An Analysis on the Differences in Visitor Behaviors between Traditional and Digital Exhibitions –
Taking Kaohsiung Museum of Shadow Puppet for Example

Chiao-Yun Chen, National Yunlin University of Science and Technology, Taiwan
Li-Shu Lu, National Yunlin University of Science and Technology, Taiwan

Abstract
In recent years, the evolution of new technologies has affected the relationship between visitors and exhibitions. Therefore, this study attempts to investigate the differences in visitor behaviors and experience behaviors under different exhibition patterns in Kaohsiung Museum of Shadow Puppet. Firstly, this study investigated and analyzed the existing exhibition planning and patterns, further used non-participant observation to perform observations, recorded visitors' visitor behaviors and experience behaviors, and compared the differences in visitor behaviors between traditional and digital exhibitions. The results showed that: (1) in terms of exhibition pattern, traditional exhibitions (48%) were outnumbered by digital exhibitions (52%). According to the proportion, digitalization and interactivity have been widely applied to Cultural Hall of Shadow Puppetry Museum; (2) the attracting power and holding power of digital exhibitions were higher.

In terms of experience behavior, appearance, touch operation, photo taking, discussion, and level of participation of digital exhibitions were higher than those of traditional exhibitions. Therefore, the level of participation of experience behavior for exhibitions with higher attracting power and holding power is higher. Finally, according to the research results, this study proposed suggestions on visitor-oriented exhibition design for Kaohsiung Museum of Shadow Puppet, in order to make a contribution to the promotion of traditional arts and sustainable heritage.

Keywords: Shadow Puppetry Museum, Traditional Exhibition, Digital Exhibition, Visitor Behavior, Experience Behaviors

Introduction

The "local culture museum projects" proposed by the Ministry of Culture aims to assist each region to conserve, rejuvenate, and reuse their local cultures, reinforce emotional bonds between community members, and make each local culture museum the fountain of local vigor and energy. In addition to being the incarnation of congregated local cultures and energies, this concept of rejuvenation and sustainability also prompts the renaissance of local cultures and history (Ministry of Culture, 2012). In recent years, local culture museums have further become each region's culture bases, which local cultural life revolves around. In this way, local culture museums are shouldering the task of encouraging the public's cultural participation, strengthening local residents' identity, continuing and perpetuating cultures, and sharing cultural resources. As such, local culture museums are evidently important for connecting with locals and spreading local vitalities (Lu and Hsu, 2013). However, along with the continuous development of technology, exhibitions at museums are presented in an innovative way in the direction of diversification and involving the experience of visitors' five senses.

Geng (2006) pointed out that "newness" refers to new concepts and new approaches such as using a large amount of digital images, multimedia applications, and computers. On the contrary, "oldness" refers to traditional object-centric exhibitions and an emphasis on the genuineness of objects. At present, similar approaches are still observable at many museums. In addition, audiences' research on the operation of a museum has received mounting attention in recent years. To enhance museum visitors' interest and intellectual learning, exhibition patterns and techniques have diversified to incorporate elements of traditional exhibitions and digital exhibitions. However, how much time do museum visitors spend on a single display at an exhibition? What are the characteristics of exhibitions that are appealing for museum visitors? Different exhibition patterns may affect behaviors of museum visitors and the effectiveness of an exhibition.

The Kaohsiung Museum of Shadow Puppet, which is located in Gangshan District, Kaohsiung City, had a large-scale repair and revamp in 2012 after a water damage caused by Typhoon Fanapi. After renovation, static exhibitions and an emphasis on the passing down of knowledge at the old museum was replaced with a fusion of traditional and digital exhibition techniques (as shown in Figure 1 and Figure 2). As such, facing the ever-changing exhibition patterns, this study attempts to explore visitors' different behaviors when visiting a traditional exhibition and a digital exhibition as well as the interplay between the two exhibition patterns and visitors' participatory behaviors. This study's central research purposes include: (1) to investigate and classify the Kaohsiung Museum of Shadow Puppet's current planning of exhibition areas and exhibition patterns; (2) to compare visitors' different behaviors in visiting a traditional exhibition and a digital exhibition (attracting power, holding power, and visitors' participatory behaviors).
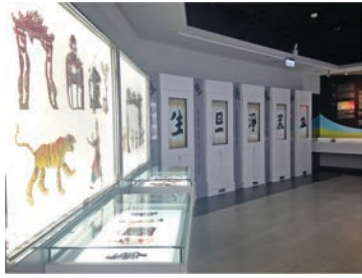
Figure 1: Traditional Exhibition.

Figure 2: Digital Exhibition.

Related work

With the aim of examining different behaviors that visitors show when they visit traditional exhibitions and digital exhibitions at the Kaohsiung Museum of Shadow Puppet, this study proposes to review literature in the following areas: (1) the Kaohsiung Museum of Shadow Puppet's history and current status; (2) exhibition patterns and techniques adopted by the museum ;(3) behaviors of exhibition visitors.

One- The Kaohsiung Museum of Shadow Puppet's history and current status

In respect of the development of shadow puppetry and the museum, shadow puppetry, puppetry, and glove puppetry are acclaimed as the main three types of puppetry and are all traditional and all-inclusive folk art in Taiwan. Following the infiltration of movies and singing and dancing performances into temple fairs in the end of 1971, the number of shadow puppetry audience and troupes shrank drastically and eventually there were only five remaining troupes in Kaohsiung County. In the beginning of 1981 after the completion of the Ten Major Infrastructure Projects, the government became devoted to conserving cultural assets, disseminating ethnic arts, and put a lot of effort into promoting traditional techniques and craftsmanship with ethnic and local elements (Lin, 2003).

Kaohsiung County (which became Kaohsiung City after the merging of Kaohsiung City and Kaohsiung County in 2010) is the place of origin and an important town for the development of shadow puppetry in Taiwan. The Kaohsiung Museum of Shadow Puppet, which was established in 1986 under the endorsement of the government and commenced operations in 1993, is Taiwan's second museum of traditional theaters other than the Taiwan Theatre Museum in Yilan. The one-of-a-kind Kaohsiung Museum of Shadow Puppet, which is located in Gangshan District, Kaohsiung City, is a multifunctional theatre museum. In addition to the preservation of traditional cultures, the museum also emphasizes on educating and allowing visitors to participate in shadow puppetry along with possible innovations in the future (The Bureau of Cultural Heritage, Ministry of Culture, 2010).

Later, the first big-scale revamp in the past 19 years after its establishment was carried out in 2011- 2012 due to a damage by Typhoon Fanapi. When the overhauled museum reopened to the public in March 2013, displays at the museum were also restructured to include six theme-based areas: teaching classrooms, display sections, archive rooms, theaters, digital shadow puppetry theatres, and areas for visitors' participation in experience-centered designs with the aim of conserving traditional elements and incorporating modern technologies.

Figure 3: Kaohsiung Shadow Puppet Museum.

Two- Exhibition patterns and techniques at the museum

In the era of digitalization, media products are digitalized by the media industry so as to go with the trend of digitalization and to cater to the audience's demand for information. This is the background for the creation of digital exhibitions. In the era of digitalization, exhibitions have the two-way interaction feature. Visitors who only received one-way messages in the past have become active participants who interact with exhibitions. Some features of digital exhibitions include: (1) being more humanized and taking a human perspective; (2) turning passive visitors to active participants; (3) a synthesis of technologies, culture, and art.

However, the term "interactive" is a broad concept which refers to as significant as interactions between the audience and the media and as small as interactions among the audience (Li, 2009). In addition, according to various scholars' propositions, the interplay between how a digital exhibition is presented and sensations felt by visitors, interactions between a digital exhibition and visitors, and visitors' participation in a digital exhibition fall into the three categories as shown in Table 1.

Table 1
Digital Exhibition Patterns

Digital exhibition	Definition & Description
Viewing Exhibition	To increase the multimedia way to communicate with the audience, and by the ways of sound or videos to understand the various items (Lin, 2011).
Interactive Exhibition	No preset programs. The exhibits due to individual operations have different responses by visitors , and have correlation between the two feedback (Hung, 2007).
Multi-touch Display	Display facilities by the audience's body to start , such as the physical blocking infrared, or press the button to start your fingers, etc (Tu, 2001).

Traditional exhibitions refer to object-centric exhibitions which stress on the realness of displayed objects, which means that an exhibition without objects for display would not qualify as an exhibition. At a traditional exhibition, objects or the real look of objects are presented to visitors. The exhibition patterns include display design, model display, zoological specimen display, and explanatory board as shown in Table 2.

Table 2
Traditional Exhibition Patterns

Traditional exhibition	Definition & Description
Display Design	The main display objects arranged in a shop window. Through the window exhibits to watch, usually belong to the historical heritage of conservation value and to avoid touching the audience exhibits (Lin, 2009).
Modeling Exhibition	By the way of model to explain the contents and can reproduce the exhibit. The Model Exhibit is also divided into two kinds of narrow and large type (Lin, 2009).
Specimen Exhibition	Presented by the true type and the real items. Through description of the real Specimen, Can be visitors to realize more about the actual presentation of the exhibits (Lin, 2009).
Scenario Exhibition	A space scenarios combine exhibits with information. In addition to view the individual exhibit, more space atmosphere of the exhibition will be experienced (Shu, 2013).
Panel Display	Explanation for the contents of the exhibits , along with interpretation of the text and pictures. Visitor to understand the contents of this information through the exhibit to realize (Chen and Chang, 2009).
Participatory Exhibition	Visitors operation on exhibits, leading to changes in the exhibits, but no correlation between the two feedback (Chang, 2009).

Chang (2009) proposed that exhibition techniques refer to techniques which aim to convert structuralized and organized resources and content to lucid and unambiguous narration to interact with visitors. Systematized, organized, and tiered display media not only create displays in a tangible space and environment but also exercise an effective control of exhibition atmosphere, the physical environment, provide means and techniques that preserve zoological specimen, provide proper sensory stimulation and a quality exhibition with depth.

As such, according to the interaction between humans and displayed objects, exhibition techniques may be classified into six categories including zoological specimen display, ecosystem display, dynamic machinery display, and visitors' participation as shown in Table 3.

Table 3
Expression Patterns

expression patterns	Type	Description
specimen Exhibit	Category exhibition	The exhibits displayed in accordance with the categories, through the traditional way.
	Subtopic exhibition	This is a small subject of an idea, with an obvious topic to attract an audience interested.
Ecological Exhibit	Original Ecological Style	Conception an original environment, by three-dimensional graphic manner. Ecological display methods can be said the way of natural history display.
	Narrow Ecological	

	Style	
	Enlarge Ecological Styled	
dynamic mechanical	Prototype Analog	Based on real prototypes to achieve realistic results show.
	Concept Analog	The purpose is not a description of the action of the specimen, but illustrates a principle.
Spectators Participation	Active Participation	The development of exhibition by science. By the audience to understand the content, and combination of games and learning ways to reach.
	Passive Participation	
projection Exhibit	Slideshow cinema	Utilizing the principle of film to projected stories and pictures. The screen display as the main tool, emphasizing the effect of the new film projection technology.
High-tech Exhibition	Computer Show	use high-tech to present different results of the exhibition.

(Han Baode,2000).

Three- Behaviors of museum visitors

The broad definition of museum visitors' behaviors refers to visitors' outward behaviors as well as individual visitors' inner thoughts and emotions (Tyler, 1949). According to the proposition of Wagar (1976), an exhibition must create attracting power and holding power in order to produce a desired result of elucidation. Other scholars also pointed out the importance of an exhibition's attracting power and holding power for visitors and the interaction between visitors and displays at an exhibition (Loomis, 1993; Bitgood, 1994; Hsu and Lin, 2005). Therefore, it can be learned that attracting power and holding power are both fundamental elements for the success of an exhibition.

Holding power refers to the average time that all visitors who gaze at a particular display for over three seconds spend on gazing at the display, i.e. the time that visitors spend in front of the display (Bitgood, 1988; Chen, 2001). With respect to attracting power, Hsieh pointed out that attracting power is an indicator for a display's popularity. All visitors who spend more than three seconds looking at a display are considered valid samples of visitors, and the percentage of valid samples of visitors among all samples of visitors is the index of a display's attracting power. According to a study of visitors' preference and characteristics of behaviors by Hsu and Lin (2005), there is generally a positive correlation between attracting power and holding power despite the inconsistent rank of attracting power and holding power in different themes.

Bitgood (1988) pointed out three elements that affect behaviors of visitors. The first element is design, which is the presentation of displayed content and quality and is conducive to the showing of visitors' behaviors. The second element is visitors, who choose which display to visit based on their personal interests, knowledge, and prior experiences. The third element is the setting.

When a museum is seen as an integral setting, exhibition visitors' behaviors as a result of responding to environmental stimulus are predicable behaviors. In summary, both attracting power and holding power are fundamental elements for the success of an exhibition and visitors' various behaviors are the focus of all studies and observations.

Research Method

This study mainly used field survey and non-participant observation to conduct a 2-stage field investigation. Stage 1: This study used field survey to analyze and summarize the existing exhibition patterns and expression patterns. Stage 2: This study used non-participant observation to perform observations, recorded visitors' visitor behaviors and experience behaviors, and compared the differences in visitor behaviors between traditional and digital exhibitions.

At last, to propose conclusions and suggestions; with the execution description listed as follows:

Stage One- Field Survey and Recordkeeping
The analysis of exhibition patterns predominantly involves conducting onsite investigation to classify and analyze displayed objects. The period of investigation is from June 1, 2014 to June 30, 2014.

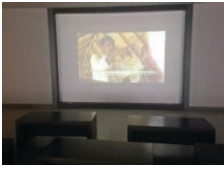Stage Two- Non-Participant Observation of Exhibition Visitors' Behaviors
The non-participant observation method was adopted to observe visitors' behaviors as well as to compare and analyze different behaviors of visitors who visit a traditional exhibition and a digital exhibition (displayed objects' attracting power and holding power and visitors' behaviors of participation). The one-month investigation is from July 1, 2014 to July 31, 2014. Visitors who visit the museum at a time between the peak hours 10 a.m. and 5 p.m. on a weekend are randomly selected for non-participant observation, a method which is the least likely to cause interference to visitors and more likely to collect visitors' natural behaviors objectively (Bitgood, 1988; Wager, 1976).

Analysis and Discussion

One- Exhibition planned and existed
According to the survey and analysis of this study, the Shadow Play Museum of Kaohsiung City has six sections: Performance Area, Exhibition Area, Digital Shadow Play Theater, Experience Area, Reference Room, and Promotion & Research Center. They were designed with both traditional preservation and modern technological integration in mind; with the description as follows (Table 4). Permanent exhibition are mainly located 1F Exhibition Area and 4F Digital Shadow Play Theater & Experience Area two districts, but also the 2-field of this study were to Analysis on the Differences in Visitor Behaviors.

Table 4
Exhibition Area

Teaching Classroom	Exhibition Area	Reference Room
Performance Area	Digital Shadow Play Theater	Experience Area

There are 17 themes at the six exhibition areas. In particular, the seven exhibition patterns of the 17 displays include panel display, display design, scenario exhibition, and participatory exhibition in the category of traditional exhibition as well as viewing exhibition, interactive exhibition, and multi-touch display in the category of digital exhibition.

They four ways to present the exhibitions include inviting the participation of visitors, specimens, projected images from a video projector, and displays aided by high-tech gadgets. With regard to themes of the exhibitions, there are six themes at the traditional exhibitions (T1-1~T4-2) as shown in Table 5 and nine themes at the digital exhibitions (D1-1~D3-5) as shown in Table 6.

Table 5
Traditional Exhibition Topic (T)

exhibition patterns	expression patterns	Topic & Content	
Panel Display （T1）	Spectators Participation （Passive Participation ）	T1-1. Origin Of Shadowgraph	
Display Design （T2）	specimen Exhibit （ Category exhibition）	T2-1. Script Introduce	T2-2. Musical Instruments
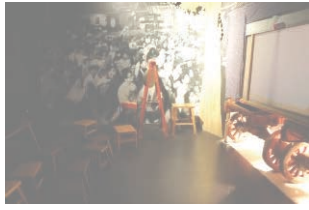
	T2-3. Permanent Figures	T2-4. Troupe Figures
Scenario Exhibition （T3）	specimen Exhibit （ Subtopic exhibition）	T3-1. Screen Background
Participatory Exhibition （T4）	Spectators Participation （ Active Participation ）	T4-1. Musical Instruments Experience	T4-2. Paper Figures Operation Experience

Table 6
Digital Exhibition Topic (D)

exhibition patterns	expression patterns	Topic & Content	
Viewing Exhibition （D1）	projection Exhibit （ Slideshow cinema）	D1-1. Screen Foreground	D1-2. Digital Shadow Play Theater
Interactive Exhibition （D2）	High-tech Exhibition （ Computer Show）	D2-1. Digital Figures Experience	D2-2.Figures Experience Operation

Multi-touch Display（D3）	High-tech Exhibition（Computer Show）	D3-1. Operation Introduce	D3-2. Troupe Introduce
		D3-3. Background display situation	D3-4. Character Introduction
		D3-5. Musical Instruments Operating demonstration	

In terms of the composition of exhibition patterns, there are more digital exhibitions than traditional exhibitions. Meanwhile, the "display design" exhibition pattern makes up the highest percentage (24%) of all traditional exhibitions while the "multi-touch display" exhibition pattern makes up the highest percentage (28%) of all digital exhibitions as shown in Figure 4.

Figure 4: Exhibition patterns proportion

Two- The comparison and analysis of museum visitor's behaviors Conclusion

Both attracting power and holding power are fundamental elements of the success of an exhibition and visitors' various participatory behaviors are also an indicator of a

successful exhibition. For that reason, we investigated exhibitions' attracting power and holding power for visitors by staying at the museum to observe visitors' behaviors.

In doing so, we attempted to know visitors' respective behaviors when visiting a traditional exhibition and a digital exhibition and to compare the interplay between the two exhibition patterns and visitors' behaviors of participation.
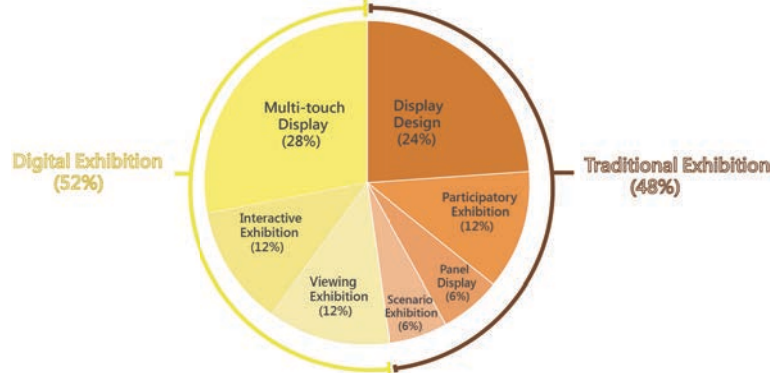
Museum visitors' behaviors ─ an analysis of traditional and digital exhibitions' attracting power and holding power for visitors

A comprehensive observation of exhibitions at the museum reveals that "digital exhibitions" are better than "traditional exhibitions" as shown in Table 7. In terms of attracting power, exhibition patterns such as interactive exhibition, scenario exhibition, viewing exhibition, and participatory exhibition have stronger attracting power.

On the contrary, exhibition patterns such as display design, multi-touch display, and panel display have weaker attracting power. Exhibition visitors showed a lack of interest in static images and text descriptions whereas interactive exhibitions encouraged parent-child interactions and were more popular among visitors. However, attracting power alone is unable to make an absolute holding power forecast. Viewing exhibitions, interactive exhibitions, panel displays, and participatory exhibitions have a descending order of holding power whereas scenario exhibitions, multi-touch displays, and display designs have poorer holding power.

In this study, we multiply attracting power (times) by holding power (seconds) to come up with the top five themes at the exhibitions: revisit the bamboo theatre (13014 seconds), visitors' experience of manipulating a shadow puppet (9641 seconds), visitors' digital puppetry experience (6600 seconds), visitors' experience of playing real musical instruments (3266 seconds), and visitors' experience of manipulating a paper bag puppet (3175 seconds). The bottom three themes are the demonstration of how to control backstage music (204 seconds), the introduction of puppets in the troupe (189 seconds), and the introduction of the troupe (108 seconds). Therefore, it can be inferred that "interactive exhibition", "viewing exhibition", and "participatory exhibition" are the three exhibition patterns with the strongest attracting power and holding power.

On the contrary, all indexes of "display design" in the traditional exhibition category and "multi-touch exhibition" in the digital exhibition category are unsatisfactory. As revealed by the 4-1 investigation and investigations of the current status of the museum, "display designs" and "multi-touch displays" take up the largest area in the museum's yet both have unsatisfactory attracting power and holding power, indicating that further modifications and adjustments are required for the content of displays and ways of presentation.

Figure 9: Multi-touch Display   Figure 10: Display Design
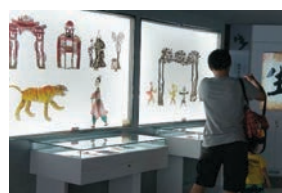
Table 7

Compared the differences in visitor attracting & holding power between traditional and digital exhibitions

exhibition sorts	expression patterns	Topic & Content	attracting power （Number/ Total number） order		holding power （ Sec/ Total number） order		Attracting power×holding power order	
Traditional exhibition	Panel Display	Origin Of Shadowgraph	12'p （29%）		161's	4	1932	
	Display Design	Script Introduce	8'p （19%）		51's		408	
		Musical Instruments	11'p （26%）		28's		308	
		Permanent Figures	14'p （33%）		21's		294	
		Troupe Figures	7'p （17%）		27's		189	∗
	Scenario Exhibition	Screen Background	30'p （71%）	2	59's		1770	
	Participatory Exhibition	Musical Instruments Experience	23'p （55%）	5	142's	5	3266	4
		Paper Figures Operation Experience	25'p （60%）	4	127's		3175	5
Digital exhibition	Viewing Exhibition	Screen Foreground	27'p （57%）	3	482's	1	13014	1
		Digital Shadow Play Theater	12'p （29%）		65's		780	
	Interactive Exhibition	1F Digital Figures Experience	30'p （71%）	2	220's	3	6600	3
		4F Figures Experience	31'p （73%）	1	311'	2	9641	2

	Operation	)	s	
	Operation Introduce	3'p （7%）	102's	306
	Troupe Introduce	4'p （9%）	27's	108 ＊
	Background display situation	4'p （9%）	68's	272
Multi-touch Display	Character Introduction	14'p （33%）	48's	672
	Musical Instruments Operating demonstration	6'p （14%）	34's	204 ＊

An analysis of behaviors of visitors at a traditional exhibition and a digital exhibition

The analysis mainly involves observing and recording visitors' behaviors and reactions in the five categories: looking (looking at displays or reading accompanying text descriptions), touching (touching displays or touching touchscreens), taking photos (taking photos), writing (taking notes), and discussing (discussing matters in relation to the content of displays and giving instructions to senior visitors), as well as using the above five indicators to evaluate visitors' involvement in exhibitions. As visitors' involvement in exhibitions is proportional to the amount of visitors' behaviors and reactions, visitors whose amount of behaviors are over the mean amount of behaviors ($\geqq 3$) are defined as visitors with a high level of involvement in order to understand the involvement of visitors.

In terms of the observation and recordkeeping of visitors' behaviors at this stage, every 30 seconds is defined as a time unit to record visitors' behaviors such as observing, operating, and reading (as shown in Table 8). Some key points for the observation of visitors is that "looking" refers to visitors lingering in front of a display and gazing at the display or text descriptions next to the display, "touching" refers to visitors touching a display or a touchscreen, "taking photos" refers to visitors taking a photo of themselves standing next to a display or a display by itself, "discussing" refers to verbal exchanges between visitors and the content of discussions must be related to displays.

As the non-participatory observation method prevents the researcher from having close contact with visitors, visitors' behaviors such as "inquiring" and "giving instructions" are also included as visitors' behaviors for discussions. "Writing" refers to taking notes about displays.

Table 8

Compared the differences in visitor behaviors between traditional and digital exhibitions

Behavior patterns sorts		Content	See		Touch		take a picture		Write		Discussed		Level of participation	
			N	%	N	%	N	%	N	%	N	%	N	%
Traditional exhibition	Display	Script Introduce	8	19%	-	-	1	2%	-	-	3	7%	-	-
		Musical Instruments	12	29%	-	-	1	2%	-	-	5	12%	-	-
		Permanent Figures	14	33%	-	-	3	7%	-	-	6	14%	1	2%
		Troupe Figures	7	17%	-	-	1	2%	-	-	2	5%	-	-
	Scenario	Screen Background	30	**71%**	-	-	2	5%	1	2%	17	40%	2	5%
	Panel	Origin of Shadowgraph	8	19%	-	-	4	10%	1	2%	6	14%	2	5%
	Participatory	Musical Instruments Experience	23	**55%**	22	**52%**	3	7%	-	-	19	45%	19	45%
		Paper Figures Operation Experience	25	**60%**	24	**57%**	3	7%	-	-	18	43%	17	40%
Digital exhibition	Viewing	Screen Foreground	27	**64%**	1	2%	2	5%	-	-	22	**52%**	2	5%
		Digital Shadow Play Theater	12	29%	-	-	-	-	-	-	4	10%	-	-
	Interactive	1F-Digital Figures Experience	30	**71%**	26	**62%**	5	12%	1	2%	24	**57%**	23	**55%**
		4F-Figures Experience Operation Figures Experience Operation	31	**74%**	29	**69%**	7	17%	-	-	23	**55%**	22	**52%**
		Operation Introduce	6	14%	3	7%	2	5%	-	-	1	2%	3	7%

Troupe Introduce	5	12%	5	12%	-	-	-	-	-	-	-	-
Background display situation	4	10%	3	7%	-	-	-	-	-	-	1	2%
Character Introduction	15	36%	9	21%	2	5%	-	-	4	10%	4	10%
Musical Instruments Operating demonstration	6	14%	4	10%	-	-	-	-	4	10%	3	7%

Overall speaking, the number of museum visitors' participatory behaviors (including visitors' behaviors of interacting with displayed objects and other people) is proportional to the level of visitors' involvement in exhibitions. It is revealed that visitors show the highest level of involvement in "interactive exhibitions" in the digital exhibition category and the second highest level of involvement in "participatory exhibitions" in the traditional exhibition category.

On the contrary, visitors show a lower level of involvement in "multi-touch displays" and "viewing exhibitions" in the digital exhibition category as well as "display designs", "scenario exhibitions", and "panel displays" in the traditional exhibition category.

Further, we explore visitors' participatory behaviors one by one.
 (1) "Looking": the exhibition area for experiencing the manipulation of shadow puppets at the fourth floor has the highest visitor participation rate (74%). This exhibition area mainly features interactive and "game-based" multimedia displays which incorporate webcam and infrared technologies to allow for choices of virtual characters and setting the scenes. Its interactive and entertaining feature not only boosts visitors' interest in visiting the exhibition but also successfully grabs and sustains visitors' attention.
 (2) "Touching": referring to visitors' behaviors of touching or operating, which are particularly noticeable at interactive exhibitions and participatory exhibitions. Visitors demonstrate a large amount of participatory behaviors at participatory exhibitions. As shown in Table 8, there are only 5% of visitors who watch on the side and have no participatory behaviors. However, visitors show a high visitor participation rate overall. In comparison, only 5-10% of visitors watch on the side and have participatory behaviors at interactive exhibitions. Therefore, both interactive exhibitions and participatory exhibitions are conducive to parent-child interactions and creating the joy of adults and children having fun together. Interactive exhibitions are more likely to bring about visitors' sympathetic responses and encourage parent-child interactions.
 (3) "Photo-taking": the reason for visitors' infrequent photo-taking behaviors is that a duskier setting with inadequate lighting is favorable for a shadow puppetry show yet discouraging visitors from taking photos.

(4) "Note taking": visitors' infrequent note-taking reflects visitors' learning style, which is informal and casual in a relaxing and happy mood, and therefore the note-taking behavior is relatively rare. Another possibility is that visitors come to the Kaohsiung Museum of Shadow Puppet for recreational purposes.

(5) "Discussing" refers to behaviors of interactions between visitors such as asking questions, explaining to companions and giving guidance about museum exhibitions. In particular, discussions among visitors at "interactive exhibitions" are the most noticeable when the participation of visitors of various backgrounds (students, couples, parents and children, friends) bring about the result people having fun and a good laugh together. The result is especially visible among parents and children.

Figure 11:Participatory Exhibition   Figure 12:Interactive Exhibition

Conclusions and Recommendations

(1)   Among visitors of Kaohsiung Museum of Shadow Puppet, parent-child visitors make up the highest percentage of all visitors and most visits are dominated by children. Therefore, the design of exhibition patterns and exhibition techniques in the future has to consider the ease of use for children to boost young visitors' confidence and willingness to operate devices at exhibitions.

(2)   In terms of displayed objects' attracting power and holding power for visitors, despite making up a considerable part of all exhibition patterns, both display designs and multi-touch displays have poor attracting power and holding power, which is due to the boring and tedious content of displays and poorer responses from visitors. Therefore, further adjustments and modifications are needed for both display designs and multi-touch displays.

(3)   In terms of visitors' behaviors of participation, digital exhibitions are more popular among visitors judging from visitors' behaviors such as looking, touching, operating, taking photos, discussing, and the degree of participation. Moreover, interactive digital exhibitions are especially good.

(4)   The biggest feature of interactive exhibitions is the interplay between exhibition visitors and displayed objects. Without any preset programs, an interactive interface responds differently according to individual users' inputs. The two-way feedback between a user and an interactive exhibition involves the visual sense, the touch sensation, and sounds. Therefore, it can be realized that multi-sensory stimulation and two-way communication enable the simultaneous work of visitors' five sense organs, increase visitors' participatory behaviors, and bring closer the distance between displayed objects and visitors.

(5)   According to the empirical observation of this study, exhibition patterns with stronger attracting power and holding power lead to a higher visitor participation rate and are supposedly more likely to meet the desired communication goal of an exhibition.

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Contact email: pk226430@hotmail.com