

Summative Evaluation of Children's Creative Engagement through Interactive Exhibits: A Case Study on the Participatory Exhibition of Masterpieces in South Korea

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Abstract

The purpose of this research was to bear fruits in providing insights and understandings on how children responded and reacted to exhibits in the Participatory Exhibition of Masterpieces: Find the Secrets of Mona Lisa. We used quantitative methodology for this summative evaluation to assess the impact and effectiveness of the exhibition. Based on heavy on-site evaluation, we discovered that interactive exhibits holds bigger attracting power and holding power in addition to having higher degree of satisfaction overall. Also found was the statistically positive correlations between satisfaction and other factors, including viewing time, attracting power, holding power, background knowledge in science, motivation, and re-visit needs.

***Keywords:** motivation, viewing time, attracting power, holding power, the degree of satisfaction, correlations*

1. Introduction

In traditional museum environment, museum displays can be described as 'hands-off' or 'non-interactive.' Then followed a couple new forms of exhibits: namely, Hands-on, Interactive, Participatory, Entraining, Minds-on Hearts-on Exhibits for visitor's active engagement and participation. There is a growing field of interactive visual art that is currently being shown in art galleries and museums. Exhibits using interactive media has gained broad attention and re-shaped a number of museums around the world, especially in children's museums and science museums. Exhibitions using interactive media can be found in Louvre-DNP Museum Lab (LDML), Japan.¹ The Louvre-DNP Museum Lab is a three-year project which involve with the goal of gaining experience in innovative multimedia approaches to bring together visitors and artworks. This project involves exhibitions of one or more artworks from the Louvre's rich collection together with multimedia kiosks that offer visitors richer experiences in art appreciation through a wide range of technology. From 2006 to 2009 it held six exhibitions with touch screen and media technology to have digital presentation of real objects. The exhibits is credited for maximizing interactions along with taking the museum experience online that created constant dialogue of visitors and the exhibits. Such trend implies the need and effectiveness for participatory learning through

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multisensory experience.

At an interactive exhibition, visitors can act on the exhibit and the exhibit reacts back on them. Experience is a key issue in interactive art [1]. A participant experiencing an interactive artwork is doing something to the environment; then a visitor can actively constructs the artwork in a creative process (Z. Bilda and E. Edmonds, 2008; E. Edmonds, L. Muller and M. Connell, 2006). When we look, read or listen, we can figure out that we are engaged in an active process even though we do not physically move at all. In other words, experiencing art is driven by perception, where perception is an active and constructive process. In brief, exhibits are the heart of the museum experience, furnishing both entertainment and information. According to D. Dean (1996), "exhibit' means the localized grouping of objects and interpretive materials that form a cohesive unit within a gallery. And 'exhibition' is a comprehensive grouping of all elements that form a complete public presentation of collections and information for the public use"(p.3) [2]. G. Edson & D. Dean (1996) defined 'exhibiting' a mediating act that generates and shares meanings between visitors and the exhibits [3].

As a matter of fact, the terms hands-on, participatory and interactive are used interchangeably. Hands-on and interactive media utilizes communicational electronic equipment that allows instant information sharing (e.g., computers) to render interactions between exhibits and visitors. The former method is a touch-enabled operating exhibit, while the latter integrates cultural prototypes with technology, in which case visitors are freed from passive observing visit, accompanying physical actions and interactions to become part of the exhibit themselves unlike other means of displays aforementioned.

Among various definitions of an 'interactive' exhibit, possibly the most acceptable is that put forward by C.R. Hill and R.S. Miles(1987), which states that "Truly interactive exhibits are those which can vary their presentation according to the designer's perception of the response of the visitor." The important factors in this definition are the responses of the visitors, which have an effect on the presentation [4]. S. Bitgood(1991) made a definition on an interactive exhibit "as a device in which the visitor's response to the exhibit produces a change in the exhibit"(p.4). In addition, he made a distinction (Table 1.) from the perspectives of type of response engagement, examples of exhibit types, and possible and/or intended impact. K. McLean(1993) also defines interactive exhibits as "those in which visitors can conduct activities, gather evidence, select options, form conclusion, test skills, provide input, and actually alter a situation based on input"(p.93). The important point is that there is a visitor-controlled change in the exhibit. Another way to say this is that "the message to be delivered is, to one degree or another, under the physical control of the visitor" (H. Shettel, 1991) [5]. This definition distinguishes interactive exhibit among other types of active response exhibits - hands-on and participatory.

Table 1. Some Distinctive Features of Hands-on, Participatory and Interactive Exhibit (S. Bitgood, 1991, pp.5.)

type of response engagement	examples of exhibit types	possible and/or intended impact
hands-on (exhibit prompts the visitor to touch, climb, etc.)	1. Touching animal fur 2. Climbing on a state of an animal 3. Dressing up in firemen's clothing.	1. Produce sensory and/or perceptual learning. 2. Focus visitor's attention on object. 3. Create an increase in interest, a change in attitudes, etc. (affective learning)

<p>participatory (exhibit prompts a response and the outcome is used to teach a point by comparing it with some other response or standard; goes beyond simple hands-on)</p>	<ol style="list-style-type: none"> 1. Comparing jumping distance with other animals. 2. Feeling several objects and comparing them on characteristics such as coolness, roughness, etc. 3. Assembling a turtle skeleton and comparing with a correct assembly. 	<ol style="list-style-type: none"> 1. Teach similarities and differences between objects or events. 2. Focus visitor's attention on object. 3. Produce an increase in interest, a change in attitudes, etc.(affective learning)
<p>interactive (exhibit prompts a response which changes the state of the exhibit; the change is under the control of the visitor) Level 1: simple engagement(e.g., press a button, light turns on) Level 2: prolonged engagement(e.g., interactive computer game)</p>	<ol style="list-style-type: none"> 1. A label with a flip panel. 2. Devices with controls(buttons, levers, cranks, etc.) in which a response on the control makes a change in the exhibit(lighting, sound, object's position, etc.) 2. Interactive computer tutorials, self-testing devices, games, etc. 3. Magnifiers(magnifying glass, microscope) that when used correctly reveal what was previously unseen. 	<ol style="list-style-type: none"> 1. Teaching of cause-effect relationships(using either discovery learning or guided learning.) 2. Teach similarities and differences between objects or events. 3. Focus visitor's attention on object or event. 4. Affective learning(increase in interest, attitude change, etc.) 5. Self-testing of visitors. 6. Conceptual orientation of visitors.

There is considerable interest in the nature of learning that happens when visitors use interactive media. Research on visitor learning in museums suggests that interactivity promotes engagement, understanding and recall of exhibits and their content (B. Schneider & N. Cheslock, 2003) [6]. According to G. E. Hein and M. Alexander(1998), "visitors greatly prefer interactive elements" in exhibitions (p.16) W.H. Richard and M. Menninger(2000) evaluated specially-designed interactive galleries at the J. Paul Getty Museum and figure out that holding time was greater in those galleries [7]. At the core of interactivity is reciprocity of action, where a visitor acts on the exhibit and the exhibit reacts in various ways. Such interactivity is an essential element in the majority of exhibits in science and children's museums. The idea that interactivity can enhance visitor learning in museum exhibitions has come from the philosophies of experiential education (J. Dewey, 1938) and constructivism(J. Piaget, 1957) [8].

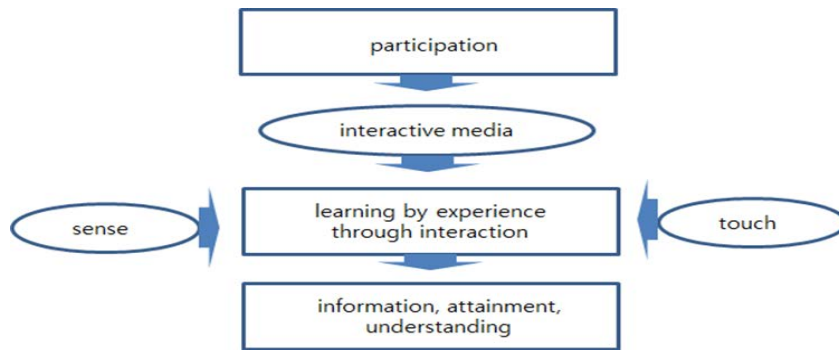


Figure 1. Flow of Experience in an Interactive Exhibition

Much of the learning that takes place in the exhibitions is non-structured and difficult to test, since visitors generally select objects that are of interest to them. They may store information for later use or they may make immediate relationships, connecting one idea to another. Each visitor brings to an exhibition a unique set of skill, knowledge, preference, expectation, motivation and prior experiences that are hard to test in advance of a visit to an exhibition. In this sense, visitors in exhibition settings are not dynamic “moving entity”, but rather a “relative entity” that moves on the relationships between exhibit environment and the exhibits. One of many significant factors in developing interactive exhibit is learning effect inferable from visitor’s reactions. Meaningful learning experience can be actualized when intention of exhibit is carried out enough and when cognitive activities are activated through visitor’s modified visiting pattern. This form of display should have clear learning objective and be able to inspire visitors by remodeling notions, facts, theories in real objects to non-prototype and newly created media that increases motivations for learning and active exploration needs, consequently enhancing visitor’s general understanding throughout one’s visiting experience.

The Participatory Exhibition of Masterpieces: Find the Secrets of Mona Lisa (hereafter the Participatory Exhibition of Masterpieces), held at V Gallery, in Seoul Arts Centre in Seoul [Jan. 7 – Mar. 28, 2010], bore significance in that it is the first interactive exhibition designed specifically for children. This exhibition was planned and produced by Creation Lab ALICE. To measure the effectiveness of the exhibition, we conducted a survey on interactive exhibits as a form of summative evaluation. Visitors were randomly selected and data was gathered in integrated methods. The goal of this study was to bear fruits in providing insights and understandings on how children responded and reacted to exhibits from the perspective of perception. This quantitative research measured motivation for the exhibit of masterpieces, background knowledge, viewing time, attracting power, holding power, satisfactory attributes, and re-visit/repeated purchase demands. We also took a deeper look in correlations between one of these factors and the degree of satisfaction. We intended to extrapolate the most relevant factors that contributed to positive exhibit experience as to interpret and expect children’s behavior in visiting exhibits.

Motivation for visiting, prior knowledge, satisfactory attributes, influence of prior exhibit experience, viewing time, holding and attracting power, re-visit needs are all part of personal context. Thus, this research lies upon the personal context in the “Interactive Experience Model” suggested by J.H. Falk and L.D. Dierking(2008) as a conceptual framework. Focusing on personal context rather than social or physical context derives from the grounds that personal context is a remarkable tool for determining attitude for visitor –that can be used to predict future behavior—and for offering insights of different visitors in curator’s perspective.

Since our research revolved around the effectiveness of the exhibition, motivation, background knowledge, viewing time, attracting power, holding power, the degree of satisfaction, satisfactory attributes, and re-visit/repeated purchase demands, we did not included when and how the fatigue occurred within the exhibit for satisfactory/unsatisfactory attributes.

2. Case Study: Participatory Exhibition of Masterpieces in South Korea

2.1. Overview

Participatory Exhibition of Masterpieces was sponsored by Korea Foundation for the Advancement of Science and Creativity (KOFAC), an umbrella organization under the

Ministry of Education, Science and Technology. This exhibition gathered around 4,800 visitors in total within three months. The purpose of the exhibition was to provide children with learning-oriented experience in the interactive environment. In addition, it inspired children to bring up knowledge in arts and science technology in a creative learning environment. Thus, children were challenged to draw scientific principles and visual expressions hidden underneath familiar masterpieces.

In the beginning, they were drawn to story-based narratives and proceed to Mission Book to solve scientific problems in masterpieces own their own. That is, their intrinsic curiosity met with storytelling technique and Mission Book’s attention-grabbing factors boost children’s self-motivation to learn in the exhibition more effectively. Following steps of Mission Book, children were exposed to learn ‘bit by bit’ as active constructors as well as curiosity-driven visitor. In this research, we assumed that children are all curiosity-driven visitors. In general, when a curiosity-driven visitors enter an exhibition, they are not motivated the expectation of extrinsic benefits. Rather they seek the intrinsic rewards that come with stimulating and satisfying curiosity. From this point of view, the value of this intrinsic reward can be labeled 'interest' [9].

2.2. Design Principles

From early on, experts ranging from storybook writers, math and science teachers, artist, broadcasting station producers, programmers, architect, etc. have been involved in this participatory exhibition project in order to make unified principle on participatory museum exhibition specifically designed for younger learners. The general principles of visitor behaviors were applied to this exhibition and the principle of this exhibit is most distinctive in the following categories²:

a. Exhibit Factors included having larger moving objects (active interactive contents), novelty objects (first digital reproduction of masterpieces for Korean children), sensory qualities (all objects were touch-based) and also interactive objects for longer viewing time.

b. Architectural Factors involved having closer proximity to exhibits, positioning every object at children’s eye-level and adding realism to exhibits perceived for longer viewing time and more positive attitude toward the exhibition in general.

c. Visitor Factors incorporates closely examine demographic characteristics (mostly children and parents) in designing level to maximize learning effects, taking social influences (socio-cultural interaction among children: *modeling* behavior in most cases) into consideration.

Table 2. Descriptions of the Main Interactive Exhibits

A Sunday Afternoon on the Island of La Grande Jatte, Seurat	Maximizing Pointilism technique (contrasted miniature dots of colors that, through optical unification, form a single hue in viewer’s eyes) on the pallet, visitors can see numerous dots re-engineering and making a unified picture through motion graphics.
Red Yellow, Blue Composition,	Based on fractal theory, each component were shown in three dimensions and transformed into giant puzzle game for

¹ According to S. Bitgood and et. al.(1988) and A.W. Melton(1972), objects in motion are more attention-getting than static objects. And B. Peart(1984) found that multi-sensory modalities increase attention.

Mondrian	children.
Yellow-Red-Blue, Kandinsky	We used state-of-the-art 3D Television set for visitors to experience the sense of dimensions and space when wearing 3D glasses.
Mona Lisa, Leonardo da Vinci	Through touch screen display, we let visitors to change the smile and facial expression so as to let users find perfect ratio [golden ratio] in Mona Lisa. We also used Fibonacci number sequence lists in the due process.
The Milkmaid, Vermeer	We revived Camera Obscura which most masters used but is not widely known due to severe secrecy policies at that time. Visitors were asked to look at the image on camera obscure and draw fine details on the lens.
David, Michelangelo	We let visitors to experience the sculpture “David” appearing in children’s palms, deploying augmented Reality (AR) technology.



Figure 2. Original Artworks and Interactive Exhibits in the Form of Digital Presentation



Figure 3. Children Engaging in Learning Experience

3. Summative Evaluation

3.1. Methodology

Summative evaluation refers to the evaluation process after the completion of a project - exhibition- to assess the impact and effectiveness. In the case of *the Participatory Exhibit of Masterpieces*, visitors gave responses on how they responded to the interactive media and the exhibition environment in terms of overall satisfaction, attracting power and holding power, satisfaction factors in detail, of their background knowledge and previous visiting experience, viewing time and staying time, whether they are willing to revisit the exhibit as a repeated purchase demand and expected demand for similar exhibitions in the near future. The given survey was answered by children and the companions (*i.e.*, parents) due to credibility and accuracy issues. The summative evaluation design can be summarized as table below.

Table 3. Summary of the Survey

Name of Evaluation	Summative Evaluation of <i>The Participatory Exhibit of Masterpieces: Find the Secrets of Mona Lisa</i>
Subject	175 visitors on completion of their visit
Age	Children with companion in 30s and 40s
Evaluation Period	March 2–27, 2010
Evaluation Method	Answering survey sheet with 20 questionnaires
Credibility	95% with sampling error of $\pm 3.23\%$
Researcher	Creative Lab on Visitor Behavior (director: Boa Rhee)

3.2. Evaluation Results

3.2.1. Demographic

Regarding age and gender of children, age group of 6-7 was the highest with 36.5, followed by 8-10 of 28.8%, which comprises the biggest age group of all when combined (65.3% total). This research was targeted mainly upon children before elementary school education, which is consistent with major age group suggested (age 6-10). Gender wise, female children and male children took up 43.2% and 56.8% each, showing more female participant of 13.7%

In terms of companion (mothers 73.9%, fathers 13.7%) were the obvious majority, taking up 87.7% in total. Guardians in 10s and 20s accounted for 7.6%. Although mothers were unrivalled in overall demographics, family visits with both parents attending were more commonplace on weekends.

The visitors possessed generally 2-3 times of prior experience in visiting exhibitions (43.2%). This was rather distant from *Report on Enjoyment of Cultural Excursions (2008)* published in the year before with 0.2% annual visit to exhibitions. Questions on previous visit(s) to children’s museums were met with high positive respondents with 78% for children and 75.2% for guardians, including 58.6% experience in visiting exhibitions on masterpieces. This implies the repeated purchase pattern existing in *Participatory Exhibit of Masterpieces*.

3.2.2. Motivation for Visiting

As theorized above in Contextual Model of Learning by J.H. Falk and L.D. Dierking (2008) visitors have different expectations for learning process: either personal, psychological and/or socio-cultural. In other words, people visit exhibitions for personal reasons and value improvement, socio-cultural interactions and for leisure enjoyment. In this exhibition, we cross-referenced visitors' motivation with last year's visiting frequency. After math, we have discovered that the low frequency group (1-3 times last year) is likely to respond their motivation as to "Spend good time with their children" whereas the high frequency group responded as to have novel learning experience or to meet their intrinsic cultural needs. This implies that frequent visitors are more motivated by learning opportunity but occasional visitors pursue entertainment. This result was identified with several studies on visitor motivation, implemented by M. Hood(1981), J. C. Chadwick(1998), and M. Csikszentmihalyi and K. Hermanson(1995). In the case of M. Hood, she compared for the motivation and value of frequent visitors to those of occasional visitors and non-participants. For frequent visitors, three attributes which are related to intrinsic motivations were particularly important - opportunities to learn, challenge of new experience, and doing something worthwhile. On the contrary, occasional visitors and non-participant favored extrinsic motivations such as being with people, or social interaction; feeling comfortable and at ease in one's surroundings, and participating actively.

3.2.3. Background Knowledge

When asked of visitor's background knowledge in science, perspective was the most common with 25.9%, followed by optical illusion (24.1%) and golden ratio (22.8%). In the meantime, visitors pointed out *Mona Lisa* (21.4) as the most familiar masterpiece, along with the *Last Supper* and *A Sunday on La Grande Jatte*. *Mona Lisa* was also the most interesting exhibit with interactivity via touch screen. As for the most familiar artist, Leonardo Da Vinci and Vincent van Gogh were substantially well known gaining 22.7 and 21.4 percent each, far higher than Mondrian's 17% and Kandinsky's 13.3%.

3.2.4. Satisfactory vs. Unsatisfactory Attributes

Visitors responded with positive answers overall. The most satisfactory attribute of this exhibit was 'Being able to touch play with masterpieces like a toy' (24.9%), followed by 'Exhibit was very original—i.e., the shape of *Mona Lisa* keeps changing as visitors touch the exhibit' (18%), showing the positive influence of participatory exhibitions. 'Comfortable environment rather than having a formal exhibition' (16.9%) took the fifth place. The fact is consistent with 'comfortable exhibit placed on children's eye-level when asked for 'Visitor's favorite thing about the exhibition' On the other hand, 'shortage on the number of exhibits', 'narrow space of the exhibition' 'immersed in playful attributes rather than the exhibits' were pointed out to be the unsatisfactory factors, each taking up 27.1%, 19.5% and 17.9% share.

3.2.5. Attracting Power of Exhibits

The most popular and interested exhibits were '*The Secret of Mona Lisa*' (32.6%) and 'The World via the Bling-Bling Lens: Vermeer and the Camera Obscura,' 'Puzzling Magic Picture: Arcimboldo and anamorphosis', 'Everywhere magical numbers: Dürer's Magic Square', 'Dizzy Hazy Illusion' were the top five exhibits.

3.2.6. Viewing Time and Holding Power of Exhibits

The survey revealed that visitor's usually stays an hour at the exhibition (34.3%). Taking a bigger picture, 40 minutes to an hour was the most common viewing time with 64.6%. Individual exhibit with longest staying time were 'The Secret of Mona Lisa' (29.2%) and 'The World via the Bling-Bling Lens: Vermeer and the Camera Obscura' Those two also possessed highest attracting power among exhibits.

On the question of attracting power --the exhibit that looked most interesting-- 'The laughing Puzzle' received 3% respondents whereas it possessed third longest staying time. This indicates low attracting power but a high holding power. Dissecting into sections, exhibit 5 to 7 achieved major 65% of attraction, meaning higher interest and crowd within that section. As observed in aforementioned unsatisfactory rate, excessive crowd rate happened not only from attracting power and holding power of exhibit, but also arose from small size of the venue. The small space exposed problems of visitor circulation and flow management.

3.2.7. Satisfaction Result, Re-visit Needs and Repeated Purchase Demands

On the exhibition in general, 45.1% of visitors responded with positive answers, which can be interpreted as willing to re-visit and having repeated purchasing demands. In specific, 93.1% of visitors expressed their hopes of revisiting. In addition, when asked whether they are willing to visit similar series of exhibits that follow, 51.1% of visitors responded positively.

We derived from the summative evaluation that visitors were highly satisfied with this exhibition as well as possessing high expectations for future exhibits. We also found that new form of exhibition bridging art and technology had considerable number of potential visitors.

4. In-depth Analysis

1.1. Correlation between needs for re-visiting and visiting needs for similar exhibit series

Re-visit needs and visiting needs for similar exhibition series showed positive relationship (correlation coefficient: 0.49).³ The correlation indicated visitors with re-visit needs also possessed repeated purchase demands. Visitors with repeated purchase needs had high chances of visiting similar interactive exhibitions for children.

1.2. Correlations between Exhibition Experience and Degree of Satisfaction

We conducted T test to determine whether prior experience in exhibition of masterpieces affected the degree of satisfaction for this exhibition. The result showed that with 55.9% ratio, there was no difference in those two groups. Therefore, the prior exhibition experience of masterpieces was not statistically significant.

1.3. Correlations between Satisfactory Attributes and Degree of Satisfaction

² The term "correlation" refers to a process for establishing whether or not relationships exists between two variables. Correlation Coefficient means a single summary number that gives people good idea about how closely one variable is related to another variable. In this research, we used the Pearson's Correlation Coefficient and this is statistically significant at the 0.01 level.

Cross-referencing motivation for visiting and degree of satisfaction, visitors with high expectations for participatory exhibits responded with 'very satisfied' with 13.1%. This result proved that visitor's degree of satisfaction increased once their visiting needs were met.

Visitors responding most satisfactory attributes as technology-enabled participatory characteristics of exhibit that allowed masterpieces to move responded with up to 60% of satisfactory rate (marked as 'satisfied' and very 'satisfied') Participatory exhibit certainly played a positive role in this exhibition.

1.4. Correlations between Background Knowledge in Science and Degree of Satisfaction

Result showed visitors with higher background knowledge in science (average or above) had higher degree of satisfaction. This fact suggested that possessing background knowledge and degree of satisfaction showed positive correlation.

5.1. Comparative Analysis on Attracting Power and Holding Power

We have conducted the comparative analysis on exhibit that gained most attraction (Attracting Power) and exhibit with longest viewing time (Holding Power). '*The Laughing Puzzle*', '*The World via the Bling-Bling Lens*', '*The secrets of Mona Lisa*' received high scores.

5.2. Cross-Reference Analysis on Viewing Time and Degree of Satisfaction

In accordance with viewing time, the degree of satisfaction (satisfied or very satisfied) also increased with 25% (20 min.), 37.7 (40 min.), 49.2% (1 hr), 50% (1hr 30 min), 54.5% (2 hrs or above) Considering that more than half visitors with viewing time of an hour or above were satisfied implied that viewing time and degree of satisfaction was statistically significant.

5. Conclusion and Implications

This research implemented a summative evaluation on *Participatory Exhibition of Masterpieces* --the first integrated form of art and science technology exhibition that adopted interactivity for children. Major evaluation result is as followings:

- The targeted audience and actual audience (family group) were identical.
- Prior exhibition experience played a significant factor in this exhibition's decision-making process.
- Marketing and promotion efforts such as Television exposure and words-of-mouth were the powerful tools for providing information about the exhibition.
- Motivations for visit were 'spending good time with children (64%)'. Frequent exhibition visitors answered their motivations as extrinsic motivations (i.e. learning), whereas occasional visitors pointed out intrinsic motivations (i.e., fun and enjoyment), showing disparity between visitors according to the frequency of visit.
- Questions on background knowledge in scientific principles, perspective, space illusion, golden ratio took top places by a small margin. Meanwhile, visitor's background knowledge in masterpieces were listed as '*Mona Lisa*', '*Last Supper*' and '*A Sunday on La Grande Jatte*' (in the order of familiarity) In particular, '*Mona Lisa*' was also the exhibit with highest attracting power(32.6%) due to its interactive attributes. Background knowledge in artists showed Leonardo da Vinci and Vincent van Gogh were the most well-known, much more so than other artists. Mondrian and Kandinsky were relatively

popular as well.

- 40 minutes to an hour was a general viewing time. In terms of holding power, 'The Secrets of Mona Lisa' (32.%) was the highest, 'The World via the Bling-Bling Lens', 'Puzzling Magic Picture: Arcimboldo and anamorphosis', 'Everywhere magical numbers: Dürer's Magic Square', 'Dizzy Hazy Illusion' were the top five exhibit. Exhibit with highest holding power were 'The Secrets of Mona Lisa' and 'The World via the Bling-Bling Lens: Vermeer and the Camera Obscura', which also were the exhibits with highest attracting power.
- Satisfactory attributes were answered as participatory exhibit that enables interactivity with 42.9% ratio. Cross-referencing satisfactory factors with prior visiting experience of masterpieces, experienced visitors pointed out interesting re-interpretation (15.9%). On the other hand, novice visitors chose comfortable exhibition environment (15.6%) as satisfactory attribute of the visit, displaying clear display in their interests. Although visitor-friendly environment was reviewed positively for one's visiting experience, narrow space and few numbers of exhibits were the biggest unsatisfactory attributes of the visitors.
- At last, analysis on correlations can be reviewed as below:
 - Taking a closer look at degree of satisfaction and re-visit needs, visitors expressed they wanted to visit similar exhibition in the future with 93.1 % ratio [repeated purchase demands] High degree of satisfaction proved the influence of the exhibition as well as to prove existing demand for future integrated display contents.
 - After conducting T tests on whether prior experience in exhibition of masterpieces affected the degree of satisfaction, the two factors did not bear statistical significance.
 - Cross-referencing the motivation for visiting with the degree of satisfaction, degree of satisfaction increases once the expectations/motivations were met.
 - Interactive exhibits met with advanced technology had positive influence in the degree of satisfaction.
 - When visitors had high level of background knowledge in science (average or above), they were more likely to be satisfied with the exhibit. This indicated positive correlation between background knowledge and degree of satisfaction.
 - Analyzing attracting power and holding power, it was found that exhibits with high attracting power also posed high holding power.
 - Viewing time increased as the degree of satisfaction did, which suggested positive correlation between the two.

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