Bridging Tradition and Technology:
Gamification of Intangible Cultural Heritage Education through Experiential Gaming

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Abstract

This study explores the methods and educational effectiveness of transforming intangible cultural heritage (ICH) craft knowledge, specifically Foshan lion head crafting, into an E-learning game. Building on the S-O-R (Stimulus-Organism-Response) theory, along with Kolb's experiential learning theory and multimodal learning theories, this research analyses the process of converting traditional craft knowledge into a 3D interactive game. This effort led to the development of "Lion Dance Crafting Workshop," a interactive learning system aimed at teenagers interested in cultural heritage. The study finds that game mechanisms, such as task setting, interactive operations, and instant feedback, effectively convey the skills and cultural meanings of Foshan lion head crafting. Results indicate that integrating educational games with traditional craft education significantly enhances student engagement and cultural identity. This research provides a practical case for educators and game designers, offering insights into the development of digital teaching tools for ICH projects.

1 Introduction

UNESCO's growing emphasis on the digital preservation of intangible cultural heritage (ICH) has made the use of digital technologies in ICH education increasingly important [1]. However, effectively transforming folk craft knowledge into digital learning content that resonates with the younger generation remains a pressing challenge.

The Foshan lion head crafting technique, a national ICH of China, embodies the essence of Lingnan culture [2]. This craft integrates various handcraft skills, such as painting and tying, while also carrying rich cultural symbols and deep spiritual connotations. However, the craft faces issues like the aging of inheritors and low participation among young people [3]. Gamified learning has been shown to have unique advantages in enhancing engagement in cultural heritage education, especially for learners from Generation Z and Generation Alpha, for whom gamified learning has become one of their main learning methods [4][5].

Based on these challenges, this study adopts the S-O-R (Stimulus-Organism-Response) theory. Kolb's experiential learning theory and multimodal learning theory are also employed to propose a game design framework for ICH craft education. Using this framework, a 3D interactive educational game, "Lion Dance Crafting Workshop Game," was developed to explore the digital transmission of ICH, targeting teenagers and young adults interested in cultural heritage. Specifically, this study aims to answer the following questions:
1) How to construct a game design framework for ICH education based on S-O-R theory?
2) How to systematically transform the knowledge of Foshan lion head crafting into digital game content?
3) How can game design based on S-O-R theory effectively promote learners' engagement and cultural identity?

2 Foshan Lion Head Crafting Technique

According to the records of national ICH inheritor Li Wei, the crafting process of the lion head can be summarized into four main stages:

2.1 Explicit Knowledge: Crafting Process

The lion head crafting consists of four core procedures: Tying constructing a cross-shaped bamboo strip f ramework with 36 precisely positioned structural points; Pasting: applying 15-20 layers of specially-made lion head paper with careful attention to avoid wrinkles; Painting: utilizing traditional Cantonese opera facial makeup color system with techniques of outlining, dyeing, dotting and texturing; Embellishing: adding components like eyebrows and eyes, decorated with horsehair and metal pieces. The entire craftsmanship emphasizes both structural stability and aesthetic expression.

2.2 Tacit Knowledge: Experience and Cultural Connotations

Tacit knowledge is mainly reflected in the following aspects:
•**Experiential Skills**: Control of strength, judgment of material properties, and grasp of crafting rhythm.
•**Aesthetic Principles**: Flexibility and innovation in traditional patterns, and the balance in color coordination.
•**Cultural Connotations**: The imposing appearance and spirit of the lion head, as well as the cultural meanings embedded in the decorative patterns.

3 S-O-R Theory and Game Design

3.1 Overview of S-O-R Theory

The S-O-R theory consists of three core elements: Stimulus (S), Organism (O), and Response (R). In game design, stimuli such as visual effects and interactive elements influence learners' emotional and cognitive states, ultimately enhancing learning engagement and cultural identity.

3.2 Application of S-O-R Theory in Game Design

A review of the literature on the application of S-O-R theory in game design (2023-2024) reveals the following characteristics:

Table 1 A review of research on the application of S-O-R theory in the ICH game design

SOR	Dimension	Design Elements	References
S	Game Enjoyment	Game Setting Achievement System Mental Stimulation Fun Experience	Qiu et al., 2024;Bai et al., 2024
S	Design Elements	Cultural Element Traditional Craftsmanship Cultural Story	Bai et al., 2024;Chai, 2024
S	Aesthetic Quality	Visual Design Sound Effects Interface	Bai et al., 2024
S	Interactivity	peration Feedback Skill Simulation VR Interactive Experience	Qiu et al., 2024;Chai, 2024
O	Cognitive Processing	Perceived Usefulness Perceived Ease of Use Learning Self-efficacy	Bai et al., 2024;Anubha, 2024
O	Emotional Response	Cultural Empathy Entertainment Experience Immersion	Qiu et al., 2024;Bai et al., 2024
R	Cultural Transmission	Continuous Usage Intention Recommendation Intention Cultural Intention Anubha	Anubha, 2024;Bai et al., 2024
R	Learning Intention	Knowledge Acquisition Skill Mastery Cultural Identity	Chai, 2024;Qiu et al., 2024

References

[1] ' Living Heritage and Education' https://ich.unesco.org/doc/src/46212-ZH.pdf, accessed 01 November 2024
[2] Ji, X., & Sirisuk, M.: 'Lion head colorful tie-dye at Foshan city, Guangdong Province: National representative and revitalizing self-identity in the process of chinesenization'. Multidisciplinary Science Journal, 2024, 6,(11), pp.1-10.
[3] Sudan, Z., Abdullah, W. J. I. B. W. : ' Conveying Spirit Through Form: An Exploration on the Shape Symbols of Foshan Awakening Lion Head '. Art and Society, 2024, 3(1), pp. 89-100.
[4] Bontchev, B., Terzieva, V., Vassileva, D., & Dankov, Y.: ' Students Attitude to Serious Games for Cultural Heritage '. IFAC-PapersOnLine, 2024, 58, (3), pp. 316-321.
[5] Fernando, P. A., & Premadasa, H. S. : ' Game-based Activity Design in Primary School Students Learning Style Detection '. Procedia Computer Science, 2024, 2, (9), pp.356-363.
[6] A. Jain.: 'In-game advertising and brand purchase intentions: an SOR perspective', Global Knowledge, Memory and Communication, 2024, pp. 24-44.
[7] Y. Xia, Y. Deng, X. Tao, et al. : 'Digital art exhibitions and psychological well-being in Chinese Generation Z: An analysis based on the SOR framework', Humanities and Social Sciences Communications, 2024, pp. 1-15

3.3 Game Design Framework for ICH Craft Education

Based on the literature review, this study mainly uses S-O-R theory, combined with experiential learning theory and multimodal learning theory, to propose a game design framework for ICH craft education, as shown in Figure 1.

In designing the system framework, the following three aspects were mainly considered:

1) **Knowledge System Transformation:** First, explicit knowledge is transformed into game tasks, and then tacit knowledge is transformed into situational experiences. Second, experiential skills and cultural connotations are conveyed through contextual design and interactive feedback.

2) **Technical Support Strategies:** The game uses 3D modeling to restore the craft scenes and tools, employs interactive design to simulate material textures and operational feedback, and uses digital display methods to present cultural elements.

3) **Evaluation System Design:** Mainly establishes quantitative indicators corresponding to the craft standards, designs evaluation methods for cultural cognition, and builds a mechanism to track learning progress.
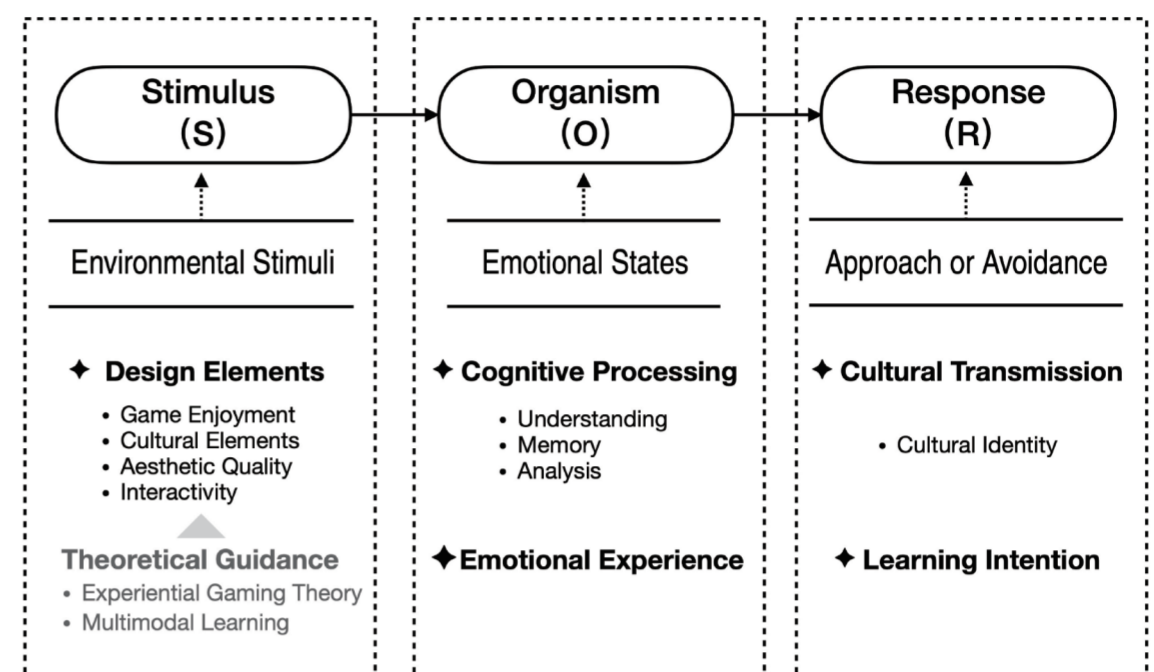

Figure1 ICH Craft Education Game Design Framework

4 Lion Dance Crafting Workshop Game System Design Practice

The "Lion Dance Crafting Workshop" is an educational game for teenagers that provides an interactive 3D experience of Foshan lion head crafting. Developed using the UE5, the game allows players to immerse themselves in the complete process of making a lion head from a first-person perspective. The design process of the "Lion Dance Crafting Workshop" game is illustrated in Figure 2. The game design focuses on the following four aspects.

4.1 Stimulus (S)

Stimuli in the lion head crafting learning system include multimodal elements and a realistic workshop setting to capture learners' attention and stimulate interest.

4.1.1 Master's Workshop Space Restoration: The game recreates the workshop of lion head master Li Wei, allowing players to experience the traditional environment. Tools for tying, pasting, painting, and decorating are precisely modeled with physics to provide realistic feedback.

4.1.2 Cultural Symbolism of the "Lion Head Wall": The game includes an exhibition space showcasing various lion heads, enhancing cultural interest and identity through exploration of their colors, patterns, and meanings.

4.1.3 Handbook Tool Design: The in-game handbook includes crafting steps, technique descriptions, and cultural background. Players can access it anytime for guidance, symbolizing knowledge accumulation in the craft.

4.2 Organism (O)

The organism represents learners' emotional and cognitive responses. Stimulus elements trigger sensory and interactive experiences that enhance learning:

4.2.1 Cognitive Processing: Visual, auditory, and verbal prompts help players understand crafting steps. The handbook and step-by-step demonstrations enable reflection and mastery.

4.2.2 Emotional Experience: Traditional elements such as music, visual design, and storytelling enhance the emotional experience. Interacting with a virtual master provides a sense of achievement.

4.3 Response (R)

Response refers to behaviors after processing stimuli, including skill mastery and cultural identity.

4.3.1 Learning Outcomes: Players gradually master crafting skills through task design and interactive feedback, cultivating innovative thinking and understanding of the craft.

4.3.2 Cultural Transmission: The game enhances cultural identity by simulating the workshop and displaying the "Lion Head Wall." Players are encouraged to share and recommend the craft, promoting its transmission.

4.4 Technical Support
To achieve design objectives, the system uses advanced technical support:
(a) UE5 - Provides high-quality visuals and a smooth interactive experience.
(b) 3D Modeling - Detailed modeling ensures visual realism.
(c) Interactive Design - Controller feedback enhances the immersive experience, adding realism to virtual operations.
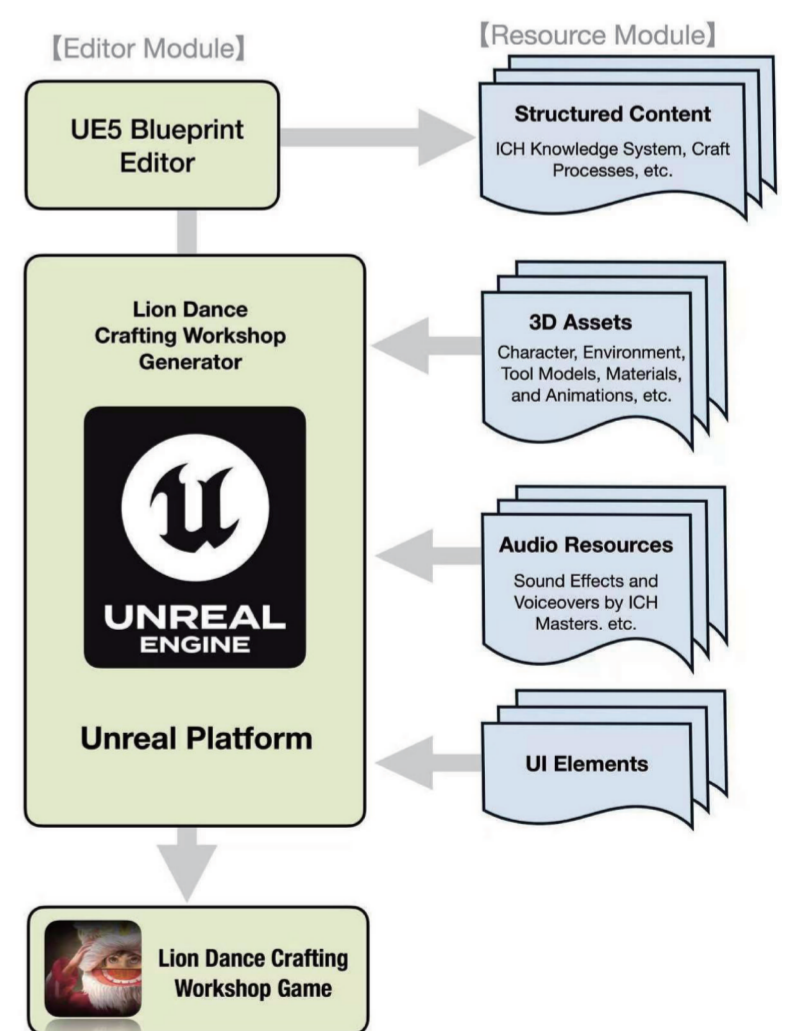

Figure2 Lion Dance Crafting Workshop Game Design Process

The design process of the "Lion Dance Crafting Workshop" game is illustrated in Figure 2.

5 Conclusion and Expected Outcomes

This study explores new ideas and practical approaches for applying S-O-R theory to the design of ICH craft educational games. By reviewing the literature, a game design framework for ICH craft education based on S-O-R theory was constructed and successfully applied in the development of the "Lion Dance Crafting Workshop" game system. However, empirical data support and practical promotion still need to be strengthened.
Future research should improve the game design by conducting user experience tests to gather subjective evaluations and feedback from players. Additionally, quantitative assessments of learning outcomes should be performed. In addition, it is necessary to explore the game's promotion and dissemination mechanisms to expand its audience and involve more people in the digital process of ICH transmission.