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Implementation of the metaverse for the management of research processes

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Abstract. The proposal seeks the design and implementation of a metaverse, as a virtual reality scenario, for the development of experiences in each of the components of formative research within the Corporación Universitaria Minuto de Dios, from the axes of Research, Development, Innovation, and artistic and cultural Creation (R + D + I + C), training, editorial management and the transfer of knowledge and technology. For this purpose, it is intended that this research be oriented from a preliminary phase of characterization of students and teachers around knowledge, competencies, and digital skills that allow to demonstrate the technical, operational, and technological capacities to be able to carry out the design and implementation, for which the development of a first phase from which it is obtained is proposed; the state of the art, a diagnosis of needs and technical characterization. These inputs will allow the development of a preliminary design with which a pilot can be carried out and through this strengthen what has been advanced with a view to a definitive design. Due to the above, it is understood that a mixed type of research is proposed that will use instruments for the collection of qualitative and quantitative information applied to a population of 1000 students and 100 teachers. Preliminary results show that said population, at least from a technical and technological point of view, has the minimum conditions for future implementation, but there are some difficulties to consider.

Keywords: Metaverse, Virtual Reality, Immersive Technologies, Formative Research.

1 Introduction

The implementation of the metaverse for the management of research processes could be considered as a support and motivation tool that offers all the actors in the process easy access to different technological resources that are currently available for their use understanding that they are at the forefront of educational trends, in addition to facilitating learning, allows teachers and students to participate in its design. Therefore, some of the advantages and benefits that its implementation would bring would be:

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1. Motivate the participation of students who are in the virtual modality in this type of process, through the implementation of immersive experiences that are a little more experiential for students.
2. Facilitate the teaching-learning process for teachers and students on research topics.
3. Formation and strengthening of digital communities taking advantage of the channels offered by the tool.
4. Have updated material where both teachers and students can collaborate to prepare it based on their needs.
5. Facilitate the integration of the new technological resources available from the metaverse by making them available in an innovative way to the educational community.

In addition, as a consequence of all this, the reputation of the institution is strengthened by having more innovative methodologies incorporated into the teaching-learning process, taking into account that together with Gamification, they offer the possibility of creating innovative immersive learning experiences (Latorre, 2022).

The problem that inspires this research is the need not only to strengthen institutional communication channels around research but also to strengthen formative research, taking into account that this type of scenario allows a greater approach of students to co-curricular spaces outside of classes such as research hotbeds, taking into account that being students of the virtual modality, the metaverse allows a closer relationship through avatars that can reflect something of their personality and interact in a different way. a little more open, as well as access to digital resources, would be done in a slightly more experiential way, which would in turn allow the certification of investigative skills and competencies.

2 Theoretical Framework

The concept of the metaverse is not new, its origins are closely linked to virtual reality, which since 1965, Ivan Sutherland in his article "The Ultimate Display", defined it from the different parts that make it up, both from the nascent hardware to the time, as were the first glasses and gloves that tried to recreate reality, as since those first algorithms and programs that made this possible. The metaverse as a concept is born from the science fiction novel Snow Crash, created and published by Neal Stephenson in 1992, where the Metaverse is defined not as an evolution of Virtual Reality but as something beyond it (Porush, 1994), then seen at that time as a world that is recreated based on reality and where users could not only interact but also carry out other leisure and recreation activities.

At the beginning of 2003, part of what is now known as the metaverse began to materialize through the Second Life online multimedia platform (second life in Spanish), which allows people to create an avatar for themselves and then interact with them. other users and with the content created by the user (Castillo, 2022). This allowed the creation not only of new worlds but of new applications compatible with platforms such

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as Microsoft Windows, GNU/Linux, and Mac OS, where twenty years later it continues to be useful and adds developments thanks to the recent growth of the Blockchain technologies sector. and the monumental investment of companies like Facebook and Microsoft in the evolution of the metaverse (Grandury, 2022).

For Nisa (2021), the metaverse is an alternative reality to natural reality that aims to offer a user considered a digital citizen, the possibility of substituting, on-demand or need, the natural reality for a different one where education can be offered. , research, work, leisure, art, religion, sport, science, and economy, among others, that occur in natural reality but under another environment that can provide greater comfort to the user, classified as contemplated in Table 1.

Table 1. Metaverse types

	Augmented reality	**Lifelogging**	**Mirror world**	**Virtual reality**
Definition	Smart environment using location-based and network technologies	Technology to capture, store and share everyday information about objects and people	Reflects the real world as it is, but integrates and provides external environmental information	Virtual world built with digital data
Characteristics	Smart environment using location-based and network technologies	Record information about objects and people using augmented technology	Virtual maps and modeling using technology GPS	Interactions between avatars that reflect the ego of the user
Applications	Smartphones, HUDs in vehicles	"Wearable" devices, black boxes	Map-based services	Multiplayer online games
Use cases	Pokemon Go, digital textbooks, realistic content	Facebook, Instagram, Apple Watch, Samsung Health, Nike Plus	Google Earth, Google Maps, Naver Maps, Airbnb	Second Life, Minecraft, Roblox, Zepeto

Fountain: Mendiola (2022), adapted from Kye B., et al, 2021

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3 Method

It is a mixed type of research, which will use qualitative instruments as quantitative instruments, in the first case seeking to investigate non-measurable issues such as perceptions. In the second case, looking for quantitative data and required technical information.

Guisao, D. C., Torres, G. E. L., & Pérez, N. M. P. (2020), based on what was proposed by (Mendizábal, 2018) define mixed research as one that

"... collects both numerical and verbal or symbolic information, in order to have a better understanding of the research problem, which implies the combination of methodologies, theoretical and epistemological perspectives to achieve the integration of the information collected, in this way, allows the analysis and interpretation of the data from a complex view of reality". (p.4).

The population under study are the 12,540 students and the 189 teachers who are part of the Virtual Rectory of the Corporación Universitaria Minuto de Dios, where the sampling will be carried out at convenience taking into account those students and teachers who are mainly related to the process. research. The sample is 1012 students and 97 teachers. The data collection forms were applied through Google Forms by formally sending them by email.

4 Results

In the case of virtual education, the metaverse is part of the new emerging technologies as a fundamental part of the construction of virtual ecosystems in the educational field, these aim to guarantee the creation of immersive environments of multisensory interaction linked to applications multiuser online platforms, which, supported by other three-dimensional environment trends such as virtual reality (VR), immersive virtual reality (IVR), and augmented reality (AR), allow the design of transformative educational scenarios where students can learn and intervene, taking into account that the vast majority of these.

In the characterization process, difficulties for its implementation are evident due to the diversity of types of computer equipment with which users usually connect to virtual activities, the connection from mobile cellular equipment prevails (42 %), Laptop or portable (28%) over tablets (7.1%) and desktop PC (12.9%); Regarding software, the Windows (83.5%), Android (18.8%), MAC (14%) and IOS (5.9%) operating systems prevail; The main type of Internet connection to access is wireless Internet or Ultra Wifi (49%), by fiber optics (30.6%) and cable Internet (23%) and in case of failure of the main connection, the Cellular data connection (77.6%) is the most used over cable Internet (10%) and satellite (1%), which represents another implementation difficulty, a figure close to 20% of users you do not have a second connection option when your first connection fails and almost 80% of users would be located in urban areas. All of the above leads to the fact that 100% of the users cannot be covered online and it is necessary to design offline work options through applications that work in this way.

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79% see the metaverse as an opportunity to improve processes and as something motivating, however, 10% view with concern the fact that it could generate some kind of addiction for being immersive; 41.2% of those surveyed have never experimented with an avatar, just as 40% have never used an immersive platform or video game such as Second Life or Roblox, contrasting with 20% who have not experienced it or been close to it either. to some artificial intelligence.

5 Discussion

Metaverse technology is a reality in higher education, so much so that several universities have begun to adopt these elements within their academic processes. Universities that have programs in the Virtual modality, precisely because they have this modality, must be at the forefront of market demands, making this type of education more attractive through this type of strategy. However, care must be taken in its implementation to the extent that it may contribute to the increase in the educational digital divide as it is not fully inclusive due to the limited access to it for the entire educational population. There is an eagerness for the implementation of new technologies without having a prior characterization of the population and without adequately preparing it for its effective implementation.

6 Conclusions

Reaching stakeholders through innovative channels and with the implementation of strategies that promote autonomous learning and the appropriation of knowledge is one of the greatest challenges of the metaverse in higher education.

The characterization results for implementation indicate that, although the metaverse is a novel opportunity in the educational field, in order to guarantee access to all users and teachers, the design must be done not only for all types of computer equipment but also to have to take into account connection speeds, the weight of applications, operating systems, access mode and storage capacity of applications, which become the design variables to consider.

The characterization shows that a strong socialization exercise must be carried out prior to implementation since a part of the population does not know not only what the metaverse is, but also many of the technologies that are related to it, as well as how to use them in the metaverse educational field.

7 Limitations and Future Research

The project is only the preliminary characterization phase, so it is suggested to continue in the design and implementation process, for which another investigative phase is required, its limitations are more of a budgetary type, taking into account the different technological options for implementation.

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References

Castillo, M. S. (2022). El metaverso como una herramienta para el e-commerce. https://ri.unsam.edu.ar/handle/123456789/2136

Grandury González, M. L. (2022). Implementación y Análisis de la Tecnología Blockchain y su Implicación Fundamental en el Desarrollo de un Metaverso Descentralizado. https://oa.upm.es/69825/

Guisao, D. C., Torres, G. E. L., & Pérez, N. M. P. (2020) El diálogo de los datos en la investigación mixta: La convergencia de enfoques para la recolección y análisis de la información. Disponible en: https://www.colmayor.edu.co/wp-content/uploads/2020/12/publicaci%C3%B3n-2.pdf

Kye, Bokyung; Han, Nara; Kim, Eunji; Park, Yeonjeong; Jo, Soyoung (2021). "Educational applications of metaverse: Possibilities and limitations". Journal of educational evaluation for health professions, v. 18, n. 32. https://doi.org/10.3352/jeehp.2021.18.32

Latorre Escudero, J. (2022). Gamificación y Marketing. https://repositorio.comillas.edu/xmlui/handle/11531/56651

Mendiola, M. S. (2022). El metaverso:¿ la puerta a una nueva era de educación digital?. Investigación en educación médica, 11(42), 5-8.

Mendizábal, N. (2018). La osadía en la investigación: el uso de los Métodos Mixtos en las ciencias sociales. Espacio abierto: cuaderno venezolano de sociología, 27(2), 5-20. http://elmecs.fahce.unlp.edu.ar/v-elmecs/actas-2016/Mendizabal.pdf

Nisa Ávila, J. A. (2021). El Metaverso: conceptualización jurídica, retos legales y deficiencias normativas. Link: https://www. worldcomplianceassociation. com/3050/articulo-el-metaverso-conceptualizacion-juridica-retos-legales-y-deficiencias-normativas. html Erişim Tarihi, 3(03), 2022.

Porush, D. (1994). Hacking The Brainstem: Postmodern Metaphysics and Stephenson's Snowcrash. Configurations, 2(3), 537-571.