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Understanding the Process of Designing Multimedia Gallery using Multimedia Gallery Framework

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Abstract

Designing spatial layout environment for multimedia galleries involves understanding of the design process which consists of design concepts implementation of architectural design sketches and 3-dimensional visualizations. Issues pertaining with the advancement of technology in the transformation of conventional gallery to multimedia gallery call for consideration of visitors' experience and a better comprehension of designing a multimedia gallery. This research focuses on assessing the understanding of designing multimedia galleries. Great emphasis is made on visitors' experience throughout the design process exercise and expression of ideas via 3-dimensional visualizations. The objectives of this research are; i) to establish the preliminary design process and expression of ideas via 3-dimensional visualizations and ii) to assess the understanding of designing multimedia galleries. The research methodology is conducted in two phases; preliminary phase one which is the architectural design process inclusive of the study of design brief, site appreciation, users' needs, spatial requirements and design intention. The design concepts are then translated into in 3-dimensional visualizations for better understanding of spatial layout and the environment. Phase two assesses students' understanding through an open

ended survey. In this research, Virtual Reality Design 1 students from Faculty of Creative Multimedia were guided in the preliminary design stage. They were briefed on the concept of multimedia gallery framework, overall design process and underwent critique sessions during the design development. The final design was finalized from a selection of alternatives and materialized in 3-dimensional visualization images and walk-through video. An open ended survey was distributed to the students after they have completed their final design. In this survey, thoughts and ideas of their concept and design were collected and processed. Visitors' experience is one of the important components in this study. Findings from the survey contribute to the understanding of designing multimedia galleries by realizing the importance of visitors' experience in the design. This research is conducted and limited to a group of semester one virtual reality students. The visualizations were also created based on basic knowledge of 3-dimensional tools. Significance of this study will benefit design students, artists and curators of multimedia galleries and the built environment, as well as establishes ground for future works.

Keywords Multimedia gallery; Built environment, Architecture design process; Visitors' experience; 3-Dimensional tools and design visualization

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Introduction

Designing in the built environment currently sees a leap in digital transformation and technological advancements. Exhibition spaces such as museums and galleries have gone through digital enhancements in their layout planning, content creation as well as the presentation itself to audience. Multimedia galleries are equipped and enhanced to meet visitors' expectations and constantly challenged in providing to the unprecedented evolution. Giannini and Bowen (2018) stated that how the galleries are treated for the consumption of current audience pose as an integral element.

Challenges raised refer to when galleries as communal spaces in communities transform from a collector node to visitor centric. These physical galleries are now equipped with more interactive digital tools parallel with the current technological advancements. Inability to cater for a more interactive audience centred space pose as an issue and requires a study in visitors' preferences and experience (Hooper-Greenhill, 2006; Recuperero et al., 2019).

In respond to the issue, the understanding of designing and developing multimedia galleries can be developed better with the realization of the importance of visitors' experience. Therefore, a designing process needs to be established and followed through in the expression of design. Assessment of the understanding of space design will provide better insights to future framework. This study aims to investigate this issue by developing these research questions: i) what are the processes involved in preliminary design stage and visualizations that can be created to express design ideas? ii) how do we assess the understanding of designing multimedia galleries, especially one that specifies on visitors' experience? In answering the research questions, two research objectives are created; i) to establish design process in preliminary design stage and express design ideas through 3-dimensional visualizations and ii) to assess the understanding of designing multimedia galleries.

Multimedia Gallery

“A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment”, International Council of Museums (ICOM, 2021). Exhibition spaces are

preservers of knowledge and centre for art and craft, cultural and heritage and others. According to Hein (2000), galleries cater for design creations and a space for visitors to view displays and exhibitions in physical, digital, symbolic, real and fictional. These exhibition spaces have gone through decades of transformation of new perspectives, development of ideas, technologies and presentation to the public. And as Varitlova (2019) states, the principle role of museums and galleries has move forward into spaces that reconstruct galleries into a more interactive environment for visitors. Incorporation of the media arts in the 19th century led to the progression of multimedia galleries. Additional insertion of digital and technological means transpire evolvement into electronic art, multimedia art, digital art, technological art interactive art, and others (Media Art, 2013).

With the creation of new spaces and experiences, multimedia galleries advocates social changes in putting forward technological development in the creation of spaces, content, tools, visitors' experiences and a sense of place (Hjalager and Nordin, 2011; Dello Pesce et al., 2019; Navarrete, 2019; MAGDIC, 2020). Balancing the dynamic environment remains a challenging task in the visitors' engagement in multimedia galleries. Therefore, areas of consideration in designing multimedia galleries are:

- i. Spatial Layout & Gallery Furniture
- ii. Types of Content and Activities
- iii. Tools and Technology in Galleries
- iv. Visitors' Experience
- v. Sense of Place

Multimedia Gallery Framework

The conceptual model of multimedia gallery design is adapted from Sense of Place Theory (Canter, 1977), Concept of Affordance (Gibson, 1979) and the concept of relationship between physical architectural space and affective emotional state (Franz, 2005). Based on this conceptual framework, multimedia galleries focus on the gallery affordance (spatial layout components) such as furniture layout, circulation, entrance & exit, resting points, seating area, openings, lighting, floor and ceiling height.

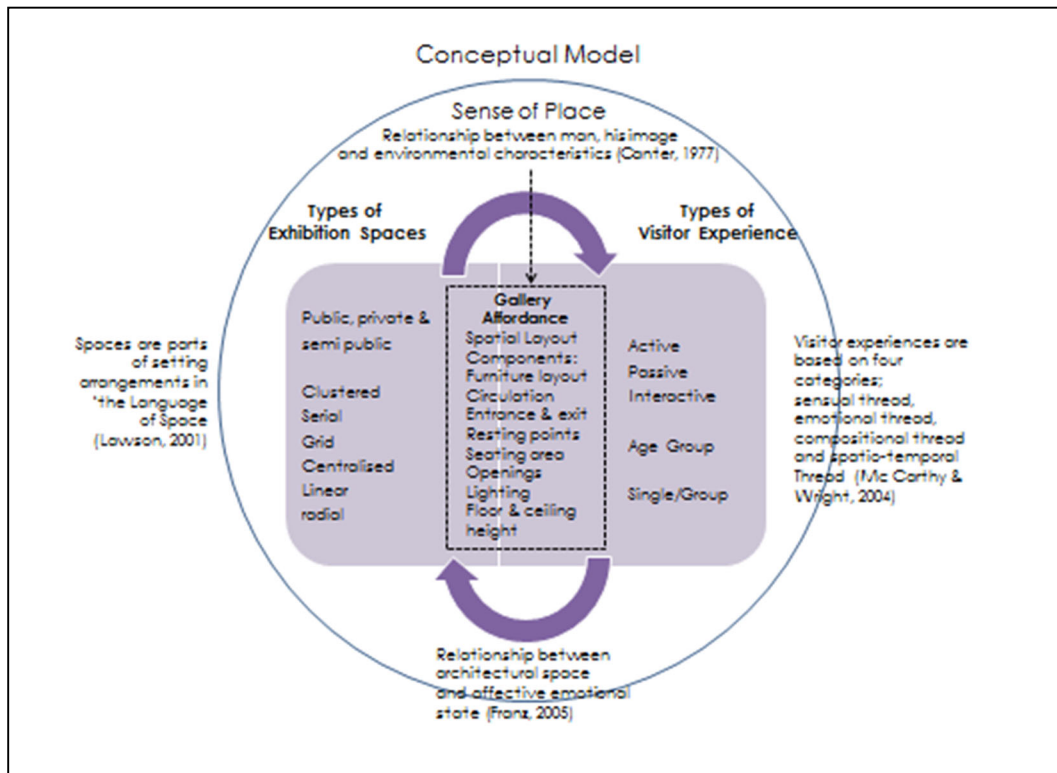


Figure 1 Conceptual Model Adapted from Six Layout Configuration (Matthews, 2018), Sense of Place Theory (Canter, 1977), Concept of Affordance (Gibson, 1979) and the Concept of Relationship between Physical Architectural Space and Affective Emotional State (Franz, 2005)

In the Six Layout Configuration (Matthews, 2018), layout is the basis to any gallery design whereby design concepts, circulation and furniture arrangement can be based on these configurations. Design sketches are then produced and progressively enhanced every week. The concept of gallery affordance (Gibson, 1979) is also adapted to understand the concept of direct perception and action, and affordance of environment properties to the visitors. Any furniture arrangement done for instance, has an effect to the visitors and any design element introduced (lines, shapes, texture, value and colour) must be based on the overall concept to ensure an effective direct perception and action. In Sense of Place theory (Canter, 1977), spaces become places when three essential components are connected. Visitors navigate based on their understanding of the space.

This framework shall be used further during the design development phase as well as the assessment of understanding. It incorporates spatial layout ideas, sense of place theory, gallery affordance items and the relationship concept of both space and visitors.

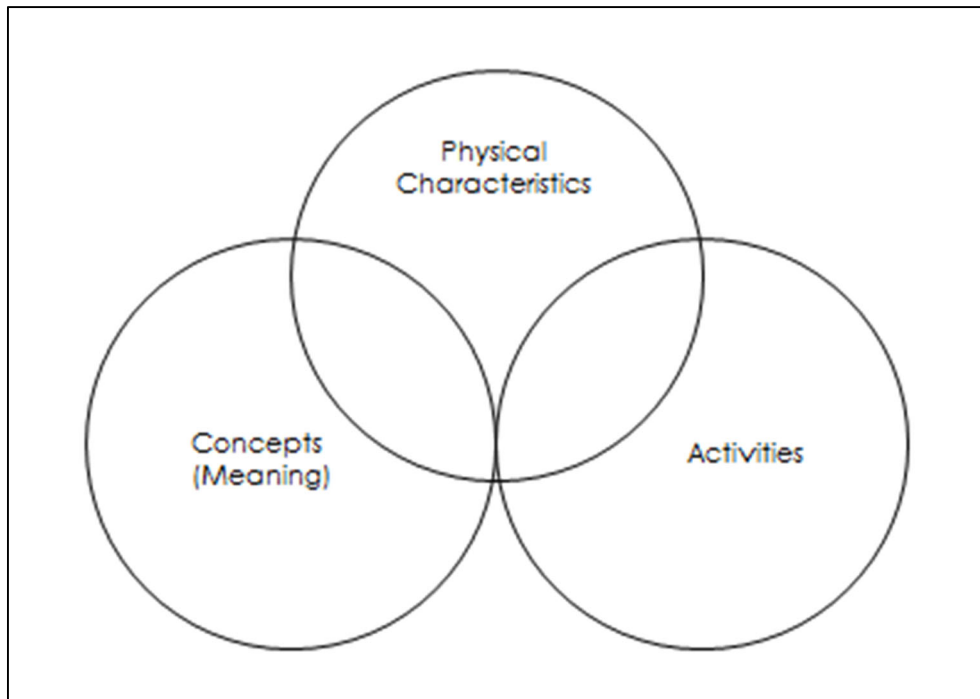


Figure 2 Sense of Place Theory (Canter, 1977)

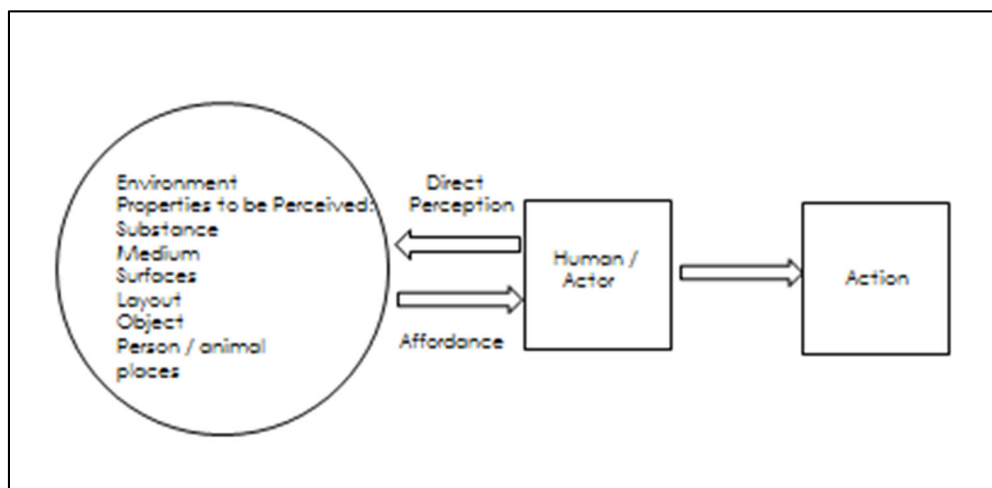


Figure 3 Concept of Affordance (Gibson, 1979)

Design Process

In designing spatial layout environment for multimedia gallery, designers follow a design process to assist and guide them. In Leister et al. (2017), Skolnick et al. described a process that comprises of the following elements: (a) concept phase, (b) schematic design phase, (c) design development, (d) fabrication documents, (e) fabrication, and (f) installation. For audience involvement, they emphasize (a) front-end evaluations during the concept phase, (b) formative evaluations in the schematic design phase, (c) prototype evaluations, and (d) summative

evaluations in the finished exhibition. Young has suggested that developers need to advocate for the visitors and think as a visitor. She has presented the design approach suggested by McLean that comprises of five phases; feasibility, preliminary design, detailed design, production planning, and production. Doering et al. presented a high-level description of the exhibition making process, (a) idea generation; (b) concept development; (c) design development; (d) production, fabrication, and installation; and (e) post-opening activities (Leister et al., 2017).

Adapting from these theories, a design process is produced and implemented to first year Virtual Reality students. The whole process of design brief, site appreciation, users' needs, spatial requirements and design intention were implemented to a group of nine students. Their progresses were tabulated following a series of weekly critique and the final presentation assessment. Their outcomes were in the form of research background of their gallery design and design concept report, sketches, design alternatives, 3-dimensional image visualizations and walkthrough video.

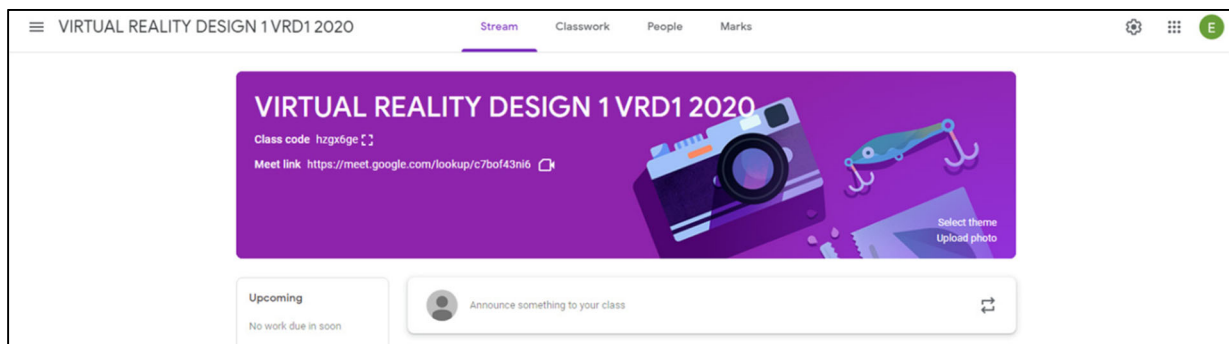


Figure 4 Virtual Reality Design 1 in Google Classroom Web Page

Methodology

This study incorporates a qualitative research method and is conducted in two phases; phase one (preliminary design stage) confirms the architectural design process which includes design brief, site appreciation, users' needs, spatial requirements and design intention. The concept is then developed further by expressing ideas in 3-dimensional visualizations while phase two assesses the understanding of designing multimedia gallery through an open ended survey.

In this research, Virtual Reality Design 1 students from Faculty of Creative Multimedia were guided in the preliminary design stage. They were briefed on the multimedia gallery

framework and overall design process, shown examples of multimedia gallery designs and underwent several critique sessions. Detailed information on gallery design is shared with them consisting of the Six Layout Configuration (Matthews, 2018), Gallery Affordance Concept (Gibson, 1979), concept of relationship between physical architectural space and affective emotional state (Franz, 2005) and conceptual model of the Multimedia Gallery Framework.

The final design was finalized from a selection of alternatives and materialized in 3-dimensional visualization images and walk-through video. An open ended survey was distributed to the students after they have completed their final design. Consent was obtained from each student during class to participate in the survey. Thoughts and ideas of their concept and design were collected and processed to find out more on their understanding of multimedia gallery design.

Further investigation was conducted to gauge students' understanding of the experiential design after they have completed design alternatives and produced 3-dimensional images and walkthroughs. Using their knowledge from the multimedia gallery framework, students were seen to create more visitor experience inclined spaces. An open ended survey was distributed to know more of their ideas on their design concepts. Their final walkthrough video also portrayed more sensitivity to visitors' experience in comparison with their initial sketches.

The open ended survey titled Gallery Questionnaire: Assessing your design using Multimedia Gallery Framework comprises of five sections:

Section A: Spatial layout & Gallery Furniture (7 questions)

- 1.0 Which layout from the 6 basic layouts did you choose for your design? Why did you choose it?
- 2.0 Can you explain your Entrance & Exit location as well as the circulation route?
- 3.0 What is the choice of furniture that you have chosen for your exhibits? Where did you place them and why?
- 4.0 Do you have allocation space for Resting Points/Amenities/Facilities such as rest area, café, washrooms, bookstore, souvenir shops and others? If you have them, why did you decide to have them?
- 5.0 Is there any opening (doors, windows) in your design? If yes, can you explain their function and their placement?
- 6.0 Do you design any significant variation of floor and ceiling height? If yes, why did you include them in?
- 7.0 Can you describe the zoning of spaces that you have designed? (Public, Semi-public and Private). And what are their functions?

Section B: Types of Content & Activities (3 questions)

- 1.0 What are the types of content that your design caters to?

Content: Analogue/Static – painting, sculpture, drawings, models etc.

- a) Digital/Dynamic – digital video screenings, digital media viewing & projections
- b) Interactive – Installations, touch screens, kinetic content, VR, AR, MR etc.

- 2.0 What activities (active, passive and interactive activities) do your visitors participate in and why did you choose them?
- 3.0 Do you think that the gallery space allocated for the activities is suitable? Why?

Section C: Tools & Technology in Galleries (3 questions)

- 1.0 What tools (analogue or digital) and technology did you implement in your gallery?
- 2.0 Can the tools assist visitors to interact with the exhibits/content?
- 3.0 Is there enough space in your gallery to cater to the tools/devices? (Comfort to visitors)

Section D: Visitors' Experience (4 questions)

- 1.0 Do you think that visitors can navigate well in your space layout design? Why? Explain based on space circulation and layout, content and activities and tools and devices.
- 2.0 Which of these groups of visitors does your design cater to?
 - a) Age Group: Children, Young Adults, Adults and Elderly
 - b) Group Type: Single Visitor, Small Group (not more than 5 person) or Large Group (more than 5 person per group)
- 3.0 Based on Content which activity is more related?
- 4.0 Active Activities, Passive Activities or Interactive Activities
- 5.0 What emotion do you intend for your visitors to feel?

Section E: Sense of Place (2 questions)

Sense of place describes the atmosphere of a place and gives a sense of well-being. It also gives identity and meaning to a space and influences ones relationship with content & context, and space & form.

- 1.0 Do you feel visitors will have a good sense of place in your gallery? Why?
- 2.0 Please suggest any improvements that you have in mind to make your gallery a better design.

Findings

Eight respondents completed the survey based on their final design of creating a multimedia gallery. They went through a set of design process which includes design brief, site appreciation, users' needs, spatial requirements and design intention. There were progressive critique session and discussion every week with the students on the development of their design. As everyone went through the same design process, they could learn and be inspired with one another. Their design developments were also consistent with each other which include background design

report, design concept, design alternative sketches, final design sketch and 3-dimensional visualizations to express their design intention. A final walkthrough video was presented at the end of the semester together with the completed survey. Respondents' answers were collected and tabulated in order to gauge their understanding of designing multimedia galleries. As their answers were tailored accordingly to their own design concept and final design, only the final section E Sense of Place is explained in this paper (Table 1).

Table 1 Section E of multimedia gallery questionnaire

Section E: Sense of Place

Sense of place describes the atmosphere of a place and gives a sense of well-being. It also gives identity and meaning to a space and influences one's relationship with content & context, and space & form (Canter, 1977).

1.0 Do you feel visitors will have a good sense of place in your gallery? Why?	
Respondent 1	Yes, as I think the artworks shown are well segregated enough to ensure the visitors don't get lost within the exhibition.
Respondent 2	In my opinion, they would as they would feel like they're at home; not in a literal way, but the warmth feeling that people get when they are comfortable with someone. The sense of relatability attracts people.
Respondent 3	In last semester, we learned many aspects about virtual reality, including the main use of virtual reality for people, 3D indoor and outdoor environment, as well as the creation and design of 3D pictures.
Respondent 4	That depends on which visitor to visit this gallery and love about history.
Respondent 5	Yes. In my opinion it is simple yet effective and visually appealing.
Respondent 6	Visitor will have a good sense of place in the gallery as the content inside the gallery can be changed and the feeling to be visited again is strong.
Respondent 7	Yes, they can have a good experience from walk, look, and listen.
Respondent 8	They will feel good only if they have interest about JDM cars or VR simulation activity. Because our gallery is made for JDM and VR simulation purpose and concept only, people only feel good if they have interest in it.
2.0 Please suggest any improvements that you have in mind to make your gallery a better design.	
Respondent 1	I would have made the artworks a bit more evenly separated but due to my platform of gallery creation having a strict grid snapping function, it was slightly challenging to do so.
Respondent 2	To start, a working door, an interactive area where visitors can interact with things, better lighting, more complex structure of the gallery, more creative exhibits.
Respondent 3	There are still many aspects that need to be improved for my professional technology. I will strengthen my understanding of 3D pictures as a whole and

	improve my drawing skills, to design better works.
Respondent 4	Projectile video in gallery and maybe hologram that visitors can see what happened in 1945.
Respondent 5	I would add a souvenir shop at the end where the proceeds go towards groups that help conserve coral reefs and they can also donate if they want.
Respondent 6	As technology improved better, the gallery will try on to next level by making visitor a virtual roles of characters in a fictional setting. The visitor will be able to virtualize themselves as they seek deeper into the gallery's masterpiece.
Respondent 7	I would like use the more "pro" device and software to improve the experience, such as animate the door, smoother walkthrough, etc.
Respondent 8	I would like to add another area which is for those who likes to modify their cars to meet up and learn from each other.



Figure 5 Ideation Board by Fatimah Maksumah Binti Kamaruzzaman



Figure 6 Design Board by Fatimah Maksumah Binti Kamaruzzaman

Discussion of Findings

Question No. 1: Do you feel visitors will have a good sense of place in your gallery? Why?

This question relates to the sense of place which describes the atmosphere of a place that gives a sense of well-being, identity and meaning to a space (Canter, 1977). When asked if visitors are able to relate to their design, respondent 1, 2, 5, 6 and 7 answered yes.

Respondent 1 mentioned that the layout for the artworks is well segregated and visitors will not lose their direction. This relates to respondents' understanding of multimedia framework which consists of spatial layout as a vital element in design space. In spatial layout, the arrangement of space components such as furniture layout, circulation, entrance and exit, resting points, seating area, openings, lighting, floor and ceiling height must be considered; concept of affordance (Gibson, 1979). Ability to incorporate this into his design ensures a good sense of place as mentioned by respondent 1.

Respondent 2 mentioned that visitors will feel like they are at home; the warmth feeling when they get comfortable with someone. The sense of relatability attracts peoples. This relates to the concept of physical architectural space and its relationship with affectional emotional state

of visitors (Franz, 2005). A good design is established during the design process when a designer designs spaces with visitors' needs and experience in mind.

Respondent 5 stated that in his opinion, his design is simple yet effective and visually appealing. This can be achieved if a designer considers the Six Layout Configuration by Matthews (2018). Understanding which of the six layout suits best with the design intention of a project will ensure that the sense of place is achieved, giving its visitors a good feeling that is effective and appealing.

Respondent 6 mentioned that visitors have a good sense of place as the content inside the gallery can be changed and this promotes a welcoming feeling that is fresh and attractive for a return visit. This statement relates to the components of a multimedia that needs to be considered during design process; spatial layout, content and activities, tools and technology, visitors experience and sense of place (Hjalager and Nordin, 2011; Dello Pesce et al., 2019; Navarrete, 2019; MAGDIC, 2020).

Respondent 7 mentioned that visitors are able to get a good sense of place and experience from walking, looking and listening. The designer, from his design process exercise, understands and able to denote that visitors' experience and relationship with the space and content is crucial to pay attention to in a multimedia gallery design (Hooper-Greenhill, 2006; Recupero et al., 2019).

Question No. 2: Please suggest any improvements that you have in mind to make your gallery a better design.

Respondent 1, 3, 6 and 7 responded to this question by relating to the design development process by Leister et al. (2017); (a) concept phase, (b) schematic design phase, (c) design development, (d) fabrication documents, (e) fabrication, and (f) installation. The respondents mentioned about their ability to design, incorporating technical skills and developing the output greatly influence their design. By having better presentation and visualisation skills, their designs can be better experienced. Respondent 1: strict grid snapping function, Respondent 3: improving technical skills of 3D visualisations and drawing skills, Respondent 6: better technical skills in creating virtual roles of fictional characters in the 3D visualization where these characters can explore the designs real time, and Respondent 7: would like to use more of 'pro' device and

software to improve experience such as animate doors, smoother walkthroughs and other interactive experiencing means.

Respondent 2, 4, 5 and 8 answered accordingly based on the multimedia gallery framework design and offered improvements to make their design better. Respondent 2: talks about designing interactive area where visitors are able to interact with the displays, having better lighting, more complex designs of the spatial gallery layout and more creative exhibits. These items relate to better designs. Respondent 4: relates more to having display technologies for instance projectile video and hologram technology. Respondent 5: respondent based his remarks on the design intention where he desires to have a souvenir shop at the gallery as an additional amenity to the overall design idea. Respondent 8 mentioned that he would also like to add another area of interactivity, that is a workshop area for hand-on and on-site activities that will able to heighten visitors' experience and promote good sense of place as mentioned by Canter (1977), where the relationship between concepts (meaning), physical characteristics and activities play vital role in design space with good sense of place.

Conclusion

After the implementation of the fourteen weeks design development process which includes briefing, designing, presentation, completion of 3D design and visualizations, students were assessed via the open ended survey on their design output and presentation. From the data collected and analysed findings, several discussions were made to answer the research questions. From the findings in Table 1, it is found out that the understanding of designing and developing multimedia galleries can be achieved by adapting the design process and following a set of guided design process and 3-dimensional visualization tools and techniques. They were able to visualize the spatial layout environment and come up with experiential design solutions during their progressive presentations. The design process that they went through and the visualization technique assisted them in visualizing their ideas.

As for research question 2, this assesses the understanding of designing multimedia galleries. The findings from the survey show in depth understanding of their design concept and spatial treatment. From the survey, we are able to follow their design intentions, how they tackle design issues and meet the challenges that rise. In comparison, previous design exercise of previous semesters, their design process did not include understanding of designing multimedia galleries based on the multimedia gallery framework. It is found out that with this batch of

students, by having a multimedia gallery framework, they are able to think and discuss critically while addressing their design challenge, as they had strong understanding of the Six Layout Configuration (Matthews, 2018), Sense of Place Theory (Canter, 1977), Concept of Affordance (Gibson, 1979) and the concept of relationship between physical architectural space and affective emotional state (Franz, 2005).

Thus, the findings in this study address the issue of catering for better visitor experience in a multimedia gallery (Hooper-Greenhill, 2006; Recupero et al., 2019). The understanding of designing and developing multimedia galleries is achieved with the realization of the importance of visitors' experience. For future works, virtual reality platform can be used for students to experience designing and developing spaces as they interact and immerse in the space that they have created. This will enhance their design skills better and be able to achieve optimum visitors' experience.

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