assess the effectiveness of a custom-built quiz platform in improving student engagement and learning outcomes in national music education. The platform's innovation lies not only in its game mechanics but also in its cultural and pedagogical design: the quiz features original content rooted in Kazakh musical heritage and includes embedded audio to preserve auditory authenticity. This approach demonstrates that culturally meaningful gamification can combine digital interactivity with heritage preservation, thus expanding the current scope of technology-enhanced learning research.

Two research questions guide the study:

**RQ1:** How does the use of a customised Quiz platform influence student engagement in national music education?

**RQ2:** How do students perceive the impact of quiz-based gamification on their understanding, engagement, and retention of musical knowledge??

This paper proceeds as follows. The next section outlines the theoretical framework, drawing on multimodal learning theory, culturally responsive pedagogy, and digital engagement scholarship to establish the conceptual foundation of the study. The subsequent section describes the research methodology, detailing the mixed-methods design, participants, data collection procedures, and analytical approach. The findings are then presented and discussed, integrating quantitative survey results with qualitative observations to examine student engagement, learning outcomes, and cultural resonance. This is followed by a section that details the design and classroom implementation of the customised

quiz platform, including its pedagogical integration and evaluative components. The paper concludes by summarising the key contributions, acknowledging limitations, and outlining directions for future research and educational practice.

## LITERATURE REVIEW

The integration of digital technologies into higher education has transformed teaching and assessment methods across disciplines, with quiz-based and gamified platforms becoming particularly popular instructional tools. A substantial body of research demonstrates that online quizzes and game-based response systems enhance student engagement, promote active recall, and support formative assessment through immediate feedback (Dakka, 2015; Woit & Mason, 2000; Yuenyongviwat & Bvonpanttarananon, 2021). Studies using platforms such as Socrative, Kahoot, and Quizizz consistently report increased student motivation, attentiveness, and participation, even when improvements in final achievement scores are modest or inconsistent (Çeliktaş & Demirbatır, 2022; Dakka, 2015). These findings suggest that quiz-based digital tools are particularly effective for maintaining engagement and reinforcing learning processes rather than solely enhancing summative results.

Recent studies (2022–2024) expand this area of research by emphasising the role of feedback, gamification mechanics, and learner interaction in shaping learning experiences. Research on Quizizz-based feedback engagement shows that students' cognitive and emotional involvement relies not only on the technology itself but also on how feedback is designed and understood (Thi Truc Le & Van Tran, 2024). Likewise, game-based student response systems have been found to promote collaborative learning and real-time reflection, especially when quizzes are integrated meaningfully into instructional design rather than used as isolated activities. Overall, these studies suggest that the pedagogical value of digital quizzes depends on their ability to organise engagement, feedback, and repetition, rather than on gamification alone.

Within music education, digital technologies have increasingly been used to support music theory teaching, listening skills, and assessment. Empirical studies show that online quizzes help music students reinforce theoretical knowledge and improve retention through repeated practice and low-stakes testing (Çeliktaş & Demirbatır, 2022). Broader assessments of digital tools in music education indicate that multimedia and interactive resources can boost learner interest, creative participation, and accessibility, especially when traditional classroom constraints are present (Gagica-Rexhepi et al., 2024). However, much of this research remains focused on general outcomes such as motivation or performance, providing limited insight into how digital tools interact with the musical essence of learning itself, which is fundamentally auditory, embodied, and emotional.

Recent research in digital and AI-supported music education further highlights the significance of audio-based and multimodal learning environments. Studies using artificial intelligence and deep learning in music teaching emphasise that effective instruction should go beyond text-based or visual representations to involve learners through sound, listening, and perceptual discrimination (Chu, 2022). Likewise, systematic reviews of technology-supported learning stress that auditory and multimodal inputs are vital in fostering meaningful understanding in arts-based disciplines (Darus & Aziz, 2025). These insights reinforce the idea that quiz-based learning in music education must prioritise authentic audio materials if it is to align with the epistemological nature of musical knowledge.

Despite these advances, a significant limitation across the existing literature is its predominantly Western focus. Most studies on gamification, online quizzes, and digital music education are based within Western higher education settings and emphasise Western classical music, popular music, or abstract music theory. Research on multicultural and non-Western music education points out that traditional musical forms are deeply rooted in cultural identity, oral transmission, and historical memory, making them especially susceptible to loss of context when transferred into generic digital formats (Nethsinghe, 2015). However, few empirical studies explore how digital tools can be adapted to support the teaching of national or indigenous musical traditions in culturally meaningful ways.

This gap is particularly evident in Central Asian contexts. While national music forms such as Kazakh folk songs and *kui* play a central role in cultural heritage and teacher education, they remain largely absent from international research on digital pedagogy. Existing studies on digital music education seldom explore how technology can serve as a tool for cultural transmission or heritage preservation, often treating musical content as interchangeable or content-neutral. Consequently, the use of pre-made quiz platforms risks reducing culturally rich musical traditions to simple recognition tasks, potentially undermining their aesthetic and cultural significance.

Recent discussions on culturally responsive pedagogy suggest that learning becomes more meaningful and sustainable when educational tools are aligned with learners' cultural frameworks and lived experiences (Ladson-Billings, 2021). However, studies examining the intersection of culturally responsive teaching and digital gamification remain limited. Wahid (2024) notes that while gamified platforms are increasingly used in higher education, they are rarely designed to reflect local cultural content, especially in arts and humanities education. This highlights the need for customised digital tools that incorporate cultural authenticity into both content and structure.

Taken together, the reviewed literature reveals three interconnected gaps. First, although quiz-based and gamified platforms effectively promote engagement and feedback, they are often implemented in pedagogically generic ways that do not sufficiently adapt to music as an auditory discipline. Second, digital music education research largely overlooks non-Western and national musical traditions, limiting its relevance to culturally diverse contexts. Third, existing studies rarely view digital quizzes as tools for cultural preservation or identity formation, instead focusing on short-term motivational or cognitive outcomes.

In response to these gaps, this study develops and assesses a customised, audio-based quiz platform specifically created for teaching Kazakh traditional music in higher education. By incorporating authentic recordings of folk songs and *kui* into interactive quiz tasks, the platform aligns gamified learning mechanics with the auditory, cultural, and embodied aspects of musical knowledge. This method directly tackles the limitations identified in previous research by showing how digital gamification can serve not only as an engagement strategy but also as a culturally responsive pedagogical tool. In doing so, the study advances current scholarship on digital music education and provides empirical evidence from a non-Western context, which remains underrepresented in the literature.

## METHODOLOGY

This study employed a mixed-methods exploratory approach to assess the pedagogical potential of a culturally contextualised, audio-based quiz platform in national music education. The research was deliberately designed as a pilot project, focusing on examining patterns of student engagement, participation, and perceived learning advantages rather than establishing causal learning outcomes. The exploratory design was chosen because the intervention was carried out in an authentic classroom setting without a controlled experimental framework or pre- and post-test comparison. While achievement scores before and after the intervention were not gathered, the study emphasised ecological validity and pedagogical practicality, enabling the tool to be assessed as it would realistically be utilised in higher education music courses. This method aligns with previous educational technology research that considers early-stage digital tools as exploratory interventions prior to large-scale experimental validation.

The participants included 78 undergraduate students enrolled in pedagogy and arts-education programmes at Korkyt Ata Kyzylorda University in Kazakhstan. A total of 78 students took part in the study. Most respondents were first-year students (35.9%), followed by third- and fourth-year students (23.1% each) (Table 1). The sample comprised 56.4% female and 43.6% male students. A majority of participants had prior musical training (60.3%) and regularly listened to Kazakh folk music (85.9%) (Table 1). Convenience sampling was used, reflecting the practical context of class-based implementation in national music courses. Students from first to third year participated in the study, and no

prior specialised training in traditional music or gamified technologies was necessary. Participation was voluntary, with informed consent obtained before data collection. Students with advanced professional training in Kazakh traditional music were excluded to maintain baseline knowledge homogeneity and reduce the risk of bias from prior expertise. All participants had access to digital devices, such as smartphones or laptops, to use the quiz platform.

**Table 1. Demographic characteristics of the participants (N = 78)**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Year of study | 1st year | 28 | 35.9 |
| | 2nd year | 14 | 17.9 |
| | 3rd year | 18 | 23.1 |
| | 4th year | 18 | 23.1 |
| Gender | Female | 44 | 56.4 |
| | Male | 34 | 43.6 |
| Prior music training | Yes | 47 | 60.3 |
| | No | 31 | 39.7 |
| Interest in folk music | Listens to folk songs/*kui* | 67 | 85.9 |
| | Does not listen | 11 | 14.1 |

The quiz platform was custom-built to align with the auditory and cultural characteristics of Kazakh traditional music. Unlike generic quiz systems that rely primarily on text-based recall, this platform prioritised audio recognition, stylistic differentiation, and culturally embedded listening tasks. Each quiz item was constructed around short audio excerpts of folk songs or *kui*, followed by multiple-choice or short-response questions. Difficulty levels were intentionally graduated, beginning with basic melody recognition and progressing towards stylistic identification and contextual interpretation. This sequencing was grounded in pedagogical principles of scaffolded listening, allowing students to build confidence before engaging with more complex auditory discrimination tasks.

The scoring mechanics aimed to support formative learning rather than foster competition. Points were awarded for correct answers, and repeated attempts were allowed, with immediate feedback after each question. This approach was based on formative assessment theory, which highlights feedback, repetition, and self-regulation as essential for consolidating learning. Time limits were included to promote focused listening, but were adjusted to prevent excessive pressure that could hinder careful auditory perception.

To achieve the study's aims, multiple sources of evidence were utilised to capture both quantitative patterns and qualitative learning processes. First, quiz performance records generated by the customised platform were collected, including task completion rates, the number of attempts per item, and average scores across instructional sessions. These data provided descriptive indicators of student participation and auditory recognition as learners interacted with the audio-based quiz tasks. Second, post-intervention survey data were collected to capture students' perceptions of engagement, motivation, and perceived learning support in the gamified learning environment. Finally, classroom observations and brief written reflections were used to document patterns of participation, listening focus, and interaction during quiz-based activities. Together, these complementary data sources enabled a process-oriented analysis of how students engaged with culturally grounded, audio-based gamified learning in an authentic classroom context.

Although no pre-test and post-test achievement scores were collected, quiz performance data offered descriptive signs of auditory recognition and engagement. Throughout sessions, most students completed all quiz tasks, with average item accuracy surpassing mid-scale thresholds, indicating consistent recognition of melodies and stylistic features. Repeated attempts lessened over time, showing increasing familiarity with the musical material rather than random guessing. Participation rates remained high across all academic years, strengthening observations of sustained engagement. Claims about

"improved auditory recognition" are therefore interpreted descriptively, based on patterns of quiz interaction, decreasing response errors across sessions, and student self-reports, rather than as statistically confirmed learning gains.

Quantitative data were analysed using SPSS 29. Descriptive statistics were initially calculated to summarise overall responses, followed by paired-samples t-tests to assess changes in engagement and learning outcomes over time. Internal reliability of the survey instrument was evaluated with Cronbach's alpha (Table 2), and effect sizes were determined using Cohen's d to measure the strength of observed changes. Qualitative data, including student reflections and observational notes, were analysed through thematic analysis. This process involved open coding to identify recurring concepts and axial coding to synthesise these into broader themes related to engagement, cultural connection, and multimodal learning experiences.

**Table 2. Reliability statistics**

| Scale | Cronbach's alpha | No. of items |
|---|---|---|
| Student perception of quiz-based learning | 0.89 | 4 |

*Note:* Cronbach's alpha indicated high internal consistency of the scale.

Ethical approval for the study was granted by the university's institutional review board. Participants were informed that their involvement was voluntary, their anonymity and confidentiality would be preserved, and that their participation or performance would not affect academic grades. All digital data was securely stored and used solely for research purposes.

Several limitations must be recognised. First, the lack of pre- and post-test achievement measures restricts the ability to make causal claims about learning improvement. Second, convenience sampling and the single-institution setting limit generalisability. Thirdly, while quiz scores and participation data provide useful descriptive evidence, they do not replace controlled experimental validation, which is essential to establish validity and ensure that the findings offer meaningful insights into real teaching practice.

Nevertheless, as an exploratory pilot study, the research offers valuable preliminary evidence on the feasibility, pedagogical principles, and cultural relevance of audio-based gamified learning in national music education. These findings lay a foundation for future longitudinal and experimental research designs.

## *Findings and Discussion*

The growing use of interactive digital platforms in higher education has made quiz-based learning a compelling teaching method, particularly in music education, where multimodal engagement is essential. Previous studies emphasise that digital quizzes promote active recall, sustain learner attention, and provide immediate feedback, ultimately enhancing memory retention and motivation (Johnson & Mayer, 2009). In the context of national music education, these tools are especially significant as they enable students to connect with cultural heritage through authentic auditory materials rather than relying solely on textual explanations. Recent research in Kazakhstan similarly indicates that integrating quiz technologies in national music teaching boosts engagement and aids in transmitting cultural knowledge.

In line with this emerging scholarship, the present study developed a custom-designed digital quiz platform specifically adapted to Kazakh folk songs and *kui*. Unlike generic commercial quiz platforms, this system incorporated original sound clips of traditional musical pieces, requiring students to identify melodies, performers, stylistic features, and thematic meanings. Through this audio-integrated design, the quiz encouraged multisensory learning, aligning with principles of embodied cognition and culturally responsive pedagogy. Students were not merely recalling abstract information but actively listening, recognising sonic patterns, and connecting auditory perception to historical and

cultural knowledge. Such a structure supported both cognitive engagement and emotional immersion, emphasising the role of national music as a lived cultural form.

The implementation revealed several pedagogical benefits. First, students showed increased engagement during quiz-based lessons, with the interactive format promoting sustained focus and participation. Learners reported feeling more excited and motivated when receiving immediate feedback and seeing their progress in real time. This outcome aligns with existing research indicating that gamified learning environments are effective in increasing motivation and enhancing student participation (Zhou et al., 2013). Furthermore, students reported that the platform supported their ability to remember and recognise musical material. Repeated exposure to traditional melodies and immediate reinforcement were perceived as strengthening auditory familiarity and stylistic awareness. These findings should be interpreted as indicative of students' perceived reinforcement rather than as statistically confirmed improvements in retention, since pre- and post-intervention achievement measures were not collected.

Furthermore, the quiz increased cultural awareness among participants. Students recognised that listening to folk songs and *kui* in an interactive environment enabled them to connect more deeply with Kazakh musical heritage. Instead of seeing traditional music as a static historical topic, they experienced it as a vibrant, emotionally compelling form of cultural expression. This aligns with culturally responsive learning theory, which suggests that learning becomes more meaningful when educational content reflects learners' cultural identities and lived experiences. By combining heritage content with modern technology, the quiz helped preserve cultural relevance while engaging contemporary learning preferences.

Despite its advantages, several limitations became apparent. Some students encountered initial technical difficulties, highlighting differences in digital preparedness. These challenges emphasise the need for introductory training or technological orientation before integrating interactive platforms into formal lessons. Moreover, although the quiz effectively reinforced recognition, comprehension, and recall skills, its structured format limited open-ended expression. As noted in previous research, quiz systems often restrict the ability to ask complex interpretative or creative questions, which are vital elements of music education.

Therefore, while the format effectively promoted accuracy and speed, it was less suitable for fostering interpretive depth or extended reflection without supplementary pedagogical strategies. Some students also expressed concerns that frequent gamification might divert attention toward performance metrics rather than thoughtful engagement with musical meaning, emphasising the need for balanced instructional approaches.

The customised quiz system developed for this study addressed some of these concerns by incorporating various task formats across five modules. Students participated in auditory recognition tasks for traditional songs, identified folk performers, distinguished stylistic features of *kui*, and answered interpretative questions about cultural significance. Audio playback and colour-coded feedback provided immediate understanding, while cumulative scoring motivated repeated attempts and self-monitoring. Classroom observations revealed that students willingly revisited questions to improve their scores, indicating increased intrinsic motivation and metacognitive awareness. This hybrid approach, combining structured auditory tasks with reflective discussions, helped maintain academic rigour while leveraging the motivational benefits of gamified learning.

## Custom quiz platform design and implementation

Instrument development was a crucial part of the research, as the study required a digital learning environment that could genuinely represent Kazakh traditional music while facilitating interactive assessments. To achieve this, the research team designed and launched a customised web-based quiz platform (https://kazakh-music-quiz.web.app/), developed specifically for this project to ensure full control over content, aesthetics, and functionality. The platform was tailored to include high-quality audio recordings of traditional Kazakh folk songs and *kui*, enabling students to engage directly with

authentic musical material rather than abstract, text-based representations. Each quiz item was created by the authors and reflected key aspects of the national musical heritage, such as melodic recognition, stylistic identification, instrument classification (e.g., dombyra), and contextual interpretation of historical significance. Gamified features like timed tasks, automatic scoring, and instant feedback were incorporated to increase learner motivation, cognitive engagement, and memory retention while maintaining high academic standards. Before deployment, the quiz content was validated by five specialists in Kazakh music education, who assessed its cultural accuracy, clarity, and pedagogical appropriateness. Their feedback led to iterative improvements to the platform. Thus, the quiz functioned not only as an assessment tool but also as a culturally grounded digital learning resource, preserving auditory traditions through modern interactive technology and supporting the transmission of intangible musical heritage in a contemporary educational format.

## Implementation of the quiz in the teaching process

The quiz platform was integrated into regular teaching activities across various student groups enrolled in national music and pedagogy courses. Instead of involving a single cohort throughout an entire semester, the tool was used with different classes representing first-year, second-year, third-year, and fourth-year students (Figure 1). This setup reflects standard university practice, where national music modules are delivered concurrently across academic levels. The quiz was incorporated as a recurring part of instruction throughout each group's teaching cycle, serving both formative assessment and guided listening purposes.

During each instructional session, students first engaged in a brief theoretical introduction and guided listening activity to contextualise key features of Kazakh folk songs and *kui* (Figure 2). Following this, learners accessed the customised quiz platform on their own devices and completed audio-based tasks aligned with the session's focus. Quiz activities required students to identify melodies, performers, and stylistic elements; recognise traditional instruments such as the *dombyra*; and interpret cultural and historical significance based on auditory cues. Immediate automatic feedback enabled students to assess their understanding in real time, while instructors provided additional commentary to enhance cultural and analytical interpretation. Throughout the session, quiz activities were repeated at various intervals to bolster auditory recognition, reinforce theoretical knowledge, and track learning progress.

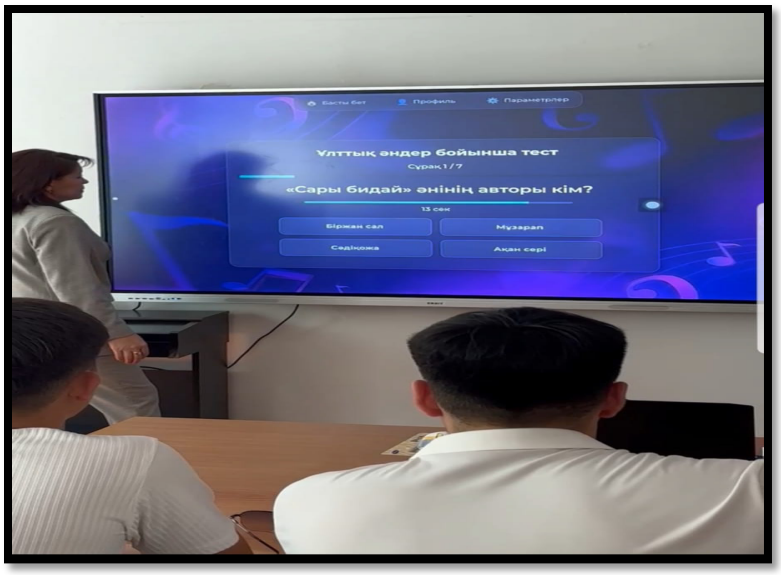


**Figure 1. Student view of the custom digital quiz platform for Kazakh traditional music**


**Figure 2. Classroom implementation of the gamified audio-quiz during national music lesson**

To promote reflective learning, students were encouraged to discuss selected quiz items after completing them, justify their answers based on musical characteristics, and engage in peer dialogue about regional and stylistic differences in traditional repertoire. This approach positioned the quiz not only as a motivational tool but also as an essential part of the pedagogical cycle, fostering repeated exposure, active listening, and deeper cultural understanding. Although the participating groups varied in academic level, the implementation demonstrated consistent pedagogical value across student cohorts, indicating that the quiz format is adaptable and effective in different learning contexts.

Besides deepening students' understanding of Kazakh musical heritage, the intervention played a crucial preparatory role for their future careers. All participating students were enrolled in pedagogical specialisations and will become schoolteachers after graduation. Accordingly, a secondary aim of the study was to familiarise future educators with innovative digital teaching tools and to encourage them to incorporate quiz-based methods into their own classroom practice. During the teaching sessions, students not only used the custom-designed platform but also learned about the wider pedagogical benefits of gamified learning technologies. The research team explicitly highlighted the advantages, such as increased motivation, immediate feedback, formative assessment, and multimodal engagement, as well as potential drawbacks, including issues with technological access and limitations for open-ended creative expression. In line with teacher-training objectives, students were also shown examples of both ready-made quiz platforms and open-source or low-code environments that enable teachers to create quizzes independently. This part aimed to empower future educators by demonstrating that digital assessment tools are not only beneficial for learners but also accessible to teachers without advanced technical skills. By reinforcing the idea that quiz-based learning can be self-designed, culturally relevant, and pedagogically sound, the research contributed to students' professional development and promoted sustainable integration of digital innovation in school-level music and cultural education.

After completing the instructional sessions with the custom quiz platform, the researchers conducted a structured student survey to evaluate the pedagogical effectiveness of the gamified approach. While classroom observations and learner reflections provided qualitative insights into engagement and cultural immersion, the survey offered a systematic way to measure students' perceived learning benefits,

motivation, and cognitive improvements. This post-intervention tool was designed to gather students' opinions on how the quiz supported their understanding of Kazakh musical heritage, kept their attention during lessons, and aided in knowledge retention.

## Survey results

Survey data were gathered from 78 undergraduate students enrolled in music and pedagogy programmes. The sample was fairly evenly distributed across academic years, with first-year students comprising 35.9% of respondents, followed by second-year students (17.9%), and an equal share from third- and fourth-year levels (23.1% each). Female students made up 56.4% of the cohort, while male students accounted for 43.6%. A significant portion of participants (60.3%) had prior musical training, and a notably high percentage (85.9%) reported that they regularly listen to Kazakh folk songs and *kui*, emphasising a strong existing connection to the national music tradition.

Overall, students have very positive views of using quiz-based learning in national music education. Mean scores for all questionnaire items ranged from 4 to 5 on a 5-point Likert scale, indicating strong support for the educational value of interactive digital tools (Table 3). Students reported that the quiz-based platform increased engagement, enhanced understanding, and boosted motivation to learn national music content. The highest mean score was recorded for the statement about instructors' digital competence (M = 4.60), indicating high student confidence in teachers' ability to integrate technology effectively into their teaching. Respondents also strongly agreed that digital technologies enhance learning quality (M = 4.58), and most viewed quiz-based learning as pedagogically beneficial (M = 4.51). Furthermore, participants indicated that quiz tasks supported their perceived memory retention and recall (M = 4.49), highlighting the extent to which students experienced gamified learning as reinforcing previously introduced musical material. As the study did not include pre- and post-test achievement comparisons, these findings reflect students' self-reported perceptions of learning support rather than objectively measured retention gains.

**Table 3. Survey items**

| Survey item | Mean | Std. deviation | N |
|---|---|---|---|
| Digital competence of teachers | 4.60 | 0.52 | 78 |
| Technology improves learning quality | 4.58 | 0.54 | 78 |
| Quiz-based learning is beneficial | 4.51 | 0.57 | 78 |
| Quiz tasks improve memory retention | 4.49 | 0.60 | 78 |

Notably, no statistically significant gender differences were observed in attitudes towards quiz-based learning, indicating broad acceptance of the method across demographic groups (Table 4). First-year students showed slightly greater enthusiasm compared to their senior counterparts, likely reflecting the novelty of digital tools and the motivational potential of gamification for early university learners. A prior musical background did not significantly influence perceptions of the platform, suggesting that quiz-based instruction can effectively support both musically trained and novice learners (Table 5). Students with and without formal musical education reported similarly positive attitudes, demonstrating that the audio-embedded quiz system enhances accessibility and inclusivity in music learning.

**Table 4. Group comparison (gender) — independent samples test**

| Test | Result |
|---|---|
| Levene's test for equality of variances | $p > 0.05$ |
| t-test for equality of means | $p > 0.05$ |

**Table 5. Group comparison (prior music training)**

| Test | Result |
|---|---|
| Independent samples t-test | $p > 0.05$ |

Although a minority of respondents reported minor technological challenges or noted that quiz-based tasks offer limited opportunities for open-ended expression, these concerns did not dampen overall positive evaluations. Students generally appreciated the immediate feedback provided by the platform, the chance for repeated engagement with musical excerpts, and the competitive yet supportive learning environment. Qualitative comments also suggested that the use of authentic audio clips fostered emotional connection and cultural pride, reinforcing the value of digital tools that facilitate immersive engagement with national cultural heritage.

Overall, these findings indicate that quiz-based learning is an effective and culturally appropriate teaching method for higher music education in Kazakhstan. By combining gamified interaction with exposure to authentic folk repertoire, the platform increased student motivation, enhanced content retention, and fostered deeper engagement with Kazakh musical heritage. The results also imply that digital quiz systems can offer fair access to cultural learning, regardless of students' prior musical training.

## CONCLUSION

This study highlights the significant pedagogical value of a culturally contextualised, quiz-based digital learning tool in higher education music teaching. By incorporating authentic audio materials of Kazakh folk songs and *kui* into a customised quiz platform, the research shows that interactive, gamified learning environments can effectively increase student engagement, motivation, and cultural understanding. The findings emphasise that quiz-based activities do more than assist memorisation; they create a dynamic space for active listening, cultural immersion, and ongoing participation, positioning traditional music not just as curriculum content but as a living cultural heritage within a modern digital setting.

The study successfully achieved its research aims by empirically examining how a custom quiz system influences student engagement and learning outcomes in national music education. Quantitative survey data and observed classroom behaviours confirmed that the platform boosted student attentiveness, enhanced knowledge retention, and supported multimodal learning. Students reported that the quiz made lessons more enjoyable, interactive, and relevant, supporting the hypothesis that culturally grounded gamification can connect traditional artistic forms with modern instructional technologies.

Importantly, this research challenges the common assumption that digital gamification in higher education is mainly suited for STEM subjects or general content delivery. By demonstrating that quiz-based platforms can serve as a means for cultural transmission and heritage preservation, the study broadens current understanding of culturally responsive digital pedagogy and expands the conceptual scope of gamified learning in the arts and humanities. It also emphasises the importance of connecting gamification with cultural identity, authenticity, and emotional engagement, an area rarely explored in existing scholarship.

This work makes three main contributions. Practically, it offers a scalable model for integrating culturally meaningful digital tools into arts education and demonstrates how future teachers can adopt similar methods to improve school-level music teaching. Theoretically, it emphasises the significance of multimodal and culturally responsive learning theories within digital environments, showing how embodied listening and cultural resonance can coexist with interactive technology. Methodologically, the study advances emerging mixed-methods research in Central Asian higher education by combining quantitative survey data with qualitative reflections and observational insights to examine affective, cognitive, and cultural aspects of learning.

While the study provides strong evidence for the effectiveness of customised gamification, several limitations should be recognised. The sample was drawn from a single university context, and variations in digital literacy and device access may influence learner experiences in other settings. Additionally, although the quiz supported recognition and recall, it offered limited scope for open-ended musical interpretation. Future research could explore hybrid models that combine gamified assessment with collaborative composition tasks, digital storytelling, or performance-based activities. Longitudinal studies might also investigate sustained cultural engagement and digital skills development over time.

Based on the findings, several suggestions emerge. Higher education institutions should consider integrating culturally significant digital tools into music and arts curricula to foster a deeper cultural appreciation and improve student engagement. Teacher-training programmes should also prepare future educators to design and implement quiz-based learning tools, especially those reflecting local heritage. As digital transformation progresses in education, incorporating authentic cultural content into gamified environments offers a promising way to preserve intangible cultural heritage while developing digital fluency and pedagogical innovation among university students.

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## AUTHORS

**Ainur Palymbetova**

8D01101- 2nd year doctoral student in Pedagogy and Psychology. Research area: development of national musical value orientation of university students through digital technologies.

Institute of Pedagogy and Traditional Arts
Korkyt Ata Kyzylorda University
Aiteke bi 29 A, Kyzylorda, Kazakhstan.

https://orcid.org/0009-0009-6986-2948
Palymbetovaainur01@gmail.com

**Sarash Konyrbayeva**

Candidate of Pedagogical Sciences,
Associate Professor in the Department of Pedagogy and Educational Management, Faculty of Philosophy and Political Science,
Al-Farabi Kazakh National University
71 Al-Farabi Avenue, Almaty, 050040.

Kazakhstan Scopus author ID:56259339900

https://orcid.org/0000-0003-3497-990X, pedsheberlik@gmail.com

**Ruslan Akhmetov**

Master of Pedagogical Sciences,
Senior lecturer in the educational program,
"Musical Education and Traditional Musical Art"

Institute of Pedagogy and Traditional Arts,
Korkyt Ata Kyzylorda University
Aiteke bi 29 A, Kyzylorda, Kazakhstan.

Cultural worker of the Republic of Kazakhstan,
Winner of the medal "Eren enbegi ushin.

https://orcid.org/0009-0003-5440-0448
E-mail: ruslanaxmetov@list.ru