

## Article

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# Exploring the Potential of Mobile Phone Applications in the Transmission of Intangible Cultural Heritage Among the Younger Generation

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**Abstract:** With the arrival of the information digitalization era, the dissemination of culture breaks the limitations of time and space, ushering in new opportunities. With China's emphasis on the digital preservation of intangible culture heritage (ICH), the use of mobile phone applications to disseminate ICH has become more relevant. Mobile phone application appeals to young users with its convenient and personalised customized operation. It combines technology with cultural heritage and has advantages over traditional media in terms of recording and dissemination. Inheritors are an important part of China's ICH protection and the core of the survival of folk crafts, of which the younger generation is an important force. This article provides an example of qualitative research on the use of apps for ICH learning in a university classroom. The use of apps as a tool for self-learning of ICH by the younger generation was used to raise their awareness of local cultural heritage and sustainable development issues, and to motivate teachers and students to preserve and disseminate local culture. The results of the study suggest that mobile phone applications are useful and effective self-learning tools for the younger generation to acquire knowledge and understanding of local ICH.

**Keywords:** intangible cultural heritage; mobile phone applications; digital technology; cultural sustainability; intangible cultural inheritors

## 1 Introduction

The Convention for the Safeguarding of the Intangible Cultural Heritage defines “intangible cultural heritage” as social

practices, representations, expressions, knowledge, skills and related tools that are recognized by communities and individuals as part of their cultural heritage. It includes oral traditions, performing arts, social practices and rituals, knowledge of nature and the universe, and traditional crafts (Bedjaoui 2004). The Chinese government, as a party to the Convention for the Safeguarding of Intellectual Property Rights, is actively promoting the protection of Intellectual Property Rights. In 2008, the Ministry of Culture and Tourism officially changed “traditional handicrafts” to “traditional skills” in the National Catalogue of ICH (Zhang et al. 2022). Traditional crafts embody ICH and their techniques represent cultural diversity. UNESCO encourages craftspeople to participate in production and to pass on their skills (Kang 2024). In 2012, the Ministry of Culture and the Ministry of Finance jointly launched the Public Electronic Reading Room Construction Plan to provide digital resources for all in public libraries and online. Projects to protect intangible cultural heritage encourage citizen participation and responsibility, making it a popular topic on China's new media platforms (Xu et al. 2022). Folding fan making was included in the second batch of national ICH lists in 2008 and has received attention from local governments, cultural figures, and social media due to its artistic and cultural value as part of China's traditional fan culture.

However, there are challenges such as insufficient understanding, publicity, and funding in the protection, inheritance, and development of folding fans (Cheng 2016a). In order to ensure the transmission of techniques and skills, it is necessary to support skilled heirs to produce handicrafts and share their knowledge within their communities. The fast-paced lifestyle of modern times has greatly impacted the transmission of intangible cultural heritage (ICH), especially when it comes to handicrafts that rely on oral tradition to pass on knowledge (Wang 2016). Traditional methods of ICH transmission often follow a rigid apprenticeship model with limited opportunities due to factors such as numbers, gender restrictions, and working environments (Xue et al. 2019). Some students lack sufficient knowledge about ICH and require guidance from older generations to address related issues. The younger generation plays a crucial role in the protection and

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transmission of ICH, as they have received a multicultural education and are familiar with new digital technologies.

The internet has changed the way people live and learn today, and this has led to radical changes in people's daily lives and in traditional teaching models. During the epidemic prevention and control period, online classes became the norm, with many apps coming to students and teachers (Chang 2021). Although there is extensive research on the interface design and function of ICH apps, there are few qualitative studies on the relationship between app teaching effectiveness, especially for the younger generation, and application design needs. In this context, the researcher proposes a test using mobile apps to explore the potential of mobile phone applications to disseminate ICH amongst the younger generation in order to promote their interest in ICH and enhance their learning.

As an educational tool, the application of ICH provides young users with basic knowledge of ICH and creates simple interaction. With these experiences, the younger generation will eventually improve their ability to learn about the ICH and take action to change the status quo and begin to protect the local ICH. This study used focus groups and semi-structured interviews to explore the potential of mobile phone applications to communicate ICH among the younger generation.

This online educational tool has had a significant impact on traditional education, as educational apps allow students to use extra time for mobile learning and access richer educational resources through mobile educational platforms. The current study aims to assess the potential of mobile apps in the learning of ICH among university students, where there are fewer similar studies compared to other educational interventions. This study focuses on the folding fan, an ICH art form, as a catalyst. An educational intervention using a mobile app was implemented in a university class to assess students' knowledge and interest in ICH after using the app. Finally, a pre-designed test and access questions were used to measure the learning outcomes of university students after using the mobile app. This article highlights the potential of mobile apps in self-learning ICH by university students and provides an example of creative and enjoyable self-learning that effectively engages both students and teachers. Most of the participants belong to the younger generation, including six males and six females with an average age of 20, and two teachers in their 30s. By preserving ICH through the use of basic tools and technology, they can focus more on local cultural heritage and sustainable development.

This article is organized as follows: Section 2 provides a literature review, while Section 3 describes the case study and research method, including ICH, the characteristics of the Folding Fan mobile app, and the expression of intangible

cultural education and transmission. The findings are then presented, followed by the conclusions. The findings suggest that mobile phone apps effectively promote the learning and understanding of ICH among university students. In addition, they show that both students and teachers have positive attitudes towards the use of mobile phone apps for ICH education.

## 2 Literature Review

### 2.1 Digitalization of ICH in China

The term ICH refers to intangible traditional cultural expressions that are closely linked to people's lives, emphasize human-centred aspects, and are characterized by living change and non-material attributes. Human transmission plays a crucial role in preserving ICH (Aljaberi and Al-Ogaili 2021). As an ancient civilization, China has a rich tangible and intangible cultural heritage. At present, the protection of ICH in China has entered a stage of comprehensive and focused preservation based on UNESCO's basic theories. Research and practical activities are being actively carried out nationwide to deepen and broaden issues related to the rescue, protection, transmission, and development of ICH. This includes the development of local products or services centered on various types of ICH themes. As an integral part of human culture, ICH is universal and all-encompassing, encompassing various behaviors, value norms, and capabilities that need to be considered for sustainable development (Cui et al. 2019).

Against this background, many scholars have extensively studied the digital preservation and dissemination of ICH. For example, in *Digital Development of ICH and Application of Key Technologies*, Yao emphasizes that the digitization of intangible heritage promotes its preservation, exhibition, inheritance, dissemination, and innovation through the role of digital technology in collecting, storing, transmitting, processing, analyzing, and applying intangible heritage data. This fully demonstrates the importance and positive impact of digital technology in safeguarding ICH (Yao 2021). Digital tools play a crucial role in heritage conservation, allowing research teams to digitally record and archive ICH. The use of artificial intelligence, virtual reality technology, and blockchain technology has laid a strong foundation for the protection of ICH through the construction of digital legal documents and archives (Erturk 2020).

In addition, digital tools have provided new channels for ICH holders to showcase and disseminate their skills during the transfer and development of ICH. For example, through social media and short video platforms, they can showcase their skills to a wider audience and attract the attention and

participation of young people (Pan 2022). In addition, some ICH holders have collaborated with technology companies to develop digital cultural products based on ICH (Ma and Guo 2023), such as mobile phone games and virtual reality experiences. These innovative approaches bring ICH into people's lives in more interesting ways.

## 2.2 The Impact of Mobile Applications on the Digitization of Chinese ICH

The term “app” is short for application software but typically refers to mobile applications. With the increasing popularity of mobile devices such as phones and tablets, there is a growing demand for different types of apps. In the first half of 2020, Internet Weekly and eNet released an app classification ranking which categorized apps into different types such as social, news, shopping, entertainment, finance, life, tools and education (Hu 2019). In this context, apps are seen as potential new tools to protect ICH and connect tourists, communities, students, and other groups with cultural heritage (Li and Li 2021). The digitization of information has accelerated the development of new media platforms. Mobile applications hold great promise for cultural communication, as they can quickly disseminate information in a variety of forms on increasingly feature-rich mobile phones. Combining mobile phone apps with ICH and culture offers advantages in recording, displaying cultural innovation, and promoting ICH that traditional methods cannot achieve (Zhang and Peng 2020).

Mobile applications have significantly expanded the reach of ICH. Mobile applications have emerged as a powerful tool. Traditionally, the dissemination of ICH was often limited by geographical and temporal factors. However, with the help of mobile apps, people from all corners of the world can access and learn about various ICH items at any time. For instance, some apps provide detailed introductions to different ICH projects through high-quality images, videos, and texts, allowing users to appreciate their beauty and uniqueness.

Moreover, mobile applications play an important role in educating the public about ICH. They can present complex knowledge in an engaging and interactive way. Some apps offer quizzes, games, and virtual reality experiences related to ICH, making learning fun and accessible. This helps to raise awareness and interest among people, especially the younger generation. For example, the “Daily Forbidden City” app, which introduces users to the precious ICH artefacts in the Palace Museum through beautiful pictures and professional explanations, allows people to enjoy the depth of royal culture and the glamour of ICH artefacts anytime and

anywhere. These apps enable users to appreciate their beauty and uniqueness, thus making a positive contribution to the dissemination and transmission of ICH (Jang and Lien 2014).

In addition, mobile applications facilitate the innovation and development of ICH. They can connect creators, artisans, and enthusiasts, providing a platform for collaboration and exchange. Through these apps, traditional ICH can be combined with modern design and technology, creating new products and experiences that appeal to contemporary audiences (Guo 2020).

## 3 Education and Transmission of ICH

### 3.1 Research on Heritage Education and Conservation Using Mobile Apps

At the same time, mobile apps offer new opportunities and avenues for heritage education and conservation.

From an educational perspective, the mobile app has significant advantages. On the one hand, it breaks the boundaries of time and space, allowing users to learn about cultural heritage anytime and anywhere. For example, the app of “Ceramics Museum of the Forbidden City” connects the collections with a “timeline” and users outside the exhibition hall can scan the code to get the detailed introduction of the collections, high-resolution images, and voice explanations, which provides a convenient learning channel for users (Xue et al. 2023). On the other hand, through diversified presentation methods such as pictures, videos, animations, etc., the app can present complex heritage knowledge in a vivid and intuitive form so as to enhance users' interest in learning and understanding. For example, some apps that introduce traditional handicrafts will demonstrate the production process of the handicrafts through animation so that the abstract knowledge becomes concrete and tangible. They are able to present complex knowledge in an engaging and interactive way, which helps to raise awareness and interest, especially among the younger generation (Azman et al. 2021).

### 3.2 Current Situation and Problems of Intangible Cultural Education Today

Nowadays, the transmission of ICH faces various problems such as ageing, discontinuity, and cultural change, which hinder its preservation and transmission. In response to this

trend, the Ministry of Culture and the Ministry of Education have launched a program called “Training and Research Programme for ICH Inheritors of China’s ICH” which connects universities with ICH heritage to intervene in its preservation (Zhang and Zou 2017). During this year’s sessions of the National People’s Congress, delegates frequently mentioned ICH in relation to keywords such as “youth” (Li et al. 2019). Younger generations are becoming ICH heirs, integrating intangible cultural products into contemporary life. They play an important role in promoting the integration of cultural tourism and rural revitalisation. However, few scholars have proposed innovative methods to popularize and transmit ICH among university students of this age group. Most studies focus on field research while neglecting the design of online new media mobile applications (Wang and Xu 2019). There is also a lack of systematic theoretical research on potential inheritors among university students, resulting in passive experiential understanding without sufficient expertise for ICH teaching.

### 3.3 The Need for ICH Education for the Younger Generation

According to data from the seventh National Census, residents aged 15–35 account for one-fifth of the country’s population (Lin and Li 2020). Young people are the hope and vitality of the nation; their success leads to national progress and strength (Qiao 2006). China has inscribed 34 items on UNESCO’s Representative List of the Intangible Cultural Heritage of Humanity, and another 1,530 items on the national list. Traditional arts such as music, calligraphy, paper cutting, and fan folding have gained popularity among young people nationwide through provincial and municipal initiatives (Tao and Cai 2021). For example, primary and secondary schools have creatively incorporated paper-cutting art in various forms to deepen students’ understanding by contextualizing it with pictures and words (Liu 2019). The use of multimedia in paper-cutting classes allows students to appreciate the charm of traditional Chinese culture while encouraging exploration and enhancing aesthetic and creative skills. Incorporating traditional paper-cutting into the classroom can also enhance students’ sense of national pride and self-confidence through cultural education (Chawla and Manhas 2015).

Therefore, educating young people is crucial to promoting ICH. Apps can serve as an effective platform to engage students by combining their interests and hobbies. These apps not only fulfil the young generation’s need for social interaction but also provide them with traditional cultural knowledge, thus meeting their learning and social

needs at the same time. When designing these apps it is important to consider the care, usability, and cultural aspects that students want. With the rapid development of society and the increasing popularity of technology, app designs for young people should be adaptable and user-friendly to enhance their practical experience.

## 4 The Case Study

### 4.1 Chinese ICH – Folding Fan

The folding fan, as an ICH, is remarkably representative and typical. First, it exemplifies traditional craftsmanship with exquisite techniques in material selection, bone splitting, surface gluing, painting, calligraphy, etc., showing the wisdom and efforts of the craftsmen at each step. Various materials such as bamboo, wood, paper, and silk are ingeniously used by ancient craftsmen (Zhang et al. 2022). Second, folding fans have great cultural and artistic significance. The calligraphy and paintings on their surfaces serve as an important medium for writers and artists to express their emotions and showcase their skills. Many famous painters and calligraphers have left their precious ink treasures on these fans, which are not only of high artistic value but also reflect the social and cultural atmosphere of the time.

The folding fan is remarkably typical, serving as a bridge between traditional culture and modern life. In ancient times, it was an indispensable accessory for the literati, a symbol of status and taste. Today, in spite of the changing times, the fan still retains its unique charm. It can be collected as art or used in everyday life, allowing people to embrace tradition and show their individuality (Li et al. 2015). In addition, folding fans are often given as distinctive gifts or displayed at international cultural exchange events to promote Chinese culture. They attract attention and affection from foreign friends while serving as important messengers of Chinese heritage. The preservation and development of folding fans exemplify the importance of protecting intangible cultural heritage (ICH). Through the efforts and innovations of the heirs, the production process has been maintained while adapting to the demands of modern society – a successful model for the inheritance and development of ICH.

However, the folding fan, traditionally seen as a symbol of Chinese culture, is not widely recognized as such. Even the younger generation tends to associate the fan with traditional Japanese culture (Zhang et al. 2021). Currently, most articles focus on the history and craftsmanship of folding fan culture. For example, some articles on Suzhou folding fans



emphasize their origin, development, and elaborate production process. In reality, many young people who appreciate folding fans are attracted to their aesthetics or fashion trends without fully understanding their deeper cultural significance and craftsmanship (Zhu 2020). To address this issue, the researchers chose the Folding Fan app – a popular ICH app on the market – as the medium for their study.

## 4.2 ICH App – Folding Fan App

With the advancement of digital media technology, traditional culture has been able to blossom in a wider range of dissemination paths, giving birth to numerous ICH apps based on the Internet and smart devices which actively pass on and promote outstanding ICH and have become an important way for people to understand and experience traditional culture (Zhang et al. 2023). The Folding Fan app has the most wonderful and special interactive experience on the craft module. While users are watching and learning the animation production, the app adds a lot of interactive design so that users have the feeling of hands-on experience in the process of personally operating the production of folding fan. This helps the user to understand the fan production process in detail. The game is mainly operated by sliding the screen and tapping which also includes light puzzle solving gameplay. The user is involved in 16 steps from choosing the bamboo to making the folding fan, and only when these processes are completed is a folding fan truly finished. As shown in Figure 1, in addition to experiencing the whole process of fan making, the design team also added a rewarding mechanism to allow users to experience the process of fan making by awarding them different titles according to their proficiency in the operation.

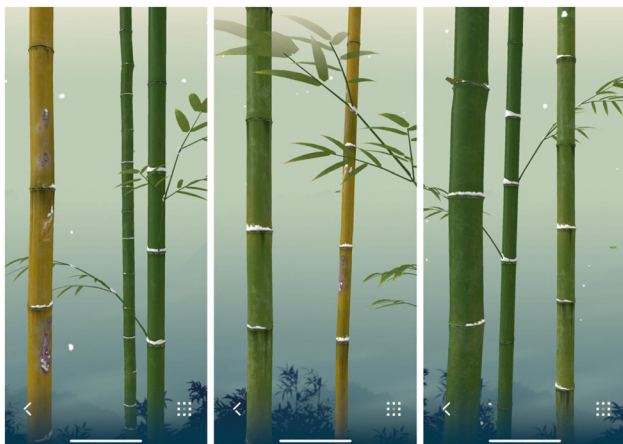


Figure 1: Screenshot of Folding Fan app page.

The Folding Fan app is a great example of the perfect combination of traditional folding fan art and mobile internet technology. It attracts users through rich content and engaging visual effects, allowing them to understand the name and structure of each part of the folding fan as well as experience the richness of the folding fan craftsmen and the history of the folding fan. It provides a clear and intuitive experience of the birth of a folding fan.

Overall, the designers considered three main aspects. Firstly, the folding fan app has cultural heritage and popular science. Second, it emphasizes practicality and fun, allowing users to interact with the product and generate affective satisfaction from functional satisfaction. Third, after experiencing and using the product, it helps to trigger the reflection on the folding fan culture (Cheng 2016b).

## 4.3 Research Process

The aim of this study is to evaluate the effectiveness of a pre-selected ICH app (Folding Fan app) as a teaching tool for university students and to assess the developing role of the ICH app as a mobile teaching and learning educational activity in the university classroom. The study and evaluation of the teaching and learning process of ICH is a multifaceted process. The case study was chosen because it allows for an in-depth investigation of facts and behaviors in real world contexts, especially in systems with complex and dynamic relationships and interactions, such as university classrooms. Therefore, the research question is:

“How do ICH apps influence university students’ interest in the ICH of folding fan culture?”

In May 2023, a qualitative study was conducted at a Chinese public university with 12 university students (six males and six females) with the average age of 20 years and two teachers: one teacher (T1) and one trainee teacher (T2) of the class. T1 is the main teacher for the class and also had previous experience in intangible culture studies. Observations, group interviews and informal conversational interviews were used as high-quality data collection techniques (Morris and Paris 2022). The study is divided into three main parts, a questionnaire test and interviews. A total of 12 students were divided into group A and group B, with a questionnaire test used to explore the efficiency of the different learning methods of the two groups and the different attitudes from the students, followed by an interview with their focus group and finally an interview with T1. In addition, research has shown that interviewers need to be flexible in controlling the duration of the interview and the number of questions during the interview process in case studies. It is best to keep the time within 3 h; the optimal

number of questions is two to eight (Su and Cui Miao 2011). Excessive interview time or too many questions can lead to disinterest on the part of the respondents, thus affecting the efficiency and quality of data collection. Therefore, the whole process of the study was set at 2 h, with 30 min for self-learning, 30 min for answering questions, 30 min for student interviews, and 30 min for teacher interviews. This was to avoid the negative emotional biases that a long period of time would bring to the students and teachers. The details are as follows:

- (1) Class group interviews were conducted prior to the educational intervention to identify the current knowledge of the university students about folding fans and things related to ICH.
- (2) The two groups of students took different methods (one through APP learning and the other through traditional paper-based book learning) of self-study on the origins, development, production techniques, and appreciation of works of folding fans for a period of 30 min, as shown in Figure 2.
- (3) After studying separately, the T2 invited each group to participate in completing the “Folding Fan Basics Test” accompanying the test, which was derived from their study (see Appendix B) and lasted 20 min.
- (4) Focus group interviews were conducted after the test with university students using traditional paper-based learning and those using the Folding Fan app as an accompanying test to observe which group was more effective and to discuss the use with each university student in order to record the results of the individual-level instructional intervention in more detail.
- (5) The T1 and a trainee T2 were interviewed to triangulate the findings of the study.
- (6) T1, who was also the coordinator of this educational intervention, had previously been trained in the ICH curriculum and was therefore invited to participate in the interview.

## 5 Results

### 5.1 Basic Level of Awareness of ICH Among University Students

The results of the class interview conducted with 12 university students prior to the educational intervention showed that eight of the students answered “Yes or have heard of it” to the question “Do you know the meaning of ICH?” In the question “Do you know that folding fans are ICH?”, 10 answered yes, but when it came to specific issues of

ICH, the degree of knowledge of students was comparatively lesser. Nine of the students were not sure. In the question “Do you know in which era the folding fan originated,” only one student answered that he/she did. Two students commented: “Folding fan culture originated in Japan. These figures show that the depth of communication of ICH needs to be improved in order to draw more attention to it.” In the question “What do you think are the main reasons for the impact and dissipation of ICH?”, eight students thought that ICH was not given enough attention, while four students agreed that it was the inevitable result of modern development. Among the questions on the greatest difficulties encountered in passing on ICH, the top answers were “the impact and challenge of foreign culture and modern civilization” (five students), “young people” (four students), and “the weak awareness of the government and society to protect ICH” (two students). Thus, university students have their own understanding and ideas on the protection of ICH and have their own clear attitudes. See Figures 2 and 3 for the discussion process.

### 5.2 Test Results

In order to verify the importance and validate the effect of the ICH app for gaining knowledge of ICH, this experiment was adopted, with the method of learning about the origin, development, production process, and appreciation of works of folding fans by students and teachers as the independent variable, the one using the ICH app method as the experimental group, and the other group for traditional paper learning as the control group with the assurance of the students’ own learning ability. Under the premise of ensuring that the students’ own learning ability was at a comparable level, the students were reasonably observed.

The experiment ensured that the students’ own level of learning ability was comparable, and the researcher and the T1 jointly imposed reasonable observations on the students to observe the final absorption of the content of the intangible cultural and cultural knowledge and their performance during the test. The main observation was their final learning and absorption of the ICH knowledge content. In addition, after the 12 university students who were the users of the app had learnt individually, the researcher invited each of them to participate in completing the “Folding Fan Basic Knowledge Test,” which was derived from their learning content and lasted for 20 min.

The test was scored on the basis of one point for one correct answer, with some questions having multiple options. The scoring questions were evaluated based on the test



**Figure 2:** The two groups of students learn in different ways.



**Figure 3:** The researcher in discussion with interviewees.

subject's responses, and the final test result was determined by each student's overall score, with higher scores indicating a greater degree of accuracy. The aim is to test which learning method is more effective in a short period of time and to understand their experience of using the Folding Fan app. The test questions are an important means of capturing the user's learning efficiency and interaction experience. The test questions were taken from their learning content. The results of the test were analyzed to determine how well the respondents learned and how much they liked folding fans. Test results are shown in Appendix B.

The conclusion is that the final score of Group B students who used the ICH app was higher, indicating that the final content summary statement was more complete, contained more detail, and had a higher percentage of correct answers to the questions. Therefore, in general, the use of the ICH app provides a more effective and reasonable aid to learn about ICH and can improve the efficiency of learning and the digestion of knowledge to a certain extent.

Furthermore, in the post-test interviews, six students mentioned that they liked and were satisfied with the app. In this regard, A discussed the role of apps in disseminating ICH. He believes that apps are a good learning tool because they are vivid and more interesting than traditional paper books. It allows the younger generation to understand a culture they have never been exposed to effortlessly. A said "the apps can make the dissemination of ICH easy and fast, in such a way that young people like it." On the other hand, C believes that fun interactions can stimulate their visual impressions and use their senses to stimulate memory. C stated that "the interaction design was very nice." In this essence, the interviewees not only shared their knowledge about the place under study but also expressed their feelings and opinions about the use of ICH apps currently available in the market. The indicators identified in this section were eventually categorized into four categories: cultural connotation; interface design; interaction design; and download channel. In terms of cultural connotation, customs,



traditional festivals, and traditional crafts concerned the interviewees the most and had been mentioned by four visitors. D claimed that “the customs of ethnic minorities are always desirable.” I and K expressed that they, “like to look inside the app for introductions to traditional festivals.” E stated that “An introduction to traditional craftsmanship must not be missing, and is best conveyed through storytelling.” In terms of interface design, design style, color, and operation interface were the most important concerns of the respondents and were mentioned by five visitors. According to B and F “Color is an important determinant of design style and users can broadly judge the category of the app in terms of color.” H stated that “the current design style of culture apps is too cluttered, I think an app with a clear design style will definitely be more popular with users”; D and E claimed “the convenience of the navigation design will be conducive for users to use it again.”

### 5.3 Teachers’ Perceptions of the Folding Fan App

At the end of the pedagogical intervention experiment, teachers T1 and T2 were asked about their opinions on the cultural effects of the Folding Fan app for learning about ICH. Firstly, both teachers gave positive answers that it was interesting and the students enjoyed it: “I think they have understood it well in such a short period of time, at least they were able to observe the process of making the folding fan carefully, which is something that textual information cannot do” (T1); “I believe they broadly understood the whole process” (T2).

When asked how the ICH app affects the younger generation’s interest in the ICH, folding fan, T1 replied,

I think the most important thing is its convenience, students can choose their favourite culture independently without the limitation of space and time, for example, during the epidemic. The app lesson is a good choice, if the app is used as a new means of learning, all those old and unfamiliar cultures can be shown to the young generation with a new look.

T2’s reply was, “I think it should be fun, it combines knowledge and game interaction, which is an interesting and challenging thing for the young generation who like to accept new things.”

Finally, T1 and T2 described the students’ reactions to participating in the process as “very good,” “very positive” (T2), and “very satisfied” (T1): “It was very rewarding, it broke the mould of conventional learning and made difficult knowledge interesting” (T2). T1 said, “The results were well worth it.”

When asked if the students were impressed by the ICH of folding fans, both teachers replied that the students were very excited about the culture of folding fans and were impressed by the experiment.

## 6 Discussion and Conclusion

Based on the results of the interviews with the students, their attitudes towards participating in the experiment, as well as the interviews with the teachers and the observations from the researcher, the following can be determined.

This study develops pedagogical experiments based on the teaching of ICH to the young generation and the encouragement of the young generation to promote and preserve local ICH in the context of digital dissemination and preservation of ICH. The study recognizes the role of apps as a tool for the young generation to learn about ICH; as mentioned in the text it allows them the young generation to effortlessly understand a culture to which they have never been exposed. Therefore, this study reveals that there is a need to use digital means to disseminate ICH and that these means are important for ICH. In this study, an app is defined as a self-learning tool, which is a product of the rapid development of the times.

This study highlights the potential of apps in the learning process of ICH for university students and provides an example of a creative and enjoyable educational activity that can effectively engage preschool students and teachers in educating an important part of the community and draw their attention to local cultural heritage and sustainable development. This example was implemented without a necessity of funding, specialized equipment nor sophisticated technology. Nonetheless, the highest potential is in the positive acceptance and attitude of the teachers and students which serves as an example that can be applied to the implementation of similar pedagogical activities. The current work is therefore an example that can be applied to the implementation of similar activities for teachers and students at all educational levels.

The aim of this study is to demonstrate the potential of ICH apps for universities to teach ICH to the younger generation through the use of the most common devices, mobile phones, and the apps that have been successfully developed on the market today. In this case, the ICH of the folding fan was chosen as the theme, especially as a relatively familiar learning target facing preservation in order to enhance the interpretation and transmission of ICH. The study found the app to be an effective educational tool. By participating in the app’s modules on appreciation, craft experience, and



historical learning, the youths were able to stimulate their interest and cultural identity in traditions, local cultural assets, and sustainable development issues. The sense of identity and pride in their own culture as well as the traditional culture of the Chinese people was enhanced. This stimulation of interest may prompt them to learn and explore relevant cultural knowledge more actively, fostering a new generation for cultural heritage and development.

In addition, the case provides educators with a new teaching idea and resource. Educators can learn from the model of the Folding Fan app and combine traditional culture with modern technology to develop more interactive and interesting teaching tools and apps. For example, in courses such as art education and history education, digital means are used to enable students to understand and experience the cultural connotations more deeply and improve the teaching effect.

Finally, it is about the exploration of personalized learning. Apps are able to provide personalized learning content and experiences based on users' actions and feedback, which reveals that educators can pay more attention to students' individual differences in teaching and adopt personalized teaching methods to satisfy the learning demands of different students so as to improve students' motivation and participation in learning.

## 7 Contributions and Implications

ICH apps have both opportunities and challenges in promoting culture. In terms of accessibility, advances in technology have provided the basis for app development but economic and policy support from governments and businesses alike is still needed. At the same time, it is crucial to ensure the quality of the content of apps as the specialized and complex nature of ICHs requires the in-depth involvement of professional cultural institutions and experts in content creation. In addition, meeting different users' demands and providing personalised services are also shortcomings of current apps.

In terms of promotion roles, the state, enterprises, and civil society play different roles. The state should formulate relevant policies and regulations, strengthen the protection and management of ICH, and provide policy guarantee and financial support for the development of apps. Enterprises can give full play to their technological and market advantages to develop high-quality apps and promote them in the market. Civil society can expand the influence of apps through participation and dissemination. In addition, it is also necessary to increase user awareness and participation so that more people are willing to use and share ICH apps.

In summary, the development and use of mobile apps for safeguarding ICH involves multiple stakeholders, such as individuals, organizations and states, all with different motivations and roles. In the process of development and use, challenges such as technical difficulties, content quality, and user demands are faced, while opportunities such as technological advancement, market demand, and policy support are also welcomed. Only through the joint efforts of all parties and by giving full play to their respective advantages can the digital preservation and transmission of ICH be better promoted and contribute to the cultural diversity and sustainable development of humankind.

## 8 Declaration of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. No funding was received for this work. We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property. We further confirm that all aspects of the work covered in this manuscript that have involved research participants have been conducted with the ethical permission and approval of the participants and that such approvals are acknowledged within the manuscript.

## Appendix A

### Sample group interview questions

- (1) Do you understand the meaning of intangible cultural heritage? If yes, have you ever visited one? If not, can you imagine what intangible cultural heritage is?
- (2) Did you know that folding fans are an intangible cultural heritage?
- (3) Do you know in which era folding fans originated?
- (4) What do you think are the main reasons for the impact and dissipation of intangible cultural heritage?

### List of questions posed to teachers after the test

- (5) What do you think about the way students learn about culture through the Folding Fan app?
- (6) Do you believe that the younger generation likes the app?

- (7) Do you think the students were able to learn about the culture of folding fans through the app?
- (8) How would you describe the students' reaction to their participation?
- (9) Would you use the app in teaching in the future?
- (10) What do you think of the digital story we created with the children?
- (11) Do you think the students were impressed with the folding fan culture?

## Appendix B

Test results for both groups of students													
Serial number	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	
1. When did the folding fan originate?	0	1	1	1	0	0	1	1	0	1	1	1	
2. What are the different types of folding fans? (Multiple answers)	1	2	2	2	1	2	2	2	2	3	3	3	
3. What is the name of the type of fan in the picture?	1	0	0	1	1	0	1	1	1	1	1	0	
4. In which country did folding fans first appear?	1	0	1	0	0	1	1	0	0	1	1	1	
5. The folding fan is made up of several components	1	0	1	0	0	0	1	1	1	1	0	1	
6. What are the components of the folding fan in the picture called?	0	1	1	1	0	1	1	1	1	1	1	0	
7. How satisfied are you with the study methods you use, and how many points would you give on a scale of 1–5?	2	2	3	2	1	1	4	4	3	4	4	4	
<b>Total score</b>	6	6	9	7	3	5	11	10	8	12	11	10	

## References

- Aljaberi, S. M., and A. S. Al-Ogaili. 2021. "Integration of Cultural Digital Form and Material Carrier Form of Traditional Handicraft Intangible Cultural Heritage." *Fusion: Practice and Applications* 5: 21–30.
- Azman, A. N., N. S. A. Rezal, N. Y. Zulkeifli, N. A. S. Mat, I. S. Saari, and A. S. Ab Hamid. 2021. "Acceptance of TikTok on the Youth towards Education Development." *Borneo International Journal* 4 (3): 19–25.
- Bedjaoui, M. 2004. "The Convention for the Safeguarding of the Intangible Cultural Heritage: The Legal Framework and Universally Recognized Principles." *Museum International* 56 (1–2): 150–5.
- Chang, Y. 2021. "The 'New Normal' Online Teaching Mode in the Post-epidemic Era Under the Perspective of 'Internet +.'" *Journal of Pingdingshan University* 36 (3).
- Chawla, G., and P. S. Manhas. 2015. "Sustainability in Higher Education: An Exploratory Investigation of Hospitality Management Courses." *Asia-Pacific Journal of Innovation in Hospitality and Tourism (APJHT)* 4: 1–24.
- Cheng, F. 2016a. "Design and Experience Research of Traditional Folding Fan Virtual Drawing APP." Master's thesis, Harbin Institute of Technology.
- Cheng, F. 2016b. *Research on the Design and Experience of Traditional Folding Fan Virtual Painting APP*. Master's thesis, Harbin Institute of Technology.
- Cui, J., A. Zhou, and X. Chen. 2019. "Influencing Factors and Path Selection of Live Inheritance of Sports Intangible Cultural Heritage in China." *Sports Science* 39 (4): 12–22.
- Erturk, N. 2020. "Preservation of Digitized Intangible Cultural Heritage in Museum Storage." *Milli Folklor* 16 (128): 100–10.
- Guo, Q. 2020. "Research on the Ways to Protect and Inherit Intangible Cultural Heritage in the Information Age." *Journal of Physics: Conference Series* 1575 (1): 012169.
- Hu, W. 2019. "Survey Analysis and Enlightenment of Mobile Reading APP." *Library Research* 44 (1): 66–8.
- Jang, H. C., and Y. N. Lien. 2014. "Educational Exhibition System and the Application of APP on Museum Mobile Learning—National Palace Museum as an Example." In *International Conference on e-Commerce, e-Administration, e-Society, e-Education, and e-Technology*. Nagoya University.
- Kang, X. 2024. "Research on the Legal Protection of the Rights and Interests of Inheritors of Intangible Cultural Heritage in China." *Open Journal of Legal Science* 12: 4387.
- Li, X., and Z. Li. 2021. "Design Innovation of Intangible Cultural Heritage: Challenges on the Basis of Mobile Phone Culture." In *Design, User Experience, and Usability: Design for Contemporary Technological Environments: 10th International Conference, DUXU 2021, Held as Part of the 23rd HCI International Conference, HCII 2021, Virtual Event, July 24–29, 2021, Proceedings, Part III*, 37–46. Cham: Springer International Publishing.
- Li, K., T. Ye, W. Xiaotong, Q. Jiao, and W. Qiang. 2019. "From the Perspective of the Two Sessions: The Voice of Culture and Tourism." *Culture Monthly* (3): 6–9.
- Li, L., C. X. Song, Y. P. Li, X. H. Wei, J. L. Wang, and X. S. Liu. 2015. "Research on the Current Status of Suzhou Folding Fans Under the Background of 'Intangible Cultural Heritage.'" *Art Science and Technology* (8): 78. <https://doi.org/10.1016/j.dci.2015.01.008>.
- Lin, T., and J. Li. 2020. "Research on Regional Differences in China's Commercial Health Insurance Demand under the Background of Population Aging." *China Health Management* 37 (8): 581–5.
- Liu, K. 2019. "Let the Art of Paper-Cutting Enter the Campus – Take the Teaching of Paper-cutting in Pengyang County No. 2 Middle School as an Example." *Ningxia Education* 10.
- Ma, Z., and Y. Guo. 2023. "Leveraging Intangible Cultural Heritage Resources for Advancing China's Knowledge-based Economy." *Journal of the Knowledge Economy*: 1–33. <https://doi.org/10.1007/s13132-023-01643-9>.

- Morris, J. E., and L. F. Paris. 2022. "Rethinking Arts-based Research Methods in Education: Enhanced Participant Engagement Processes to Increase Research Credibility and Knowledge Translation." *International Journal of Research and Method in Education* 45 (1): 99–112.
- Pan, Y. 2022. "Intangible Cultural Heritage Through Interactive Digital Experiences." Doctoral dissertation, Toronto Metropolitan University.
- Qiao, X. 2006. "Youth Groups: The Basis for the Protection of Intangible Cultural Heritage." *Journal of Chongqing University of Arts and Science: Social Science Edition* 5 (3): 1–2.
- Su, J., and C. Miao. 2011. "Designing Interview Questions for Exploratory and Confirmatory Case Studies: Theory and Case." *Journal of Management* 8 (10): 1428–37.
- Tao, W., and H. Cai. 2021. "A Review of the Research on China's Intangible Cultural Heritage since the 21st Century: Also Discussing the Possible Contribution of Geography." *Tropical Geography* 42 (1): 16–28.
- Wang, X. 2016. *Popular Reader of Taizhou Intangible Cultural Heritage*. Beijing: Beijing Book Company.
- Wang, F., and J. Xu. 2019. "Exploration on the Current Situation of College Students' Cognition of Intangible Cultural Heritage and the Path of Inheritance and Protection – Taking H School in Shenyang as an Example." *Collection* 41.
- Xu, Y., Y. Tao, and B. Smith. 2022. "China's Emerging Legislative and Policy Framework for Safeguarding Intangible Cultural Heritage." *International Journal of Cultural Policy* 28 (5): 566–80.
- Xue, K., Y. Li, and X. Meng. 2019. "An Evaluation Model to Assess the Communication Effects of Intangible Cultural Heritage." *Journal of Cultural Heritage* 40: 124–32.
- Xue, Y., P. Zhang, and M. Xue. 2023. "Virtual Display and Cross-Cultural Communication of Hejia Village Relics in Digital Media." In *International Conference on Human-Computer Interaction*, 140–58. Cham: Springer Nature Switzerland.
- Yao, G. 2021. "Digital Development of Intangible Cultural Heritage and Application of Key Technologies." *Journal of Changzhou University (Social Science Edition)* 22 (4).
- Zhang, T., and L. Peng. 2020. "Research on Design and Application of Intangible Cultural Heritage APP Based on User Experience." *Packaging Engineering Art Edition* 41 (20): 182–7.
- Zhang, D., and F. Zou. 2017. "Universities and communities – Reflections on the Survey of Young and Middle-aged Intangible Cultural Heritage Inheritors." *Cultural Heritage* (1): 17–21.
- Zhang, J., X. Li, R. Chen, X. Tan, X. Liu, Y. Ma, F. Zhu, et al. 2022. "Research on the Inheritance and Protection of Chongqing Rongchang Folding Fan "Intangible Cultural Heritage" Skills." *Shanghai Vision* (1): 123–9. <https://doi.org/10.1038/s42004-022-00743-y>.
- Zhang, W., S. Chaonan, and Z. Xuguang. 2023. "Research on Gamification Design in Intangible Cultural Heritage APPs." *Design* 8: 1834.
- Zhang, Q., W. Ding, J. Zhou, X. Li, and X. Huang. 2021. "Architecture Design of Intangible Cultural Heritage Games Based on WeChat Mini Programs-Chongming Biandan Opera as an Example." In *Advances in Creativity, Innovation, Entrepreneurship and Communication of Design: Proceedings of the AHFE 2021 Virtual Conferences on Creativity, Innovation and Entrepreneurship, and Human Factors in Communication of Design, July 25–29, 2021, USA*, 539–46. Springer International Publishing.
- Zhu, Y. 2020. "The Transfer of Intangible Cultural Heritage: Suzhou Fan as an Example of Inheritance and New Development." *Journal of Mudanjiang University* 29 (3): 27–30.