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Digitalization of UNIMED Fine Arts Gallery through Virtual Tour 360 for Accessibility and Exhibition

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ABSTRACT
The limited accessibility to physical art galleries and the lack of comprehensive documentation of exhibitions have become challenges in preserving and promoting visual art in academic settings. Particularly in the Fine Arts Education Program at Universitas Negeri Medan (Unimed), the physical gallery space has yet to accommodate wider audience engagement, especially in digital formats. This creates a gap between the potential of technological integration and the current practices in art exhibition and education. Addressing this issue, this study aims to explore the digitalization of the Fine Arts Gallery through the development of a virtual tour as an effort to increase accessibility and improve exhibition documentation. The research employs a descriptive qualitative method with a case study approach, focusing on the process of designing and implementing a 360-degree virtual gallery experience. Data were collected through observations, interviews with lecturers, students, and gallery visitors, and open-ended surveys to capture perceptions and experiences. The findings reveal that the virtual tour not only provides broader access to art exhibitions beyond physical limitations but also enhances the visual and archival quality of gallery content. Furthermore, users perceive the platform as more engaging and educational. In conclusion, the digitalization of the gallery using virtual tour technology serves as a strategic innovation to support art learning, appreciation, and preservation in higher education. This approach may serve as a replicable model for other academic institutions seeking to modernize their art exhibition practices.

KEYWORDS

Culture, Fine Arts, Design, Software, E-learning

INTRODUCTION

In recent decades, the development of digital technology has changed various aspects of life, including the world of art. The digitization of art has opened up wider access to a global audience, allowing artworks to be enjoyed without the limitations of time and space. One of the innovations in art digitization is the application of virtual tour in art galleries, which allows visitors to explore the exhibition space online through 360-degree scanning technology. With this method, the gallery space can be recorded in an interactive panoramic format, allowing visitors to explore the exhibition with an experience that almost resembles an in-person visit. This technology has been utilized by various renowned art institutions, such as Google Arts & Culture, which provides virtual tours for the world's museums (Syifa et al., 2025).

In addition to improving accessibility, gallery digitization also plays an important role in conservation and education. Documentation based on 360-degree scanning allows spaces and artworks to be recorded in a digital format that can be accessed at any time, avoiding the risk of

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physical loss or damage. Moreover, in the context of art education, digitization allows students and researchers to conduct in-depth explorations of artworks without having to rely on physical visits. Thus, this technology is not only a documentation tool, but also a more modern and interactive learning medium, in line with the development of the digital era (Sadati et al., 2024).

In ideal conditions, an academic art gallery functions as an active center of art exploration and appreciation. The gallery should not only act as an exhibition space for students and artists, but also as an educational center that supports the development of artistic, curatorial, and art studies skills (Hooper-Greenhill et al., 2009). Adequate facilities, such as a good lighting system, art archive space, and structured documentation, are important elements in supporting the sustainability of the gallery's function. Furthermore, an ideal academic gallery should be accessible to the wider public, not limited to the campus community, but also artists, researchers, and art lovers from various backgrounds.

With the advent of digital technology, ideally art galleries should not only operate in a physical format but also in a virtual form. Through 360-degree scanning, every corner of the exhibition space can be captured and integrated into an online platform that allows users to explore interactively. This technology allows for additional features such as detailed information on each work and a near-reality navigation experience. With this approach, an art gallery can function more inclusively, reach a wider audience, and strengthen its role in the development and appreciation of art in the digital age.

Although the concept of gallery digitization has been widely implemented in various global art institutions, reality shows that many academic art galleries in Indonesia still experience various limitations, including in the management and utilization of technology. The fine art gallery at the Faculty of Language and Arts, Universitas Negeri Medan, for example, still operates conventionally, relying entirely on physical space to organize exhibitions. Art exhibitions generally only take place for a limited time and access to artworks is very limited for those outside the campus environment. This results in less than optimal appreciation of artworks and often poor documentation of works for future access.

In addition, the lack of utilization of digital technology in the curation and publication of exhibitions leads to limitations in audience reach (Parry, 2007). Social media and websites that can be used as promotional and documentation tools are still not optimized, so art exhibitions are often only known by a limited scope. Students and exhibiting artists also do not get wider exposure to their works. With this condition, art galleries in the academic environment are still far from optimal in providing a broader and more inclusive art appreciation experience.

To answer this challenge, the development of an art gallery virtual tour with 360-degree scanning is a strategic solution that can be implemented (Pierdicca et al., 2021). With this technology, the entire gallery space can be recorded in an interactive panoramic format that allows visitors to explore virtually. Through integration with digital platforms, art exhibitions can be accessed anytime and from anywhere, providing greater flexibility for students, lecturers, and the general public in appreciating artworks. In addition, the 360-degree digital documentation also ensures that each exhibition is well preserved and can be accessed again in the future (Ren & Chen, 2021).

For this implementation to run optimally, there needs to be careful management and strategy. The faculty can build an online platform, a virtual tour navigation system, and interactive features such as descriptions of works in multimedia format. In addition, collaboration with other art institutions, both nationally and internationally, can open up opportunities for the fine art gallery of the Faculty of Language and Arts, Universitas Negeri Medan to be more widely recognized. With this step, the art gallery can become more modern, inclusive, and able to compete in the digital era, while becoming a more dynamic center for art education and appreciation.

METHOD

The research method used in this study is a qualitative method with a case study approach (Van Lith, 2019), This study aims to deeply understand the process of digitizing the Fine Arts Gallery at the Fine Arts Education Study Program of Universitas Negeri Medan through the development of a virtual tour as a strategy to improve accessibility and exhibition documentation. The subject of this research consists of two main components, namely the physical space of the Fine Arts Gallery as the object of digitization and the group of informants who interact directly with the space, including

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students, lecturers, and gallery visitors. The Fine Arts Gallery was chosen because of its strategic function as an art appreciation space and educational space for the academic community.

Data was collected through direct observation of the process of recording and processing the gallery space into a virtual form using a 360-degree camera. The scans were then processed with virtual tour software such as Kuula or Lapentor to produce an interactive gallery display. The integration of the virtual tour is done through a digital platform that allows wide access by the public. To gain an in-depth understanding of the effectiveness and user experience of the virtual tour, in-depth interviews were conducted with 20 informants consisting of active students, lecturers, and several visitors who have direct experience with the gallery. The interviews focused on their perceptions of the ease of access, convenience of use, affordability, and visual quality and interactivity of the virtual exhibition documentation.

The data obtained were analyzed using qualitative analysis techniques, namely through the process of data reduction, data presentation, and conclusion drawing. Data reduction was conducted to filter relevant information from the results of observations and interviews, then the data was organized in narrative form to reveal emerging patterns of findings. The results of the analysis aim to formulate an in-depth understanding of the potential of virtual tour as a digital media that not only increases the accessibility of art galleries, but also strengthens its function as a space for documentation of artworks in an academic environment.

RESULT AND DISCUSSION

1. Collecting Artwork

This collection of works aims to ensure that each work meets the aesthetic standards, concepts, and conditions that have been set. Students are required to submit their work according to the specified time so that all activities in making virtual exhibitions run well and according to procedures (Cempaka et al., 2022).

Figure 1. Collecting Artwork

2. Artwork Display

Through this display, visitors can see how each work is carefully arranged so that it can be enjoyed to the fullest in the exhibition. This documentation is also a form of appreciation for the hard work of the students in presenting an exhibition that not only displays artworks, but also the creative experience behind the process of organizing it (Khamadi & Setiawan, 2020).

Figure 2. Display the works in the exhibition room.

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3. Artwork Documentation

Photographing the works that have been displayed. The photographing process is carried out using a high-resolution DSLR camera to ensure that every detail of the work is clearly recorded. (Khaerul Saleh, 2013). To get these details, lighting is needed, which includes setting the diaphragm, shutter speed, and setting other light sources (Drs. Onggal, 2013). After that, the photos were scanned to improve the sharpness and clarity of the images, so that each element in the work can be seen in more detail and accurately. This step is done as part of the documentation efforts aimed at archiving and publicizing the best quality works.

Figure 3. Artwork Documentation

4. Tool Preparation

The main devices used were an Insta360 X3 360° camera and a tripod. These two tools play an important role in ensuring optimal visual documentation results, both in the form of photos and videos. The Insta360 X3 camera is a state-of-the-art device capable of recording the entire environment in a 360-degree view. It enables the creation of virtual reality (VR) content and provides users with an immersive experience (Iwan pranoto et al., 2021). One of its outstanding features is reframing, which allows the video's angle of view to be adjusted after recording, allowing users to choose the best perspective without the need to manually aim the camera during shooting.

Besides the camera, the use of a tripod is an important element in ensuring stability during the recording process. The tripod serves as a camera stand to avoid shaking that may affect the visual quality. With a tripod, each shot can be taken at a consistent angle, which is crucial in the preparation of virtual tours and product documentation in exhibitions.

Figure 4. Camera Insta360 X3 and Tripod.

5. Mapping The Scanning Point

Mapping the scanning point is a stage where the panorama scanner prepares a point or spot that will later be used for the scanning or recording stage of the virtual panorama of the gallery. In this virtual exhibition, the team prepared 15 scanning points starting from the front area of the gallery, the gallery yard, the entrance to the gallery which contains many works from Universitas Negeri Medan fine arts students.

Mapping the scanning point acts as a reference to visitors so that they know which point to go to and where the point is headed. In addition to being a directional reference to visitors, this stage is also one of the factors determining the number of works that will be displayed at each point in the room in the virtual gallery. For information about the mapping points in the virtual gallery scanning can be seen in the following image.

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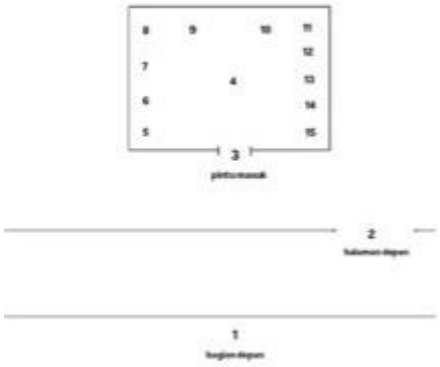

Figure 5. Mapping the scanning Point

As seen in each number in the illustration above, it can be seen that the numbering of each spot or point serves as a marker for the scanner to scan the virtual exhibition using a 360 camera. Scanning is done starting from the lowest number where the number is the outside of the gallery.

6. Scanning Panorama 360

The scanning process is done by activating the camera that has been set to pro mode with a resolution of 18 mega pixels. This resolution is the most appropriate action because at higher resolutions the scanning results show black and white image media. Scanning is done by adjusting the mapping points that have been made.

The panorama scanning process is the most important part in creating a virtual exhibition. Scanning becomes the basic aspect of making a virtual exhibition because without the panorama scanning process, the virtual exhibition will not be realized. This stage will also be the main view for visitors to be able to see the exhibition virtually *(Beraldin et al., 2005)*.

Figure 6. Scanning photos using insta 360 camera.

7. Editing Panorama

This stage begins with the completion of the panorama scanning process which then the scanning results are adjusted to the lighting and color grading on the scanned photos. This process is done in Insta360 Studio application where the scanning results at each mapping point are edited in this application.

After the lighting and grading editing process in Insta360 Studio application, then the photos that have been exported in jpeg format are edited again in Affinity Photo application. In this application, the editing process is done by adjusting the 360-degree photo, where at the beginning of the panoramic scanning results of the photo when shifted to the side shows a tilted position and is not parallel to the human eye view. This resulted in visitors' eyes becoming dizzy due to the position that is not in accordance with normal human eyesight.

Affinity Photo application serves to rearrange the horizontal point of the panoramic scanning results, so that the photo results will look normal when shifted from any angle. The results of each photo that has been edited at each mapping point will then be uploaded for the virtual exhibition

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creation process.

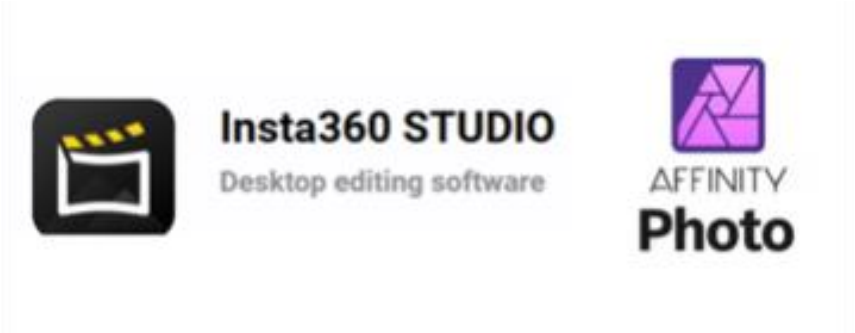

Figure 7. Software Editing Panorama.

8. The Making of Virtual Tour

Creating a virtual tour is a process of creating an experience that allows people to explore a place or location without physically being there. By using technologies such as 360-degree photos, videos, and animations, virtual tours provide a clear and detailed picture of a place, such as a museum, hotel, or tourist destination (Guttentag, 2010).

Visitors can click or swipe the screen to see different points of view, as if they were walking in the place. Virtual tours are very useful for promoting locations, helping visitors plan their visit, and providing access to people who may not be able to go to the location in person (Jung et al., 2016).

The platform used is Lapentor. Lapentor is a software platform designed to make it easy for users to create and share 360-degree virtual tours without the need for programming skills. With an intuitive and simple interface, Lapentor allows anyone, both individuals and businesses, to design virtual tours quickly and efficiently. Lapentor has various features that support the creation of interactive and engaging virtual tours. One of its key features is its ability to upload 360-degree photos and combine them into a virtual tour that can be explored interactively. This feature is very useful for various industries, such as real estate, hospitality, museums, and educational institutions, who want to provide virtual experiences to their clients or visitors.

Figure 8. Lapentor App

On this platform, all panoramic photos that have been taken are uploaded to be used as a panoramic scene. Upload Scene Panorama in Lapentor is the process of uploading 360° photos that will be used in the virtual tour. This photo will later become the main display that visitors can explore indirectly, as if they were in that location. To upload a panorama scene, we can select a 360° photo that has been prepared and insert it into the virtual tour project. After that, we can add hotspots, description text, navigation icons, or even sound and video to provide additional information. This feature is important because each panoramic scene represents one place in the virtual tour. By adding multiple scenes and connecting them, visitors can move from one location to another, making the browsing experience more real and engaging.

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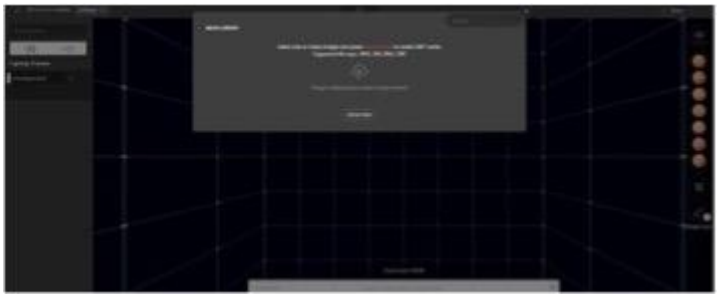

Figure 9. Panorama Scene Upload Process in Lapentor

Hotspot creation in Lapentor is the process of adding buttons or points in the virtual tour that allow visitors to move from one location to another or access additional information. Hotspots function as navigation in virtual tours, so that users can explore various corners or rooms by simply clicking on certain points. Some of the hotspots in the lapentor application are Point Hotspot, Image Hotspot, Info Hotspot, and Audio Hotspot.

9. Finalization

The finalization stage is an important step in completing the preparation of a virtual exhibition (Fitriana et al., 2024). At this stage, all elements that have been prepared previously are collected, checked, and refined to ensure an optimal final result. The finalization process begins with double-checking all panoramic contents that have been uploaded to the Lapentor platform, ensuring all hotspots are functioning properly, and fixing sub-optimal visual elements.

After all stages were completed, the team created a public access link (https://app.lapentor.com/sphere/virtual-gallery-seni-rupa) to the virtual exhibition that would be disseminated through various social media platforms and the official website of Universitas Negeri Medan.

Figure 10. Final Virtual Gallery

10.Measurement of Product Effectiveness

The results of the evaluation of user experience and perception, through in-depth interviews with 20 informants consisting of students, lecturers, and visitors, showed that the majority of respondents felt helped by the existence of virtual tours. They appreciated the flexibility of access and the representative visual display. In addition, interactive features such as information on works (hotspots) are considered to add educational value to the virtual visiting experience. Lecturers also stated that this virtual tour has been utilized in the learning process, especially in discussions about art appreciation and exhibition curation.

Through observations of virtual tour usage, it was found that users showed high enthusiasm in exploring the gallery digitally. The average duration of interaction exceeded 7 minutes, with users actively accessing the works in detail and navigating the space thoroughly without any significant technical barriers. This shows that the developed platform succeeded in creating an accessible and engaging interactive experience.

The documentation of practices before and after digitization also shows significant changes. Before the virtual tour, exhibition documentation was limited and less widespread. After the

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implementation, the gallery is not only digitally documented, but can also be accessed at any time through the official website of the study program. In fact, some lecturers have integrated the virtual tour link into the RPS as a learning resource. Promotion of the exhibition has also increased through social media, reaching a wider audience. Overall, the results of these three approaches confirm that the digitalization of the gallery through the virtual tour has brought positive impacts in improving access, documentation, and educational functions of the art gallery in the academic environment.

With this, the results of measuring the success of the product can be said to be successful. The majority of users gave positive feedback on all aspects, sharp and clear visual and audio quality, easy navigation, and providing a rewarding experience for visitors. Some minor improvements can be made to further enhance the quality of the exhibition. Overall, the questionnaire results showed high success. These measurement results will be used to refine and improve the production of virtual exhibitions in the future.

Figure 11. Documentation of Evaluation Results with Users

CONCLUSION

Thus, this virtual exhibition has been successfully implemented. The process of creating the exhibition includes collecting works, displaying works, documentation, and using 360° camera technology and Lapentor application to create an interactive virtual experience. From the evaluation results, the majority of respondents rated the exhibition as having good accessibility, adequate visual and audio quality, and easy-to-use navigation. In addition, visitor satisfaction levels were also very high, indicating that the exhibition provided an engaging and rewarding experience. These successes form the basis for future development and improvement of the virtual exhibition.

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