ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 14, Issue, 08, pp.22150-22156, August, 2022
DOI: https://doi.org/10.24941/ijcr.43941.08.2022

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

ART GALLERY VISITORS INTEREST IN VIRTUAL REALITY ART EXHIBITIONS

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ARTICLE INFO

Article History:
Received 19th May, 2022
Received in revised form
15th June, 2022
Accepted 24th July, 2022
Published online 30th August, 2022

Key words:
virtual reality,
Art,
Gallery,
Exhibition.

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ABSTRACT

Background: Exhibitions in art galleries can be digitized and accessed by visitors through virtual reality. The main question of this study seeks to find out what are the reactions, impressions and suggestions of a group of participants viewing an exhibition can be explored both in physical space and in virtual reality. objective(s) The main purpose of this paper is to observe the interest of art gallery visitors in VR technology used for art exhibitions and to analyze how well they interact with the VR experience dedicated to an art gallery. ***Materials and Methods***: The VR experience developed as a result of this study offers users a virtual space in which they can find the events that took place in the Aparte gallery at the George Enescu University in Iași, by faithfully capturing all the elements in the exhibition space following the digitization of the gallery and the exhibited artworks. The artworks have been digitized by photogrammetry, respect the proportions in reality and offer users a high degree of detail. Data were collected through questionnaires, interviews, think-aloud, and notes were taken while using the VR app. The group of participants in this experiment could experience both the virtual exhibition and the exhibition that took place in the physical space. ***Results:*** We collected the answers to the survey questions from 30 visitors who tested the VR experience. 15 men and 15 women took part in the experiment, and the age range was between 25 and 60 years. A high level of interest in virtual reality was noted, and most participants enthusiastically approached the proposal to participate in the experiment, verbally mentioning their desire and curiosity to explore the VR art gallery exhibit. ***Conclusion:*** The virtual art gallery is a solution in terms of space, dimensions, and even location, as it can be accessed from anywhere via the Internet and can accommodate any type of exhibit. More than 90% of the participants stated that they agree or strongly agree to use the VR set in exhibitions in the future, and after experiencing the VR application, most of the participants expressed their desire to see more such exhibitions in VR and they noted some advantages of this type of experience, such as viewing exhibitions from home or exploring past exhibitions that they had not been able to get to.

Citation: ***Adrian Mihai Brinza.*** **2022.** "Art gallery visitors interest in virtual reality art exhibitions". *International Journal of Current Research*, 14, (08), 22150-22156.

INTRODUCTION

The main purpose of this paper is to observe the interest of art gallery visitors in VR technology used for art exhibitions and to analyze how well they interact with the VR experience dedicated to an art gallery. In order to better understand and evaluate the user experience of the VR system and the VR experience, a holistic evaluation was required through which information was collected on various aspects of interaction and use, which have the role of improving and refine the experience. The technological advance has allowed the development of virtual reality, a new environment of artistic creation and multisensory communication, which offers new opportunities for expression in the artistic sphere and for the dissemination of artistic content on a global level. Virtual reality is an environment composed of interactive simulations that are correlated with the position and actions of the participant, giving the participant the sensation of being mentally immersed or present in the simulation or representation of a virtual world.

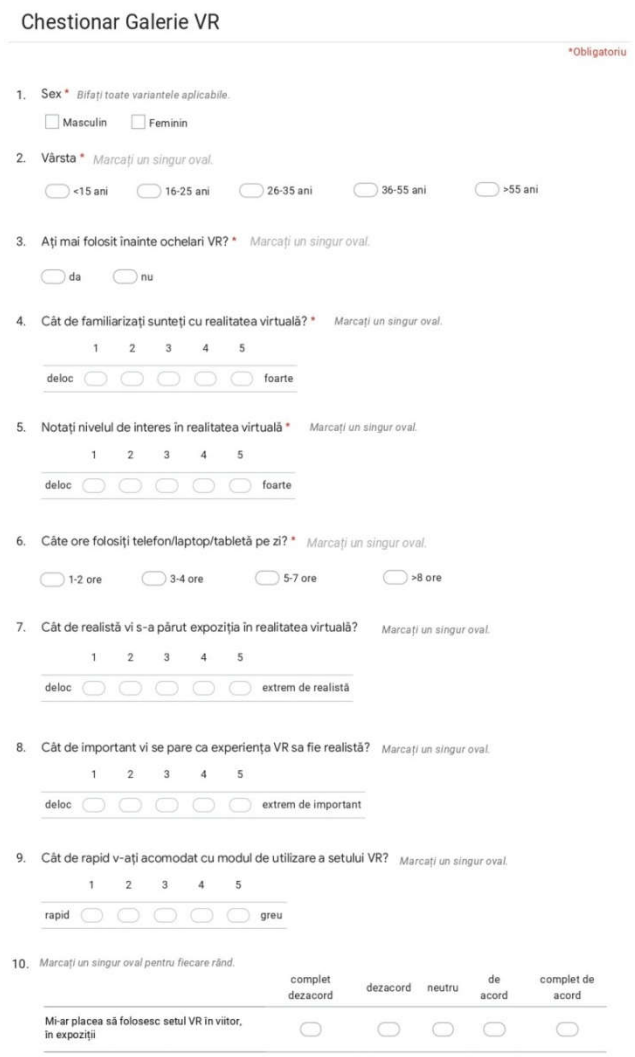
VR applications dedicated to exhibitions offer users a real-time experience both inside the gallery and online outside of it. These applications manage to solve the limitation of space, location and exposure time, and exhibitions thus gather a diverse and much larger audience. By addressing these limitations, VR exhibition designers expand their creative horizons and can focus on designing interactive, authentic, and memorable experiences. A virtual gallery is a digital entity that shares some characteristics with the gallery in the physical space, being accessible to the general public and focusing on a cultural asset. It aims to complement and amplify the traditional gallery experience by building an authentic, interactive environment with a more effective presentation of the exhibited content and the artist. Similar to the institutional mission of a physical gallery, the task of a virtual gallery is to be accessible to the public, allowing access to knowledge related to collections and to organize their presentation in a coherent and systematic way, preserving them for a long period.

Exhibitions in art galleries can be digitized and accessed by visitors through virtual reality, and the main question of this study seeks to find out what are the reactions, impressions and suggestions of a group of participants viewing an exhibition that can be explored both in physical space and in virtual reality.

MATERIALS AND METHODS

The VR experience developed as a result of this study offers users a virtual space in which they can find the events that took place in the Aparte gallery at the George Enescu University in Iași, by faithfully capturing all the elements in the exhibition space following the digitization of the gallery and the exhibited artworks (Fig. 1). Artworks digitized by photogrammetry respect the proportions of reality and offer users a high degree of detail. In addition to the classic reality event experience, users benefit from comprehensive information and descriptions of the artists and the artworks they discover, can browse their favorite exhibitions from the comfort of their homes using VR systems, and can take the time to contemplate each exhibited artwork, not being pressured by the operating schedule of the gallery in reality or conditioned by the location. The application proposed for the experiment of this paper also has a menu area, through which the desired exhibits can be selected based on the poster and description, but within the finishing of the exhibit, users will only have access to the "Palindrome" exhibit to report the responses collected through interviews and questionnaires, to a single experience common to all participants. Within the virtual gallery, the mode of movement is carried out by teleportation, users being able to choose, by means of the control levers, the point where they want to be transported and the orientation in the exhibition hall. Their representation in virtual reality is rendered by unisex white gloves that are correlated with the position and movements in reality, thus facilitating immersion in the simulation and interaction with the elements in this environment, and the entire gallery room is proportional to the size of the avatar perceived by the user. The group of participants in this experiment were visitors at the finish of the "Palindrome" exhibition that took place in the Aparte gallery on May 3, 2022, because they could participate in both the virtual exhibition and the exhibition that took place in physical space.Data was collected through questionnaires, interviews , by the method of thinking aloud and notes taken during use.Interviewing is a technique of gathering information about users by talking directly to them, through an interview you can gather more information than with a questionnaire and you can reach a deeper level of detail, being an effective solution to get reactions subjective, opinions and perspectives on how people reason about problems [1]. Structured interviews have a predefined flow of questions and open-ended interviews allow the respondent to provide additional information and facilitate the interviewer to explore avenues of inquiry that may arise spontaneously during the interview. Demos of a prototype can be used in conjunction with user interviews to help the user talk about the interface.A questionnaire is a written set of questions used to obtain information from users before or after they have participated in a usability evaluation session [2]. Questionnaires are suitable for collecting demographic information (eg, age, gender, computer experience) and subjective data (eg, opinions, comments, preferences, ratings) and are often more convenient and consistent than spoken interviews. In the context of 3D user interfaces, questionnaires are used quite frequently, especially to obtain information about subjective phenomena such as [3]simulator presence or sickness. The questionnaires developed for this experiment can be found in Fig 2 and Fig 3. Before the experiment, a pilot test with a small number of participants was carried out, through which some changes were made to the VR experience and the questionnaire

Fig. 1. Participant exploring the virtual art gallery VR experience



Chestionar Galerie VR

*Obligatoriu

1. Sex * *Bifați toate variantele aplicabile.*
   Masculin Feminin
2. Vârsta * *Marcați un singur oval.*
   <15 ani 16-25 ani 26-35 ani 36-55 ani >55 ani
3. Ați mai folosit înainte ochelari VR? * *Marcați un singur oval.*
   da nu
4. Cât de familiarizați sunteți cu realitatea virtuală? * *Marcați un singur oval.*

	1	2	3	4	5	
deloc						foarte

5. Notați nivelul de interes în realitatea virtuală * *Marcați un singur oval.*

	1	2	3	4	5	
deloc						foarte

6. Câte ore folosiți telefon/laptop/tabletă pe zi? * *Marcați un singur oval.*
   1-2 ore 3-4 ore 5-7 ore >8 ore
7. Cât de realistă vi s-a părut expoziția în realitatea virtuală? *Marcați un singur oval.*

	1	2	3	4	5	
deloc						extrem de realistă

8. Cât de important vi se pare ca experiența VR sa fie realistă? *Marcați un singur oval.*

	1	2	3	4	5	
deloc						extrem de important

9. Cât de rapid v-ați acomodat cu modul de utilizare a setului VR? *Marcați un singur oval.*

	1	2	3	4	5	
rapid						greu

10. *Marcați un singur oval pentru fiecare rând.*

	complet dezacord	dezacord	neutru	de acord	complet de acord
Mi-ar placea să folosesc setul VR în viitor, în expoziții					

Fig. 2. Questionnaire page 1 of 2

For the VR experience, the dimensional proportions of the virtual gallery have been adjusted so that the user's perception of the explored space is correlated with the experience of visiting the gallery in reality. And in the questionnaire, certain questions were reformulated to avoid possible misunderstandings.

[1]Hix, Deborah, Developing User Interfaces: Ensuring Usability through Product and Process, John Wiley and Sons, 1993
[2]ibidem
[3]Witmer, Bob, Singer, Michael, Measuring Presence in Virtual Environments: A Presence Questionnaire, Presence: Teleoperators and Virtual Environments, 1998 , pp. 225–240

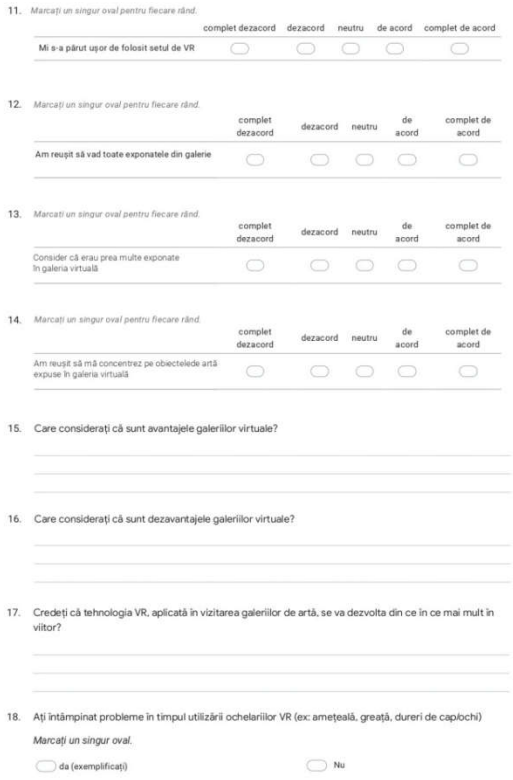


Fig. 3.Questionnaire page 2 of 2

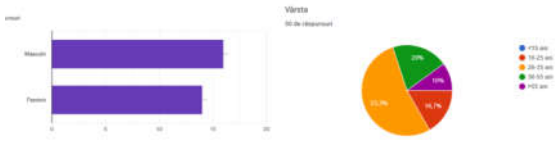
RESULTS

The appropriate number of participants who can identify around 80% of usability problems is between 5 and 8 according to Nilsen and Landauer (document VR.pdf , but to generate enough qualitative and quantitative data we collected anonymously the answers to the questions in the questionnaire of to 30 visitors who voluntarily tested the VR system and experience. The experiment involved 15 male participants and 15 female participants, and the age range was between 25 and 60 (Fig. 3).During the test session, the experiment participants were made aware that the retrieved data are anonymous, then they were asked before the experiment about possible physical and mental problems to avoid possible discomfort generated by the interaction with the VR system, they were asked about previous experiences with VR systems to be able to provide more details to participants who were interacting with such a system for the first time, and last but not least, they were asked about their excitement to test such an experience. I assisted each participant throughout the entire experiment, and after an introduction to the entire system and an example of how to use it, I gave them a series of tasks in a fixed order to observe their performance.

The tasks proposed to the group of participants were the following:

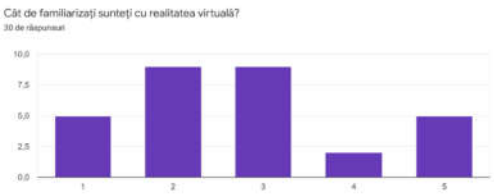
- Tracking how to use the VR system and the proposed VR experience.
- "I would like you to adjust the position of your VR headset on your head so that it sits comfortably and the image is clear."
- "I'd like you to locate the thumb joystick on the left hand control stick and push it left or right to rotate the virtual camera position."
- "I'd like you to locate the thumb joystick on the right hand control stick and push it forward to start the move method."
- Exploring the VR system on your own.
- Moving in front of a particular artwork in the exhibition hall.
- Identifying the description of an exhibited artwork.
- Identifying the exhibit description.
- Centering the gaze by pressing the joystick.
- Exploring the VR experience on your own.

During the performance of these tasks, the participants were encouraged to express out loud what they were thinking, thus facilitating the collection of information about the user experience and possible difficulties they encountered during the experiment. After completing the tasks, participants were asked to complete the usability and experience questionnaire, and were then asked about their overall impressions of the VR system and the virtual art gallery. Preparations for the experiment took place before the "Palindrome" exhibition was finished, and consisted of setting up the VR equipment in the exhibition hall. The Oculus Rift 2 VR headset was connected to a laptop on which the software dedicated to the VR experience ran, and on an external monitor the image viewed by the participants in the experiment was played to track their activity and to be able to provide user help to people who could have encountered difficulties. Additionally, a smart phone was used to capture video and photos of various aspects of the entire experiment. The questionnaires were printed and accompanied by writing materials, so that they could be completed later by the participants in the experiment. Sanitary hygiene measures were taken throughout the experiment to prevent the transmission of germs and viruses through the use of the system, and the VR headset and control sticks were disinfected before each use by a new participant. The results of the questionnaire addressed to the group of participants are presented below. All participants were able to successfully complete the assigned tasks, although for a limited number of participants it was necessary to re-exemplify the movement method and assist them with usage guidance throughout the VR experience. Following the entire experiment, several usability problems encountered by the participants were collected by expressing them aloud during the experience and by means of the proposed questionnaire. The most important usability aspects that the participants noticed during the experiment are summarized below, based on the answers to the questions and the reactions while using the VR system and the proposed experience (Fig. 4 and Fig 5).



Demographic data relating to sex and age. Graph generated based on answers to questions 1,2

Graph generated based on the answers to question 3 of the questionnaire.

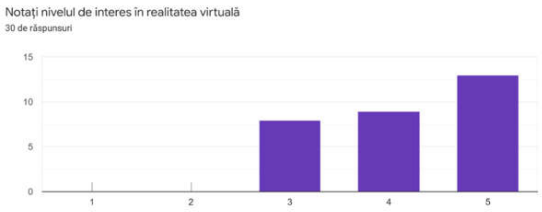


Graph generated based on the answers to question 4 of the questionnaire.

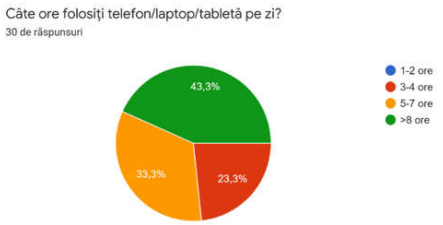
Fig. 4. Demographic data and questionnaire results 1 of 4

A high level of interest in virtual reality was noted, and most participants enthusiastically approached the proposal to participate in the experiment, verbally mentioning the desire and curiosity to explore the art gallery within virtuality. Among the visitors of the exhibition there were also a small number of participants who stated

that they came to the exhibition specifically to test the VR experience that they learned about from the presentation of the event, this fact indicates the interest of the art-loving public for this way of viewing exhibitions artistic (Fig. 5). It is worth noting that all the participants in the experiment are phone, laptop or tablet users, and most of them spend more than 5-7 hours of use per day, because a high degree of intuitive handling and a time reduced accommodation with how to use the VR system. Only for a small group of participants over the age of 55 did we notice a need for verbal assistance throughout the experiment and a slightly higher time to understand how to use the VR system, especially the control sticks (Fig. 5 Following the discussions with the participants of the experiment and based on the answers collected through the questionnaire, we noticed that for more than half of them the experience was perceived as realistic or extremely realistic, they were delighted with the way in which the gallery was replicated in VR and easily identifying common visual elements with the gallery in reality (Fig. 6). Most of the participants expressed their desire and expectation that the virtual art gallery should present a high level of realism, in order to be able to capture as many visual details as possible in the exhibition they are attending. Three of the participants expressed their desire to see other visitors in the virtual experience or at least the presence of three-dimensional silhouettes to which they can relate visually when exploring the space (Fig. 7).



Graph generated based on the answers to question 5 of the questionnaire.

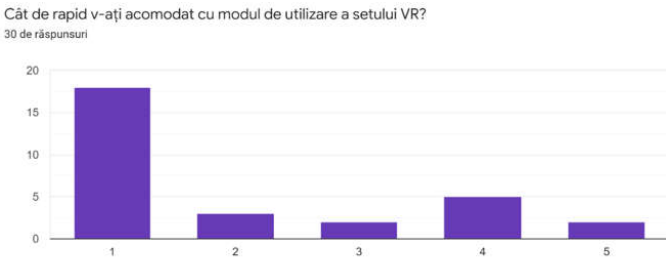


Graph generated based on the answers to question 6 of the questionnaire.

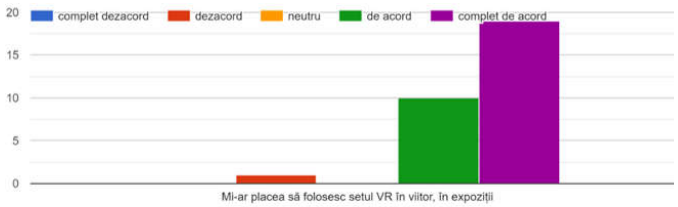
Graph generated based on the answers to question 8 of the questionnaire.

Fig. 5. Generated graphs based on questionnaire results 2 of 4.

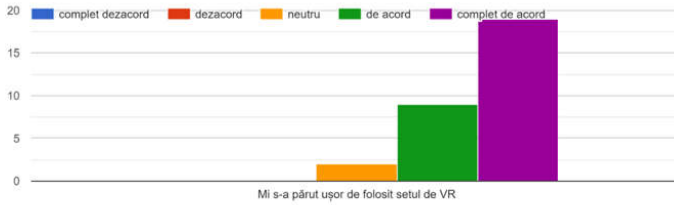
Most of the participants quickly became comfortable with how to use the VR set, including a high percentage of participants who were experiencing virtual reality for the first time. A high percentage of participants noted the difficulty in identifying the buttons on the joysticks and the need to have the graphical representation of the joysticks within the VR experience.



Graph generated based on the answers to question 39 of the questionnaire.



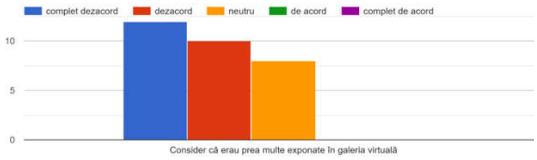
Graph generated based on the answers to question 10 of the questionnaire.



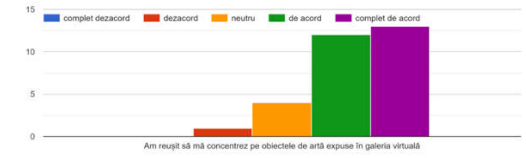
Graph generated based on the answers to question 11 of the questionnaire.

Fig. 6.Generated graphs based on questionnaire results 3 of 4

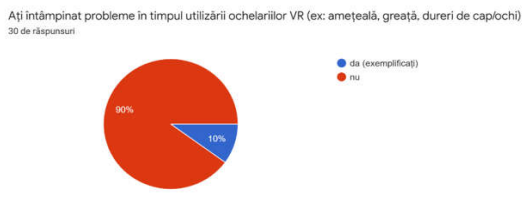
Graph generated based on the answers to question 12 of the questionnaire.



Graph generated based on the answers to question 13 of the questionnaire.



Graph generated based on the answers to question 14 of the questionnaire.



Graph generated based on the answers to question 18 of the questionnaire.

Fig. 7.Generated graphs based on questionnaire results 4 of 4

Table 1. Answers presenting advantages of virtual galleries

What do you think are the advantages of virtual galleries?
• The cultural education of people who have no chance to visit them
• If distance is a problem (galleries from abroad) the virtual gallery is a solution, especially since it can also be accessed by students from rural areas
• The ability of anyone to have access regardless of their location
• They can be viewed by anyone, anywhere
• Interacting with exhibited artworks from a distance, long-term archiving of exhibitions
• It can be visited later, it can be interactive
• Viewing objects at a distance
• The possibility to see exhibitions all over the world, chosen on various themes
• They could also be used in schools to present an exhibition, archaeological sites, fortresses, etc.
• Economy of travel time. Access for disabled people who cannot move
• The speed of sending a message. The possibility of remote access
• The fact that there are no concrete physical limits
• Accessibility, the possibility to explore numerous galleries with minimal effort
• Easy access to remote images, quick access to information
• Digitization of exhibitions and their easy access
• Reducing travel time. They can be stored electronically and used in the future in the artist's personal wallet
• Remote/ non-stop availability. Exposure to a wider audience. You can resume watching where you left off
• The ease of viewing a virtual gallery. Lack of agglomeration/ can be observed in peace
• Viewing artistic events in world cities, famous museums
• Fast travel to different locations
• To view galleries remotely
• They can focus on the exhibits without being distracted by the people around them
• Movement in the exhibition hall
• Can be accessed anytime, great experience
• Virtual galleries allow artists to exhibit their artwork to a much larger audience
• Visitors can access the virtual galleries from anywhere

Table 2 Answers presenting disadvantages of virtual galleries

What do you think are the disadvantages of virtual galleries?
• I would prefer an experience that involves more stimuli (auditory, olfactory)
• Physical impact, communication, socialization
• The lack of the human factor
• Depending on the type of exhibited artworks, the atmosphere conveyed by the artworks may be missing (oil paintings, books)
• They have no protocol
• Lack of physical contact
• Image resolution and movement speed in virtual reality
• Restricted movement possibilities in VR
• If they were to be used in schools, several users would have to connect simultaneously
• Possible psychological effects.
• Removal of socialization
• Headache for prolonged use. Too little tactile feedback
• Lack of networking, physical human interaction
• Lack of human interaction and socialization
• Headaches, dizziness, lack of socialization
• Tiring for the eyes
• They are still not as realistic as the physical version
• Image quality that could detract from complete immersion
• The use of technology requires accommodation with it
• Artificial image vs reality
• It is lost from the actual dimensions, the distortion of reality/proportions
• Reduced mobility
• The possibility of hitting exhibits
• You can't focus on the artworks, the VR experience takes precedence
• I don't think all artworks can be digitized

The tested application presented at the avatar level a set of three-dimensional hands correlated with the user's movements, but following the experiment it was noted the need to represent the control levers as well in order to be able to easily identify the position of the buttons on them. Considering this aspect, I think that the tutorial for this experience can be done by lighting the control methods directly on the 3D representation of the joysticks and activated by voice or from the menu button on them (Fig. 6). More than 90% of the participants stated that they agree or strongly agree to use the VR set in exhibitions in the future, and after experiencing the VR application, most of the participants expressed their desire to see more such exhibitions in VR and they noted some advantages of this type of experience, such as viewing exhibitions from home or exploring past exhibitions that they had not been able to get to.

Thus we noticed the importance of designing within the VR experience an area where the user can choose from several options the exhibition he wants to view, based on the name of the exhibition, the artist, the poster and the description. This functionality of the application would require the creation of a database that would include all the details of several exhibitions and all the digitized artworks that were exhibited within them. The limitations that may arise for certain digitized artworks are represented by the inability of current tools to capture all types of materials, especially reflective or translucent ones, as well as certain installation or happening artworks that involve projections or even interaction with the visitor (Fig. 7). Most of the participants stated that they easily used the VR set, and during the experiment we could see that as soon as they understood how the teleportation mode works, they were excited to explore the

entire virtual gallery, and several of them voiced cool that the whole system is intuitive and that they didn't expect it to be so easy to interact within it. Two of the participants stated at the end of the experiment that they expected the position of the virtual gallery to be fixed and the movement through it to be correlated only with physical movements, and they mentioned that they were confused by the fact that by teleporting they could change their position in the virtual gallery, and at the end of their experience they were in a different place than in reality. Here, for a limited number of participants, a high level of realism of the visual representation is closely correlated with the degree of renunciation of reality and immersion in virtual reality. A high percentage of the participants in the experiment were able to effortlessly explore the entire virtual gallery and see all the exhibited artworks. We noticed that due to the easy mobility of getting from one artwork to another, users spent more time discovering each artwork on display and noticing details that they stated they had not paid attention to in reality. This fact is encouraging for virtual exhibitions, because currently the estimated attention time on each artwork exhibited in real exhibitions is extremely low, and through virtual galleries this time could be extended, and the art-loving public could benefit from more many details and information about each exhibited artwork. Most of the participants spent the time necessary to view all the artworks on display in the virtual gallery, and I believe that some of those who only viewed a few of the artworks was because they just wanted to test the concept and did not feel comfortable spending more time to explore the whole exhibition. Following the experiment, many of the participants expressed a desire to see more of the artist's work and asked if they could select other art exhibitions. Similar to one of the questions asked previously, participants expressed a desire to visit more virtual exhibitions and see other types of artworks on display, such as sculptures or video projections. The answers regarding the advantages of virtual galleries can be found in Table 1 , the answers showing the disadvantages of virtual galleries can be found in Table 2 and all the answers to the following question "Do you think that VR technology, applied in visiting art galleries , will it develop more and more in the future?"they were affirmative (Fig. 7). In the virtual art gallery, participants could focus on the exhibited artworks and we observed their interest in analyzing details in each artwork, as well as the desire to learn more audio or visual details about the exhibited collages. Two of the participants stated after the experience that they wished they could have a zoom option to avoid having to change their avatar's position, and another participant wished they could change their height in VR or fly within the experience , to be able to easily see all the details of the artworks, including those in the upper part of the exhibited collages. The 10% of participants who experienced problems while using the VR glasses stated that they could not clearly see the image on the headset screens due to vision problems or due to condensation on the lenses, and one of the participants mentioned the feeling of imbalance and disorientation when teleporting from one area to another of the virtual gallery. It is encouraging that a percentage of 90% of the participants easily accommodated to the VR experience and did not encounter any problems during use, and this aspect indicates an effective design of the VR application in which users are easily immersed and easily perceive the space virtual art gallery proposed in the experiment.

DISCUSSION

I was pleased to note from this experiment that there were no people who could not cope with how to use the VR system, even though many of the participants were encountering this technology for the first time. Through the interviews addressed directly to the participants, both during use and at the end of the experience, we discovered a series of impressions and suggestions that could direct the further development of the virtual art gallery. Some participants mentioned that they would like to have a zoom option, through which they could look at the exhibited artworks in detail. In the documentation I have come across some recommendations that suggest avoiding such scaling options, but one method encountered in one of the studied applications is to allow the user to manipulate the exposed artwork, being able to select the 3D object and observe it from all points of view . Some of the participants stated after using the application that they felt alone or isolated, and that they would have liked to interact in VR with other people as well, or to see other figures in the exhibition hall that would give the feeling of an audience. Here, the social aspect is an important one for the visitors of an art gallery, this should be taken into account in the further development of the virtual gallery. Users could meet other people visiting the gallery in real time, and could even converse verbally with other users, exchanging ideas and impressions about the event they are attending, or even making new virtual friends. The proposed experiment was well received by the participants of the "Palindrome" exhibition finish, and based on the information gathered, I believe that I can continue to develop the virtual experience to include an attractive exhibition library and expand the application to a much wider audience.

CONCLUSION

The field of virtual reality has evolved significantly in recent years, and the adoption of this technology in the exhibition sector has seen considerable growth and transformed the way people experience and perceive artworks of art. For professionals in the exhibition field, VR technology has a multilateral role in exhibitions, virtual reality attracting new audiences, offering new ways of interpretation, allowing the personal involvement of the visitor in the interpretation processes and facilitating new ways of understanding art, practically virtual reality does not it replaces the gallery experience, but allows the visitor to experience something they would not have access to in any other way. The main advantages of integrating VR technology into exhibitions are collection engagement, visitor attraction, education, immersion, accessibility, personalized experiences and technology reliability. The ability of virtual reality is to transport visitors to inaccessible places or moments in time and provide memorable experiences with a strong emotional impact through engaging stories and scenes, thereby improving visitor engagement with the projected exhibitions. VR exhibitions have the advantage of changing the general perceptions of ordinary visitors, can be interesting and engaging even for people with low expectations of what an exhibition can offer, and can benefit people with disabilities, allowing them to access places they would not otherwise have be accessible. Mainly, virtual reality provides increased accessibility for people who want to have exhibition experiences at home and allows a gallery to reach thousands of people. A number of limitations of current exhibition experiences can also be identified, relating to lack of social interaction, quality of graphics, staff and training needs, relatively high cost, distraction or acceptance of technology. One of the most significant limitations concerns the social aspect of visiting exhibitions, as most VR experiences are designed for a single user, separating the visitor from the rest of the environment and not allowing for any social interaction. Virtual reality and emerging technologies have succeeded in altering the exhibition experience and in some cases reinventing traditional exhibition design concepts, and a holistic understanding of VR experiences is essential as it will influence their design, perception and acceptance by exhibition professionals . The perception of art gallery and museum professionals regarding the adoption of VR technology is important, as they are the mediators between the developers of VR experiences and the visitors of exhibitions. I believe that VR exhibitions will know true success when technology overcomes its inability to provide immersive social experiences and VR applications become much more interactive and social. For the university environment, creating a virtual art gallery is an ideal tool for learning because universities have an essential role in training future artists, curators and gallerists by teaching students new skills and techniques. By using the virtual art gallery, teachers will be able to easily convey to students the curatorial and organizational skills of exhibitions, by positioning digitized artworks in the virtual simulated space of the gallery, by exemplifying the correct lighting methods and by designing materials with a role in communication and information of the participants within the exhibition. The virtual art gallery makes it possible to display large art collections, gathered over the years, exhibits of great historical value or pieces of impressive size that do not fit in the

exhibition space in reality. The virtual art gallery is a solution in terms of space, dimensions and even location, as it can be accessed from anywhere via the Internet and can accommodate any type of exhibit. The Internet is a global communication medium that offers a unique opportunity to address a considerably wider audience than traditional galleries, which are limited not only by capacity, but also by the temporal and spatial constraints of the real world. As cultural institutions responsible for the dissemination and presentation of art, galleries hold a great responsibility, but are often limited by time, space and location. The virtual art gallery solves the time and space limitation that many artists and galleries face when it comes to exhibiting artwork in a gallery in physical space, with virtual art gallery exhibitions being accessible anytime, anywhere through internet connection. At the same time, this is an effective solution for archiving exhibitions, by preserving the original characteristics of the events, compared to the classic archiving methods that only allow the viewing of images from the events. The virtual art gallery allows the display of pieces of any size and an unlimited number of exhibits, solving the problem of limited space and resources that most art galleries present.

Thus, artists no longer face creative limitations when it comes to creating artworks that must fit within the gallery space and have the opportunity to exhibit all their artworks, regardless of their dimensional characteristics. Exhibitions continue to be a highly effective means of communication, and digital technology has the potential to revitalize art galleries by facilitating new ways of exhibiting artworks.

Conflict of Interest statement: There are no conflicts of interest.

Funding statement: This article has no funding source.

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