

# Stories of Aboriginal Culture Represented by Generative Art and Projection-Mapping

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## ABSTRACT

This study aims to explore how to combine generative art and projection mapping techniques to highlight the culture and stories of the Paiwan tribe. Through students' participation in the University Social Responsibility (USR) program and collaboration with the Paiwan tribal community, cultural materials such as legends, totems, and patterns of the Paiwan tribe were collected and integrated with professional skills learned in the classroom to create artworks. Students created six sets of works, each focusing on diverse cultural elements of the Paiwan tribe. Using technologies such as 3D modeling, generative art coding, and projection mapping, the patterns of the Paiwan tribe were digitally transformed and projected onto three-dimensional sculptures, presenting the imagery of indigenous culture through light and animation. This study employed questionnaire surveys to assess the audience's satisfaction and opinions about the exhibition. Among the 171 valid questionnaires, 97.7% of the audience supported presenting indigenous culture using such technologies and display methods. The audience considered the content and technology of projection mapping to be the highlights of the exhibition, with the highest rating given to the 3D HoloLens presentation of the blessing ceremony. In terms of gender differences, males focused more on technical applications, while females paid more attention to story content and cultural expression. The research found that experiential learning can effectively enhance students' understanding of indigenous culture. Students entered the tribe, learned about traditional totems and stories, and used digital technologies to give them new life. The entire process allowed students to connect their learning with culture and vividly present it through the power of technology. This innovative exhibition also provided a platform for the tribe to convey their voice. This study respects the intellectual property rights of indigenous people, using their patterns with the consent of the tribal council and mostly creating secondary works through generative art. In the future, the application of technology can be deepened and expanded to other ethnic groups to achieve multicultural exchange. This provides current ideas for the preservation, display, and education of indigenous culture, helping to promote cultural dissemination and understanding.

**Keywords:** Projection Mapping, Generative Art, Indigenous Culture, Storytelling, Experiential Learning

## 1. Introduction

The literature shows that according to archaeological and linguistic findings, and even genetic evidence, there is a high likelihood that the ancestors of the Austronesian culture, including the indigenous people of Australia, originated from Taiwan (Ko, et al., 2014). Taitung is the region in Taiwan with the largest concentration of indigenous cultural groups, with eight tribes residing there. Taitung University is the only institution of higher education in the Taitung area, with only one design-related department. The students at this university often meet indigenous cultures because indigenous issues are frequently discussed in the classroom. Due to the University Social Responsibility (USR) program, students collaborate with the local Paiwan tribe to carry out the project, attempting to describe the stories of the Paiwan people and learn about indigenous cultures. Although Taitung University is surrounded by many tribes, over 80% of the students

at this school come from other regions, making the opportunity to understand the local culture even more meaningful. In numerous foreign education systems, there have also been calls to incorporate indigenous cultural education. This can effectively promote indigenous cultural publications, research, and teaching methods, especially in the public school system (Kanu, 2002). In this study, after students participated in the USR program, they combined the generative art and projection-mapping techniques learned during the semester to narrate the legendary stories of the Paiwan tribe through an exhibition. During the one-week exhibition period, a questionnaire survey was conducted on the visiting audience to evaluate the effectiveness of using these two techniques to represent indigenous culture.

The cultural expression of indigenous peoples can be understood through everyday objects, textiles, clothing, ornaments, paintings, rituals, and more. Paintings include murals, pottery paintings, decorative patterns, tattoos, etc., which contain many

symbolic patterns. These patterns are protected by intellectual property rights in Taiwan, and the public cannot use them without permission. They must obtain consent from the tribal council before using them. Since this research is combined with the USR project and cooperates with the tribal council, consent for use has been obtained. Most of the works in this research process do not directly adopt the patterns of the tribe but rather undergo secondary creation through generative art coding. Indigenous patterns are a cultural right, used for cultural preservation and dissemination. Especially after 1980, cultural rights have become a new human right worldwide (Huang, et al., 2015). The USR project is a multicultural curriculum implementation plan that allows participating students to enter the tribe, experience some tribal activities, and receive personal guidance and explanations from the indigenous people. These arrangements will improve the quality of the curriculum and effectively enhance participants' understanding of the culture. Therefore, the experience plays a crucial role for the participants (Ng, et al., 2009). Similarly, after experiencing the culture of these tribes, students must use generative art techniques to convert the collected data, including patterns, into digital forms. These generated digital patterns contain different meanings and the stories being told.

In the learning stage, we have expanded our approach to address three critical issues: (1) the forms through which learners can effectively understand indigenous culture, (2) the methods for expressing the knowledge acquired, and (3) the evaluation of the learning's effectiveness. To underpin this approach, we have incorporated Experiential Learning Theory (ELT) as the theoretical framework, particularly suited for adult learners, such as the third-year university students participating in this course.

According to Dewey's (1986) explanation, learning involves the integration of experience with conceptual understanding and the application of observation to action. Therefore, we led students into the tribe, where they engaged directly with individuals knowledgeable about indigenous culture, who introduced the meaning and significance of traditional indigenous patterns. This immersive experience established a sturdy foundation of both experience and conceptual understanding.

The knowledge acquired by students is then expressed through technology. Specifically, the technique of generative art to create visual representations of indigenous cultural elements. Generative art, drawing from fields such as cognitive science and artificial life (A-Life), employs semiotics, computer computation, machine learning, and evolutionary programming (Boden & Edmonds, 2009) to reinterpret these cultural patterns in a modern context. This methodological integration

aligns with the principles of the University Social Responsibility (USR) program, which emphasizes the application of academic learning to real-world cultural and social contexts.

To assess the effectiveness of this experiential learning approach, we utilize questionnaires for statistical evaluation, which includes a thorough analysis of data through various analytical methods, formulas, and considerations of psychological cognition and gender issues. This enhanced depth of analysis is supported by data collected from exhibition attendees, providing a comprehensive understanding of the impact and effectiveness of using generative art and projection-mapping to present indigenous culture.

The primary goal of this study is to understand whether the use of generative art and projection-mapping techniques can more effectively represent indigenous culture, clearly articulate their stories, and gain recognition and preference from the audience. Our research provides a new way of interpreting indigenous culture, at least by reinterpreting indigenous patterns and symbols through technological techniques. In addition, after learners experience indigenous cultural activities, they apply their learned professional skills to new types of exhibitions, thereby evaluating the effectiveness of learning. This is an immediate observation of learning feedback. Traditional visual arts and crafts of Taiwan's indigenous peoples are valued and receive attention in the international market. Particularly in the field of product design, many studies show that indigenous cultural assets have high value and can inspire rich creative elements (Lin, 2007). Furthermore, our research will contribute to indigenous tribes, university education, and social responsibility. For indigenous tribes, we effectively connect with traditional culture and establish communication channels between the tribes and the outside world through field visits. Tribes can also use this channel to speak out, express their demands and ideas, and have their voices more directly conveyed and understood. Through actual participation, university students expand their life experiences, effectively link their professional learning in school, and practically apply multimedia technology to media communication. Social responsibility is achieved through the USR project, allowing Taitung University to continuously provide communication, cooperation, and progress for indigenous culture from a localized, long-term, and caring dedication stance. Forbes (1979) once said that knowledge without a soul at its core is a dangerous thing. We believe that knowledge is not only found in the classroom but can also be gained from the natural environment, by entering tribes and interacting with indigenous people, learning their paintings, crafts, languages, etc., and experiencing

more knowledge beyond books. The target readers of this study are educators, teachers, students, new media artists, and curators. Teachers and educators can discover different educational methods, including experiential education and communication with tribes. Students can learn knowledge and practical output. New media artists can understand some methods of expressing issues, such as combining new media techniques with traditional painting, especially on indigenous issues. Curators can consider more ways of representing indigenous issues.

This study explores whether using generative art as a visual representation technique for indigenous patterns and stories, presented through projection-mapping, can provide viewers with a unique experience. This is an issue. The rest of the paper is structured as follows. We will discuss the next work of this paper. In the next stage, we will describe the creative methods of generative art and the production process of projection-mapping. We will also introduce how indigenous stories are applied to these works. We will also demonstrate the process of establishing the exhibition and the questionnaire during the exhibition. In addition, we will conduct statistics on the questionnaire to verify whether the questions we raised have been resolved. Finally, we will review and propose future work and research.

## 2. Material and Methods

### 2.1 Participants

The exhibition lasted for one week, and the participants of this study were the viewers during this period. The main research method used was a questionnaire survey, and filling out the questionnaire was optional. Each participant who completed the questionnaire received a small gift, which was a sticker featuring graphics from the event. The exhibition was held on the campus of Taitung University, and it was estimated that most viewers would be students and teachers. Since this exhibition was a competition, the works were ranked, so people knowledgeable about indigenous culture were invited to judge. We will also include their opinions in the research analysis.

### 2.2 Pattern from Aboriginal Culture

The theme of this exhibition is the culture of the Paiwan tribe in the Taitung area. The cultural materials used in this exhibition come from five sources: (1) lilies, (2) Chinese Moccasin, (3) clothing patterns and colors, (4) the legend of Palji's red eyes, and (5) ceramic beads. First, we will enter the Paiwan tribe in Jinfeng Township to conduct field research. We will collect stories, totems, patterns, and culture-related topics of the Paiwan people. Lilies represent nobility in the Paiwan tribe and are often used for decoration and headdresses (Figure 1).

Next, in the culture of the Paiwan tribe, there is another important symbol of the Chinese Moccasin. According to legend, the Chinese Moccasin is the ancestor of the Paiwan people, and it is also the exclusive pattern of the Paiwan nobility. The Chinese Moccasin pattern appears extensively in Paiwan wood and stone carvings, daily necessities, and clothing (Figure 2). During the process, we also saw many woven fabrics used for clothing decoration. The main colors used by the Paiwan tribe are black, white, yellow, red, and green (Figure 3). We listened to the Paiwan people tell the story of Palji. Palji was born with a pair of fiery red eyes. Anyone who was seen by those eyes would die an unnatural death, and if it were an object, it would burn. Many Paiwan tribes have legends about Palji burning nearby giant stones (Figure 4). The painting of Palji's eyes in the tribe is depicted on the stage backdrop of tribal activities. Finally, the Paiwan people taught students to make their own ceramic bead bracelets. The ceramic beads were randomly drawn by the students, with nineteen patterns. Each pattern represents a different meaning, and those who draw them are blessed. Therefore, the patterns of ceramic beads are also suitable for creative designs (Figure 5).



Figure 1. An ornament on a stone in the tribe.



Figure 2. At the entrance to the tribe, figures wearing Chinese Moccasin headdresses are painted on stones.





**Figure 3.** The picture shows ribbon fabric used for costume decoration.



**Figure 4.** Palji's painting with red eyes below is the famous local roselle flower.



**Figure 5.** Draw the buoy to look like a ceramic bead.

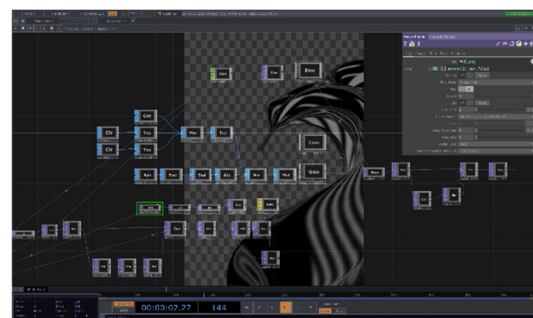
## 2.3 Generative Art

In this creation, we used the software TOUCHDESIGNER to assist us in producing generative art graphics, placing a strong emphasis on the methods used to generate aboriginal patterns. TOUCHDESIGNER is an intuitive, convenient, and suitable visual programming software for artists and designers, particularly effective in the context of cultural preservation. The main feature of TOUCHDESIGNER is its node-based editing

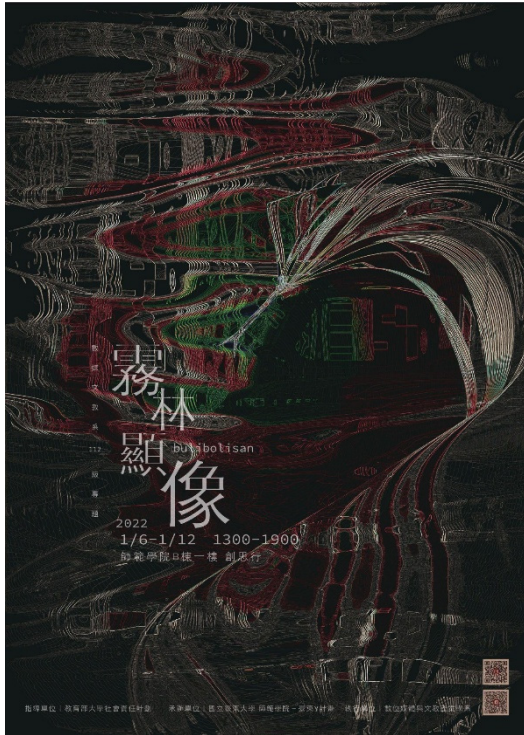
interface, which offers a more accessible alternative to the traditional command line, making it ideal for complex visual representations, special effects, interactive systems, and stage lighting. Developed by the Canadian company Derivative, TOUCHDESIGNER is widely recognized in the stage performance industry, Projection-Mapping projects, and even in Hollywood film production.

We meticulously re-coded the collected cultural materials using TOUCHDESIGNER, incorporating both 2D special effects and 3D graphics to create generative art that resonates with the Paiwan culture. For instance, in the design of dynamic posters, we used the Chinese Moccasin as the central character, crafting flowing and delicate lines using five traditional colors: red, green, yellow, black, and white. This approach not only respects the intellectual property rights associated with indigenous symbols but also reinterprets these symbols through a modern digital medium. Upon completion, this dynamic poster is intended not only for continuous looping on TV but also as the main visual poster for the exhibition (Figure 7).

Furthermore, we applied generative art techniques to a projection on a translucent curtain (Figure 8). We designed green leaves as part of a generative system and projected them onto the curtain, creating a layered installation art piece (Figure 9). This work not only exemplifies the unique characteristics of a generative system but also underscores our meticulous selection of projection materials. After experimenting with over a dozen fabrics and materials, we identified the most suitable material based on three key criteria: translucency, rigidity, and image representation. This careful selection process sparked significant interest from curtain manufacturers, demonstrating the broader impact and appeal of our innovative approach.



**Figure 6.** The process of creating a dynamic poster in TOUCHDESIGNER.



**Figure 7.** The key vision poster of the exhibition. This is also a dynamic poster created using generative art.



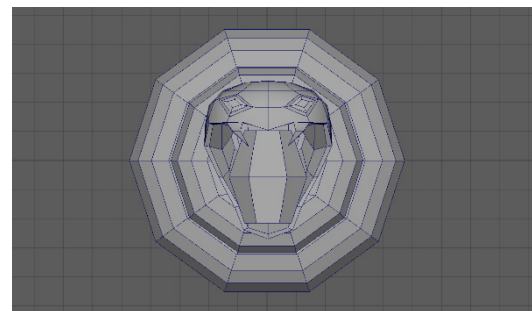
**Figure 8.** This photo is a floating curtain of leaves made from generative art.



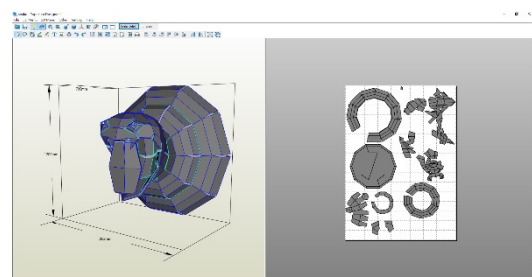
**Figure 9.** We can create a layered projection effect using just one projector.

## 2.4 3D Model

This exhibition uses three-dimensional models as projected objects. First, based on different themes, we use MAYA as the modeling tool (Figure 10). Second, once the 3D model is established, we use Pepakura as the flattening tool (Figure 11). Third, we enlarge the produced flat pattern onto thick cardboard, cut, and paste. Finally, we reinforce the structure to complete the three-dimensional model (Figure 12). There are six themes in this exhibition, so there will be six models. We only highlight one of the models in this chapter.



**Figure 10.** Creating a 3D model of the Chinese Moccasin using MAYA.



**Figure 11.** Flat pattern created using Pepakura.

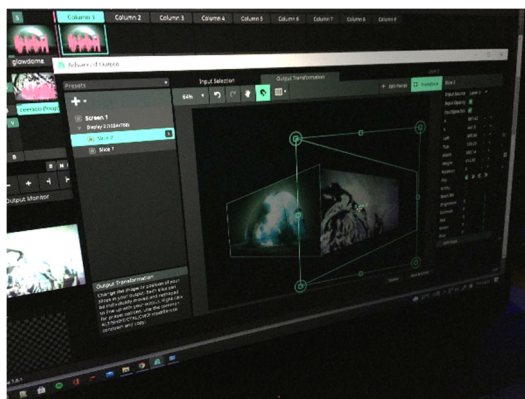




**Figure 12. The completed three-dimensional model with dimensions of H=1200\*W=1262\*D=795 mm.**

## 2.5 Projection-Mapping

After completing the 3D models and the content in TOUCHDESIGNER, we used Resolume Arena software for Projection-Mapping in this project. Arena is owned by Resolume B.V., a company based in the Netherlands. Arena is a real-time video mixer that can mix visuals and audio and play them back in real-time. In addition, it can also create masks for pre-arranged materials and perform Projection-Mapping through the output of a projector. Figure 13 shows the interface of Resolume Arena for visual and audio operations. Figure 14 shows the real-time projection of images within a limited range through the projector. These two images depict events occurring simultaneously and are photographs documenting our training of students in the classroom. First, we composited two video clips into a single frame, including masks. Then, we projected the image onto a person holding an umbrella, and as the person moved, the image moved along with them.



**Figure 13. Resolume Arena software for the operation of the film synthesis interface.**



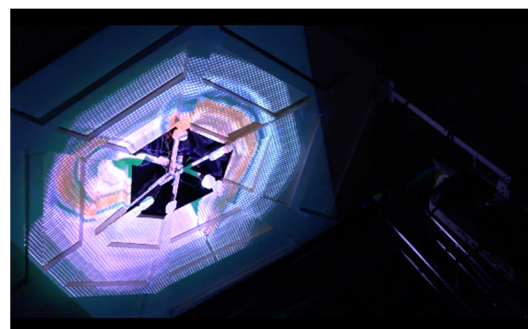
**Figure 14. We projected the image onto the umbrella in real-time and moved it.**

The exhibition features six sets of works, each measuring at least 120 centimeters. Each set is based on the patterns, totems, weaving, symbols, and related culture of the Paiwan tribe. Figure 15 uses the Chinese Moccasin and lily as models, with the

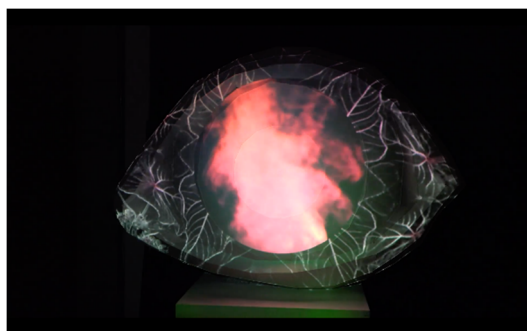
totem displaying radiance, weaving, and different colors of lilies. Figure 16 depicts a model of an indigenous roof, with the design incorporating the appearance of the previously mentioned ceramic beads. There are eight patterns of ceramic beads here, with meanings including nobility, warrior, luck, land, peacock, rhinoceros beetle, protection, and wine jar. The shape in Figure 17 is a large eye, which tells the story of Palji. It also depicts a heart, expressing Palji's emotional changes through variations in patterns. Figure 18 shows the head of a Chinese Moccasin snake, emerging from a shield with a ceramic bead in its mouth. The ceramic bead in the Chinese Moccasin's mouth changes patterns, and the shield also undergoes pattern transformations. Figure 19 is a concrete human head, uniquely featuring a nose and mouth but no eyes. This work uses the weaving patterns of indigenous people and projects animated expressions onto the eye area. Similarly, it also tells the story of Palji. Figure 20 consists of a combined model with three parts: a Chinese Moccasin, a ceramic jar, and spheres. The main story describes the sun coming into the world, giving birth to two eggs of red and white color, which are protected by the Chinese Moccasin. The two eggs hatch into a man and a woman, who become the founding nobility of the Paiwan tribe. The design primarily incorporates patterns of nature, including the red sun, soil, grass, water, and the Chinese Moccasin's patterns.



**Figure 15. The intention of the Chinese Moccasin (Hundred-Pace Snake) is conveyed by using indigenous totems as patterns on the snake's body.**



**Figure 16. This is a work featuring a roof, with indigenous patterns projected onto it.**



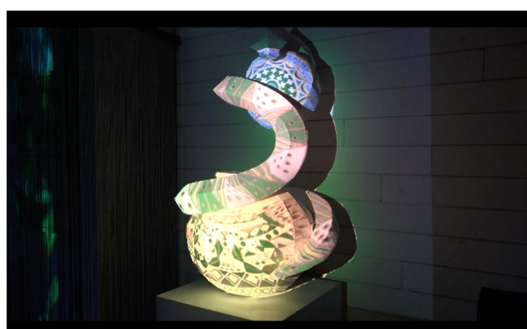
**Figure 17.** The fire in Palji's eyes symbolizes divine power.



**Figure 18.** The head of the Chinese Moccasin (Hundred-Pace Snake), enhanced with the projection of indigenous patterns.



**Figure 19.** Palji's portrait, with the eyes covered by totems, represents the limitation of divine power and human fear.

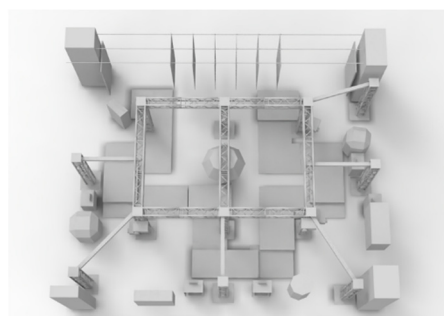


**Figure 20.** The Chinese Moccasin (Hundred-Pace Snake) emerging from a jar is a traditional indigenous story, representing the origin of their ancestors.

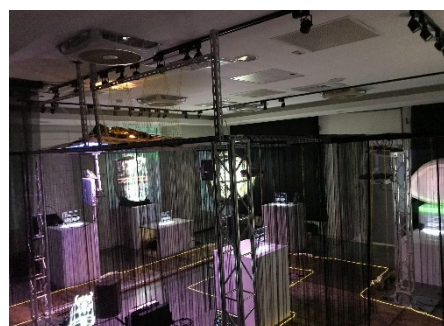
## 2.6 Exhibition

The entire exhibition site covers an area of approximately 600 square meters, with a height of

300 centimeters. The main structure is constructed using Truss (Figure 21, 22). The floor is built using wooden pallets, which serves an eco-friendly function. Since the entire exhibition space is dark, we use LED light strips on the floor for guidance and place Chinese Moccasin (Hundred-Pace Snake) lampshades at important intersections as reminders. These Chinese Moccasin lampshades are designed and produced using 3D printers (Figure 23). The exhibition features 6 main exhibits, 1 3D Hololens piece, and 1 floating projection, totaling 8 works. We place a 3D Hololens animation of an indigenous person's head at the entrance, representing that when entering a sacred place, an elder will chant a blessing song for you, praying for your safety as you enter the mountains (Figure 24). The main technology used in this installation is a 3D fan, with numerous RGB LED light sources on the blades. Through rapid rotation, it creates a visual persistence effect, forming dynamic images. Finally, six projection mapping works, one 3D Hololens work, and one holographic projection work are displayed throughout the exhibition space (Figure 25). Viewers follow the guidance of the light strips and complete their journey through a one-way path with a separate entrance and exit.

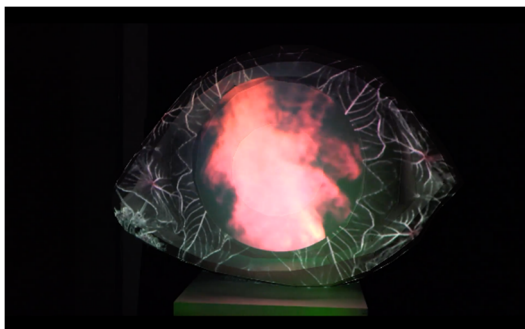


**Figure 21.** 3D design of the exhibition hall.

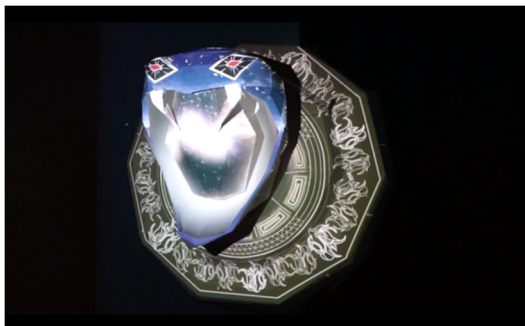


**Figure 22.** The actual appearance of the exhibition site after design.





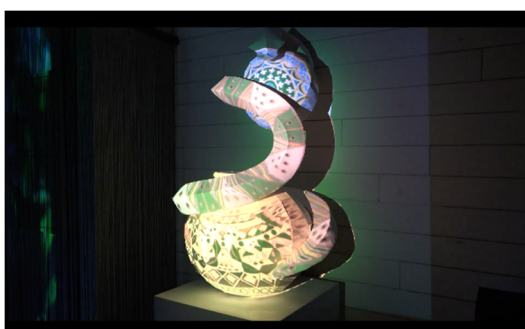
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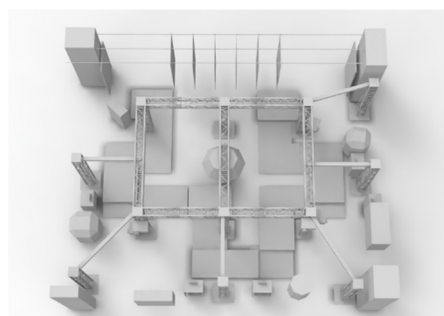


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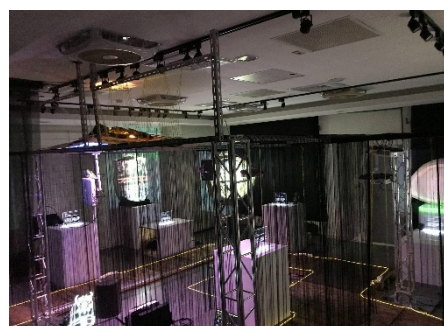
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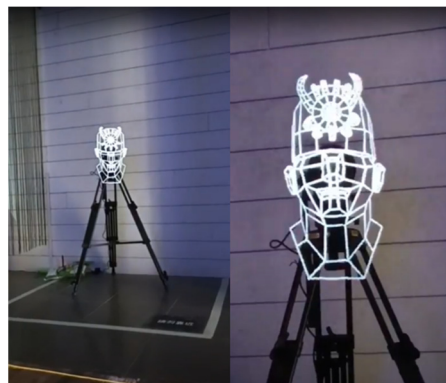


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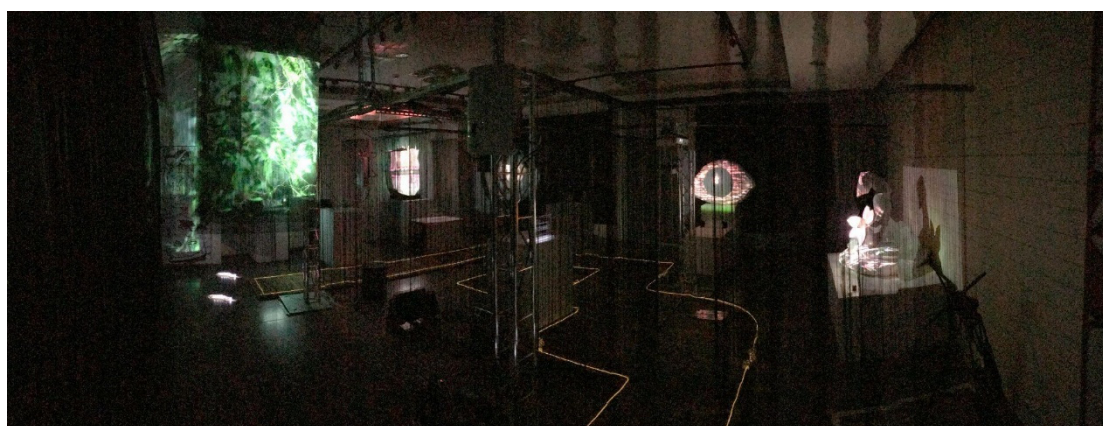




**Figure 23.** A 3D printed lampshade in the shape of a snake serves as a guide for the trail.



**Figure 24.** 3D HoloLens is used for blessing singing



**Figure 25.** Exhibition perspective.

### 3. Result of Questionnaire

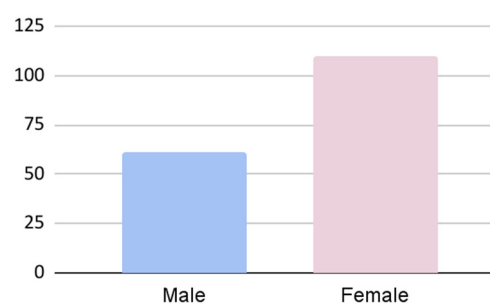
#### 3.1. Data Analysis

This exhibition includes a questionnaire, and viewers receive a small gift after completing it. We collected 171 valid responses. The survey focuses on viewers' feedback to understand their agreement and satisfaction with using generative art and projection mapping to present indigenous culture and stories. The questionnaire includes a. occupation, b. residence, c. experience with projection mapping, d. overall satisfaction, e. flow line planning, f. richness, g. satisfaction with projection mapping technology, h. readability of cultural expression, i. satisfaction with 3D HoloLens technology, j. reasons for ranking first, k. reasons for ranking last and support survey. Finally, we analyzed gender issues, calculating the average importance placed by different genders on six aspects: overall satisfaction, flow line planning, richness, projection mapping technology, cultural expression, and blessing technology.

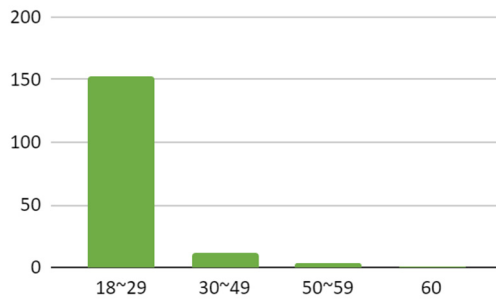
#### 3.2. Experience Analysis

In this questionnaire, there were 61 valid questionnaires from males, accounting for approximately 35.6%, and 110 from females, accounting for approximately 64.3% (Figure 26). The visitors' age distribution was as follows: 153

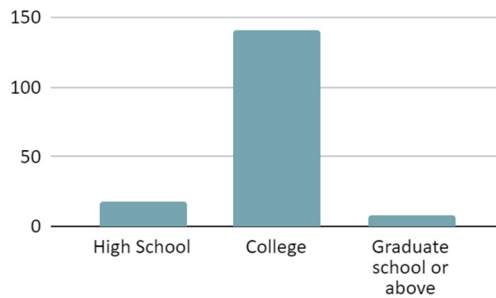
people aged 18-29, 12 people aged 30-49, 4 people aged 50-59, and one aged 60 or above (Figure 27). The 18-29 age group constituted the majority, accounting for approximately 89.4%. After investigating the audience's educational background, it was found that most of the visitors had a university education, accounting for 82.4% (Figure 28).



**Figure 26.** The Gender of the Questionnaire Survey.

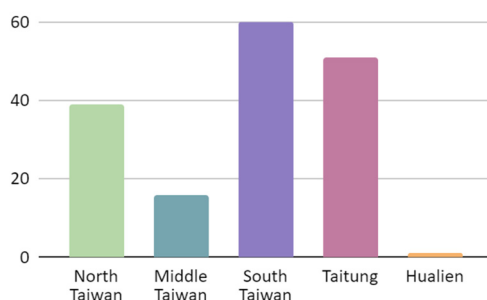


**Figure 27. Age distribution.**



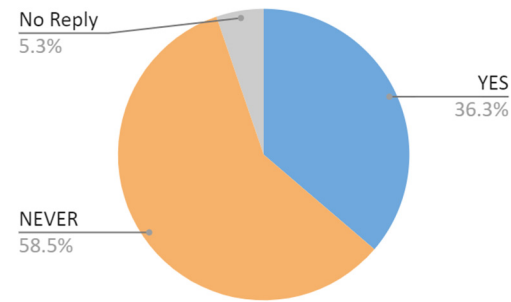
**Figure 28. The degree distribution.**

Since the exhibition was held in Taitung City, Taiwan, we conducted a regional survey of the visitors and found that most attendees were from southern Taiwan, as shown in Figure 29. There were 60 people from southern Taiwan, accounting for 35%. Following that, 51 people were from the Taitung area, making up 29.8%, while 39 people from northern Taiwan comprised 22.8% of the total visitors.



**Figure 29. The area where people come from.**

Additionally, Figure 30 provides insight into whether the surveyed attendees had previously seen projection-mapping works or similar exhibitions. 62 people (36.3%) had seen them before, while 100 people (58.5%) had not. Nine people did not provide a response.



**Figure 30. Have you seen any work by projection-Mapping?**

Next, Table 1 presents a 5-point Likert scale assessment of satisfaction for six categories (a-j): a. Overall satisfaction, b. Flow design satisfaction, c. Content richness satisfaction, d. Projection-mapping technology satisfaction, e. Indigenous cultural representation satisfaction, and f. Blessing ritual technique satisfaction. The satisfaction survey results show consistently high average scores across all six aspects, with the 3D Hololens technology used to represent the indigenous blessing ceremony receiving the highest satisfaction score.

**Table 1. Satisfaction survey.**

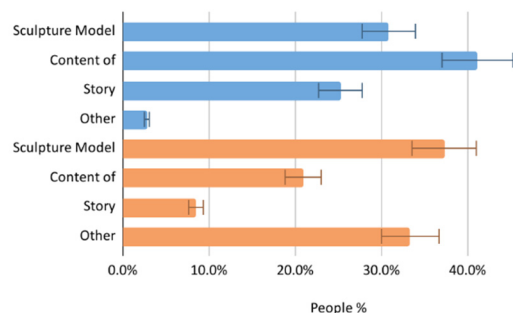
Overall satisfaction	16.68%
Flow line satisfaction	16.05%
Content satisfaction	16.81%
projection-mapping technology satisfaction	16.81%
Native cultural performance satisfaction	16.77%
3D Hololens technical satisfaction	16.88%

To identify why audiences enjoyed the exhibition, we defined three criteria: a. 3D sculptural models, b. Projection-mapping content, c. Story, and d. Other. Most attendees believed the projection-mapping content was the best, while the 3D sculptural models were rated less favorably. There were also various other opinions, mostly regarding areas that were considered weaker. The confidence interval for the positive reasons was significant, while for the negative reasons, the intervals for the 3D sculptural models and other causes were less significant (Figure 31).

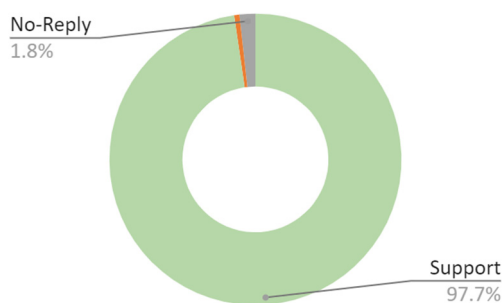
We also surveyed audience support for the technologies used in the exhibition, including 3D sculptural models, projection-mapping, and 3D Hololens. The survey results showed that 97.7% of attendees supported this presentation



approach (Figure 32).



**Figure 31. Blue marks the best reasons and orange marks the worst reasons.**



**Figure 32. Do you support the technology and display effect used in this exhibition?**

Table 2 shows the results of our regional survey on attendees' prior experiences with projection-mapping exhibitions. Among those who had never seen a projection-mapping exhibition, most were from southern Taiwan (33 people), followed by the Taitung area (32 people). Of those who had previously seen such exhibitions, most were from northern Taiwan (20 people).

**Table 2. The area where the people who saw the projection-mapping exhibition came from.**

Location (Taiwan)	Experience of Projection-Mapping			
	No-Reply	Yes	Never	Total
North	2	17	20	39
Middle	1	3	12	16
South	3	24	33	60
Taitung	2	17	32	51
Hualien			1	1
Other	1	1	2	4
<b>Total</b>	<b>9</b>	<b>62</b>	<b>100</b>	<b>171</b>

### 3.3. Gender Analysis

This study examined the differences in satisfaction priorities by gender (Table 3). For men, the 3D Hololens technology was rated the most satisfying aspect. For women, the results were similar but with a variation in the second-ranked criteria. Most women considered the use of technology to represent indigenous culture as particularly important. Additionally, they placed storytelling in second place, sharing this ranking with men. Men, however, ranked projection-mapping technology in second place. Both genders agreed on the third-ranked criteria, which was consistent with the women's second-place choice.

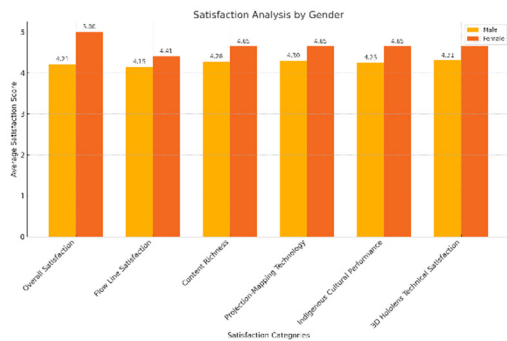
In fourth place, preferences diverged. Men ranked the application of technology to represent indigenous culture in fourth place, while women placed projection-mapping in that position. This indicates that men emphasized the technological aspects, while women valued cultural storytelling.

In the overall rankings across genders, the top-ranked criteria remained consistent with earlier findings. Both storytelling and projection-mapping were consistently rated highly. This result aligns with the distinctive preferences of both genders.

Figure 33 illustrates the satisfaction ratings across different categories, comparing the responses of male and female participants. By examining the ratings given by both genders, several key trends emerge. Firstly, in terms of overall satisfaction, female participants gave the highest rating (5.00), while male participants rated it slightly lower (4.21). This trend is reflected in other categories as well, where female participants consistently rated aspects such as content richness, projection-mapping technology, indigenous cultural performance, and 3D Hololens technology higher than their male counterparts.

Notably, the 3D Hololens technology received the highest satisfaction ratings from both genders, indicating its significant role in enhancing the audience's experience and effectively conveying cultural narratives. Additionally, the projection-mapping technology also received substantial positive feedback, demonstrating its success in reinterpreting indigenous totems and symbols in digital form, vividly showcasing these cultural elements through dynamic light effects.

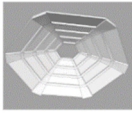
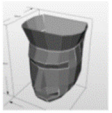

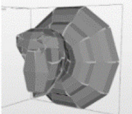


These results suggest that female participants are more inclined to highly value cultural expression and the application of technology, particularly in the context of indigenous cultural storytelling. This data further supports the effectiveness of the technological methods used in this study for presenting and educating about indigenous culture, confirming the project's contribution to cultural dissemination and understanding.



**Figure 33. Comparison of satisfaction ratings by gender across categories.**

### 3.4. Self-Assessment Analysis

In the survey, students also participated in part of the voting process to select what they considered to be the best work among the six groups. The voting format is shown in Figure 34.

Projection work tips			
Ranking	Group 1	Group 2	Group 3
Projection work tips			
Ranking	Group 4	Group 5	Group 6

**Figure 34. Students ranked the six groups from 1st to 6th place.**

Table 3 presents an analysis of voting trends across five rounds. In the first vote, Groups 2 and 6 stood out as the most popular, each receiving 23 votes, while Group 1 lagged significantly behind with only 6 votes. During the second vote, Group 5 took the lead, earning 24 votes, while Group 1 remained the least favored, gathering just 7. The third vote showed

a more balanced distribution, with votes ranging narrowly between 21 and 22; however, Group 1 once again had the fewest votes, this time with 8. In the fourth vote, Group 4 emerged as the clear leader, collecting 31 votes, while Group 2 recorded the lowest number, at 12. Finally, in the fifth vote, Group 2 regained the top position with 25 votes, whereas Group 4 fell to the bottom, receiving only 13 votes. These results reflect varying group dynamics and shifts in voter preferences over the rounds.

**Table 3. Vote Statistics**

Rank	Group 6	Group 4	Group 3	Group 5	Group 2	Group 1
1st	23	19	22	17	17	6
2nd	25	20	20	24	15	7
3rd	21	21	21	21	22	8
4th	20	31	18	17	12	13
5th	15	13	18	21	25	15

### 3.5. Cross Analysis

This study examined gender differences in satisfaction priorities (Table 4). For males, the highest satisfaction came from the technological presentation of 3D HoloLens, followed by projection mapping. Females shared the top preference for 3D HoloLens but prioritized the use of technology to present Aboriginal culture and storytelling content. Males placed greater importance on technology, while females valued cultural and narrative expression more. Both genders ranked storytelling content and projection mapping highly, reflecting shared appreciation despite differing focal points.

**Table 4. The rank of satisfaction by gender.**

	Male		Female		Both	
Overall satisfaction	4.21	5	4.64	5	4.49	5
Flow line satisfaction	4.15	6	4.41	6	4.32	6
Content satisfaction	4.28	3	4.65	2	4.52	2



projection-mapping technology satisfaction	4.30	2	4.65	4	4.52	2
Native cultural performance satisfaction	4.25	4	4.65	2	4.51	4
3D Hololens technical satisfaction	4.31	1	4.66	1	4.54	1
	The mean of attention	Rank	The mean of attention	Rank	The mean of attention	Rank

#### 4. Conclusion

Using generative art and projection-mapping technology, this study explores the potential of modern technology in presenting Taiwan's indigenous culture, particularly focusing on the Paiwan tribe's stories. Students collaborated with the tribe and applied classroom-learned techniques to create six installations that encompass Paiwan totems, patterns, symbols, and cultural elements. They used projection-mapping technology to bring these 3D models to life with light and dynamic imagery, vividly conveying indigenous stories. This innovative approach effectively captured the audience's interest and received high praise.

According to the survey results, 97.7% of the 171 attendees supported this technology and its display style, with the indigenous blessing ritual receiving the highest satisfaction. Men tended to focus more on technological applications, while women emphasized storytelling and cultural representation. Overall, the content and technology of projection-mapping were considered highlights of the exhibition.

The study addressed three main questions: (1) How should learners understand indigenous culture? (2) How should the learning content be presented? (3) How can learning outcomes be evaluated? Experiential Learning Theory (ELT) played an important role here. Students immersed themselves in the community to learn about traditional totems and stories, applying their technical skills in generative art and projection-mapping to transform indigenous patterns into a digital form, giving them new life.

In terms of intellectual property rights, the study strictly adhered to relevant regulations, using indigenous patterns only with the tribe council's consent. Most works underwent secondary creation using generative art technology, blending student creativity with modern technology to present indigenous stories and symbols in a fresh visual language.

This innovative presentation method not only improved students' understanding and respect for

indigenous culture but also provided a platform for the tribe to voice their needs and ideas directly. Taitung University's Social Responsibility Practice Plan (USR) played a crucial role in linking students' academic knowledge with culture, using new media technology to promote indigenous culture.

In the future, this research will deepen technological applications and strengthen cooperation with tribes. Respecting traditional culture, it will continue exploring how generative art and projection-mapping can enrich the storytelling of indigenous stories. The application of this technology can extend to other indigenous tribes or cultural exhibitions, achieving multicultural interaction and exchange. Overall, this research offers new approaches for preserving, presenting, and educating about indigenous culture, contributing to cultural dissemination and understanding.

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