

Digital Interpretation of Nanjing Paper-cutting Symbols: An Innovative Pathway to Cultivating Cultural and Artistic Literacy in Youth

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ARTICLE INFO

Article history

Received: May 11, 2024

Accepted: December 28, 2024

Published: March 31, 2025

Volume: 13 Issue: 2

Conflicts of interest: None

Funding: None

ABSTRACT

In the contemporary context of rapid digitalization and evolving youth interests, traditional art forms such as Nanjing Paper-Cutting face significant challenges in preserving their cultural significance. This study explores the semantic transformation of Nanjing Paper-Cutting symbols within digital games and their potential value in cultivating cultural and artistic literacy among youth. The analysis of the paper-cutting symbols in the digital game Nanjing Paper-Cutting Show examines the reinterpretation of these symbols in virtual environments and how they enhance young people's understanding of traditional culture through interactive experiences. The employment of semiotic analysis and case study methodologies in this paper unveils the processes of visual, interactive, and cultural shifts associated with the digital expression of paper-cutting symbols. The findings indicate that digital games not only stimulate interest among young people in traditional arts but also ascribe new meanings to traditional symbols within contemporary contexts, thereby enhancing their cultural and artistic literacy. Ultimately, this paper proposes strategies for promoting the application of traditional arts in digital education, offering insights for the inheritance and innovation of Nanjing Paper-Cutting in modern educational settings.

Key words: Nanjing Paper-cutting, Digital Games, Semantic Transformation, Cultural and Artistic Literacy

INTRODUCTION

In the context of rapid globalization and digitalization, the preservation and transmission of traditional culture face significant challenges. Nanjing Paper-Cutting, as a unique form of folk art and part of the world's intangible cultural heritage, embodies rich regional culture and historical traditions (Gu, 2023), highlighting its importance in artistic expression and societal values. However, with the younger generation's increasing focus on digital technology and modern culture, traditional handicrafts are at risk of being forgotten. Therefore, it is crucial to explore effective ways to interpret and disseminate Nanjing Paper-Cutting symbols through digital technology to enhance the cultural and artistic literacy of youth.

In recent years, digital games have emerged as a prominent medium for cultural dissemination, attracting significant attention from young audiences. Digital games not only offer entertainment and interactivity but also provide immersive learning experiences (Petersen et al., 2022). By designing digital games, it is possible to effectively integrate traditional cultural symbols with modern technology, creating a new platform for youth to understand and experience Nanjing Paper-Cutting culture. This approach presents an

innovative pathway for enhancing the cultural and artistic literacy of young people.

Consequently, this study aims to digitally interpret Nanjing Paper-Cutting symbols, examining their application in digital games and their impact on cultivating cultural and artistic literacy among youth. This research not only provides theoretical support for the digital transformation of traditional arts but also offers practical guidance.

Introduce the Problem

The traditional meanings of Nanjing Paper-Cutting symbols can be adapted to digital environments through careful integration processes that emphasize cultural significance, ensuring these symbols retain their original meanings while gaining relevance in modern digital contexts. This adaptation is crucial for conveying cultural values to contemporary audiences, particularly youth, who interact with these symbols within digital platforms.

The forms of expression of Nanjing Paper-Cutting symbols in digital games play a significant role in shaping young people's understanding of cultural heritage. By presenting these symbols interactively, digital games foster an

immersive experience that connects youth with the historical and cultural roots of Nanjing Paper-Cutting, enhancing their appreciation and knowledge of traditional culture.

Furthermore, the presentation of Nanjing Paper-Cutting symbols in digital games contributes to the development of young people's aesthetic abilities. Engaging with these traditional symbols in a modern, visually appealing format nurtures aesthetic sensitivity, encouraging youth to explore and appreciate the artistic qualities of their cultural heritage while fostering cultural identity and confidence.

Explore the Importance of the Problem

Against the backdrop of globalization, the transmission of traditional culture and the cultivation of a sense of identity face numerous challenges (Sutrisno, 2023). As a representative of traditional Chinese folk art, Nanjing Paper-Cutting can be effectively presented in games through digital means, leveraging its visual and interactive characteristics to engage young audiences. This approach facilitates an immersive experience that allows youth to encounter and appreciate the aesthetic value of traditional cultural symbols. Such engagement not only strengthens their sense of belonging to traditional culture but also subtly enhances their aesthetic capabilities, laying a foundation for cultural confidence.

Digital games, as highly interactive media, are capable of transmitting knowledge and stimulating youth's thinking and imagination through interactive design (Ellison & Drew, 2020). By effectively integrating Nanjing Paper-Cutting symbols into games, young people can grasp the cultural connotations behind these symbols while being guided to incorporate traditional cultural elements into modern contexts through new scenarios and gameplay, thereby fostering innovative thinking. This method offers possibilities for the vibrant transmission of traditional culture and contributes to the innovative expression of cultural content.

In the process of digitalization, maintaining and conveying the traditional meanings and cultural values of Nanjing Paper-Cutting is a critical issue (Shu, 2023). The recreation of traditional cultural symbols within digital games faces the challenge of balancing their original meanings with adaptability to new media. Exploring the mechanisms of semantic transformation for Nanjing Paper-Cutting symbols in digital environments helps preserve the core cultural values in new forms, ensuring they are not misunderstood or diluted. Additionally, this approach provides insights into the sustainable development of cultural transmission in the digital age, aiding in the digital protection and innovation of other traditional cultural symbols.

Objectives and Research Questions

This study aims to explore effective approaches for adapting the traditional meanings and cultural values of Nanjing Paper-Cutting symbols to digital environments, focusing on their impact on youth's cultural understanding and aesthetic development. Through examining the integration of these traditional symbols into digital games, this research seeks to identify strategies that preserve the cultural integrity of

Nanjing Paper-Cutting in digital formats while enhancing its accessibility and relevance for younger audiences.

To achieve these goals, this study addresses the following research questions:

1. How can the traditional meanings of Nanjing Paper-Cutting symbols be adapted for digital environments in ways that preserve and convey their cultural significance?
2. How do different digital expressions of Nanjing Paper-Cutting symbols within games influence young people's understanding and appreciation of cultural heritage?
3. How does the presentation of Nanjing Paper-Cutting symbols in interactive digital games affect young people's aesthetic awareness, fostering cultural identity and enhancing their aesthetic literacy?

By addressing these questions, this research aims to provide insights into the digital preservation and innovative representation of traditional cultural symbols, ultimately contributing to sustainable cultural transmission in the digital era.

LITERATURE REVIEW

Cultural Symbolism of Nanjing Paper-Cutting Art

Nanjing Paper-Cutting is a representative form of Chinese paper art with a rich history. Historical records indicate that the origins of Nanjing Paper-Cutting trace back to the early Ming Dynasty, when people cut red paper into coin shapes and affixed them to door frames during the New Year to symbolize good fortune. Over time, Nanjing Paper-Cutting developed a distinct artistic style and expression. In the 1950s, cultural workers summarized its characteristics as "flowers within flowers, themes within themes, coarseness blended with finesse, and simplicity revealing spirit." These characteristics not only reflect the artistic style of Nanjing Paper-Cutting but also convey profound cultural significance.

As an outstanding representative of traditional Chinese folk art, Nanjing Paper-Cutting has deep roots in the region and embodies a wealth of cultural connotations. Research indicates that the origins of Nanjing Paper-Cutting are closely linked to ancient religious rites and folk beliefs (Xue, 2019), and its development reflects the interplay between social change and economic growth. Throughout this evolution, Nanjing Paper-Cutting has become widely used in folk activities such as festivals, weddings, and birthdays, embodying rich regional culture and traditional customs.

Nanjing Paper-Cutting is not only unique in technique but also exemplifies the distinctiveness of local culture in its artistic style. Studies have pointed out that the forms of Nanjing Paper-Cutting are diverse, often featuring themes of animals, plants, and everyday life, showcasing a strong local flavor and liveliness. These artistic works provide not only visual enjoyment but also serve as a medium for cultural transmission, reflecting the historical changes and values of the people in the Nanjing region. For instance, during folk activities, paper-cuttings are often used as decorations, symbolizing auspiciousness and expressing people's aspirations for a better life (Gu, 2023).

The cultural meanings embodied in Nanjing Paper-Cutting symbols warrant in-depth exploration. Through an analysis of their symbolic significance and historical context, we can discern that Nanjing Paper-Cutting is not only a vessel for local culture but also a testament to social history. Researchers have noted that these paper-cutting works often carry profound meanings, reflecting people's pursuits of happiness, prosperity, and well-being (Gong, 2024). Moreover, Nanjing Paper-Cutting plays a crucial role in local customs; aside from being used for festive decorations, it is also a vital form of folk-art transmission, representing community cohesion and cultural identity.

Concept of Cultural and Artistic Literacy and Pathways for Cultivation

Cultural and artistic literacy refers to an individual's ability to understand, appreciate, create, and express within cultural and artistic domains (Kuttner, 2020). This concept encompasses not only the capacity to appreciate cultural and artistic works but also the understanding of their cultural backgrounds and artistic expressions, alongside creative thinking skills based on this understanding. In contemporary society, the significance of cultural and artistic literacy has become increasingly pronounced. With the acceleration of globalization, individuals live in a multicultural context, making cultural and artistic literacy a crucial factor in promoting cultural exchange, enhancing cultural confidence, and strengthening social identity. Additionally, research indicates that strong cultural and artistic literacy positively impacts adolescents' holistic development, enhancing their aesthetic abilities and fostering innovative and critical thinking, thereby making them more competitive in future studies and life.

Art education plays an indispensable role in improving adolescents' cultural and artistic literacy. Effective curriculum design should emphasize not only the transmission of artistic knowledge but also the participation in practical activities, allowing students to experience the charm of art through hands-on engagement. For instance, through practical activities like painting, music, and drama, adolescents can personally experience the creative process of art, thereby deepening their understanding and appreciation of it. Moreover, teachers' guidance and feedback are crucial in enhancing students' cultural and artistic literacy. Studies show that teachers can effectively stimulate students' creativity and artistic expression through heuristic teaching and personalized guidance.

Application of Digital Technologies and Digital Games in Cultural and Artistic Literacy Education

In today's rapidly developing information technology landscape, the application of digital technologies in art education has become increasingly diverse, encompassing various forms such as online courses, virtual exhibitions, and interactive learning tools (Lin & Laoakka, 2024). These technologies not only provide students with a flexible learning environment but also enhance their learning experiences.

Research shows that online courses can break the temporal and spatial limitations of traditional classrooms, allowing students to access rich cultural and artistic knowledge globally. At the same time, virtual exhibitions and interactive learning tools offer intuitive ways to present artworks, enabling students to understand the background and connotations of artistic works more deeply.

Gamified learning, as an emerging educational approach, effectively enhances adolescents' cultural and artistic literacy by integrating game elements into the learning process (Sanchez et al., 2020). Its characteristics of fun, interactivity, and immersive experience provide students with a more engaging learning method, significantly improving learning outcomes. Research indicates that gamified learning not only enhances adolescents' understanding and acceptance of cultural content but also stimulates their interest and enthusiasm for learning. Participation in digital games has been shown to increase adolescents' engagement and involvement in cultural learning, thereby enhancing their comprehension of cultural and artistic matters.

Furthermore, integrating traditional cultural elements into digital games can effectively stimulate adolescents' creativity and cultural sensitivity. By experiencing and understanding traditional culture within game contexts, adolescents cannot only enhance their recognition of cultural symbols but also explore the diversity and depth of culture through interactive design and game mechanics (Alvarez et al., 2019). This approach offers new possibilities for the transmission and innovation of traditional culture, allowing adolescents to cultivate cultural sensitivity and creativity in an enjoyable gaming experience.

Semiotics and Semantic Transformation of Cultural Symbols

Semiotics, the study of signs and their meanings, provides essential theoretical support for the digital transformation of cultural symbols (Gretzel & Collier de Mendonça, 2019). By analyzing the composition, function, and meaning of symbols within specific cultural contexts, semiotics helps researchers understand the adaptability and transformation mechanisms of traditional cultural symbols in new media environments. In the digitalization process, the semantic transformation of cultural symbols is not merely a continuation of their traditional meanings but also a re-interpretation in modern contexts.

In digital games, the application of traditional cultural symbols faces challenges related to semantic adaptation. Game designers must reconstruct the semantics of these symbols while preserving their cultural value, ensuring they resonate with modern players' experiences and interactive needs. This transformation necessitates a deep understanding of the original meanings of the symbols while considering the cultural backgrounds and aesthetic requirements of contemporary players. Research has found that with appropriate design and conceptualization, traditional cultural symbols can gain new life within games, attracting the attention of younger players and enhancing their understanding and experience of culture (Dai et al., 2019).

Specifically, the semantic adaptation of traditional cultural symbols in digital games manifests in multiple dimensions. For instance, in games, designers can tightly integrate traditional symbols with game contexts through visual representation, interactive design, and narrative structure, creating gaming experiences that retain cultural connotations while also being entertaining. This approach not only enhances players' sense of participation and cultural identity but also provides new platforms for the dissemination and education of traditional culture.

Semiotics plays a pivotal role in the digital transformation of cultural symbols. By analyzing the semantic adaptation process of these symbols, we can better understand how traditional cultural symbols achieve renewal in modern digital environments. This research not only provides theoretical guidance for the application of cultural symbols in digital games but also offers valuable insights for digital cultural transformation in other fields.

Relevant Theories

Semiotics, as a discipline that studies the generation of meaning through signs, emphasizes the significant role of symbols in cultural transmission (Zolyan, 2019). According to the theories of Peirce and Saussure, symbols not only represent objects but also carry profound cultural connotations and social meanings. Semiotic theory provides theoretical support for the digital transformation of cultural symbols, especially in analyzing how traditional cultural symbols adapt and transform in new media environments. In a digital context, cultural symbols need to be reinterpreted to align with contemporary cultural backgrounds. During this process, the semantics of symbols may change; however, their core values can be preserved. By adopting a semiotic perspective, researchers can deeply explore the recreation and cultural adaptability of Nanjing Paper-Cutting symbols in digital games, revealing their potential and challenges in digital dissemination.

Gamified learning theory highlights the enhancement of motivation and outcomes through game mechanics (Jayalath & Esichaikul, 2022). Research shows that gamified learning can increase the enjoyment and interactivity of learning, providing adolescents with immersive learning experiences. Cultural education through games can effectively enhance adolescents' understanding and acceptance of cultural content. The core of this theory lies in utilizing game design elements, such as points, levels, challenges, and rewards, to stimulate students' interest and engagement. Integrating traditional cultural elements into digital games not only helps adolescents understand the connotations of culture but also ignites their creativity and cultural sensitivity. Digital games serve as new carriers for cultural education, offering fresh perspectives and possibilities for the transmission and innovation of traditional culture.

Cultural dissemination theory focuses on how culture is transmitted and transformed across different media and social environments (Hammond, 2021). In the context of globalization and digitalization, traditional culture faces new challenges and opportunities for dissemination. Researchers

point out that the application of digital technologies in cultural dissemination not only enhances the visibility of culture but also promotes innovative expressions of culture (Jin & Liu, 2022). As an emerging cultural dissemination medium, digital games, with their entertaining and interactive qualities, enable cultural content to be presented in more accessible ways. By integrating Nanjing Paper-Cutting symbols into digital games, we can effectively attract the attention of the younger generation and enhance their cultural identity and aesthetic abilities. Cultural dissemination theory provides a theoretical foundation for understanding the application of Nanjing Paper-Cutting in digital games, aiding researchers in exploring innovative dissemination pathways for traditional culture in the digital age.

The integration of semiotics, gamified learning theory, and cultural communication theory provides a multidimensional theoretical framework for this study. Semiotics aids in understanding the adaptation and transformation of Nanjing Paper-Cutting symbols within digital environments. Gamified learning theory highlights the role of digital games in enhancing cultural understanding and aesthetic appreciation among adolescents. Meanwhile, cultural communication theory offers insights into the dissemination and innovation of traditional culture in the digital age. The convergence of these three theories establishes a robust theoretical foundation for examining the digital interpretation of Nanjing Paper-Cutting symbols and their impact on the cultural and artistic literacy of youth.

METHOD

Research Design

This study is grounded in semiotics, gamified learning theory, and cultural communication theory to analyze the digital transformation of Nanjing Paper-Cutting symbols and their recreation in digital games. Semiotics supports the adaptability of cultural symbols, while gamified learning theory emphasizes the promotion of learning through interactive and immersive experiences. Cultural communication theory focuses on the pathways through which traditional culture is disseminated in new media. A qualitative research approach is employed, utilizing literature reviews and case analyses to collect data related to Nanjing Paper-Cutting symbols and their applications in digital games. The research framework is illustrated in Figure 1.

Data Collection

The data collection for this study will focus on three key areas to deeply analyze the application of Nanjing Paper-Cutting symbols in digital games and their impact on youth.

Traditional representations and semantic analysis of nanjing paper-cutting symbols

This section will systematically collect traditional representations related to Nanjing Paper-Cutting, including its artistic styles, production techniques, and symbolic meanings.

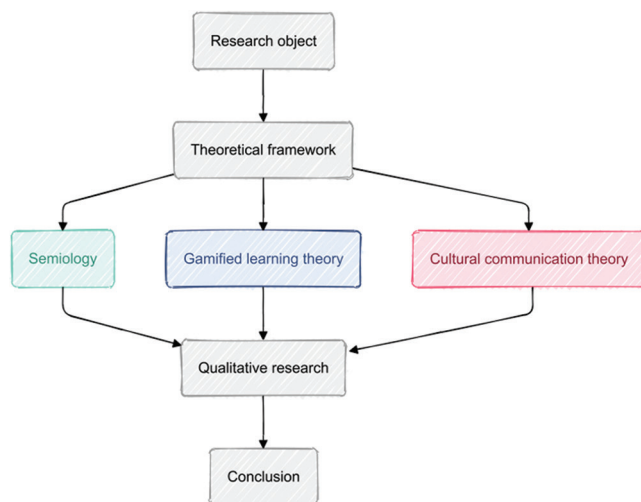


Figure 1. Research framework

Through a review of existing literature and case studies, this analysis will clarify the historical context, regional characteristics, and cultural connotations of Nanjing Paper-Cutting symbols. This understanding will not only highlight the traditional value of these symbols but also lay the foundation for subsequent studies on their digital transformation.

Semantic transformation of nanjing paper-cutting symbols in digital games

This section will focus on the representation and semantic adaptation of Nanjing Paper-Cutting symbols in digital games. By analyzing specific digital game cases, this part will explore the manifestations of paper-cutting symbols, design concepts, and the shifts in their cultural meanings within the games. Collecting game design documents, player feedback, and relevant data will help elucidate how these symbols facilitate cultural transmission and innovative expression in a digital environment. This process will reveal the potential of digital games as mediums for cultural dissemination and provide empirical evidence to enhance youth recognition of traditional culture.

Youth cultural understanding and aesthetic experience of nanjing paper-cutting symbols in digital game contexts

This section will gather data on youth understanding and aesthetic experiences of Nanjing Paper-Cutting symbols through surveys and interviews. It will analyze their encounters with these symbols in digital games, including their comprehension of cultural connotations, emotional resonance, and aesthetic responses. This data will help evaluate the impact of digital games on the cultural and artistic literacy of youth, providing a basis for subsequent educational practices.

Through the data collection and analysis of these three areas, this study aims to comprehensively understand the performance of Nanjing Paper-Cutting symbols in digital games and their influence on youth cultural identity and aesthetic abilities, thereby providing theoretical support and practical guidance for the digital dissemination of traditional culture and educational practices.

RESULTS AND DISCUSSION

Traditional Forms and Semantic Analysis of Nanjing Paper-cutting Symbols

Nanjing Paper-Cutting, as a unique form of folk art, carries rich cultural connotations and historical background. Through the analysis of its traditional forms and cultural semantics, we can better understand its important position in the cultural heritage of the Nanjing region.

Traditional forms

The forms of Nanjing Paper-Cutting are diverse. Based on their purposes and stylistic characteristics, they can be mainly categorized into several types, including Embroider, Anthophilous, Competing Fragrant Flowers, Door paper cut, as shown in Table 1.

Semantic analysis

In the art of Nanjing Paper-Cutting, the graphic elements not only possess aesthetic value but also carry profound cultural significance. These symbols serve not only as visual decorations but also as emblems of historical heritage and local identity. Below is a semantic analysis of several representative Nanjing Paper-Cutting symbols, revealing their symbolic meanings and emotional resonance within Nanjing's culture.





Plum Blossom: As the city flower of Nanjing, the plum blossom symbolizes resilience and noble spirit. Plum Blossom Hill in Nanjing is renowned as the "First Plum Blossom Mountain under Heaven," serving not only as a destination for viewing plum blossoms but also as a significant marker of Nanjing's historical culture. The plum blossom patterns in paper-cutting typically exhibit simple yet powerful forms, embodying tenacity and an indomitable spirit, making it a symbol of the character of the people of Nanjing (Zhaoyan & East, 2021).

Swallow: Symbolizing Spring, the swallow heralds' new beginnings and a bright future. In Nanjing Paper-Cutting, the swallow motif often appears in works themed around spring, symbolizing the welcoming of spring and the arrival of good fortune, infused with vibrant energy. "Swallow Cliff" in Nanjing, known as the "First Cliff of the Yangtze River," inherently carries the imagery of the swallow. The representation of swallows in paper-cutting signifies the optimistic outlook of the people of Nanjing towards life and their hopes for the future.

Tiger: In traditional Chinese culture, the tiger symbolizes authority and power, while also representing protection and safety (Cao et al., 2024). In Nanjing, the image of the tiger is exemplified by names such as "Lion Bridge" and the stone lions in front of Chaotian Palace, emphasizing its role as a guardian. The portrayal of tigers in paper-cutting is vivid and majestic, used to ward off evil and ensure safety, reflecting the people's wishes for a stable life.

Nanjing City Wall: The Nanjing City Wall stands as a testament to the rise and fall of Nanjing as an ancient capital, symbolizing the city's strength and historical depth (Yang,

Table 1. The main traditional forms of Nanjing Paper-Cutting

Type	Purpose	Illustration
Embroider	The base of embroidery provides a rich pattern for embroidery.	
Anthophilous	Used for wedding and other festive occasions decoration, add auspicious decorative elements.	
Competing Fragrant Flowers	It provides solemn decorative patterns for traditional rituals such as ancestor worship and deity offerings.	
Door paper cut	It is used to adorn the door lintel during the Spring Festival, adding to the festive atmosphere.	

2020). As an important component of cultural history, military defense architecture, and urban planning, the city wall is often depicted in paper-cutting as continuous geometric patterns, representing the resilience of urban spirit and cultural memory. The wall patterns in Nanjing Paper-Cutting embody a nostalgia for the ancient capital's culture and a guardianship over contemporary life.

These paper-cutting symbols not only enrich the expressive content of Nanjing Paper-Cutting art but also convey deep emotions and values through their cultural semantics. Through the semantic analysis of these symbols, we can gain a deeper understanding of the cultural significance and social value of Nanjing Paper-Cutting as a traditional art form in contemporary times, as shown in Table 2.

Semantic Transformation of Nanjing Paper-Cutting Symbols in Digital Games

With the consent of the game maker himself, we captured the digitized symbols of the digitized game "Nanjing Paper-Cutting Show" for analysis. Nanjing Paper-Cutting The digital transformation of Nanjing Paper-Cutting symbols breathes new life into their modern dissemination and preservation. In digital games, paper-cutting symbols are transformed through animation techniques into characters, backgrounds, or props, providing a fresh visual experience

of traditional paper-cutting art. The flexible application of colors and patterns in games integrates modern design concepts, resulting in paper-cutting that retains traditional aesthetics while appealing to the tastes of younger players.

Furthermore, paper-cutting symbols play a crucial role in game mechanics, enhancing interactivity and enjoyment. For instance, some games incorporate paper-cutting symbols in puzzles or challenges, allowing players to engage with the essence of traditional culture while having fun. Through this digital format, paper-cutting symbols not only gain new cultural significance but also foster cross-cultural communication in a globalized gaming context, paving new pathways for cultural transmission, as illustrated in Table 3.

Cultural Understanding and Aesthetic Experience of Nanjing Paper-cutting Symbols by Adolescents in Digital Games

With the development of digital technology, Nanjing Paper-Cutting symbols are presented in new forms within digital games, enabling adolescents to deeply appreciate the charm of this traditional culture through interaction. This section explores the cultural understanding and aesthetic experiences of adolescents regarding Nanjing Paper-Cutting symbols in digital games, focusing on their recognition of these symbols and their emotional responses.

Table 2. Semantic analysis of representative symbols of Nanjing Paper-Cutting







Signifier	Signified	Cultural Connection	Illustration
Plum Blossom	Symbolizes resilience and noble character	The city flower of Nanjing; Meihua Mountain is known as "the first plum mountain in the world."	
Tiger	Symbolizes nobility and authority, also represents protection and safety for people□	Place name: Lion Bridge; stone lions in front of the Chaotian Palace.	
City Wall	Witnessed the prosperity and changes of Nanjing as an ancient capital; symbolizes the city	An important part of cultural history, military defense architecture, and urban planning.	

Table 3. Semantic transformation of Nanjing paper-cut symbols in digital games

Signifier in Game (Game Element)	Signified in Game (Reinterpretation of Cultural Meaning)	Semantic Transformation	Illustration	Prototype	Type
Appear as scene decorations and props	Represent the time and place of the game scene while symbolizing the player's character and refinement	Serve to guide players into the game scene, enhancing the sense of immersion.		Plum Blossom	Animation
Character Representation with Dynamic Design and Interactive Functions	Represent the Player's Character, Embodying the Symbolism of the Animal	Used for Emotional Guidance and Task Prompts, Where Players Must Use Their Character to Complete Specific Tasks		Tiger	Animation
Appear as scene decorations	Transform into Specific Scene Landmarks	Indicate to Players the Entrance to Specific Areas and Tasks Related to Cultural Heritage		City Wall	Image

Cultural understanding

In the context of digital games, adolescents exhibit diverse and profound understandings and cognitions of Nanjing Paper-Cutting symbols. First, research indicates that through

interactive experiences in games, adolescents gradually develop a basic understanding of Nanjing Paper-Cutting culture. They can identify common paper-cutting symbols such as plum blossoms, tigers, and city walls, and grasp the traditional cultural meanings behind them. For example, the city

wall often symbolizes history in paper-cutting, further emphasizing the deep historical and cultural value of Nanjing Paper-Cutting within the game context.

Additionally, adolescents' interpretations of Nanjing Paper-Cutting symbols are influenced by game design. In many games, paper-cutting symbols are cleverly integrated into game mechanics and storylines, encouraging players to engage in active thinking and discussion throughout the gameplay. This interaction not only enhances their understanding of cultural symbols but also allows them to explore the deeper meanings of culture within the game context. Through gameplay, adolescents can gain insights into the connections between certain paper-cutting symbols and local customs and festivals, sparking their interest in and exploration of traditional culture.

For instance, in games featuring a module for creating greeting cards, players can assemble unique Lantern Festival cards by selecting decorative patterns, blessing phrases, character designs, and ornamentation. This process not only allows them to experience the joy of creation but also helps them recognize the significance of the lotus lantern custom during Nanjing's Lantern Festival. As shown in Figure 2.

The lotus lantern tradition of the Lantern Festival is an important cultural custom in the region, originating from the ancient reverence for fire, which further developed with the introduction of Buddhism. Today, Nanjing residents still celebrate with vibrant activities during the Lantern Festival. For example, large lantern fairs are held around the Confucius Temple area, featuring an array of beautifully crafted lanterns that attract numerous visitors. Through such gaming



Figure 2. Lantern festival greeting card assembled by users in the game

experiences, adolescents not only deepen their understanding of Nanjing's traditional culture but also engage with the charm and vitality of the culture through active participation.

Finally, adolescents' cultural understanding of Nanjing Paper-Cutting symbols reflects their recognition of their cultural identity. Through participation in digital games, they not only appreciate aesthetics but also construct a sense of cultural identity. This sense of identification helps adolescents build cultural confidence, enabling them to maintain a love and respect for their local culture even when faced with the challenges of globalization.

Aesthetic experience

The aesthetic experience of adolescents regarding Nanjing Paper-Cutting symbols in digital games is a crucial aspect involving emotional responses and subjective evaluations. In the game, using the swallow symbol as a case study, adolescents develop unique aesthetic evaluations through their visual perception and interactive experiences with paper-cutting symbols.

First, the swallow symbol, representative of Nanjing Paper-Cutting, is reinterpreted within digital games, showcasing its beauty through color, shape, and composition, thereby enhancing its visual appeal as shown in Figure 3.

This study employed semi-structured interviews to gather insights from two young Chinese individuals from the Nanjing area regarding their perceptions and experiences of the paper-cutting symbol "swallow" in digital games. Participant A, aged 25, is a resident of Nanjing, while Participant B, aged 22, is a university student from the outskirts of the city. Both participants possess a certain level of familiarity with Nanjing's local culture and have experience with digital games, making their perspectives representative and valuable for this study.

The interviews focused on several aspects of the swallow paper-cutting symbol's representation in digital games, including its color, shape, composition, visual appeal, symbolic meaning, interactive experience, and cultural educational value. The recorded interview data were analyzed thematically, with information categorized into topics such as color, shape, and composition. Key phrases and statements were extracted to highlight the participants' perspectives on the



Figure 3. Swallows in paper-cutting games

visual, emotional, and cultural-educational dimensions of the swallow symbol.

Research indicates that adolescents generally show a high level of interest and affection for the swallow elements in the game, perceiving them not only as visually appealing but also rich in cultural significance. Within the game, the swallow symbol is enhanced by the integration of dynamic effects and sound, further enriching the aesthetic experience and allowing adolescents to enjoy the beauty of cultural art while participating in the game.

Additionally, interactions with the swallow symbol in the game often evoke emotional responses among adolescents. For example, the swallow symbolizes spring and rebirth, eliciting positive and uplifting emotions. Such emotional experiences not only enhance their appreciation for the swallow symbol but also help them establish a deeper emotional connection with traditional culture.

Furthermore, adolescents' aesthetic experiences with the swallow symbol in digital games promote their understanding of beauty and enhance their creativity. Through observation and interaction, they are able to appreciate the unique charm of paper-cutting art more profoundly, thereby stimulating their potential for artistic creation. This cultivation of aesthetic ability holds positive implications for the future artistic development and cultural heritage of adolescents as shown in Table 4.

To foster the integration of traditional art, particularly Nanjing Paper-Cutting symbols, in digital education, a series of strategic initiatives can be implemented to cultivate the cultural and artistic literacy of young people. The following strategies are illustrated in Figure 4.

1. **Enhancing Interactive Experiences:** By increasing interactivity within digital games, Nanjing Paper-Cutting symbols can be transformed into operable elements, such as card-matching games and interactive blessings. This approach not only boosts youth interest in the games but also allows them to subtly absorb traditional cultural education through their interactions.
2. **Introducing Cultural Background Explanations:** Embed historical and cultural background information about Nanjing Paper-Cutting symbols within the games. This can be done through images, audio, or video formats

that explain the traditional meanings and historical significance of the symbols. Such integration aids youth in developing a deeper understanding of these symbols' cultural value, fostering respect and recognition for traditional culture.

3. **Adopting Narrative-Driven Game Structures:** Utilize narrative or mission-driven game designs to incorporate paper-cutting symbols into the storyline. This design allows youth to naturally engage with and comprehend the semantic transformations of these symbols as they complete tasks. Not only does this enhance the game's enjoyment, but it also imparts new narrative value to traditional symbols, enabling youth to learn cultural content in an entertaining way.
4. **Enriching Visual Expression:** The visual representation of Nanjing Paper-Cutting symbols on digital platforms can be diversified, combining modern design styles that resonate with the aesthetic preferences and visual habits of young audiences. This enhances their acceptance of and interest in traditional art.
5. **Integrating Educational Functions:** Combine Nanjing Paper-Cutting symbols with educational content by incorporating digital paper-cutting activities or designing related learning modules in subjects such as art and history. This allows youth to experience the allure of traditional art both inside and outside the classroom, gradually cultivating their cultural and artistic literacy.

Analysis of the significance of the improvement of cultural and artistic accomplishment

The present study set out to assess the effect of the digital paper-cutting game on the enhancement of cultural and artistic literacy in adolescents. To this end, the data from 351 questionnaires completed before and after the experiment were statistically analyzed. The questionnaires covered five aspects of cognitive and emotional experience, namely the respondents' cognition of the history of Nanjing paper-cutting, their understanding of the meaning of the symbols, their appreciation of the artistic features, the emotional resonance of the symbols, and their attitudes towards cultural identity. The results of the pre- and post-tests showed that the mean

Table 4. Analysis of aesthetic experience of the swallow symbol

Illustration	Content Description
Color	The main colors are gray and white, interspersed with subtle yellow and green details, and the overall tone is soft and quiet, creating a warm and harmonious atmosphere
Shape	The shape is streamlined, with broad, spread wings and an elegantly clipped tail
Composition	Two swallows fly in a diagonal pattern, the composition is simple and dynamic
Visual Appeal	The swallow's streamlined silhouette and vivid color combination make it visually striking
Emotional Resonance	Feeling the emotion of joy, hope and renewal
Symbolic Meaning	Swallows are a symbol of good luck in many cultures, heralding the coming of spring and happiness. It stands for diligence, enterprise and freedom
Interactive Experience	In the game, the swallow symbol interacts with the player through animation effects to enhance the sense of participation
Cultural Education	The combination of game plot and swallow symbol guides cultural learning

cognitive scores of the adolescents in cultural and artistic literacy increased significantly, and the paired-sample t-calibration results are shown in Table 5 and Table 6.

The Paired-Samples T Test was utilised to evaluate the variation in composite scores prior to and following the experimental intervention. The findings revealed that the mean score prior to the experiment was 1.9 ($SD = 0.4$), and the mean score post-experiment was 3.9 ($SD = 0.5$), with a statistically significant discrepancy ($p < .01$). This finding suggests that the digital paper-cutting game has had a substantial impact on enhancing the adolescents' understanding of Nanjing paper-cutting culture and their appreciation of art. In conclusion, the experimental results have validated the efficacy of digital games in promoting the cultural and artistic literacy of adolescents, particularly in the context of transmitting and innovating traditional culture, a domain that holds significant educational value. These findings offer substantial support for an educational model that integrates traditional culture and art with digital technology.

DISCUSSION

In the context of rapid globalization and digitization, effectively inheriting and promoting traditional culture in the digital age has become a key issue in cultural studies and education. This study explores how digital technologies enhance the cultural and artistic literacy of youth through the application and semantic transformation of Nanjing Paper-Cutting symbols in digital games. Grounded in frameworks of semiotics, gamified learning theory, and cultural communication theory, this research reveals the adaptability of Nanjing Paper-Cutting symbols in digital environments, their transmission pathways, and their impact on youth's cultural understanding and aesthetic abilities. This section will discuss the significance and challenges of the digital interpretation of Nanjing Paper-Cutting symbols in enhancing youth cultural literacy.

Balancing Symbolic Transformation and Cultural Value Preservation

Integrating Nanjing Paper-Cutting symbols into modern gaming contexts demands a nuanced approach to ensure their cultural significance is retained. This study reveals that, through digital transformation, designers employ creative strategies in visual representation and semantic construction to reinterpret these symbols, presenting them in ways that resonate with contemporary audiences and provide enriched aesthetic experiences.

The Impact of Digital Games on Youth's Cultural Understanding and Aesthetic Ability

This research shows that digital games, as emerging cultural communication media, positively influence youth's cultural understanding and aesthetic abilities. Through interactive and immersive gaming experiences, young players can engage with and understand the artistic features and cultural connotations of Nanjing Paper-Cutting, enhancing their cultural sensitivity and aesthetic judgment. The study reveals that the visual representation and meanings of Nanjing Paper-Cutting symbols are effectively conveyed through scenes, tasks, and symbol interactions within the games, allowing youth to gradually grasp the cultural significance embedded in these symbols during enjoyable learning experiences. This finding suggests that digital games hold great potential for cultural and artistic literacy education, providing new pathways for the modern dissemination of traditional arts.

The Re-creation and Innovative Expression of Nanjing Paper-cutting Symbols

The study indicates that the re-creation of Nanjing Paper-Cutting symbols in digital games not only enhances the visual appeal of the games but also fosters innovative expressions

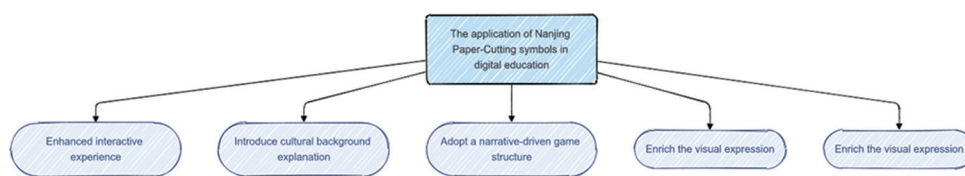


Figure 4. Strategies for integrating nanjing paper-cutting symbols in digital education

Table 5. Paired samples statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before	1.90	351	0.45	0.0239
	After	3.87	351	0.51	0.0271

Table 6. Paired samples test

	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	df	Sig. (2-tailed)
Pair1 Before - After	-1.97	0.29	0.0157	-1.9985	-1.9365	350	<.01

of traditional cultural symbols. Designers adapt these symbols to the visual demands of the gaming context through transformations in color, pattern, and dynamic effects, resulting in an artistic style that both preserves traditional culture and aligns with modern aesthetics. This innovative expression enriches the visual experience of the games and breathes new life into Nanjing Paper-Cutting symbols for the younger generation.

Potential Limitations and Future Research Directions

Although this study offers valuable insights into the digital transformation of Nanjing Paper-Cutting symbols, several limitations need to be addressed in future research. First, the study focuses primarily on a single digital game, “Nanjing Paper-Cutting Show,” which may limit the generalizability of the findings. Future studies could explore a broader range of digital games or interactive platforms to examine how different media and design approaches influence the transformation of traditional cultural symbols.

Second, while this research examines the visual and semantic shifts of paper-cutting symbols, it does not delve deeply into the emotional and cognitive responses of a diverse demographic, particularly those with varying levels of familiarity with traditional culture. Further research could explore how different age groups, cultural backgrounds, and levels of exposure to traditional art influence the understanding and appreciation of these symbols in digital contexts.

CONCLUSION

In this study, we explored the semantic transformation process of Nanjing Paper-Cutting symbols in digital games and their impact on fostering cultural and artistic literacy among youth. The findings indicate that digital interpretations provide new perspectives for expressing traditional symbols, allowing Nanjing Paper-Cutting symbols to acquire richer meanings and cultural values in virtual environments. Through interactive games, youth can immerse themselves in the experience and understanding of these traditional symbols, enhancing their recognition and interest in Chinese traditional culture.

Digital games, as a medium for cultural education, can present complex traditional cultural symbols in modern ways, enabling youth to engage with and comprehend the historical and cultural connotations of these symbols interactively. Moreover, digital means can innovatively expand the visual and semantic characteristics of Nanjing Paper-Cutting, making them more accessible to contemporary youth’s understanding and aesthetic preferences. The semantic transformation of symbols not only enhances the educational function of traditional culture but also provides new pathways for cultural inheritance in the digital age.

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