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Revisiting Polytechnic University of the Philippines – Sta. Mesa: An Augmented Reality Journey through Architectural Heritage and Genius Loci

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Abstract

This research project aims to develop an augmented reality (AR) application to showcase the architectural heritage of the Polytechnic University of the Philippines (PUP) Sta. Mesa campus before its recent renovations. By leveraging AR technology, the project seeks to provide an immersive and interactive experience that allows users to visualize and explore the campus's historical fabric and architectural heritage. Through AR, the aspect of immersive experience can also provide a visualization of the trajectory for campus' renovation efforts from the reference of PUP's historical fabric and architectural heritage. The application will recreate key structures and spaces, accurately reflecting their original designs and spatial configurations. In addition to visual reconstruction, the project will delve into the spirit of the place and the concept of genius loci, emphasizing the unique character and cultural significance of the PUP Sta. Mesa campus. By incorporating archival materials, oral histories, anecdotal accounts, and virtual models; the AR experience will highlight the elements that define the campus's identity and heritage. The aim is to foster a deeper appreciation of the historical context and architectural evolution of the campus, promoting a sense of continuity and connection among students, faculty, and alumni. Ultimately, this research not only preserves and revitalizes the architectural memory of PUP Sta. Mesa also enhances contemporary understanding and engagement with its historical landscape, as well as a reference in visualizing PUP's future carrying its original spirit and heritage. Through the innovative use of AR, the project demonstrates the potential of digital tools in heritage conservation, renovation, and education, bridging past and present in a meaningful and dynamic way.

Keywords

Augmented Reality; Architectural Heritage; Genius Loci; Renovation; Visualize

1. Introduction

Augmented Reality (AR) is a technological concept that creates a composite vision by overlaying computer-generated imagery on top of the actual environment in an immersive manner. It is commonly used in natural environments that can be altered visually enhanced with the addition of details and other functionalities, i.e. Gaming, Entertainment, Advertising, Education, Technological Application, and Architectural Design (Digital Catapult, 2024). On the other hand, the Latin term Genius Loci, which means "guardian deity of a place," describes the ensuing atmosphere or feel of a particular location and is also sometimes called the "spirit of place." With a campus that is over 50 years old and an institution that has been there for 119 years. Polytechnic University of the Philippines (n.d.) states its humble beginnings as a business school on October 19, 1904. Ever since, spaces have been created, destroyed, and rebuilt over time to give education as well as memories, experiences, influences, and perspectives among individuals. Albeit, the campus is currently experiencing tremendous renovation, changing its architectural and structural designs. In general, it is a challenge on how to pay homage to the cultural and architectural heritages According to Australia ICOMOS (2013) stated in the Burra Charter, “Places of cultural significance enrich people’s lives, often providing a deep and inspirational sense of connection to community and landscape, to the past and to lived experiences” (p. 1). Through Augmented Reality (AR), people have a means to experience famous locations and the places of cultural significance for each person that went to PUP Sta. Mesa, thus redefining how we interact with historical and cultural narratives of the institution. As the proposed suggestion by Stovel (2012) on the NARA document on authenticity of 1994 states “Increasing awareness within the public of this fundamental dimension of heritage is an absolute necessity in order to arrive at concrete measures for safeguarding the vestiges of the past.” (Appendix 1). Augmented reality thus has the potential for the PUP community to be made aware of the value of PUP Sta. Mesa campus for them to see the spirit of place which can be a catalyst for AR itself to be the concrete measure in preserving PUP Sta Mesa’s spirit of place and sharing the Genius Loci felt by its community. A study found regarding the sustainability of using such a gives a narrative that, the evidence gathered in the said study that AR’s premise therefore could be an effective tool to emphasize and simply formal concepts through informal and/or casual environments (Sommerauer & Müller, 2018). Augmented Reality can be used with more traditional methods of exploring Heritage like conducting tours, and introducing guides and pamphlets, it will be in PUP’s undertaking to make these tours public or not. But in essence, AR could empower traditional methods of knowledge for architectural heritage through supplementing the implementation of these traditional methods. This is because a school’s heritage is the cultural heritage of that institution, and it may include both tangible and intangible aspects of that institution’s life (Lim et al., 2024). AR could be used to convey this heritage, but the delivery is to the institution’s discretion, possible via both traditional and non-traditional methods of knowledge. The key focus still for the Augmented Reality program is to be used by the PUP community at their own discretion, maybe through study or others. Another focus for the program is to complement and enhance the Renovation process of PUP Sta. Mesa through using the data of old information, places, and models of original place into the place of renovation through the AR program thus getting the original PUP layouts, vibe, and feel as a reference for construction and renovation by envisioning what the place once was and using it at as the footnote to renovate that specific place. According to the Study named: “AUGMENTED REALITY SYSTEM APPLICATIONS IN CONSTRUCTION PROJECT ACTIVITIES” by Kivrak et al., (2013) Information Technology (IT) utilization at construction sites constitutes a positive effect on the project’s overall efficiency, productivity, and the like thus making the site have safer work conditions and quality whilst keeping costs down and timetables at schedule. The study concludes that IT has thus become essential to integrate into the work environment to sustain competition in that field of industry (Kivrak et al., 2013). Mobile devices can turn into a portal to the past as you move around the campus, superimposing interactive narratives, 3D reconstructions, and historical photos on the current setting. Whether you are an inquisitive tourist, alumnus, faculty member or non-teaching personnel, this AR experience offers a special change to engage and personally connect to the institution’s spirit of place.

1.1. Study Aim

This research is aimed at the study and conceptualization of a feasible way in which the architectural and cultural heritage of Polytechnic University of the Philippines Sta. Mesa campus will be well-preserved with the use of Augmented Reality that can capture the Genius Loci or Spirit of Place (in Filipino, Diwa ng Lunan). It identifies the distinctive atmosphere and sense of place of the campus. This study seeks to capture and represent the Genius Loci

or Spirit of Place through immersive AR experiences which will enhance the educational and cultural engagement of students, faculty, alumni and visitors by integrating AR technologies. Moreover, this study will assess the effectiveness of AR in conveying historical and cultural narratives of the institution and will also evaluate the potential of AR to create a sustainable method for long-term heritage preservation by using that historical and cultural narrative of the institution as Architectural heritage as knowledge to convey to the community and to use it to complement present and future construction and renovation efforts at the institution. Thus, this study also seeks a way to develop scalable AR models that can be adapted to other heritage sites and provide recommendations for integrating AR into heritage preservation practices at academic institutions.

2. Materials and Methods

2.1. Research Design

This study employs a quantitative approach which utilizes weighted values and numbers to interpret data, which will revolve around a quantitative inquiry involving surveys and interviews converted to weighted values. As stated in the IPO or Input-Process-Output chart (see Figure 1), this approach would be initiated by the design of a structured online survey, which was piloted and reviewed by experts in technology to enhance the validity and reliability associated with the identification and rectification of any ambiguities in the questions. This approach obtains data through the choice of given hypothesis as answers and ranking of questions and statements and then accumulated to form results via visual aids like charts and graphs. Furthermore, this approach is more suitable for diving into the relationship of a technical entity or program like Augmented Reality to its target purpose like visualizing PUP Sta. Mesa showcasing

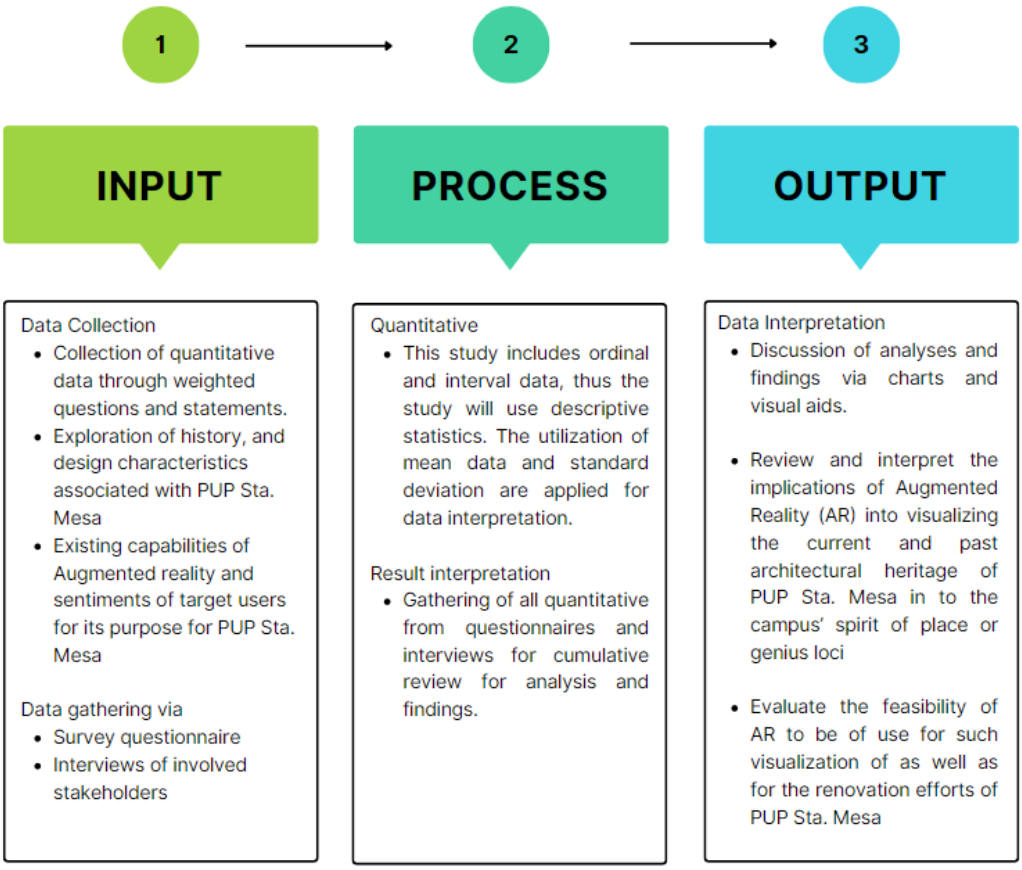

Figure 1: Research paradigm (Source: By Authors)

heritage and the spirit of place and looking at the feasibility of its application through empirical data with minimal opinionated inputs. Moreover, Cochran's formula ha was used in testing the internal consistency and, therefore, the reliability of the survey. Then, the content validity of the questionnaire was cross-checked by technology experts to establish that proper measures of the constructs were obtained through the survey. Subsequently, such findings were

combined with literature about heritage preservation using AR applications for the validation of results on how well AR could represent and communicate the Genius Loci of the campus while it undergoes renovation. Done this rigorous way, the approach is going to make sure that findings from the study are robust and apply directly to the objectives of the research.

2.2. Research Locale

The study is predominantly conducted within the online environments and the physical confines of Polytechnic University of the Philippines Sta. Mesa Campus, addressed at A. Mabini Campus, Anonas, Santa Mesa, Maynila, 1016 Metropolitan Manila, Philippines; Latitude 14.59791° or 14° 35' 53" north and its longitude 121.01059° or 121° 0' 38" east.

2.3. Population and Sampling

$$n = \frac{z_a^2 * p * q}{e^2}$$

Cochran's formula for unknown population was used to find the sample size; a total of three hundred eighty-five (385) respondents were identified as the population for this study. These respondents consist of students, university staff, faculty, alumni, and other related stakeholders who can be of benefit or a target audience upon implementing the Augmented Reality program. These three hundred eighty-five (385) respondents are all selected randomly as long as they fall on the above demographics fit for data gathering of this study. The study makes use of Purposive sampling in which researchers would relate the purpose of the study and the understanding of its audience. The sampling technique was chosen to maximize the randomness in the sense of getting as many people from the PUP community as possible who have a bit of information about the topic such as Architecture and Information Technology and thus getting the minimum amount where the point can stand for the whole community. This results in using the formula of unknown population which is used for high and uncertain population settings and thus giving a number of respondents enough to make a point which is Three-hundred Eighty-five (385). This will thus measure the interest and the overall feasibility of an Augmented Reality program implementation through the audience's current knowledge.

2.4. Data Gathering Procedure and Instrument

Google Forms will serve as this study's primary gathering instrument, this form via link will be distributed via online media platforms such as Gmail and Messenger. A printed copy of this form will also be provided for respondents who lack internet or Google account access. Interviews are to be held if current methods provide insufficient results. Furthermore, the researchers of this study made sure that all responses would be completely confidential and that all sensitive information would be deleted at the end of this study. A Survey Questionnaire via Google Forms will be used for the data-gathering procedure stated above. A printed version of this questionnaire will be provided for respondents with no means of access to Google Forms. The questionnaire consists of a set of arranged questions with scores and ratings, as well as simple questions to be answered by the target population of three hundred eighty-five (385) respondents determined sample size. The questionnaire will be numerically analyzed to interpret the data from the respondents involved. The researchers will also brief the respondents through disclaimers and further information about the purpose of this study. Ethical considerations were thoroughly addressed in the study. Before the actual interview, informed consent was attached to the first page of the questionnaire so that they were made aware of the study's purpose, benefits, risks, and funding involved with this study presented as the basis if they are willing to agree or decline to participate. The researchers made sure that all responses would be completely confidential, and everything will be deleted after the completion of the research. The questionnaire used in this study is a series of carefully arranged questions to be answered by a population designed to collect data with questions about the respondents' profiles. The content and concepts tackled in it are laid out in a way that it is separated as topics, namely: General questions, where questions are laid out to get the sentiments of the respondent on the topic, Specific questions, where questions are laid out to assess the experience and knowledge the respondent already has with the program. And lastly, Augmented reality Application Functions where respondents are asked about what functions they want to

see in the program when it is launched. Three hundred eighty-five (385) respondents were calculated to determine the sample size (n) for this study. With the nature of the topic, the questionnaire uses the qualitative approach, and results are to be projected through pie charts and graphs. Ethical approval was obtained and validated by the research experts at the Polytechnic University of the Philippines and was given an Ethical clearance before proceeding with the instrument for Data Gathering Procedure.

2.5. Scope and Delimitation

This research will focus on the feasibility of an Augmented Reality through conceptualization for preservation and referencing of the Polytechnic University of the Philippines Sta. Mesa's architectural heritage as well as its spirit of place (Genius Loci). Our respondents are selected at random if they fit the intended demographic of this study. This study was conducted from May 2024 until July 2024.

2.6. Literature Review

2.6.1. "Revealing the "spirit of the place": Genius Loci, a spatial augmented reality performance based on 3D data and historical hypotheses" (Favre-Brun et al., 2012)

- **Background**

Genius Loci, commonly referred to as "spirit of place" is an artistic presentation that is observed at places with value to the people and is based on historical conjectures and 3D scans. In this study's example, the researchers created a 3D model of Villeneuve-lès-Avignon church in this instance. The church was then depicted with a 3D live model based upon the panoramic imagery of virtual data and photos extracted from the 3D model cross-referencing existing images and the real-life space in an interactive manner. Studies conducted through HeritageByte—an AR-based learning environment—succeeded in proving that it is possible to increase users' interest in and knowledge of the Villeneuve-lès-Avignon school heritage significantly. Implying that the methodology can be replicated for academic settings and other heritage sites. However, the researchers managed to identify a few limitations connected with technical issues and strike a balance between informative content and gameplay. For AR technology to be effective in conserving and promoting cultural heritage, more research should investigate its dependability and the balance of content. Genius Loci may only materialize if a project combines AR and traditional presentation strategies that are tailored to both the actual space and the user for the users of AR to understand what it is projecting much easier, thus making Genius Loci easier to see.

- **Interpretation**

As interpreted, visitors should immerse themselves first in the surroundings, then, use augmented reality (AR) to supplement the experience. Advanced versions of AR can immerse audiences into multisensory environments, but still, there are technical aspects to consider like the hardware and technical difficulties. (Favre-Brun et al., 2012) As aforementioned, the campus is undergoing tremendous changes due to the reconstruction of campus buildings. The findings of this research benefit this study by giving insights and different approaches in terms of applying AR. With these, during special events in Polytechnic University of the Philippines – Manila, events like this can be held. Thus, immersing the stakeholders in its architectural and cultural archives and heritage provides homage to its history. It is proven through this study that AR is the most suitable in terms of showing the genius loci and fully immersing the audience into the "spirit of place." However, there are also several limitations to AR. Even so, with the continuous betterment of AR, it may be able to break all these barriers in the future by fully capturing the "spirit of place" and being an excellent channel for cultural heritage preservation and promotion.

2.6.2. "Augmented reality Based Cultural and Natural Heritage Preservation of Quirino Province: A proposed Developmental Framework" (Duldulao & Palaoag, 2024)

- **Background**

With the fast pace of technological capability forced upon by the pandemic, there is a need to adapt to the advancement of technology. Despite this, current multimedia displays are not representative of the actual thing. Quirino is a small

province with a prominent importance in Region II that can attract a wider audience, with some parts of the province intertwined with its neighboring provinces, and a mixed variety of people and cultures are also intertwined with one another (Duldulao & Palaoag, 2024). An excerpt from TheLanguageDoctors states, "Keeping heritage alive helps improve the environment" thus acknowledging that protecting heritage benefits society. (TheLanguageDoctors, 2021) As smartphone technology advances, phone cameras can employ Augmented Reality (AR) technology to overlay virtual environments over real environments viewed from the said camera lens. Phones also can be used to explore and adapt to the current environment around them (Tcha-Tokey et al., 2016). AR is also capable of recognizing imagery and writings from the real world and interacting with its current environment enticingly. With this said, AR could help tackle the lack of learning opportunity and the enhancement of preservation efforts interpreted from the results of this case study.

- **Interpretation**

The findings suggest that even local visitors still need more opportunities to explore their province's heritage, and issues addressing preservation efforts and upholding the heritage are being prioritized. (Duldulao & Palaoag, 2024). This case study is of benefit to this study in terms of relating the findings of this case study in getting an insight into the problem being addressed for PUP Sta. Mesa campus with its Architectural Heritage. Whilst the case study focuses on natural and cultural heritage, the sentiments and hypothesis proposed can also be applied Architecturally, by delving into Architectural Heritage which people's sentiments in this case the PUP community grab hold of through the spirit of place or Genius loci. Through this case study, the same hypothesis can be applied to this study where PUP Sta. Mesa campus as well as its stakeholders and community be of benefit in an interactive technology like AR. Since the tool can be used to fill in the gaps of the task on hand of upholding the Architectural heritage of the campus, related to architecture, AR, in this case, could be a reference for future preservation efforts (i.e. renovation, or adaptation of architectural elements) which is not covered by the case study.

2.6.3. "Exploring The Potential Affordances Of Augmented Reality (AR) Game-Based Learning In Campus Heritage Preservation" (Vu et al., 2024)

- **Background**

With Augmented Reality, there is a lot of potential for its applications, in this study. AR is used as an interface for Game-based learning with the goal of preserving the campus heritage of Hwa Chong Institution (HCI) in Singapore. Campus heritage refers to the tangible and intangible assets inherited from the campus or institution's history. This concept is then therefore bridged by AR to the intended users for them to learn more about the campus in question and to stimulate their situational interest in it, where the environment (i.e. specific features of the campus) can induce the feeling of exploration. This exploration will come from the gamification of AR which makes use of Interactive UI and UX and is thus a Location-based game, with similarities to other AR-based outdoor video games like Pokemon GO. In this way, this case study can measure the effectiveness of gamification by measuring the user's situational interest in this matter. The objective of this paper in essence is to explore the potential of AR as a tangible means of preservation for HCI.

- **Interpretation**

From the findings of this paper, it can be said that AR is a tangible means of preservation for Hwa Chong Institution which other academic institutions can use as insight into gauging the feasibility of applying AR to their specific contexts like PUP Sta. Mesa. In this paper, it is said that there are limitations that need to be worked around by deliberate design choices regarding what AR approach should be used (Vu et al., 2024). In this case, using AR gamification implies that there should be a balance between the gaming element, entertainment, and useful information that will keep the interest of its users but at the same time, prevent a specific aspect of the AR application from overshadowing its main goal which is to preserve the elements of HCI. This too can be applied to PUP Sta. Mesa in which, one of the main stakeholders for an AR application are students that have a high tendency to prefer a visually appealing, entertaining approach. Knowing that AR has the potential to preserve campus heritage is already a concept to build up an AR program for PUP, but there should be consideration as to what AR medium will be used

for its implementation and what is its pros and cons in the long run, especially if PUP will go with AR through gamification.

2.6.4. "Augmented Reality Book Design for Teaching and Learning Architectural Heritage: Educational Heritage in Hong Kong Central and Western District" (Cheng et al., 2024)

- **Background**

Through the emergence of mobile technology and ubiquitous computing, new channels have emerged for the preservation and transference of cultural heritage in accessible and interesting ways. Virtual tours through mobile applications permit users to experience cultural heritage beyond their physical boundaries. This expands understanding and appreciation as people interact with historical sites through visual guides that describe artifacts and guide visitors through significant locations. Digital technology in learning settings means that mobile technology has radically changed classrooms, especially during a virtual tour and digital story experience, to make learning culturally relevant. Augmented reality (AR) became indispensable in transforming old materials designed for traditional learning into museums and heritage education. Once you have a book, such as one in the Smithsonian library, it must just sit there; now they can use augmented reality apps to bring books to life or place them on walls and really share them with visitors. This dynamic approach to learning boosts the motivation of the students and makes them have an interesting experience while at school. Even though AR is increasingly applied in different areas of education, research into its application in architectural heritage education is very limited. To bridge this gap, an innovative AR book design was developed for undergraduate students to explore architectural heritage in the Central and Western District of Hong Kong, historically significant as a cultural and educational hub. This project also offers an extremely insightful look into the colonial education system of Hong Kong, which saw various schools being established by several missionary organizations. As a result, these institutions have left behind a heritage of architectural monuments in the region.

- **Interpretation**

AR technology presents a potential gateway for teaching architectural heritage, where the very conventional textbook would become an interactive learning device. The use of such a device would allow students to better relate to the historical architectural styles, particularly the combination of Chinese and Western designs so characteristic of Hong Kong during its colonial period. (Cheng et al., 2024) The AR book of the project gives students a detailed view of architectural designs through 3D models and interactive features, making cultural history more relatable. Findings from the study suggest that AR technology can increase motivation and engagement, addressing longstanding challenges in cultural heritage education, such as perceived irrelevance and student disengagement. It was exposed through an evaluative study with undergraduate students at a local institution in Hong Kong that there is a significant percentage of satisfaction rate when associated with the useability, immersion, and amusement attributes of the AR book indicated by the values received with the 7-point Likert scale values scored by the participants during questionnaires and interviews alike: a diversity of feedback by participants shows the educational efficacy for this technology in school premises. This study sheds light on the usability of AR in heritage education and reflects that AR technology could help to integrate heritage studies into mainstream curricula. Throughout the study, proper ethical consideration was managed through the consent of all participants to be involved in it, demonstrating that the study was committed to responsible research practices. Through this case study, PUP Sta. Mesa can learn that AR technology is a tool that can be utilized to integrate said technology into the fabric of the academe, maybe for curricula or information purposes.

3. Results

The research instrument via an Online Survey allowed the PUP community to freely express and narrate their experiences with the campus. Through this instrument, the researchers aim to gauge the feasibility and application of a proposed Augmented Reality program.

3.1. Demographics

Reflects the breakdown of the sample size in terms of age, gender, and their position in the university.

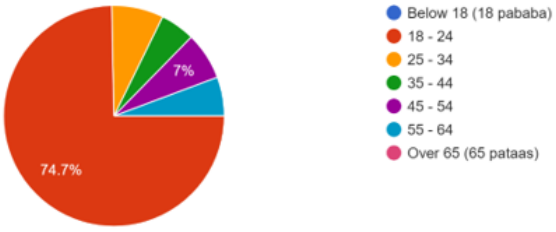

Figure 2: (a) Age of the respondents

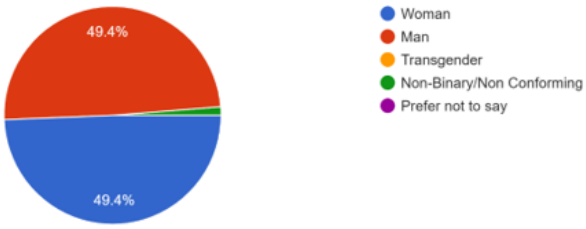

Figure 3: (b) Gender of the respondents

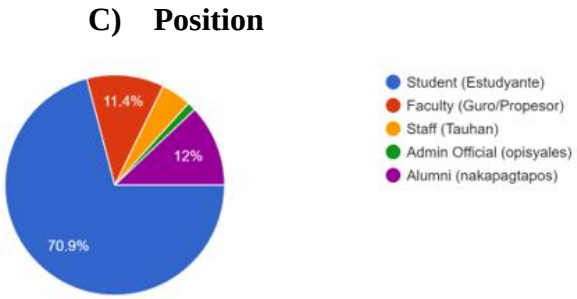

Figure 4: (c) Position in the University of the respondents (source: by author)

A) Age

Pie chart results disclose that 74.7% of the respondents are aged 18-24, and 7.6% are aged 25-34. 5.1% are aged 35-44. 7% are aged 45-54, while the remaining 5.7% are aged 55-64. None of the respondents are aged 18 or below, nor 65 and above. (see Figure 2).

B) Gender

An equal 49.4% of respondents classify as Men and Women, while 1.3% of respondents are non-binary/non-conforming. None of the respondents belong to other gender classifications (see Figure 3)

C) Current Position in the University

The majority of the respondents are students totaling 70.9%, 12% are alumni, 11.4% are faculty, 4.4% are staff, and 1.3% are Admin officials. (See Figure 4)

General Questions

This section focuses on PUP's relationship with the respondents and their stance on Interactive Technology filling the role of upholding PUP Sta. Mesa's Genius Loci and Architectural Heritage.

General Question #1 - The feeling of Genius Loci or the spirit of place further emphasizes the feeling of PUP Sta. Mesa through its Architectural heritage and its spaces and vice versa; manifests as sentimental values.

In this question, 42.4% of respondents strongly agree that the spirit of place emphasizes the feel of PUP Sta. Mesa, 41.8% do agree, 12% remain neutral, whilst 3.2% disagree and 0.6% strongly disagree. (See Figure 5)

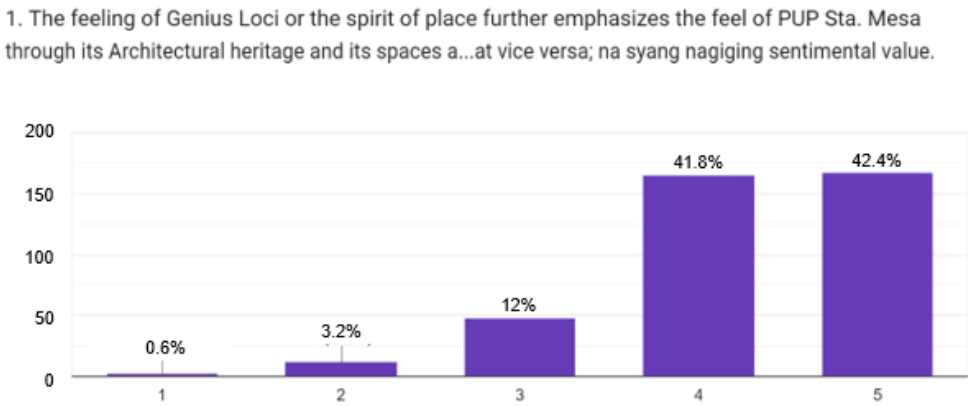

Figure 5 Graph showing results from General Question 1(source: by author)

General Question #2 - It is imperative for PUP Sta. Mesa to make use of modern tools to promote Architectural heritage, the spirit of place, and its vibes.

In this question, 63.3% of respondents strongly agree to use modern tools in promoting Architectural heritage and the spirit of place of PUP Sta. Mesa campus, 25.9% do agree, 10.1% remain neutral, 0% disagree, and 0.6% strongly disagree. (See Figure 6)

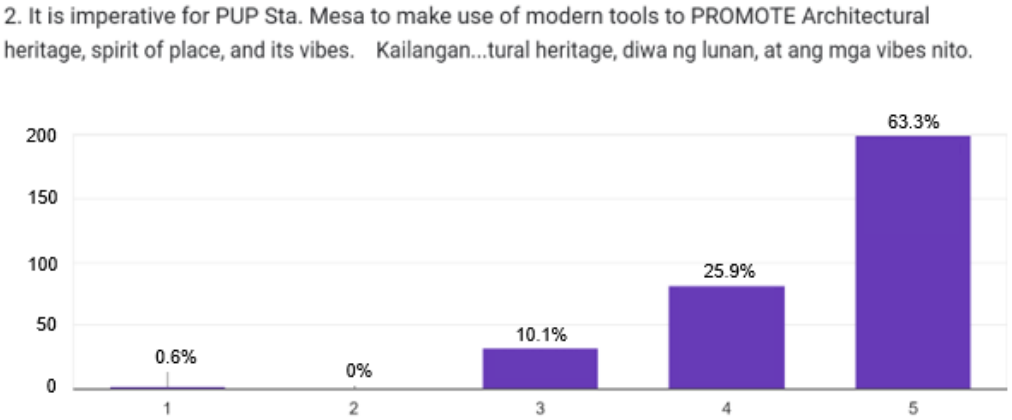

Figure 6: Graph showing results from General Question 2(source: by author)

General Question #3 - It is imperative for PUP Sta. Mesa to reference its own Architectural heritage, the spirit of place, and its vibes with the help of tools or technologies available.

In this question, 62.7% of the respondents strongly agree that it is imperative for PUP to reference its architectural heritage, and its spirit of place, 31% agree, 6.3% remain neutral, and 0% disagree nor strongly disagree. (See Figure 7)

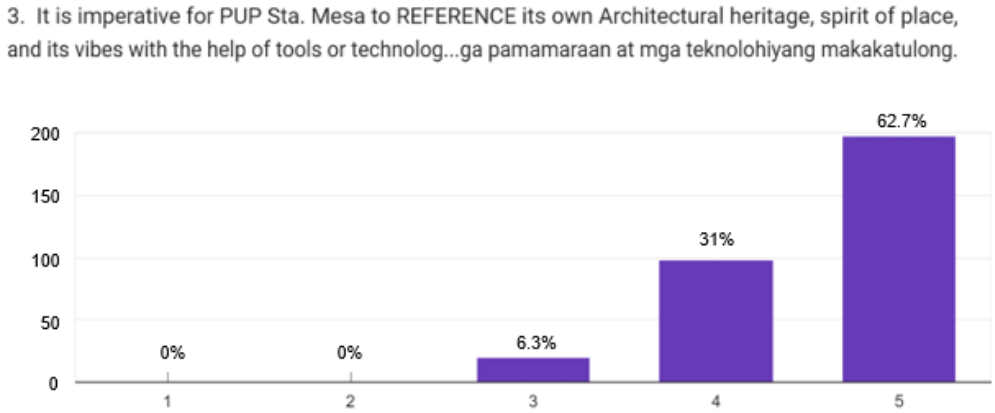

Figure 7: Graph showing results from General Question 3 (source: by author)

General Question #4 - I would like to relive PUP Sta Mesa's Genius Loci or spirit of place through virtual means like interactive technologies.

In this question, 55.1% of respondents strongly agree that they want to relieve PUP Sta Mesa's spirit of place through virtual means, 31.6% do agree, 10.8% remain neutral,1.9% disagree, and 0.6% strongly disagree. (See Figure 8)

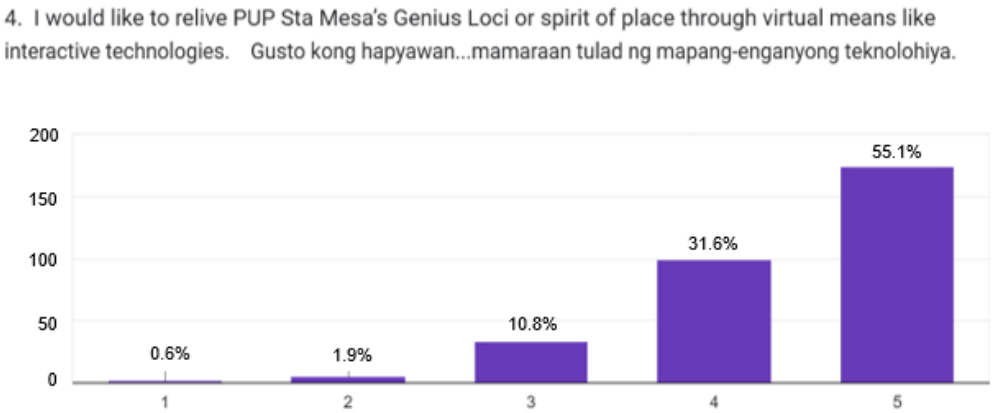

Figure 8: Graph showing results from General Question 4 (source: by author)

General Question #5 - Would you patronize a form of interactive technology that will uphold the Architectural Heritage of PUP Sta. Mesa as well as envisioning its Genius Loci (Spirit of Place)?

In this question, 53.2% strongly agreed to patronize Interactive Technology for PUP's Architectural heritage, and 35.5% agreed. 11.4% remained neutral, 1.9% disagreed, and 0% strongly disagreed. (See Figure 9)

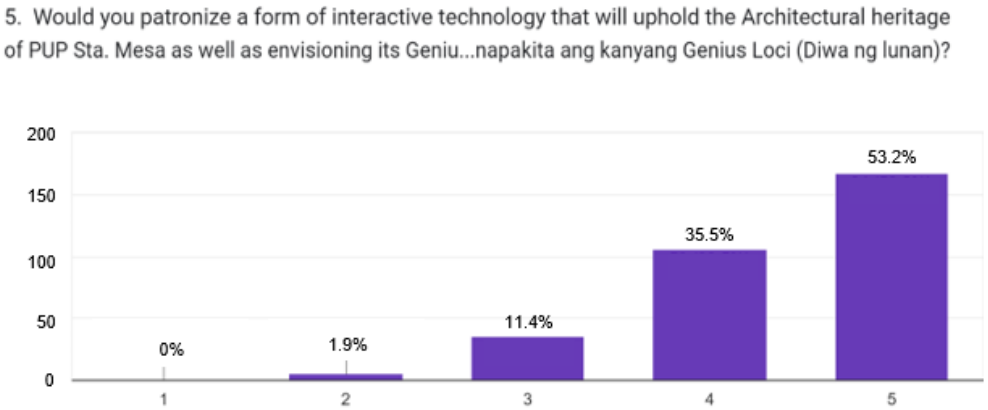

Figure 9: Graph showing results from General Question 5 (source: by author)

3.2. Specific Question Results

This section focuses on the respondents' Interactive Technology experience and their stance on the feasibility to be implementing PUP Sta. Mesa as an AR application.

Specific Question #1 - I am familiar with the emerging trend of using interactive technology like augmented reality to enhance preservation and reference purposes.

In this question, 48.7% of respondents strongly agree that they are familiar with the emerging trend of using interactive technologies like Augmented Reality, 30.4% agree, 17.1% remain neutral, 3.2% disagree, and 0.6% strongly disagree. (See Figure 10)

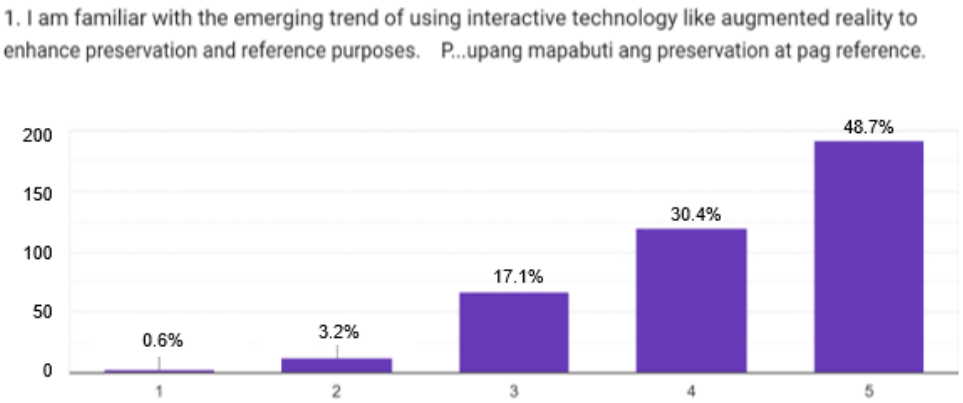

Figure 10: Graph showing results from Specific Question 1 (source: by author)

Specific Question #2 - I have experience with using interactive technologies in preservation settings (i.e. museums, and arcades).

In this question, 37.3% strongly agree that they have intensive experience with interactive technologies relating to preservation, 28.5% agree, whilst 19.6% remain neutral, 9.5% disagree and 5.1% strongly disagree. (See Figure 11)

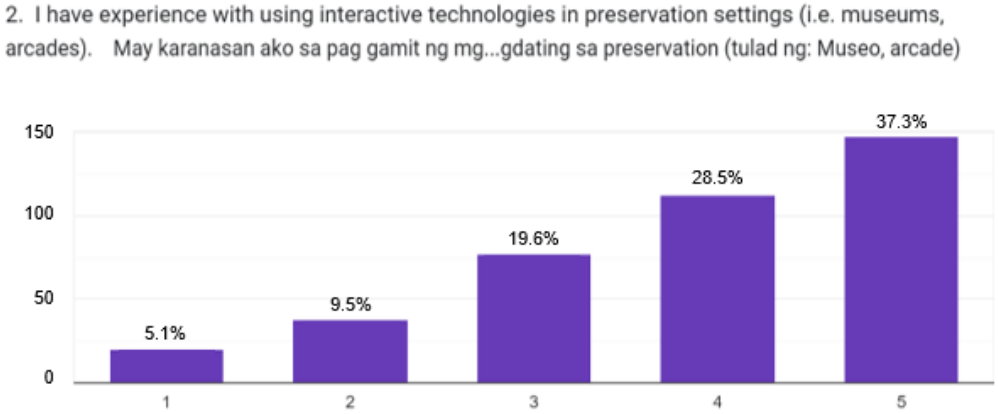

Figure 11: Graph showing results from Specific Question 2 (source: by author)

Specific Question #3 - The use of interactive technologies like Augmented Reality in preservation settings and architectural heritage peaks my interest in learning more about those topics.

In this question, 51.3% of respondents strongly agree that preservation and architectural heritage through Interactive Technology pique their interest. 34.8% agree, 13.9% remain neutral, whilst 0% disagree or strongly disagree. (See Figure 12)

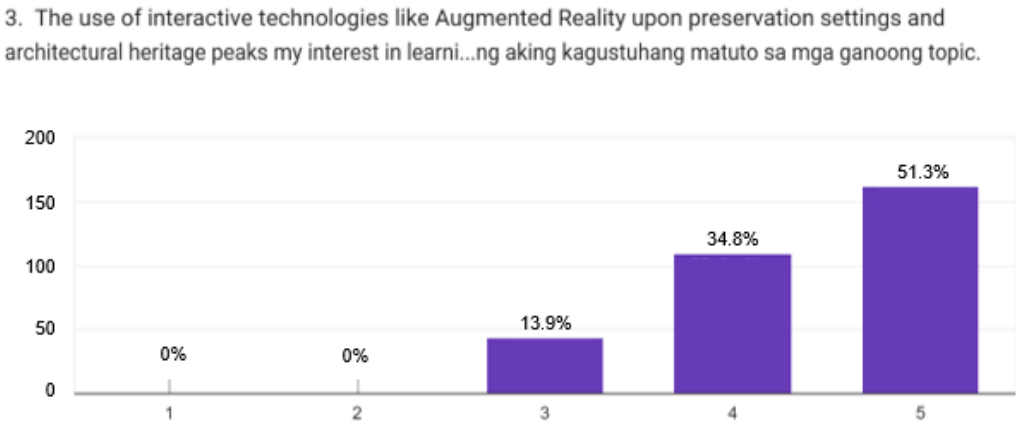

Figure 12: Graph showing results from Specific Question 3 (source: by author)

Specific Question #4 - I think that current interactive technologies are ADEQUATE ENOUGH for an Augmented Reality application to be launched to the PUP community.

In this question, 34.2% agree that Interactive Technology is adequate enough for an AR application to be launched at PUP Sta. Mesa, 31.6% strongly agree, 27.2% remain neutral, whilst 5.7% disagree, and 1.3% strongly disagree. (See Figure 13)

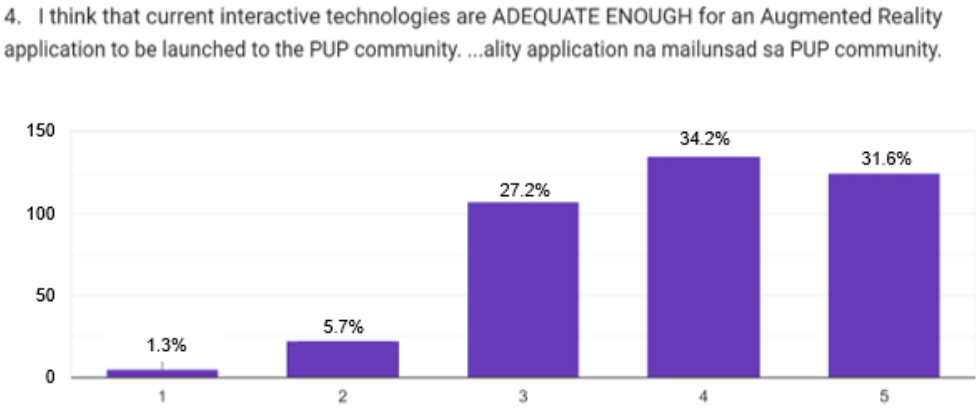

Figure 13: Graph showing results from Specific Question 4 (source: by author)

Specific Question #5 - The use of this application can be a tool to make use of Architectural characteristics as a reference for current and future renovation work.

In this Question, 53.2% strongly agree that the AR application can be a tool to reference Architectural characteristics for future renovation work, 39.9% agree, 7% remain neutral, and 0% disagree or strongly disagree. (See Figure 14)

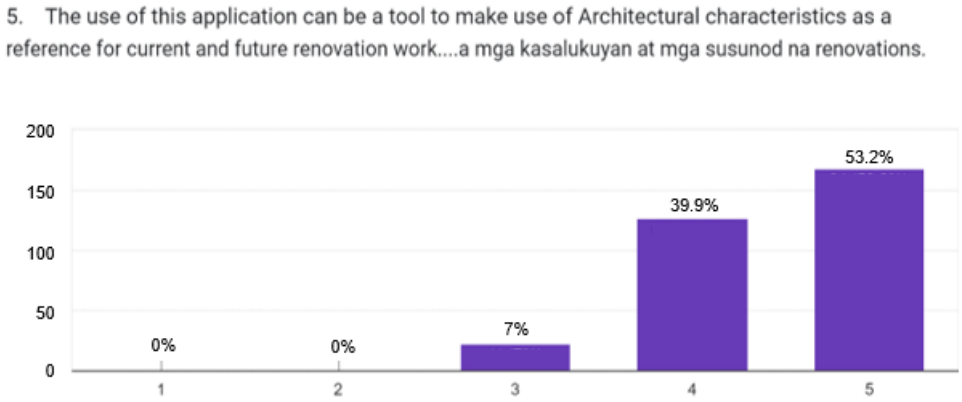

Figure 14: Graph showing results from Specific Question 5 (source: by author)

Specific Question #6 - Augmented reality and similar interactive technologies can be a key asset for keeping PUP's architectural heritage as well as preserving the quirks of the campus further highlighting its Genius Loci as time goes on.

In this question, 55.7% strongly agree that AR and similar technologies can be an asset for architectural heritage preservation and Genius Loci of PUP, 36.1% agree, 8.2% remain neutral, whilst 0% disagree nor strongly disagree. (See Figure 15)

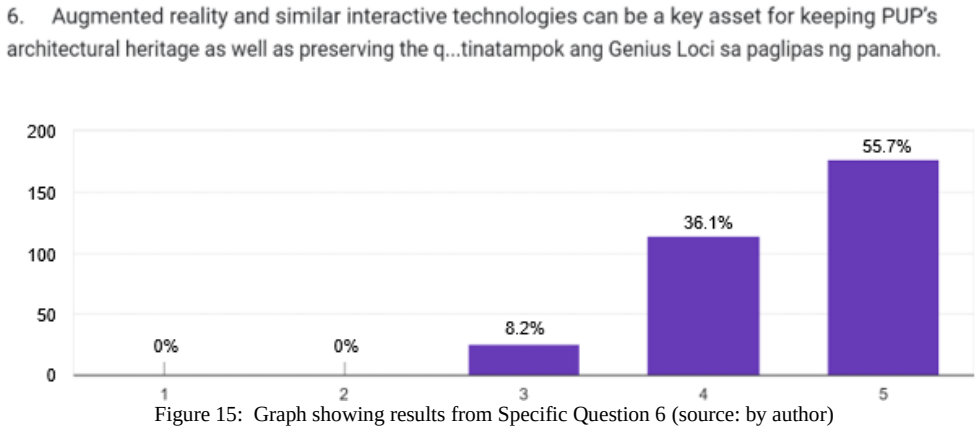

Figure 15: Graph showing results from Specific Question 6 (source: by author)

3.3. Augmented Reality Application Functions

This section highlights which of the following functions are most desired by users to be included in a proposed AR application. The results from the respondents are as follows:

53.2% of respondents strongly agree to have Audio Integration, 37.3% agree, 8.9% remain neutral, 0% disagree, and 0.6% strongly disagree. (See Figure 16)

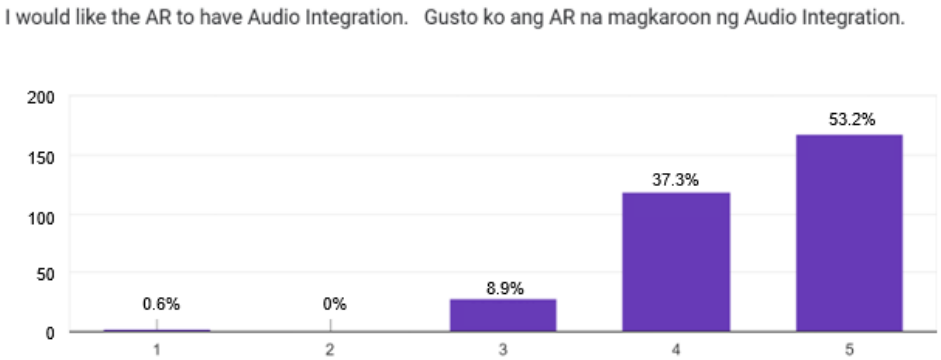

Figure 16: Graph showing results on responder sentiments on Audio Integration (source: by author)

44.9% of respondents strongly agree that the AR application be gamified, 31% agree, 19.6% remain neutral, 3.2% disagree, and 2.1% strongly disagree (See Figure 17)

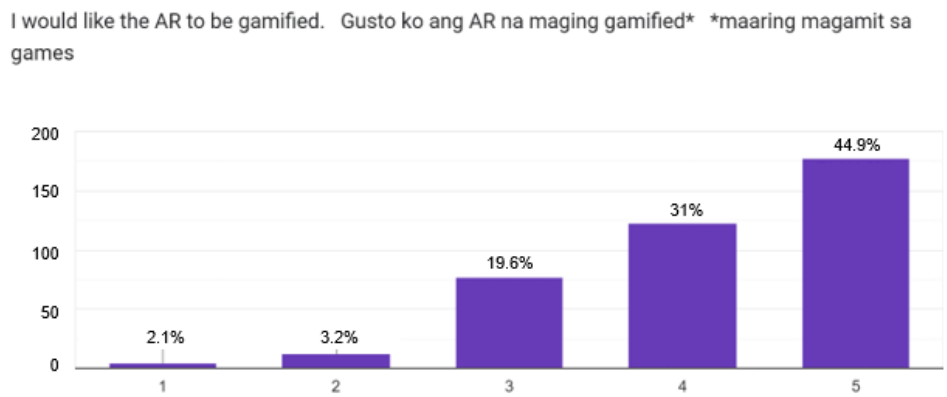

Figure 17: Graph showing results on responder sentiments on gamification of AR program (source: by author)

74.7% of respondents strongly agree that there should be suitable UI and UX for the application, and 19.6% agree. 5.7% remain neutral, whilst 0% disagree nor strongly disagree. (See Figure 18)

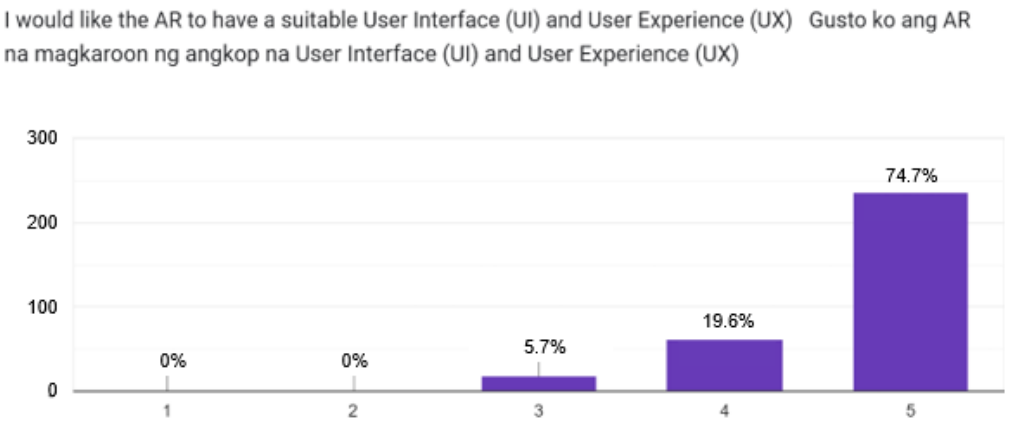

Figure 18: Graph showing results on responder sentiments with UI and UX of the program (source: by author)

71.5% of respondents strongly agree with having cross-platform compatibility (compatible with phones, tablets, laptops and other devices), 21.5% agree, 6.3% remain neutral, 0.6% disagree and 0% strongly disagree. (See Figure 19)

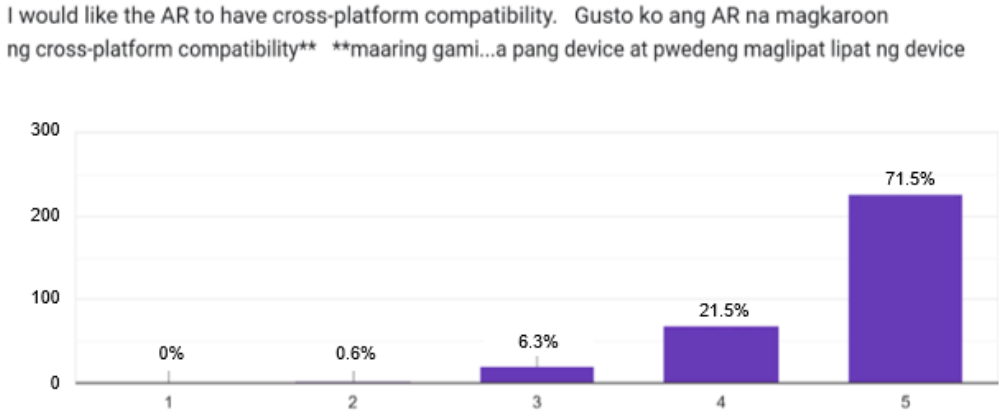

Figure 19: Graph showing results on responder sentiments with cross-platform compatibility (source: by author)

84.8% of respondents strongly agree with having strong security and user privacy, 11.4% agree, 3.8% remain neutral, and 0% disagree or strongly disagree. (See Figure 20)

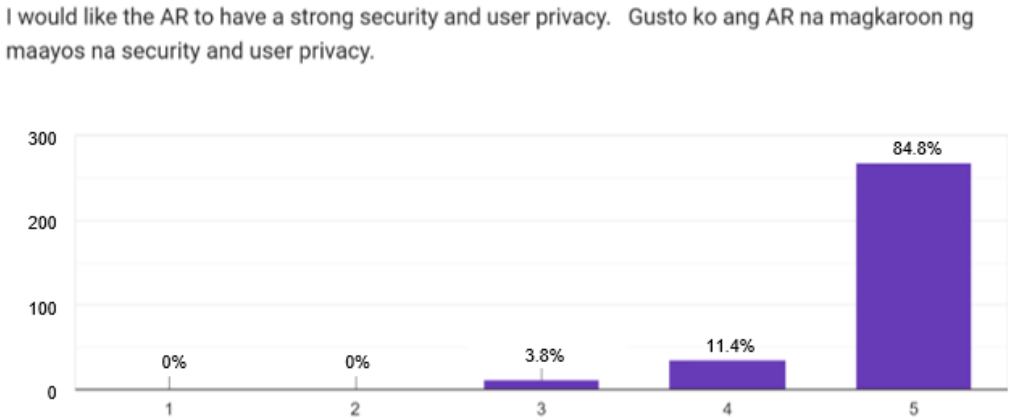

Figure 20: Graph showing results on responder sentiments upon proper security and strong user privacy (source: by author)

72.2% of respondents strongly agree that the application should be customizable, 24.1% agree, 3.2% remain neutral, 0.6% disagree, and 0% strongly disagree. (See Figure 21)

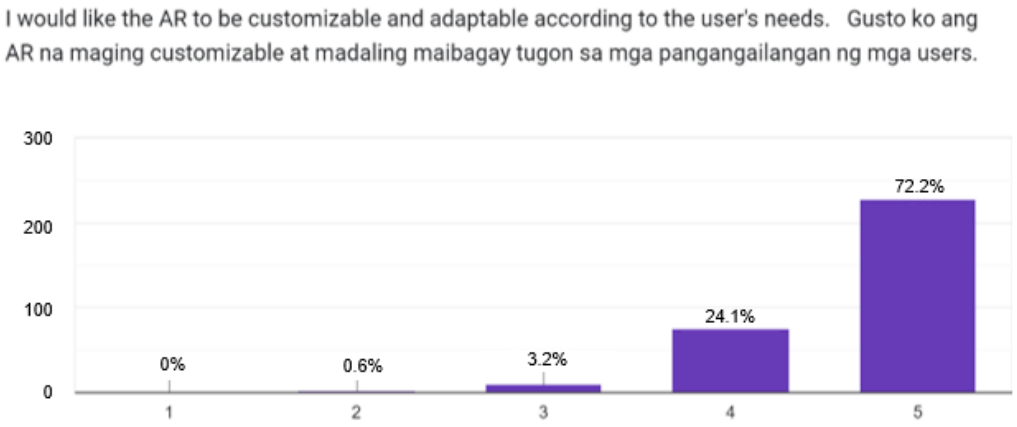

Figure 21: Graph showing results on responder sentiments upon customizability and adaptability to user's needs (source: by author)

47.5% of respondents strongly agree with AR and AI integration, 27.8% agree, 20.3% remain neutral, 3.2% disagree, and 1.3% strongly disagree. (See Figure 22)

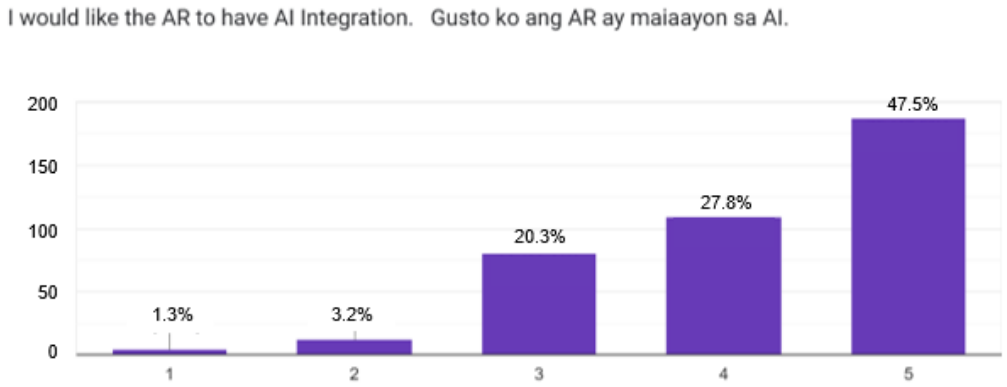

Figure 22: Graph showing results on responder sentiments with AI integration for the AR program (source: by author)

71.5% of respondents strongly agree with the application having great graphics, 18.4% agree, 9.5% remain neutral, 0.6% disagree, and 0% strongly disagree. (See Figure 23)

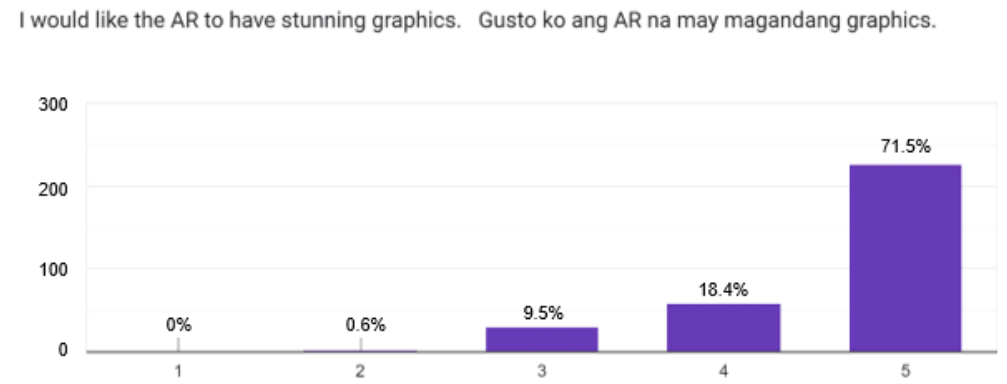

Figure 23: Graph showing results on responder sentiments with the AR program with great graphics (source: by author)

74.7% of respondents strongly agree that the application's performance be optimized (more powerful), 14.6% agree, 5.7% remain neutral, whilst 0% neither disagree nor strongly disagree (See Figure 24)

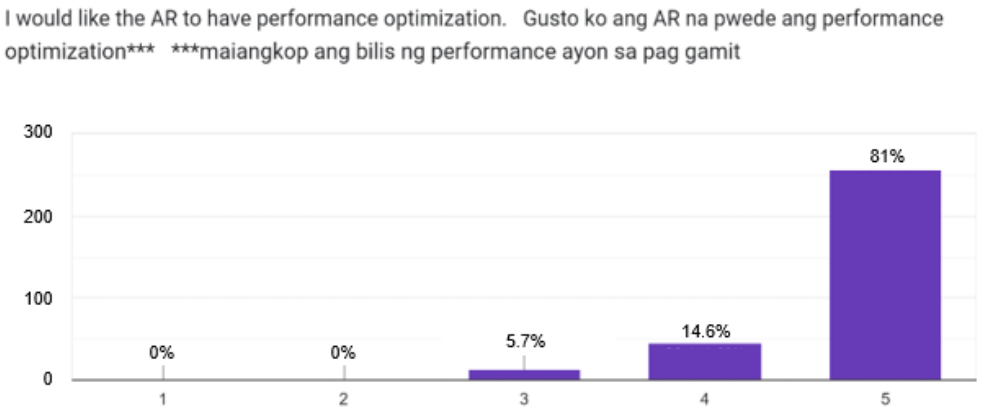

Figure 24: Graph showing results on responder sentiments with AR getting performance optimization features (source: by author)

4. Discussion

Based on the results from the research instrument, the majority of this study's participants are 18-24-year-olds enrolled on PUP's Bachelor programs, the second most participants are Alumni, followed closely by Faculty and the rest making up of University staff. The gender breakdown of these participants is near 50-50 men and women with a small margin belonging to other gender classifications. The research instrument is divided into 3 categories (1) General questions – PUP's relationship to the respondents and their stance on Interactive Technology filling the role of upholding PUP Sta. Mesa's Genius Loci and Architectural Heritage. (2) Specific questions - revolves around Interactive Technology experience and its feasibility to be implemented PUP Sta. Mesa as an AR application. (3) Augmented Reality Application function - Which features do the respondents want the proposed AR application to have? On the General questions part, The majority thinks that the spirit of place strongly influences their feelings for PUP Sta. Mesa has no objections to using modern tools to promote these influences. Responses also show favor for the discourse of PUP's architectural heritage and its sense of place, and they are on board with relieving PUP Sta Mesa's spirit of place through virtual means, as well as patronizing Interactive Technology. The Specific Questions part tells that the majority of the respondents are familiar with Interactive Technologies but not everyone has an extensive experience with it. The respondents are more inclined to be interested in the preservation and architectural heritage if it is in tandem with Interactive Technologies. However, a sizable chunk of the respondents are unsure if current Interactive Technology assets are adequate to be rolled out at the scale of PUP Sta. Mesa campus. Despite some doubt about its Interactive Tech's inadequacy, Interactive Tech like AR can still be useful as an architectural reference for renovation works, and such technology is crucial in preserving PUP Sta. Mesa's architectural heritage and its spirit of place. The Augmented Reality Application function highlighted what are the important functions the respondents want the most. The results say that the application should be customizable and adaptable to users' preferences and there should be strong security and user privacy measures. These two functions got the highest approval from respondents. The least amount of approval meanwhile is the integration of AI in the application and its gamification, with other notable features in between (i.e. User Interface or UI, User Experience or UX, application graphics, audio, and compatibility.

5. Conclusions

Overall, the study shows a strong interest and attitude toward the use of modern and more Interactive Technologies, in particular Augmented reality (AR) in preserving and promoting PUP Sta. Mesa campus' architectural heritage and spirit. Through the use of the IPO process and research instruments, the study showed the specifics of this strong interest and which demographics are more into it which is the use of Interactive Technology itself like AR to promote Architectural Heritage and Genius Loci as well as to reference this said heritage and Genius Loci of PUP Sta. Mesa campus. A perceived narrative interpreted from the responses of a student-alumni majority of the PUP community. The Literature review thus provided the examples and sentiments that occur in the implementation of these types of technology, as well as the feasibility of such technology in the preservation discipline through different modes. With the results of this study agreeing to the benefits and necessity of these technological tools deeming that Interactive Technology like AR is a feasible way to uphold PUP Sta. Mesa's Architectural Heritage and Genius Loci. We

recommend that PUP Sta. Mesa must invest in the development and implementation of AR applications to firmly establish confidence that this type of application is adequate for use in PUP and the scale it demands. It can be said that the results validate the feasibility of the concept of an AR application that visualizes the architectural heritage and Genius Loci. With this in mind, there should be further discussion of the practical implications of the AR application itself, given that the initiative is deemed feasible. In this regard, there is already feedback from this study that highlights which features the community wanted with the AR application which can be a part of studying such applications' practicality. PUP capitalizing on this application can mean increasing campus engagement with its architectural and cultural identity, thus matching the interests of the population concluded from this study. This will also help realize the implementation of this study in the future with scalable AR models and thus integrating AR to heritage preservation practices at academic institutions like PUP.

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Ethics Approval

The authors have received ethics approval from the ethics committee of the University of Kitakyushu for the interviews and questionnaires that were conducted by the authors.

Conflict of interest

The authors declare there is no conflict.

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