***Research on Context Analysis and Interpretation for Paiwan Mouth Flute and
Nose Flute Life Craft Culture of Taiwan Indigenous Peoples***

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Abstract
In the indigenous community of Taiwan, Paiwan Mouth Flute and Nose Flute craft has gradually become marginalized due to technological progress and the influence of mainstream culture, becoming a highly valuable cultural asset. Despite recent attempts at digital preservation, purely Digital Archive struggles to convey the historical and cultural significance. Challenges such as talent outflow and economic decline further exacerbate the difficulties faced in the inheritance and development of Mouth Flute and Nose Flute culture. This study adopts a Digital Humanities perspective to systematically organize extensive data and utilizes contextualized analysis for a visually presentation, enhancing the understanding of the cultural development structure. The goal is to promote and sustain the cultural heritage more effectively. By collecting literature, the study employs Historical Method to organize and create visual presentation such as a cultural context sketch and a historical development distribution map for Paiwan Mouth Flute and Nose Flute Life Craft. In-depth Interviews invites scholar and craftsman to provide revisions, presenting a comprehensive cultural context diagram. Through this research, the aim is to deepen the understanding of the cultural significance and impact on the Paiwan community conveyed by the Mouth Flute and Nose Flute, comprehensively showcasing its cultural charm. It is hoped that based on this study, future developments in digital applications for culture will elevate cultural value and economic level, contributing to sustainable development goals. The research model presented here can also serve as a reference for future researchers and developers in related fields.

Keywords: Paiwan, Mouth Flute and Nose Flute, Context Analysis

Introduction

In Taiwanese society, the advancement of technology and information has influenced many traditional cultures, including that of the indigenous peoples of Taiwan. Indigenous peoples have a history spanning thousands of years in their original tribes, developing unique cultures. However, in recent years, employment and economic pressures have led to indigenous peoples migrating to more economically viable urban areas, indirectly impacting the future development and preservation of culture in tribal regions (Chen, 2008). As a result, some indigenous cultures are gradually disappearing, such as the Paiwan tribe's " Mouth Flute and Nose Flute", which reflects the group's way of life, values, and carries emotional and ancestral significance. Therefore, enhancing tribal social progress and preserving cultural sustainability has become a major issue.

In recent years, the Taiwanese government has utilized digitalization to preserve and develop indigenous cultures, attempting to promote the growth of the knowledge economy and industries. However, there is a lack of understanding of the cultural significance behind artifacts and the collective memory of tribes (Tsai, 2009). Therefore, this study adopts a Digital Humanities perspective to address past issues in cultural artifact preservation by employing dynamic management of interpretive data, transforming culture into contextualized and visually presented forms. This allows for more analysis and development space for such cultures and enables more diverse interdisciplinary value utilization.

This study utilizes a Digital Humanities perspective with a focus on Paiwan Mouth Flute and Nose Flute culture as the primary research objective. The aim is to have a deep understanding of the cultural context of the Paiwan Mouth Flute and Nose Flute. After outlining the cultural context of Mouth Flute and Nose Flute, digital tools and platforms are utilized for analysis and Metadata, designing visual presentations to enable audiences to quickly comprehend the cultural significance of Mouth Flute and Nose Flute. This aims to enhance cultural value and the important goal of inheritance. Therefore, the research objectives of this study are as follows:
1. Analyze and outline the context diagram of the Paiwan Mouth Flute and Nose Flute culture.
2. Develop visual presentations of Paiwan Mouth Flute and Nose Flute culture.

Paiwan Mouth Flutes and Nose Flutes

From the perspective of world ethnic music, Austronesian ethnic groups predominantly use simple bamboo and wooden instruments. Taiwanese indigenous peoples have also developed a rich culture of wooden and bamboo instruments, including xylophones, mouth organs, bowed instruments, nose flutes, among others, utilizing abundant wood and bamboo resources. The traditional instrument of the Paiwan tribe, the " Mouth Flute and Nose Flute," has a long history with origins difficult to ascertain, known only through myths and legends. Taiwan has undergone various ruling regimes, exposing indigenous cultures to external civilizations. The earliest written records of Mouth Flute and Nose Flute date back to the Qing Dynasty and the Japanese colonial period, with the Double-tube Nose Flute being the only instrument among Taiwanese indigenous peoples capable of producing harmonics and rarer than Nose Flutes found in South Pacific regions. However, its traditional music and associated taboos have gradually faded (Tseng, 2012). Since 1945, with advancements in research methods, the quantity of literature has continuously increased. However, by the 1960s, surveys conducted by Lu Bing-chuan revealed that aside from some Paiwan and Rukai

tribes, the artistry of using Mouth Flute and Nose Flute among indigenous peoples had nearly become historical, indicating severe loss of this traditional skill at that time.

To address this situation, Hu Tai-li was commissioned by the "Council for Cultural Affairs, Executive Yuan (Taiwan)" in 1995 to conduct in-depth research on Mouth Flute and Nose Flute. Over the years, the results of Hu 's research and preservation efforts have been compiled into four categories of important Paiwan flutes: Double-tube Nose Flutes, Double-tube Mouth Flutes, Single-tube five-hole Mouth Flutes, and Single-tube seven-hole Mouth Flutes, along with various music scores and analyses, flute-making techniques, significantly contributing to the preservation and inheritance of Paiwan Mouth Flute and Nose Flute culture. Currently, the usage and preservation of Mouth Flute and Nose Flute among Taiwanese indigenous peoples, particularly the Paiwan tribe, remain prominent (Hu ,2001).

The crafting of Paiwan Mouth Flute and Nose Flute integrates nature and culture, with bamboo selection requiring consideration of the season and collection from deep mountain areas. The process involves drying, baking, and measuring finger holes, deeply influenced by ancestral worship and the legend of the hundred-paced snake, imbuing flute-making with cultural significance. However, there are few successors in the new generation, with only a handful dedicating themselves to the technical craftsmanship of flute-making. Moreover, the carving on the flute body intuitively connects with historical memory and cultural experiences, but bamboo skin is thin and susceptible to damage if not handled with good carving skills. Hence, it is evident that the craftsmanship of Mouth Flute and Nose Flute making requires accumulation of time, experience, and a certain understanding of one's own culture to produce a standard Mouth Flute and Nose Flute, highlighting the preciousness of these instruments.

The Application of Digital Humanities

Digital technology and its applications have profoundly influenced and shaped contemporary society, providing opportunities for new work, communication, and research in cultural and other domains. The rise of digital communication and virtual environments has provided platforms for new forms of art and interaction, creating new records and interactive modes using digital technology, while also offering tools to enhance audience engagement, thus better achieving preservation and dissemination goals (Affleck & Kvan, 2008).
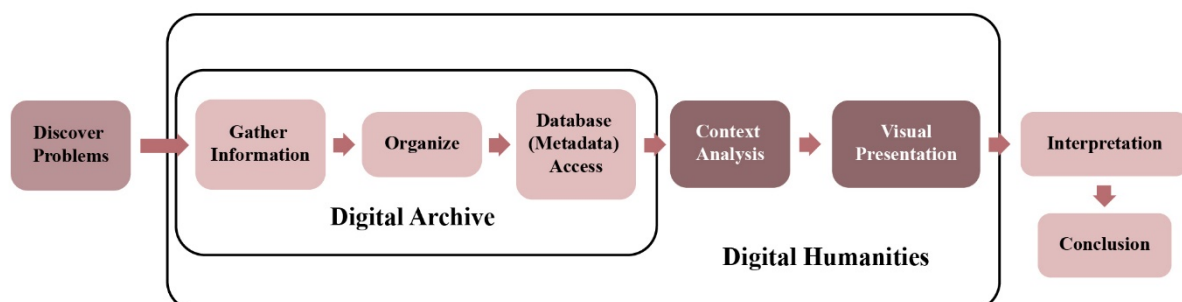

Figure 1: The humanities research process in Digital Humanities collaboration

Thus, Digital Humanities has emerged, emphasizing the importance of context and visual presentation in the process of Digital Archiving. After identifying issues, data is collected, organized, and recorded as Metadata in databases for retrieval. Digital Humanities recognize

the value of cultural content and expression, enabling organized analysis to identify cultural contexts within vast cultural data and share them through visual means that are easier to convey and present. The synergistic combination of information technology and humanities research allows researchers to explore data more comprehensively and continually adjust and generate new problem awareness during the research process (Xiang, 2018).

In the early stages of Digital Humanities research, most scholars were primarily computer scientists, with fewer participants from the humanities, who also lacked effective mastery of digital tools, making it difficult to lead research directions and obtain research results. With the development of digital technology, however, the field gradually matured, with humanities scholars beginning to collaborate with information scientists or develop their own analysis systems. As involvement in Digital Humanities research expanded, academic perspectives also broadened, encompassing textual and imagistic expression and providing new presentation methods for the visualization of traditional literature. Integration with background information systems, such as temporal-spatial information systems and the expanded use of GIS (Geographic Information Systems), enables traditional, complex, and opaque literary data to be presented visually, making their characteristics more understandable to readers. Simultaneously, readers can quickly grasp various word frequency distributions and effectively utilize textual comparisons to identify intertextual relationships (Yang, 2023). This interpretive approach also provides more research outcomes for the exploration of the Mouth Flute and Nose Flute craft life.

The Paiwan Mouth Flute and Nose Flute in Digital Humanities

In this study, the concept of Digital Humanities is introduced to comprehensively present the cultural significance of the craft of Mouth Flute and Nose Flute. In collecting literature and organizing data, besides ensuring the accuracy of the information, complete contextual maps will be compiled from multiple perspectives. Subsequently, the ArcGIS platform will be utilized for visualization. The ArcGIS platform not only allows for the importation of interpretive data but also links various functionalities and programs on ArcGIS Online for analysis and map creation, thus creating different spatiotemporal map patterns within the cultural context of Mouth Flute and Nose Flute craftsmanship. Furthermore, it can analyze, manage, and share geographic information, providing user-friendly editors that allow non-experts to participate and lowering the usage threshold. Additionally, it can be used, collaboratively edited, and information shared across different mobile devices, enhancing the visibility of culture. Therefore, as a digital tool for visualization, it is highly suitable and can leverage greater cultural value and impact.

Methods

To delve deeper into the essence encapsulated within the craft and cultural significance of Flute and Nose Flutes, as well as their extensive historical development, this study employs historical research methods and in-depth interviews. Data related to Paiwan Mouth Flute and Nose Flute were collected, organized, analyzed, and summarized to comprehend the meaning and importance of Mouth Flute and Nose Flute within Paiwan culture. At the outset of the research, historical research methods were utilized to clarify the origin and developmental context of Mouth Flute and Nose Flute culture. Subsequently, interviews were conducted with Paiwan Mouth Flute and Nose Flute artisans and academic representatives to achieve the objectives of this study.

Historical Research

From a theoretical perspective, historical research method is a methodology for studying historical events and their evolution. From a technical standpoint, historical research method can explore any factual occurrences of the past. By employing scientific methods, it aims to discover and present the truth of past events, providing a historical background for current institutions, measures, and issues, and integrating perspectives from different periods to interpret their new meanings and values. It seeks to identify and verify causal relationships, serving as a process for analyzing the present and predicting the future (Chen, 2018).

The execution of historical research method involves three main components: research design, historical analysis, and report writing. Research design includes selecting the research topic and defining research questions. Historical analysis encompasses data collection, analysis, authentication, integration, and interpretation. Report writing involves presenting research findings and composing the research report. Therefore, this study focuses on the historical development of Paiwan Mouth Flute and Nose Flute culture. It involves further searching for primary sources, including actual Mouth Flute and Nose Flute, textual and audiovisual records, oral testimonies from relevant individuals, as well as literature such as "*The Music of Takasago Tribes in Formosa*" (by Kurosawa Takashi, 1973), "*Paiwan double-tube Mouth Flute and double- tube Nose Flute*"(by Sauniaw Tjuveljevelj, 2000), "*Paiwan Nose Flute and Mouth Flute*"(by Hu et al., 2001), to gain a deep understanding of its historical background and development context. Subsequently, in-depth interviews will be conducted to cross-validate the accuracy and reliability of the data, laying the foundation for further research and database establishment.

In-Depth Interviews

"In-Depth Interviewing" is utilized in qualitative research, where researchers view the interview process as a speech event and emphasize the collaborative process of meaning construction between the interviewer and the interviewee (Mishler, 1986). The advantage of in-depth interviews lies in their small sample size, providing in-depth narrative opinions to conduct overall generalized inferences and highlight unique professional insights of individual cases. This study adopts semi-structured interviews conducted in a one-on-one format with a predetermined outline of topics. The method employs paraphrasing to guide the interviewees to provide in-depth responses on the topics. This interviewing approach effectively captures the perspectives of the interviewees, particularly suitable for exploring human feelings, emotions, and other traits that are not easily observable. Semi-structured interviews acquire data in a simple, effective, and practical manner, enabling interviewees to express their true thoughts under guidance, thereby revealing the deeper meanings behind their behavior (Ruan, 2018).

The primary goal of this study is to clarify the cultural context of Mouth Flute and Nose Flute, based on historical literature to develop a cultural context diagram of Paiwan Mouth Flute and Nose Flute culture. Three experts with profound knowledge in the field were invited for interviews, including an academic expert in Mouth Flute and Nose Flute culture research, a national treasure-level Mouth Flute and Nose Flute artisan, and the first female player and album publisher of Mouth Flute and Nose Flute. Through in-depth interviews, the experts were guided to provide more comprehensive and accurate answers to fully understand their perspectives. After completing the interviews, the data will be organized and analyzed, and upon confirmation of accuracy, the cultural context diagram will be revised, focusing on a

deeper understanding of Mouth Flute and Nose Flute craftsmanship culture. This will facilitate subsequent digitalization efforts and provide crucial reference for visualization presentation.

Object	Expertise / Experience	Date	Location
Miss Liang	Analysis and Research on Architectural Culture and Cultural Relics of Aboriginal Peoples / Member of Pingtung Cultural Assets Review Committee	2023/06/01	National Yunlin University of Science and Technology
Mr. Xie	Paiwan double-barreled Mouth Flute and Nose Flute / "Important Traditional Art Preserver" designated by Council for Cultural Affairs, Taiwan	2023/11/04	Piyuma, Taiwu Township, Pingtung County 921, Taiwan
Miss Sauniyau	Paiwan double-barreled Mouth Flute and Nose Flute / Intangible Cultural Assets of the Ministry of Culture Taiwan, Pingtung County Government, Preserver of the traditional art of Mouth Flute and Nose Flute of the Paiwan people、Nominated for the 27th Golden Melody Awards Ethnic Language Singer Award	2023/06/15	National Yunlin University of Science and Technology

Table 1: In-Depth Interview objects

Creation of Database Metadata

"Metadata," refers to "data about data," which describes other data. Depending on their attributes and types, Metadata contain various informational fields and descriptive fields to provide basic and advanced information about the stored content. In the humanities field, the establishment of metadata aids in the use of retrieval systems and allows users to quickly understand the basic data and important information of the stored content. By presenting the stored content in terms of "time," "space," and "theme," users can quickly understand relevant content from historical periods, geographical information, and themes (Ministry of Culture, 2020).

Therefore, this study utilizes the ArcGIS platform to digitally construct Metadata, enabling the main content of digitalized Mouth Flute and Nose Flute data to be described more rapidly and clearly. In this way, each data user can understand the content of Mouth Flute and Nose Flute culture data through browsing Metadata, thereby achieving the purpose of data searching, management, maintenance, and dissemination. Additionally, Metadata can be further used for visualization presentation and processing in the future.

Display name	Field	Type
OBJECTID	OBJECTID	ObjectID
Name	Name	Title
birth year	birth year	Date
Ethnicity	Ethnicity	String
Holding a flute	Holding a flute	String
length	length	String
Number of holes	Number of holes	String
blow mouth	blow mouth	String
Mouth Flute and Nose Flute title	Mouth Flute and Nose Flute title	String
Learning Resume	Learning Resume	String
Wind instrument qualification	Wind instrument qualification	String
Flute sound performance	Flute sound performance	String
Towns and villages	Towns and villages	String
Purpose for blowing	Purpose for blowing	String
clan name	clan name	String
other	other	String
Photos and files	Photos and files	Appendix

Table 2: Mouth Flute and Nose Flute culture Metadata field

Metadata is particularly important in humanities and social science research because these fields often involve complex social and cultural phenomena that cannot be fully understood solely through numbers and statistical data. Through Metadata, researchers can delve deeper into the cultural significance, social relationships, and individual perspectives of Mouth Flute and Nose Flute craftsmanship, thereby gaining a deeper understanding and insight into the research topic.

Results

This study introduces the traditional craftsmanship of Mouth Flute and Nose Flute of the Paiwan indigenous tribe in Taiwan within the framework of Digital Humanities. Its aim is not only to preserve this cultural treasure with a history spanning thousands of years but also to facilitate a deeper understanding of the cultural value and significance behind this craft through the analysis of cultural context, thereby contributing to the goal of cultural heritage preservation. In terms of research methodology, historical research methods are employed for data collection, analysis, authentication, integration, and interpretation to establish the cultural context of Mouth Flute and Nose Flute craftsmanship. Subsequently, in-depth interviewing is utilized to verify and compare the accuracy of this context, ultimately forming a cultural context diagram of Paiwan Mouth Flute and Nose Flute craftsmanship. Based on this diagram, the construction of metadata is further conducted, and the visualization of data is presented to enable even those unfamiliar with this culture to engage with it. In the future, this study can also enable subsequent researchers to explore more diverse ways of presentation, engage in interdisciplinary applications, and showcase its maximum impact and value.

Diagram of the Context of Paiwan Mouth Flute and Nose Flute Crafts Culture

Based on the research literature collected using Historical Research methods and supplemented by data unearthed through In-Depth Interviews, continuous revisions and scrutiny have been conducted. This presentation format allows for the clear display of a vast array of items and their causal relationships within limited space, enabling those unfamiliar with the subject to intuitively grasp the cultural significance and interconnections behind Mouth Flute and Nose Flute.
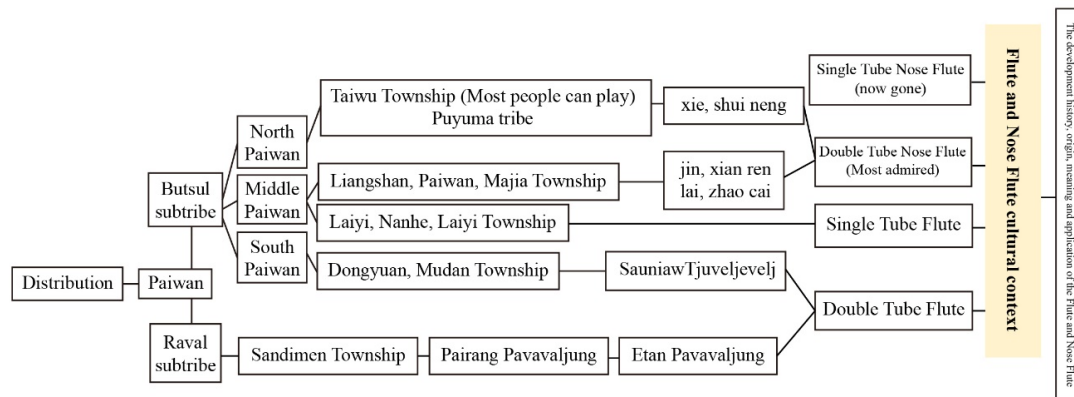

Figure 2: Diagram of the Context of Paiwan Mouth Flute and Nose Flute Culture (part 1)

In Figure 2, the distribution and variations in form of Mouth Flute and Nose Flute among the Paiwan tribe are primarily revealed. It can be observed that Mouth Flute and Nose Flute culture is widely distributed among the Paiwan tribe, particularly prevalent among the "North Paiwan," "Central Paiwan," and "South Paiwan" within the two subgroups of the "Raval" and "Butsul" systems. Different systems give rise to regional developmental differences, with each having its own representatives. Thus, even though most tribes share similar forms and functions, various myths, legends, and crafting practices emerge due to regional disparities, as depicted in this figure.
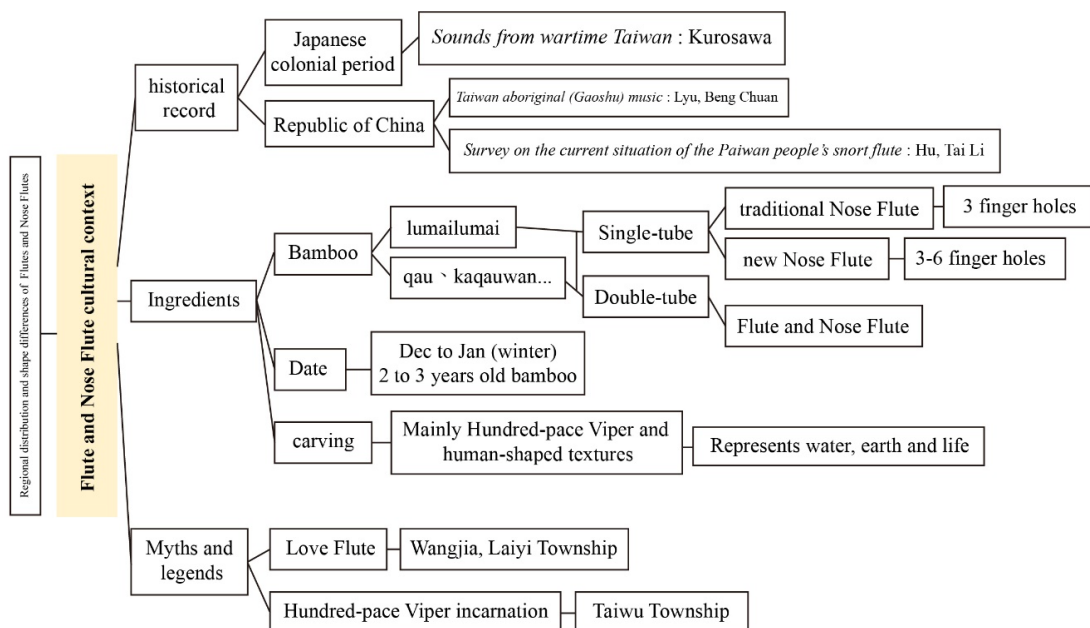

Figure 3: Diagram of the Context of Paiwan Mouth Flute and Nose Flute Culture (part 2)

In Figure 3, a contextual summary is provided regarding the historical development, compositional construction, and mythological stories of Mouth Flute and Nose Flute. With no written system among the indigenous people, the earliest written records date back to the Japanese colonial period, providing insight into the use and forms of Mouth Flute and Nose Flute over the past century. Over time, the cultural significance and use of Mouth Flute and Nose Flute have been more extensively documented. Regarding composition, the materials, harvesting dates, and flute carvings shed light on the production process and its cultural connotations. Mythological stories primarily derive from oral accounts, with these unwritten legends becoming increasingly precious over time.
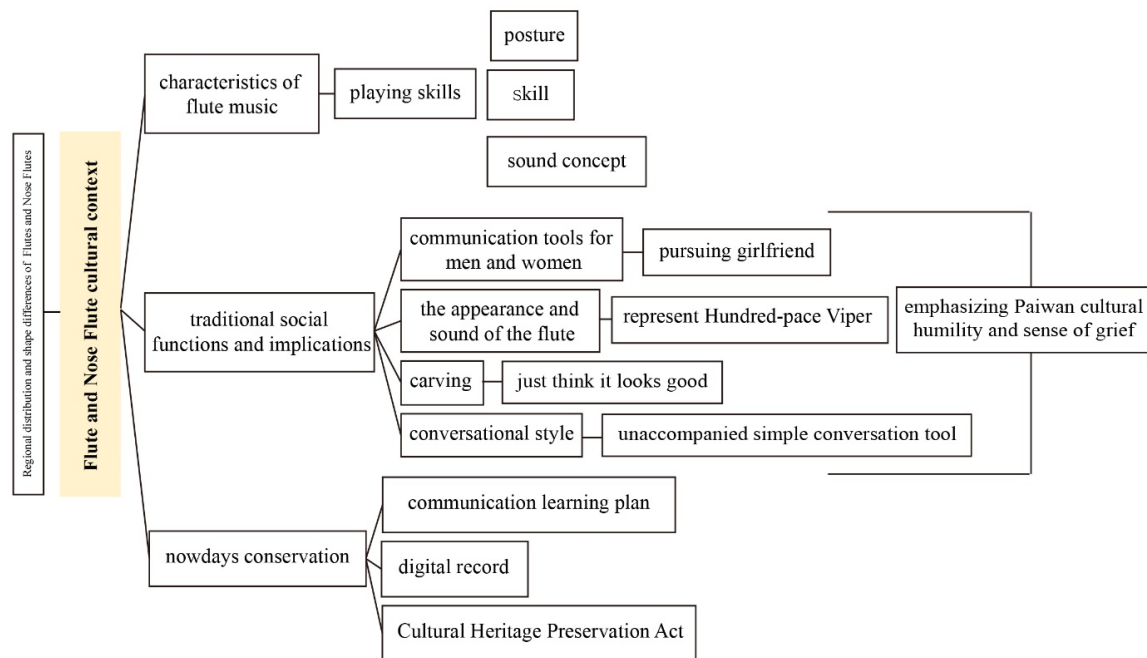

Figure 4: Diagram of the Context of Paiwan Mouth Flute and Nose Flute Culture (part 3)

In Figure 4, a summary is provided on the playing characteristics, traditional societal functions and significance, as well as contemporary preservation efforts of the flutes. In terms of playing characteristics, the research findings of subsequent scholars regarding playing techniques and sound concepts are mainly compiled. In traditional Paiwan society, lacking systematic instruction, individuals rely on self-practice and understanding, resulting in distinct individual playing styles and posing challenges for inheritance. Regarding traditional societal functions and significance, a clear understanding of the primary role, timing of use, and the flute's symbolic representation as the guardian spirit of the Paiwan tribe, the Centipede God, is attained, indicating the flute's revered status within the Paiwan tribe, symbolizing collective humility and mourning. Finally, efforts made to preserve this precious culture in contemporary times are described. In addition to implementing transmission programs, digital documentation and regulations have been established to regulate and preserve this cultural content, with the hope of ensuring its continuity through these endeavors.

Visualized Presentation of Historical Distribution of Paiwan Mouth Flute and Nose Flute Crafts Culture

Based on the cultural context, this study utilizes the ArcGIS geographic information system platform to establish metadata. It visually presents data on Mouth Flute and Nose Flute,

including regional distribution, distribution of artisans, forms, and usage, since the existence of written records. This visualization is done on maps in terms of time, space, and content. It enables users to analyze, organize, search, and manage data, while also contributing to the goals of preserving, maintaining, and disseminating Mouth Flute and Nose Flute culture. Additionally, this method lays the foundation for subsequent diverse applications.

Figure 5: Distribution of indigenous people with Mouth Flutes and Nose Flute During the Japanese colonial period

From Figure 5, it can be observed that during the Japanese colonial period (1900s), indigenous tribes all used Mouth Flute and Nose Flute to some extent. However, in the northern regions, usage was relatively scarce among tribes, while in the south, nearly every tribe used Mouth Flute and Nose Flute, especially among the Paiwan and Rukai tribes. However, Mouth Flute and Nose Flute are now almost exclusively found among the Paiwan tribe. At that time, Mouth Flute and Nose Flute varied in length from 15 to 50 centimeters and had 3 to 6 holes. Some tribes used them for rituals such as mourning, obtaining heads, or marriage ceremonies. They were most found among the 22 and 12 societies of the Paiwan and Rukai tribes, with lengths ranging from 30 to 90 centimeters, but most commonly between 40 and 60 centimeters. The number of finger holes mostly ranged from 3 to 6. Although their function was like today's Mouth Flute and Nose Flute, their form and purpose may have had different cultural meanings at the time.
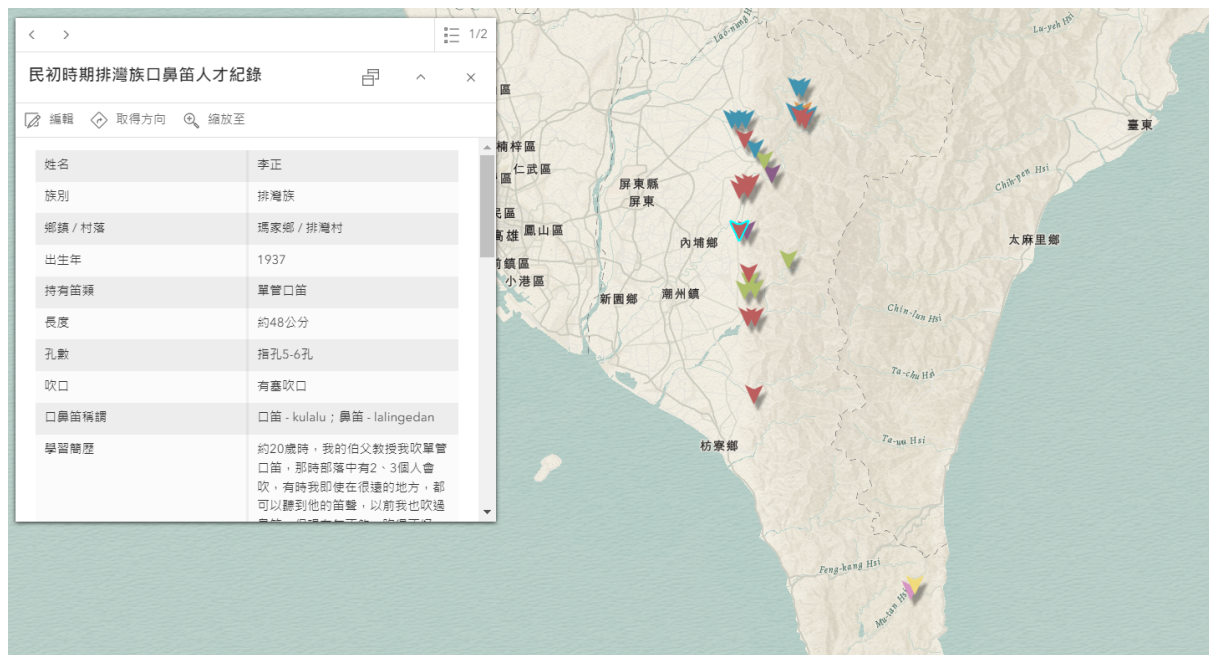
Figure 6: Distribution of Paiwan Mouth Flute and Nose Flute players during the early days of
the Republic of China

From Figure 6, it can be observed that during the Republic of China era, compared to the Japanese colonial period, the diversity of Mouth Flutes and Nose Flute significantly decreased, with the use of Mouth Flutes and Nose Flute among different ethnic groups greatly reduced, with only the Paiwan tribe continuing to play Mouth Flutes and Nose Flute. Single-tube Nose Flutes had disappeared, and the number of holes in Double-tube Nose Flute was reduced to only two forms: 3 holes and 5 holes. Among them, 3 hole flutes were mainly concentrated in the northern and central Paiwan tribes of the Butsul system, while the remaining were mostly 5 hole flutes, with lengths mostly ranging from 45 to 60 centimeters. In terms of Mouth Flute, there was a clear regional difference, with Double-tube Mouth Flute mainly found in the Raval system, while Single-tube Mouth Flute were mainly found in the northern and central Paiwan tribes of the Butsul system. However, it is interesting to note that most tribes using Single-tube Mouth Flute are not the same as those using Double-tube Nose Flutes, but are more inclined towards the central region. In terms of the number of holes, whether Single or Double-tube Mouth Flute, 5 holes were mainly used, but 7 hole flutes appeared in villages in Laiyi Township, and some tribes also had 3 hole or 6 hole flutes.

Conclusions

This study employs the framework of Digital Humanities to explore the cultural heritage of Mouth Flute and Nose Flute craftsmanship among the Paiwan indigenous people of Taiwan, with the aim of preserving this cultural asset that spans millennia. Through the analysis of cultural contexts, the goal is to enhance people's understanding of the cultural significance and meanings behind Mouth Flute and Nose Flute, thus facilitating cultural inheritance. Utilizing digital tools, the historical distribution and evolution of Mouth Flute and Nose Flute are presented clearly. The research findings also indicate significant differences in Mouth Flute and Nose Flute culture between the Japanese colonial and Republic of China periods, including changes in form and usage patterns, as well as a reduction in diversity. However, many current practitioners of Mouth Flute and Nose Flute playing are elderly and may not be able to continue the tradition, posing challenges to the cultural inheritance of Mouth Flute

and Nose Flute culture. In the modern era of technological advancement, effectively preserving and inheriting Mouth Flute and Nose Flute culture has become an important issue worthy of further exploration.

Contributions and Suggestions

In today's rapidly advancing society of digital technology, culture is increasingly influenced by universal values and the speed of internet dissemination, presenting a trend towards globalization. While this globalization poses challenges to many cultural industries, it also provides new possibilities for cultural preservation and dissemination. Focusing on the precious craft culture of Mouth Flute and Nose Flute among the Paiwan indigenous people, this study aims to leverage the power of digital technology to present the cultural heritage embedded in Mouth Flute and Nose Flute to the public. Through the emerging perspective of digital humanities and the application of digital tools in Mouth Flute and Nose Flute culture, the study seeks to enhance its cultural allure and value. The outcomes not only generate value for relatively less explored digital humanities applications in Taiwan but also contribute to subsequent researchers and the cultural industry.

By integrating cultural contexts with digital applications, the study exemplifies how traditional culture can be visualized using digital technology, enriching the means of cultural preservation and inheritance. It also provides practical experience for related fields and inspires researchers in other domains to explore the potential applications of digital technology in culture or other diverse fields. Although the study focuses only on the cultural context and visualization presentation of Mouth Flute and Nose Flute craftsmanship, future extensions could encompass modes such as transformation and reuse, creative value addition, diverse presentations, and even curation and dissemination, maximizing the cultural impact.

With the continuous advancement of technology, there is potential to explore further innovative digital applications in the research and dissemination of Mouth Flute and Nose Flute culture. For instance, utilizing Virtual Reality (VR) and Augmented Reality (AR) technology could create immersive experiences of Mouth Flute performances, allowing audiences to intuitively experience the charm of Mouth Flute culture. Moreover, leveraging social media and online platforms could expand the outreach of Mouth Flute culture to broader audiences, facilitating its dissemination and exchange.

In conclusion, future research could delve deeper into understanding Mouth Flute and Nose Flute craftsmanship culture, exploring its applications and values in various domains, and leveraging digital technology and innovative approaches to promote the preservation and inheritance of Mouth Flute culture.

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