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Original Article

Development and Implementation of a Multiplatform Museum in VRChat's Metaverse to Disseminate University Achievements

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Abstract - *This study addresses the problem of the limited visibility and dissemination of academic and professional achievements in the university community, using as a solution a multiplatform virtual museum developed in the VRChat metaverse. The goal was to develop and implement an environment in the metaverse that allows the timeline and achievements of the University of Sciences and Humanities to be appreciated. To achieve this, the environment was planned, modeled, integrated, and tested to comply with the standards to be multiplatform. The result was a museum accessible to both Oculus Quest and PC and Android devices, and the environment was evaluated by different dimensions. In this way, the metaverse is a tool with great potential for the dissemination of knowledge, overcoming the limitations of traditional physical environments.*

Keywords - *Metaverse, VRChat, Virtual museum, Multiplatform experience, Virtual museum, Virtual reality.*

1. Introduction

In today's digital age, many universities face a significant challenge that is the limited visibility and appreciation of their academic and professional achievements and the need to reinvent the ways in which they transmit their achievements. Around the world, some universities take advantage of the metaverse to differentiate themselves.

In Europe, a team from the Polytechnic of Turin used extended reality technologies integrated into metaverse platforms as tools to overcome various limitations.

To create a museum in the metaverse inspired by the Italian Resistance, XR technologies were employed to recreate the square in Ivrea, Italy, allowing for immersive educational interactions [1].

In Latin America, the ORT University developed a virtual three-dimensional model of the museum of pre-Columbian and indigenous art. This project involved the use of digital instruments such as Spatial.io and Luma AI to create an interactive environment that increases access to collections that are not physically displayed. The museum's website was also redesigned, and a mobile application was created favoring its digital dissemination [2].

In Peru, the use of the metaverse as an educational and innovation environment dates from 2009 to 2011. For this, the Second Life platform, a virtual environment, was used for the creation of the faculty of engineering and architecture of the San Martin de Porres University [3]. Demonstrating that the use of these tools gives us a new way of disseminating places and achievements in different environments.

The metaverse is a term conceptualized as a space beyond or after the universe that was popularized when Neal Stephenson introduced it in his novel "Snow Crash", published in 1992 [4]. This fact placed the modern origin of the concept. Likewise, the metaverse combines VR and AR, integrating social interaction, digital identities, and personalized experiences, and, unlike multiplayer games, transcends by focusing on the active participation of users [5]. This feature differentiates metaverses from video games as such.

As a tool, the metaverse stands out in areas such as education, offering an immersive and accessible learning space, without restrictions of time or space, thus favoring the limitations of face-to-face teaching and educational interruptions, promoting independent and flexible learning [6]. This turns the metaverse into a collaborative space.

Moreover, while the evolution of the metaverse is at a very early stage, it is also true that investments in the implementation of the Metaverse are considerably high [7].

In this context, the University of Sciences and Humanities (UCH) currently lacks an immersive and accessible museum where its outstanding academic and scientific achievements can be comprehensively exhibited, missing out on the potential offered by the metaverse. The rapid advancement of digital technologies has created visual environments that allow visitors to interact more autonomously with materials and information [8]. This makes it essential to create a virtual space for the dissemination of its institutional trajectory.

The objective of this work is to develop and implement a multiplatform museum in the metaverse, in order to make visible and disseminate the academic and professional achievements of the community of the University of Sciences and Humanities.

The article is organized into sections. In the second section, the state of the art will be written, in the third section, the materials and methods, in the fourth section, the results, in the fifth section, the results, and finally, the discussions and conclusions.

2. Literature Review

In this study, Swedzky [9] pointed out the need for the National University of San Martín in Argentina to adapt to a new teaching environment in the performing arts, due to the pandemic caused by the coronavirus. This research aimed to transform the intimate environment of confinement into a creative and narrative space, reinterpreting everyday objects as elements loaded with history and meaning. The focus of this research was the identification of puppet techniques and viable objects for learning. Creative proposals were also presented, and then it was involved in restructuring subjects and activities. One of the proposals was the creation of a virtual museum called the Small Virtual Museum of the Quarantine, which was hosted on the university's website. This museum facilitated creative expression in times of isolation and also fostered a sense of community and support among participants.

On the other hand, the authors [10] pointed out that the spatial and temporal limitations that museums and galleries were exposed to by the COVID-19 pandemic have. This study sought to understand whether exhibitions in the metaverse can help to better understand the topics and increase interest in face-to-face exhibitions. Their immersion consisted of everything from entering virtual space, explaining missions by the NPC, to recording and sharing personal experiences. Gamification increased participation, interest in physical samples, and strengthened the connection between virtual and face-to-face experiences. This research showed that gamification in the metaverse improves participation, interest, and the connection between virtual and physical experiences.

Triviño et al [11] addressed the need to modernize traditional tourism to make it more sustainable and more aligned with cultural heritage and local communities. The purpose of the study was to classify a cultural artifact, specifically a perfume burner found in the ruins of Montilla Castle, and to develop a 3D model that facilitates its visualization in a virtual museum within the metaverse.

To achieve this, they used a methodology that uses photogrammetry, photographing the object from different angles to create a three-dimensional model. The result of this research was the creation of a 3D model of the "perfume burner", which allows it to be visualized in a virtual environment. It is concluded that the technologies used allow the museum, being virtual, to be accessible globally.

In the research by García and Ruiz [12], they point out that the lack of public access to archival and museum collections limits the dissemination of cultural heritage. Its objective was to establish a methodology to create 3D digital models of museum or heritage collections, using tools that are accessible and low-cost. To do this, they used a methodology that combined LIDAR scanning, photogrammetry, traditional surveying, and analysis of historical drawings to create 3D models. This research managed to establish an efficient flow for the digitization of 3D models, highlighting the LIDAR of the iPhone 13 Pro for its accessibility and effectiveness in the creation of simple models. All this defined an accessible method to digitize and disseminate heritage with accessible tools.

While in Valdez's research [13], the main problem is the need to be able to bring spaces of culture a virtual space to lead to cultural reflection. The objective of this study was to explore and reinterpret pieces of pre-Hispanic cultures from Ecuador through an immersive virtual environment in the Second Life metaverse. This proposal was developed from an interdisciplinary methodological approach, this methodology responded to the different cultural ways of inhabiting virtual environments.

The result of this research was an immersive environment in Second Life that consisted of the relationship of representations of Ecuador's pre-Hispanic past. It can be concluded that, although there are challenges such as the risk of simplification of heritage, it also presents opportunities for critical reflection on history. The review highlights how virtual environments and the metaverse have transformed cultural, educational, and social experiences, overcoming physical limitations and encouraging participation.

3. Materials and Methods

For the development of the virtual museum in the metaverse of the University of Sciences and Humanities, it was based on planning and testing the environment.

3.1. Research Procedure

The methodology used consisted first of planning; subsequently, integration was carried out; and, finally, they were carried out with the tests to ensure their correct functioning. All these steps are shown in Figure 1.

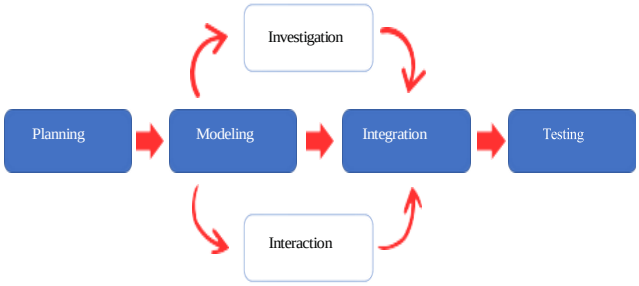

Fig. 1 Phases of the methodology

3.1.1. Planning

During the planning stage, the bases for developing the virtual museum were defined, starting with the selection and organization of the most important achievements of the University of Sciences and Humanities. These achievements were classified into categories, which made their implementation easier. The creation of a section for academic achievements and another for the university's timeline was also defined.

3.1.2. Modeled

In this stage, the virtual museum was designed by establishing two main structures, which are the achievement environment and the timeline, and the space environment where the two structures will be.

3.1.3. Integration

During the stage, the respective functionalities and impact of the virtual museum were integrated, focusing on accessibility, user interaction.

3.1.4. Testing

At this stage, it focused on ensuring the dissemination, sustainability, and multiplatform accessibility of the virtual museum. Ensured compatibility of the environment with Oculus Meta Quest devices, Android phones, and PCs. As well as creating a form to test the virtual museum.

4. Tools

This section will describe the tools that were used to create the environment.

4.1. Unity

Unity is a real-time graphics engine that makes it easy to create interactive and immersive experiences. It allows programmers to collaborate effectively on complex projects and is compatible with various platforms, such as Windows, Mac, and Linux. [14].

4.2. VRChat

VRChat is a virtual reality platform focused on social interaction, where users can connect through fully customizable avatars, which can be viewed with virtual reality devices. This digital environment allows participants to immerse themselves in virtual worlds created by the community, where dynamic interaction is essential [15].

4.3. Creator Companion

The VRChat Creator Companion is the main tool for content creation on VRChat. This platform offers access to official packages, community input, educational materials, tools, and other essential resources for the development of experiences in the metaverse [16].

4.4. Steam

Steam was initially created as a tool to provide automatic video game updates over time; it became a digital distribution platform, allowing the purchase, download, and management of games, as well as access to social features and additional content [17].

5. Results

In the results, it was possible to develop the space in the metaverse, one in which the achievements of the university can be visualized, and in the other, where the timeline of the university can be seen.

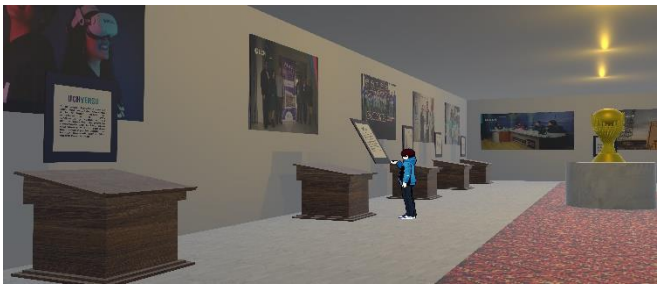

Fig. 2 Surroundings of the UCH achievement museum

Fig. 3 UCH timeline

Fig. 4 Museum surroundings

Figures 2, 3, and 4 present the virtual environment of the museum, designed within VRChat, with the purpose of exhibiting the achievements of the University of Sciences and Humanities. This space includes an interactive timeline that allows the public to visually and dynamically explore the most important milestones. In Figure 4 you can see two teleporters that facilitate going to the achievement hall or the timeline.

In Figure 5 it can be seen that the museum is for both Oculus Quest and PC; the Android version also allows entry to the museum by cell phone.

Figures 5 and 6 show that the museum is compatible with PCs and mobile devices with Android operating systems. Likewise, the Android version allows access to the museum from mobile phones and virtual reality glasses such as the Oculus Quest.

Finally, to culminate with the testing of the museum in the metaverse, a form of five categories was made with the aim of surveying members of the UCH community and, in this way, being able to visualize their degree of satisfaction and optimize the UCH museum in the metaverse.

Fig. 5 VRChat interface

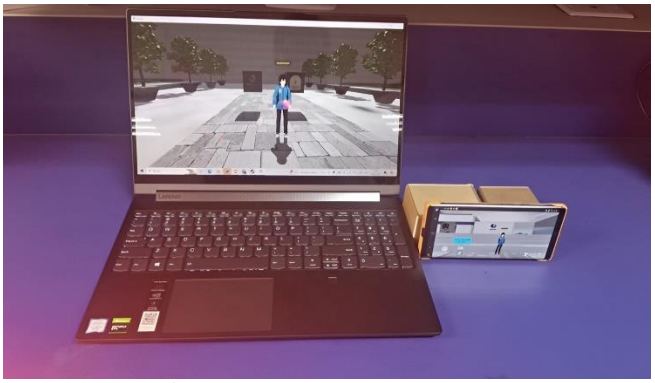

Fig. 6 Test of the museum's environment on PC and mobile

Table 1. Questions on the Likert scale

Dimension	ID	Question
User experience	1	Navigation in the virtual museum was intuitive and easy to understand.
	2	Controls and interactions within the metaverse were accessible and functional.
	3	The graphic quality of the virtual museum is satisfactory.
Content and learning	4	The information about the university's achievements was clear and understandable.
	5	The interactive timeline helped me better understand the evolution of the university.
	6	Multimedia resources such as images and texts enriched my learning.
Accessibility and compatibility	7	You can access the museum without technical difficulties.
	8	The museum worked correctly on my device (PC, mobile, or Oculus Quest).
	9	The loading speed and stability of the environment were adequate.
Interaction and participation	10	I felt I could interact meaningfully with the museum's content.
	11	The opportunity to share my experience within the metaverse was valuable.
	12	The museum's integration with other metaverse platforms enhanced my experience.
Overall satisfaction	13	I am satisfied with my experience at the virtual museum.
	14	I would recommend this experience to other students and professionals.
	15	I consider the metaverse to be a good tool for academic and cultural dissemination.

Table 1 presents the four dimensions into which the survey was classified. These dimensions are for user experience, content and learning, accessibility and compatibility, interaction and participation, and finally for general satisfaction. Each of these dimensions has three questions, all of them measured on a Likert scale from 1 to 5.

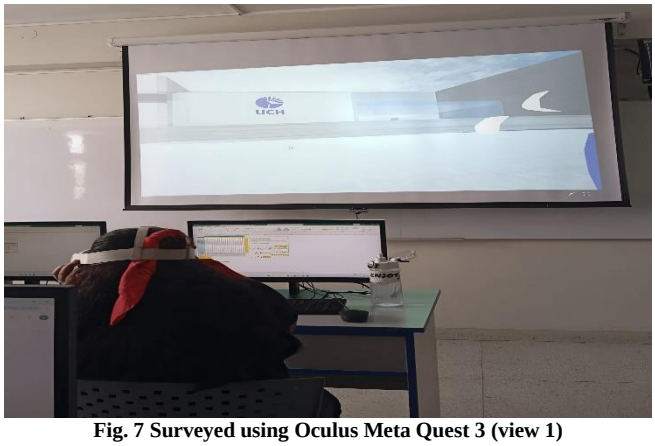

Fig. 7 Surveyed using Oculus Meta Quest 3 (view 1)

Fig. 8 Surveyed using Oculus Meta Quest 3 (view 2)

In Figures 7 and 8, members of the UCH community using the Oculus Quest 3, the members, after testing the museum in the metaverse, were invited to fill out the form created to test the environment. Once the surveys are completed, the data of all participants is organized in order to generate a radar graph.

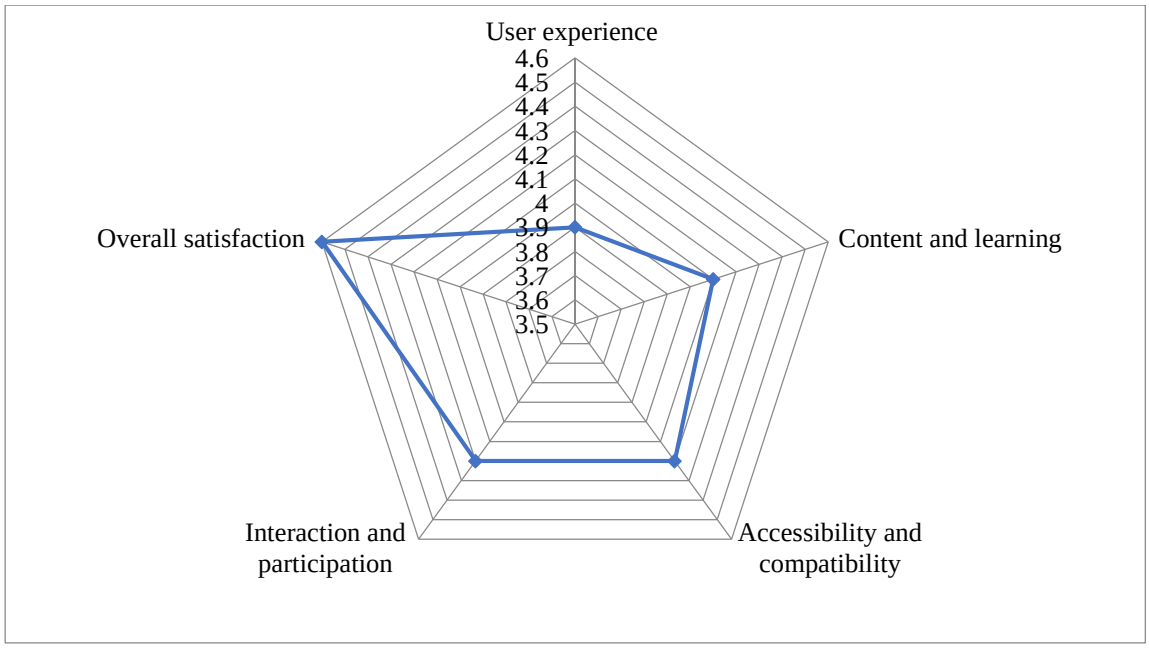

Fig. 9 Radar graph based on likert questions

In Figure 9, the perception of users about the platform is shown in five key dimensions using a Likert scale (1-5). The results indicate high general satisfaction (4.56), accessibility and compatibility (4.26), interaction and participation (4.26), and content and learning (4.22). However, user experience (3.96) scored the lowest, suggesting opportunities for improvement in design and navigation.

6. Discussions

In recent years, the metaverse has gained relevance as a space for social interaction, education, and the exploration of new digital environments. Paredes-Otero [18] mentioned that during the pandemic, the importance of the metaverse increased significantly, driving its application in digital environments.

On the one hand, Swedzky [9] highlighted the creation of a web museum that allowed the National University of San Martín to adapt the teaching of performing arts during the pandemic. Similarly, Martínez Peláez et al [19] showed that the metaverse also serves as a space for university preservation and dissemination, making use of interactive

digital tools for various academic and cultural events. However, in these studies mentioned above, the environments developed did not manage to be multiplatform. Meanwhile, Piva [20] showed the exhibition of Kandinsky-based artworks in a VR museum in two elementary school classes. However, compared to the present research, he focused on elementary school students and a museum to represent art and not the academic achievements and historical line of his institution.

On the other hand, the authors [21] used surveys to assess respondents' level of knowledge about the metaverse and perception of gaming advertising. Unlike the present research, which sought to visualize, through surveys, the points of improvement of the platform rather than to determine the level of knowledge of the respondents about the metaverse. Finally, one of the limitations to a good initial interaction in the metaverse is that it can be very complex for people who have no experience using virtual reality glasses to have difficulty adapting to immersive environments.

7. Conclusion

In conclusion, the research achieved its purpose, which was to develop the multiplatform virtual museum in the VRChat metaverse, in order to publicize the timeline and the academic and professional achievements of the University of Sciences and Humanities. During the tests, its usability was confirmed on the various platforms, such as Oculus Quest, PC, and Android mobile devices.

The results obtained through the Likert scale surveys demonstrated a good assessment of the environment; however, the need to optimize usability to improve the user experience was identified. It is relevant to note that the virtual reality glasses testing platform was only tested on the Android operating system, since Oculus Meta Quest 3 virtual reality glasses were used.

On the other hand, metaverses are interconnected networks where the user occupies a central role, and their development depends on the integration of advanced technologies, the creation of specific content for the platforms, and the active participation of the users themselves [22]. In this sense, this work managed to use immersive technologies to give visibility to academic achievements and in the creation of interactive and collaborative educational experiences.

References

[1] Chiara Innocente et al., "A Metaverse Platform for Preserving and Promoting Intangible Cultural Heritage," *Applied Sciences*, vol. 14, no. 8, pp. 1-14, 2024. [CrossRef] [Google Scholar] [Publisher Link]

[2] Valentina Golubei, Student Creates Innovative 3D Universe for the Museum of Pre-Columbian and Indigenous Art, ORT, 2024. [Online]. Available: https://www.ort.edu.uy/novedades/estudiante-crea-innovador-universo-3d-para-el-museo-de-arte-precolombino-e-indigena

[3] F. Casas Sulca, F. Pascual Calderón, and M. Sanz Fraile, "Competencies for Educational Organizations in Implementing Projects in Second Life. An Experimental Guide from the University of San Martín de Porres (2009-2011)," *EduTicInnova-Journal of Virtual Education*, vol. 1, no. 1, pp. 31-39, 2013. [Google Scholar]

[4] Carlos Gutierrez-Cirlos et al., "Medicine and the Metaverse: Current Applications and Future," *Medical Gazette of Mexico*, vol. 159, no. 4, pp. 286-292, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[5] Javier Acevedo Nieto, "An Introduction to the Metaverse: Conceptualization and Scope of a New Online Universe," *AdComunica, Scientific Journal of Strategies, Trends and Innovation in Communication*, vol. 24, pp. 41-56, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[6] Bokyung Kye et al., "Educational Applications of Metaverse: Possibilities and Limitations," *Journal of Educational Evaluation for Health Professions*, vol. 18, pp. 1-32, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[7] M.R. Guilabert Vidal, "Property in the Metaverse," *Private Law Notebooks*, vol. 4, pp. 53-79, 2022. [Publisher Link]

[8] Manuel Drago Diaz German, "Mesh Retopology Applied to 3D Cultural Heritage Models to Improve Interactive Visualization in Virtual Reality and Augmented Reality," *Ge-Conservacion*, vol. 24, no. 1, pp. 87-98, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[9] Javier Swedzky, "Plenty of Reasons to be Poetry". The Experience of El Pequeño Museo Virtual de la Cuarentena," *Journal of Studies on Animated Forms Theater*, vol. 1, no. 24, pp. 90-109, 2021. [CrossRef] [Google Scholar] [Publisher Link]

[10] Joohun Lee, Jaehoon Bae, and Yunkyung Bae, "Implementation of a Gamification-Based Metaverse Exhibition: A Case Study of the Farewell Museum," *Sustainability*, vol. 16, no. 14, pp. 1-18, 2024. [CrossRef] [Google Scholar] [Publisher Link]

[11] Paula Triviño-Tarradas et al., "The Application of Metaverse in the Tourism Sector as a Tool for Enhancing Sustainability-Case Study: A Medieval 'Perfume Burner' of the Local Historical Museum of Montilla (Cordoba, Spain)," *Sustainability*, pp. 1-14, 2024. [CrossRef] [Google Scholar] [Publisher Link]

[12] Nuria García Gutiérreza, and Oscar Ruiz López, "A Virtual University Museum for the Recovery of Historical Memory," *CIMED Congress - 1st International Congress of Museums and Digital Strategies*, pp. 517-534, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[13] Ana Rosa Valdez, "The Nameless Lands: In the Middle of the Lake," *Index, Contemporary Art Magazine*, vol. 16, pp. 147-181, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[14] Unity Engine, Unity, 2024. [Online]. Available: https://unity.com/es/products/unity-engine

[15] Felix Krell, and Nico Wettmann, "Corporeal Interactions in VRChat: Situational Intensity and Body Synchronization," *Symbolic Interaction*, vol. 46, no. 2, pp. 159-181, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[16] Package Manager, VRChat Creator Companion, 2024. [Online]. Available: https://vcc.docs.vrchat.com/vpm/

[17] Luis Alberto Gonzáles Usca et al., "Steam Video Game Reviews Classifier," *Innovation and Software*, vol. 5, no. 1, pp. 69-80, 2024. [CrossRef] [Google Scholar] [Publisher Link]

[18] Guillermo Paredes Otero, "The Study of the Metaverse in Times of Pandemic. Review of the Scientific Literature on the Final Digital Frontier," *Areas International Journal of Communication*, no. 61, pp. 132-148, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[19] Agustín Martínez Peláez, Sara Núñez De Prado Clavell, and Javier Rodríguez Abengozar, "The "URJC Virtual Museum," A University Heritage in the Metaverse as a Model of Mediation between Artists and Collectors," *Praxis and Intervention Spaces from Art and Education*, pp. 308-322, 2023. [Google Scholar] [Publisher Link]

[20] Manlio Piva, "Virtual Tour and Immersive Teaching: Creating a Virtual-Interactive Museum in Primary School," *IUL Research*, vol. 4, no. 7, pp. 1-16, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[21] Gema Bonales Daimiel, Eva Citlali Martínez Estrella, and Sheila Liberal Ormaechea, "Analysis of the Use of Advergaming and the Metaverse in Spain and Mexico," *Latin American Journal of Communication*, no. 80, pp. 155-178, 2022. [CrossRef] [Google Scholar] [Publisher Link]

[22] Verónica Crespo-Pereira, Eva Sánchez-Amboage, and Matías Membiela Pollán, "Facing the Challenges of Metaverse: A Systematic Literature Review from Social Sciences and Marketing and Communication," *The Information Professional*, vol. 32, no. 1, 2023. [CrossRef] [Google Scholar] [Publisher Link]