

Research on Multi-dimensional Interactive Picture Books of Guangxi Zhuang Nationality

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Abstract

In the era of globalization and modernization, the inheritance and innovation of traditional national cultures face significant challenges. The "March 3rd" festival of Guangxi Zhuang nationality, rich in cultural connotations and unique artistic value, is at risk of being marginalized due to societal changes. This study aims to explore the application of cultural elements of Guangxi Zhuang March 3rd Festival in interactive picture books, design five multi-dimensional interactive picture books to spread Zhuang culture, and analyze the role of interactive picture books in inheriting and promoting national culture. To achieve these objectives, a combination of qualitative and quantitative research methods is employed. The study begins with the combing and analysis of cultural elements through literature review and field investigation. Then, the design and production of picture books are carried out, incorporating five core stories: the Dragon Mother Sacrifice, the Song Wei Festival, the Bamboo Pole Dance, the Copper Drum, and the Five-color Glutinous Rice. Multi-dimensional interactive methods, such as three-dimensional pop-up structures, touchable textures, sound chips, and NFC technology, are used to enhance the reader's multi-sensory experience. Finally, a comprehensive analysis of the picture book design is conducted. The results reveal that multi-dimensional interactive picture books can effectively integrate cultural elements of Guangxi Zhuang March 3rd Festival, providing an engaging and interactive way to spread Zhuang culture. These picture books not only showcase the essence of Zhuang culture but also meet the aesthetic demands of modern readers, offering new ideas and methods for the modern dissemination and development of national culture.

Keywords: Zhuang Culture; Interactive Storybooks; Innovation & Cultural Storytelling; Multi-sensory Design

Introduction

In the era of globalization and modernization, the inheritance and innovation of traditional national cultures have become increasingly challenging. The "March 3rd" festival, as one of the most significant traditional festivals of the Guangxi Zhuang nationality, is rich in cultural connotations and unique artistic value. However, with the rapid development of society and the shift in lifestyle of the younger generation, this traditional culture faces the risk of being marginalized. Meanwhile, the study of Xue Chufan (2024) emphasized the importance of interactive elements in the design of traditional culture picture books, suggesting that interactive technology can significantly enhance readers' engagement and understanding of cultural content. In this context, the exploration of how to pass on and innovate the culture of the Guangxi Zhuang nationality through multi-dimensional interactive picture books has become a pressing issue.

This study holds significant theoretical and practical importance. Theoretically, it delves into the profound historical and cultural heritage of the Guangxi Zhuang nationality, aiming to accurately capture the unique charm and spiritual core of the Zhuang culture. By combining traditional cultural elements such as the sacrifice to the Dragon Mother, the Song Fair, hydrangea throwing, bamboo dancing, five-color glutinous rice, and bronze drum beating with modern interactive technology, this research proposes an innovative design method. This method not only reflects the essence of Zhuang culture but also meets the aesthetic demands of modern readers, thus enriching the theoretical framework of cultural inheritance and innovation. Practically, the study provides new ideas and methods for the design of multi-dimensional interactive national culture picture books, contributing to the promotion of Guangxi's cultural and creative industries. It also strengthens the transmission and innovation of national culture, offering valuable references for similar national cultural creative product designs in the future. It highlights the significance of interactive picture books in preserving and promoting ethnic culture, and emphasizes the need to combine traditional cultural elements with modern interactive technologies to create engaging and educational materials that can attract and inspire contemporary audiences, particularly the younger generation, to appreciate and identify with the rich heritage of Zhuang culture.

Research Objectives

1. Explore the application of Guangxi Zhuang March 3 cultural elements in interactive picture books
2. Design five multidimensional interactive picture books that can effectively spread Zhuang culture
3. Analyze the role of interactive picture books in inheriting and promoting national culture

literature review

In recent years, the integration of national culture and multi-dimensional interactive picture book design has attracted wide attention in academic circles. Xue Chufan (2024) discussed the design method of interactive picture books of traditional culture, emphasizing the importance of interactive elements in cultural communication. Li Fangying and Liu Linlin (2023) took Chinese herbal medicine culture as an example to study how to integrate traditional cultural elements into the design of preschool children's picture books, providing a reference for the selection of cultural elements in this study. Li Gao-wei and Lu Jingjing (2023) designed three-dimensional picture books based on the legend of Maonan Nuo culture, showing the innovative expression of ethnic minority culture in picture books. Qiu Li (2023) and Zhao Ziqian et al. (2022) respectively studied the application of Yunnan ethnic minority folk culture and ethnic minority epic in the creation of children's picture books, which provided valuable regional cultural design experience for this study.

Xia Yan (2022) discussed the application of folk pattern elements in the design of children's picture books from the aesthetic perspective, which provides a new idea for the visual design of this study. Kong Chao et al. (2022) studied the integration of Yunnan's intangible cultural heritage and the design of picture books for children's art education, emphasizing the important role of picture books in cultural inheritance and education. Jiang Yu (2021) conducted an in-depth study on the integration of Chinese traditional culture and the design of children's picture books, which provides the theoretical basis for this study. Gu Xiao (2020) took Lushun region as an example to discuss the design of creative picture books based on the innovation and transformation of regional cultural innovation, which provides a reference for the regional cultural innovation in this study.

These researches explore the combination of traditional culture, minority culture and picture book design from different perspectives, providing a rich theoretical and practical basis for this study. However, there is still a relative lack of multidimensional interactive picture book design for the March

3rd culture of Guangxi Zhuang nationality in the existing studies. Most of the studies focus on single cultural elements or traditional picture book forms, and the application of multi-dimensional interactive technology in national cultural picture books is not deep enough. In addition, the evaluation methods and effect analysis of picture book design in the existing studies also need to be improved.

Based on previous studies, this study will focus on the specific cultural background of Guangxi Zhuang Nationality, and explore how to integrate multicultural elements such as mother of Dragon sacrifice, song wei and throwing hydrangea into the multi-dimensional interactive picture book design. The research will combine modern technologies, such as augmented reality (AR) technology, to explore more innovative ways of interaction to enhance readers' immersion and engagement. At the same time, this study will establish a more systematic evaluation system to evaluate the effectiveness of picture book design from multiple dimensions, such as cultural communication effect, user experience, and artistic value. Through these innovations, this study aims to provide new theoretical insights and practical approaches for designing multi-dimensional interactive picture books centered on Guangxi Zhuang culture. By integrating traditional cultural elements with modern interactive technologies, the research seeks to enhance the appeal and educational value of Zhuang culture, making it more accessible and engaging to contemporary audiences while supporting the preservation and broad dissemination of this rich ethnic heritage.

Conceptual Framework

The research framework is shown in the Figure1.

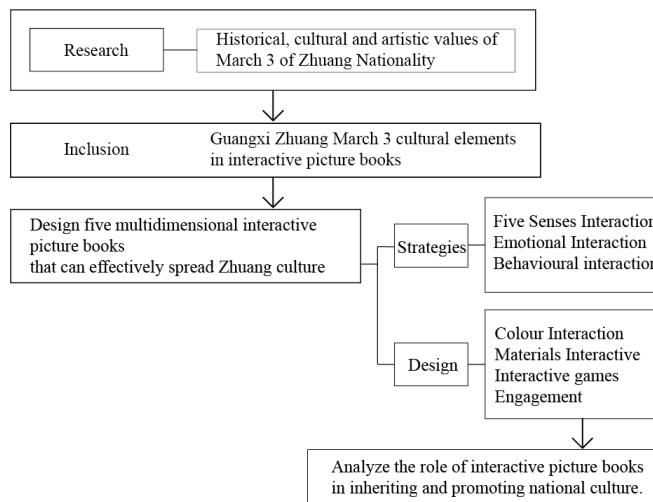


Figure 1 Conceptual Framework (source: Constructed by researchers, 2024)

Research Methodology

The combination of qualitative and quantitative research method is used to explore the application of Guangxi Zhuang March ethnic culture in the design of multi-dimensional interactive picture books. The study process mainly includes the following steps:

1. Combing and analysis of cultural elements. Through literature review, field investigation, the main cultural elements of Guangxi Zhuang nationality, including worship the dragon mother, song fair, throwing hydrangea, bamboo dance, five-color glutinous rice and beating bronze drum, etc. The historical background, the symbolic significance and the artistic value of these cultural elements are analyzed in detail, and their specific expression and importance in the Zhuang culture are determined.

2. Design and production of picture books. Based on the previous literature review and field research, the design and production of picture books began. First of all, the main content of the picture book was determined, including five core stories: the Dragon Mother Sacrifice, the Song Wei Festival, the Bamboo Pole Dance, the Copper Drum, and the Five-color Glutinous Rice. Then, a detailed story script design is carried out, incorporating Zhuang cultural elements and traditional customs. In terms of visual design, colors and patterns rich in Zhuang characteristics are adopted, such as the patterns of Zhuang brocade and elements of traditional clothing. Multi-dimensional interactive methods, such as three-dimensional pop-up structures, touchable textures, sound chips, etc., are also designed to enhance the multi-sensory experience of readers.

3. Comprehensive analysis. This paper summarizes the advantages and disadvantages of picture book design, puts forward suggestions for further improvement and the improvement direction of future design, and provides a valuable reference and reference for similar national cultural and creative product design in the future.

Research Results

1. Integration of Guangxi Zhuang March 3rd Cultural Elements into Interactive Picture Books

1.1 Origin and development of March 3 Festival

The March 3rd Festival of the Guangxi Zhuang nationality, also known as "Gewei Festival" or "Acacia Festival", is one of the most important traditional festivals of the Zhuang nationality, whose origin

can be traced back to ancient times. It is said that March 3rd originally originated from the zhuang ancestors' worship of nature and hope for harvest. In the farming society, March was the beginning of spring ploughing, and the Zhuang people held sacrificial activities to pray for good weather and good harvest. As time goes by, the festival has gradually incorporated more cultural connotations. In the Han Dynasty, March 3 became an important day for zhuang people to offer sacrifices to their ancestors and celebrate the harvest. During the Tang and Song dynasties, March 3 further developed and became a auspicious day for young men and women to meet and make friends, adding a strong folk color. During the Ming and Qing Dynasties, the celebration of March 3 became more colorful, forming unique folk activities such as song fair, throwing hydrangea and bamboo dance.

1.2 Analysis of the main cultural elements

The March 3rd Festival of Guangxi Zhuang nationality contains rich and colorful cultural elements, among which the most representative ones include: (1) Dragon mother worship: Dragon mother belief is an important part of Zhuang culture. It is said that the mother of the Dragon is the patron saint of the Zhuang people, which can bring good weather and good harvest. During March 3, the Zhuang People's Association held a grand sacrificial ceremony to express their reverence and pray for the dragon mother. This ceremony not only reflects the zhuang people's reverence for nature, but also reflects its profound spiritual and cultural connotation. (2) Song Wei: Song Wei is one of the most distinctive activities in the March Third Festival. The Zhuang nationality is known as the "song sea", and the event provides a platform for young men and women to communicate and show their talents. At the song fair, people express their feelings, convey their wisdom, and show the unique musical culture of the Zhuang people. This form not only inherits the musical tradition of the Zhuang people, but also becomes an important way of social and cultural communication. (3) Playing the bronze drum: The bronze drum is one of the most important traditional instruments of the Zhuang nationality, and it plays an important role in the March 3rd Festival. Playing the bronze drum is not only a musical performance, but also a ritual cultural activity. The sound of the bronze drum is believed to communicate between heaven and earth and pray for good weather. During the festival, the sound of copper drums is often accompanied by various celebrations, such as sacrifice, singing and dancing performances. The production technology and performance skills of the bronze drum are all important parts of the Zhuang culture, which reflect the artistic talent and cultural wisdom of the Zhuang people. (4) Bamboo pole dance: The bamboo pole dance is one of the most representative folk dances of the Zhuang nationality.

During March 3, people gather together and dance between the bamboo poles that open up and down to the rhythm of the music. This dance not only tests the dancers' skills and coordination ability, but also symbolizes the Zhuang people's love for life and their vision for the future. The performance of the bamboo dance often becomes the climax of the March 3rd festival celebration, showing the vitality and charm of the Zhuang culture. (5) Five-color glutinous rice: Five-color glutinous rice is an indispensable traditional food in the March 3 festival. The five colors (usually black, red, yellow, purple and white) respectively symbolize different good meanings, such as a good grain harvest and a happy life. Making five-color glutinous rice is not only a cooking skill, but also a cultural inheritance. By sharing this delicious food, people express their yearning for a better life and their gratitude to their ancestors. The color collocation and production technology of the five-color glutinous rice reflect the unique understanding and creativity of the Zhuang people on the food culture.

1.3 Artistic value and symbolic significance of cultural elements

The cultural elements of the March 3rd Festival of the Guangxi Zhuang people contain rich artistic value and profound symbolic significance, reflecting the wisdom and creativity of the Zhuang people.

These cultural elements together constitute a rich and colorful picture scroll of Zhuang culture. They not only have high artistic value, but also give people the enjoyment of beauty in multiple sensory levels such as vision, hearing and touch, but also carry the spiritual beliefs, values and life wisdom of the Zhuang people. Through these elements, we can have a deep understanding of the Zhuang people's reverence for nature, their pursuit of harmony, their longing for love and their yearning for a better life. The artistic value and symbolic significance of these cultural elements are not only the essence of the Zhuang culture, but also an important part of the diverse culture of the Chinese nation, providing rich materials and unique perspectives for us to understand and appreciate the ethnic minority culture. In the contemporary society, the artistic value and symbolic significance of these cultural elements still have strong vitality, constantly stimulating cultural innovation and artistic creation, and injecting new vitality into the inheritance and development of national culture.

2. Development of Five Multi-dimensional Interactive Picture Books for Zhuang Culture Dissemination

In the design of multi-dimensional interactive picture book of March ethnic culture of Guangxi Zhuang, a series of creative interactive elements have been carefully created, aiming to provide readers

with immersive cultural experience. Each picture book chapter integrates a unique multi-dimensional interactive design, fully mobilizing the readers' multi-sensory participation.

2.1 Worship the Dragon Mother

In the part of "Worship the dragon mother", we show the scene of the mother and the dragon in the waves through the three-dimensional structure, and skillfully use NFC technology to let readers feel the sound of the waves and the dragon through their mobile phones, creating an immersive atmosphere. The use of color is not only bright and catching, but also respects the Zhuang cultural tradition. In the chapter of "Song Fair Festival", we add a touching embroidery texture to the hydrangea, and design a rotating hydrangea structure, so that readers can experience the fun of throwing hydrangea. At the same time, through the built-in chip and NFC technology, readers can enjoy the authentic Zhuang folk songs, as if they are in the lively song fair scene (Figure 2).



Figure 2 Worship the Dragon Mother (source: Design by researchers, 2024)

In the three-dimensional picture book sacrifice to the mother of the dragon, the picture shows the scene of the little dragon and the mother of the dragon walking hand in hand on the rough water, overcoming difficulties together; Among them, the auditory interaction in the five-sense interaction is used, the command chip is added to the scene, and the NFC function is turned on the mobile phone, and the sound of the wave and the dragon can be received and played, creating an immersive experience for readers.

Among them, the auditory interaction in the five senses interaction is used, the command chip is added to the scene, and the NFC function is enabled on the mobile phone to receive and play the wave sound and the dragon intoning sound, creating an immersive experience for readers. The emotional interaction of the scene of offering sacrifice to the Mother of Dragons shows the kindness of

the mother of Dragons and the brave little dragon with a grateful heart, which enables the readers to receive this emotion through the picture performance. The use of bright, high-contrast colors can quickly attract children's attention. At the same time, the use of colors should respect Li cultural traditions.

2.2 Song Fair

The picture of the duet of love songs and the performance of copper drums highlights the unique charm of Zhuang music culture and shows the core of Gewei culture. The dynamic display of the bamboo pole dance not only reflects the vitality of the Zhuang dance, but also symbolizes the positive attitude of the Zhuang people. We also designed traditional dry-bar residential buildings, showing the architectural style of the Zhuang people. The scenes of labor and rice planting reflect the industrious and simple lifestyle of the Zhuang people (Figure 3).



Figure 3 Song Fair (source: Design by researchers, 2024)

In the three-dimensional picture book song fair section, the picture shows the scene of singing folk songs, duet songs and throwing hydrangeas at the song fair in the karst mountains of Guangxi. In the three-dimensional picture book song fair section, the picture shows the scene of singing folk songs, duet songs, and throwing hydrangeas at the song fair in the karst mountains of Guangxi; Among them, the tactile interaction of the five senses is used, and the embroidery texture is pasted on the embroidery figure, so that the readers can feel the delicacy of the embroidery through the touch; Auditory interaction, Guangxi is known as the "sea of song" reputation, the scene to add phonograph, phonograph placed record, record built-in command chip, mobile phone open NFC function close, you can receive and listen to Zhuang folk songs, for readers to create an immersive experience, in the reading process to visit the song. Throwing the hydrangea ball in the song fair can convey the admiration of both sides, and convey the surging love expressed by both sides under the hydrangea ball through the three-

dimensional structure. The hydrangea structure is independent, and it can be rotated by touching, and the attitude of dancing in the air can be restored in the interaction process. The process of picking up each record to identify is also the process of putting the record into the phonograph in a real situation.

2.3 Bronze Drum

The design of the "bronze drum" part is ingenious. We present the magical scene of the bronze drum dispersing the darkness through the three-dimensional structure. Readers can touch the texture of the bronze drum and even simulate the percussion action. Through NFC technology, readers can also listen to the unique timbre of the bronze drum. We also designed desirable star elements to enhance the interaction between the reader and the story. In the chapter of "Bamboo Dance", we created the three-dimensional structure of bamboo poles and characters dancing with the opening and closing of the pages. Through NFC technology, readers can enjoy the music of bamboo dance and experience the cheerful dance atmosphere of the Zhuang people (Figure 4).



Figure 4 Bronze Drum (source: Design by researchers, 2024)

In the bronze drum part of the three-dimensional picture book, the picture shows the scene where the darkness gradually fades under the light of the copper drum and the stars; Among them, the auditory interaction in the five-sense interaction is used, the copper drum has a unique timbre, the couple is lofty, the command chip is added to the copper drum in the scene, and the mobile phone turns on the NFC function to get close, you can receive the sound of the copper drum percussion, creating an immersive experience for readers.

In the bronze drum section of the three-dimensional picture book, the picture shows the scene of the darkness gradually fading under the brilliance of the bronze drum and stars; Among them, auditory interaction in the interaction of the five senses is used, the sound of the bronze drum is unique, and the couple is far away. The command chip is added to the scene of the bronze drum, and the

mobile phone can turn on the NFC function to receive the knocking sound of the bronze drum, creating an immersive experience for the readers. In terms of emotional interaction, according to the legend of the bronze drum, the bronze drum lights up the night sky for the Zhuang people like stars, removing evil spirits and guarding the land. The scene of the darkness fading plays a certain role in encouraging readers emotionally and achieving an emotional link with the books. Some areas can remove the stars so that they can accompany the reader and keep them as they are.

2.4 Bamboo Pole Dance

As a unique dance art form, the flexibility of the movement and the change of rhythm symbolize the positive attitude of the Zhuang people towards life and the pursuit of harmony. The interaction between people and bamboo poles in the dance reflects the harmonious coexistence of man and nature. Five-color glutinous rice is not only a culinary art, its color matching and production technology reflect the aesthetic pursuit of life of the Zhuang people, and the five colors symbolize different beautiful meanings, such as abundant grains and a happy life, reflecting the Zhuang people's yearning for an ideal life. The sound of the drum is believed to be able to communicate the heavens and the earth, and its unique timbre and rhythm symbolize the soul and spiritual sustenance of Zhuang culture (Figure 5).



Figure 5 Bamboo Pole Dance (source: Design by researchers, 2024)

In the bamboo pole dance part of the three-dimensional picture book, the picture shows the scene of the Zhuang people dancing with the rhythm of the bamboo pole in the harvest rice field; Among them, the auditory interaction in the five-senses interaction is used, the rhythm of the bamboo pole dance is distinct, the command chip is added to the bamboo pole in the scene, and the NFC function is turned on on the mobile phone, and the bamboo pole percussion sound and bamboo pole dance

music can be received, creating an immersive experience for readers.

The auditory interaction in the five senses interaction is used, the rhythm of bamboo dance is distinct, the command chip is added to the scene bamboo pole, and the NFC function of the mobile phone is enabled to receive the tapping sound of bamboo pole and the music of bamboo dance, creating an immersive experience for readers. In terms of emotional interaction, the hard work of the Zhuang people shows the cheerful scene of diligence and joy, and the readers can receive this emotion through the picture performance. Use the three-dimensional bamboo rod structure, so that the bamboo rod and the character as the page opens and closes into a dancing posture.

2.5 Five-color Glutinous Rice

The design of "five-color glutinous rice" is even more unique. We pasted the real five-color glutinous rice on the page, so that readers can feel the charm of this traditional food through touch, smell and even taste. Through these rich interactive designs, they not only enhance the interest and participation of the picture books, but also make the Zhuang culture presented in front of the readers in a more vivid and intuitive way, achieving the effect of teaching and having fun. This multi-dimensional interactive design concept perfectly combines traditional culture with modern technology, providing readers with a unique journey of cultural exploration (Figure 6).



Figure 6 Five-color Glutinous Rice (source: Design by researchers, 2024)

In the three-dimensional picture book five-color glutinous rice part, the picture shows the scene of the advent of the five-color glutinous rice god, the Zhuang people live and work hard to make a unique five-color glutinous rice; The five-sense interaction of touch, taste and smell is used, and the five-color glutinous rice is inserted and pasted with raw materials to enable readers to interact in the five senses of touch, taste and smell. The touch, taste and smell interaction in the five-sense interaction are used. The five-color glutinous rice is inserted and pasted with raw materials, and readers can

interact with the five senses of touch, taste and smell. In terms of emotional interaction, the picture conveys the Zhuang people's hard work and harvest through diligence and wisdom, and finally creates magnificent five-color glutinous rice.

In the design of multi-dimensional interactive picture books based on the third ethnic culture of Zhuang nationality, five representative elements are carefully selected: dragon mother, bamboo dance, throwing hydrangea, song fair, five-color glutinous rice and bronze drum. Each element is integrated with a unique interactive design. The chapter shows the scene of waves through the three-dimensional structure, and uses NFC technology to realize auditory interaction, so that readers can feel the waves and dragon sound. The bamboo dance part presents the harvest scene, and also uses NFC technology to play dance music. Add the embroidery texture in the embroidery ball section to enhance the tactile experience. The Festival incorporates phonograph elements and plays Zhuang folk songs through NFC technology. The five-color glutinous rice chapter innovatively uses the real glutinous rice to activate the readers' sense of touch, taste and smell. The bronze drum part shows the dark scene of the bronze drum, while using NFC technology to reproduce the sound of the bronze drum.

In the production process, pay attention to material selection, use 250 gsm to 350 gsm card paper to ensure the stability of the stereo structure. The use of color follows the Zhuang cultural tradition, while considering the visual impact and emotional expression. The light and shadow effects are used to enhance the three-dimensional sense of the picture, and the composition principles such as three points and symmetrical balance are used to guide the visual process. Through these carefully designed interactive elements and production skills, it is aimed to create an immersive Zhuang cultural experience for readers, so that traditional culture can be presented in a more vivid and intuitive way to realize the effect of teaching and fun.

3. Analysis of the Role of Interactive Picture Books in Preserving and Promoting National Culture

The analysis of the role of interactive picture books in preserving and promoting national culture reveals several key insights. Firstly, interactive picture books serve as powerful educational tools that enhance cultural transmission. By incorporating elements like touchable textures, sound effects, and augmented reality, these books transform the learning experience into an engaging and multi-sensory activity. This interactivity not only captures the attention of readers but also deepens their understanding and retention of cultural content. For instance, features such as tactile hydrangea textures, authentic

folk songs via NFC technology, and real five-color glutinous rice allow readers to connect with Zhuang culture on multiple levels, making the cultural experience more vivid and memorable.

Secondly, interactive picture books play a crucial role in revitalizing and promoting national culture in the modern context. They provide a bridge between traditional cultural elements and contemporary audiences, particularly the younger generation, who are more accustomed to digital and interactive media. By presenting cultural heritage in an innovative and appealing format, these books help counteract the marginalization of traditional culture in the face of rapid societal changes. They also foster a sense of cultural pride and identity among readers, encouraging them to appreciate and preserve the rich tapestry of Zhuang culture. Overall, the fusion of interactive technology with cultural storytelling ensures that national culture remains relevant and thriving in today's fast-paced and technology-driven world.

Discussion

In the discussion of this research, we highlight the correspondence between our results and existing literature, focusing on key aspects of our findings. First, our study aligns with the research of Huang et al. (2023), who emphasized the importance of integrating traditional cultural elements with modern interactive technologies to enhance cultural inheritance and innovation. Our use of NFC technology and three-dimensional structures in the interactive picture books effectively transforms cultural elements into engaging content, echoing Huang et al.'s findings on the potential of interactive media in boosting audience engagement and cultural identity. For example, the immersive experience created through wave sounds and dragon intoning in the "Worship the Dragon Mother" section, as well as the authentic folk songs accessed via NFC technology in the "Song Fair" section, demonstrates how interactive elements can make cultural learning more appealing and memorable.

Second, our research corroborates the significance of multi-sensory interactions in cultural experiences as pointed out by Yang et al. (2023). We incorporated multi-sensory elements such as touch, sound, and visual effects into the picture book design, creating a more immersive cultural experience for readers. The innovative design of the "Five-color Glutinous Rice" chapter, which allows readers to interact with the rice through touch, taste, and smell, exemplifies how multi-sensory engagement can enhance the depth of cultural understanding and emotional connection. This finding is

consistent with Yang et al.'s assertion that multi-sensory participation significantly deepens the understanding and emotional bond with cultural content, thereby improving the effectiveness of cultural inheritance and education.

New knowledges

This research has generated significant new knowledge in the field of cultural preservation and interactive media design. The following table summarizes the key contributions and innovations that emerged from the study, highlighting how the integration of traditional cultural elements with modern interactive technologies can enhance cultural engagement and education.

Table 1 Summary of New Knowledge Contributions

New Knowledge Category	Details
Innovative Design Method	Developed an innovative design method that integrates cultural elements of the Guangxi Zhuang March 3rd Festival with modern interactive technologies, such as augmented reality and near field communication, to create multi-dimensional interactive picture books.
Cultural Element Integration	Successfully integrated five core cultural elements of the Guangxi Zhuang nationality into the interactive picture books: sacrifice to the Dragon Mother, Song Fair, bamboo dance, bronze drum, and five-color glutinous rice. Each element was meticulously designed to enhance the cultural authenticity and reader engagement.
Systematic Evaluation Framework	Established a systematic evaluation framework to assess the effectiveness of the multi-dimensional interactive picture books from multiple dimensions, including cultural communication effect, user experience, and artistic value. This framework provides a comprehensive approach to evaluating the impact and success of the design.

Conclusion

This study explored the use of multi-dimensional interactive picture books in preserving and innovating Guangxi Zhuang culture. By combining cultural elements with modern technology, we designed five interactive picture books that effectively promote Zhuang culture. These books transform traditional cultural elements into engaging content, boosting readers' interest and participation in ethnic culture and deepening their understanding. Overall, this research offers new design concepts for multi-

dimensional interactive picture books and contributes to the innovative inheritance and spread of Guangxi Zhuang culture.

Suggestions

Based on the in-depth discussion of the multi-dimensional interactive picture book design of the Zhuang Nationality in Guangxi, this paper draws the following three suggestions:

1. Leveraging Multi-Dimensional Interactive Picture Books for Cultural Heritage

Multi-dimensional interactive picture books offer a highly effective approach to preserving and innovating the March 3rd culture of Guangxi Zhuang nationality. By incorporating core cultural elements such as dragon mother worship and song fairs, along with innovative techniques like NFC technology and multi-sensory interaction, these books create an immersive cultural experience. This method not only vividly showcases the essence of Zhuang culture but also significantly enhances readers' participation and cultural identity through sensory stimulation, providing new avenues for the inheritance and development of ethnic minority cultures in modern society.

2. Interdisciplinary Integration in Cultural and Creative Product Design

This research underscores the importance of interdisciplinary integration in designing cultural and creative products. By combining knowledge from ethnology, cultural research, design, and interactive technology, the study successfully merges traditional cultural elements with modern design concepts and technical means. This approach not only preserves the authenticity of cultural rituals but also enhances the appeal and interactivity of cultural experiences through modern technology, offering new directions for the cultural and creative industry and demonstrating how multi-disciplinary collaboration can drive the innovative inheritance and modern expression of traditional culture.

3. Enhancing Cultural Communication Through Interactivity and Participation

The design of multi-dimensional interactive picture books transforms readers from passive recipients to active participants in cultural experiences. Multi-sensory interactions, such as touching hydrangea textures and listening to bronze drum sounds, significantly boost learning interest and memory retention. Additionally, elements like detachable stars and rotatable hydrangeas enhance reading engagement and deepen readers' understanding of Zhuang culture. This interactive learning model is particularly effective for contemporary audiences, especially teenagers, providing a new and

engaging method for national cultural education and highlighting the need for innovative interactive approaches in future cultural inheritance and educational practices.

References

Xue, C. (2024). Research on the Design of Interactive Picture Books for Traditional Culture. *Shoe Design and Technology*, 4(07), 160–162.

Gu, X. (2020) Design and research of creative picture books based on regional cultural innovation and transformation Take Lushun area as an example. *Modern ancient Chinese creation*, (46), 69–70.

Jiang, Y. (2021) Research on the integration of Chinese traditional culture and children's picture book design. *China National Expo*, (08), 211–213.

Kong, C., He, R. & Liu, Jie. (2022). The integration of Yunnan intangible cultural heritage and picture book design for children's art education. *Industrial Design*, (02), 120–122.

Li, F. & Liu L. (2023). Study on picture book design for preschool children based on Chinese herbal medicine culture. *Industrial Design*, (08), 136–139.

Li, G. & Lu J. (2023). Study on the design of three-dimensional picture books based on the Maonan Nuo culture legend "Zhongding Return Wish". *Footwear process and design*, 3(04), 84–86.

Qiu, L. (2023). Research on the application of Yunnan ethnic minority folk culture theme in the creation and design of children's picture books. *Shanghai Packaging*, (02), 159–161.

Xue, C. (2024). Research on interactive picture book design of traditional Culture. *Footwear process and design*, 4(07), 160–162.

Xia, Y. (2022). The aesthetic presentation of folk pattern elements in the design of children's picture books. *Journal of Yuzhang Normal University*, 37(02), 85–90.

Zhao, Z., Meng Y. & Yang, L. (2022) Research on the design of ethnic minority epic theme picture books. *Hunan Packaging*, 37(06), 73–75.

Huang, Q. R., Yang, F., & Shen, A. W. (2023). Design of Interactive Game Based on Traditional "Intangible Cultural Heritage". *Packaging Engineering*, 44(12), 235–239.

Yang, Y. Y., Ji, T., & Zhang, D. D. (2023). Design and Application of Cultural Heritage in Serious Games. *Packaging Engineering*, 41(4), 312–317.