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Article

Virtual reality for inclusion in community health

Realidad virtual para la inclusión en salud comunitaria

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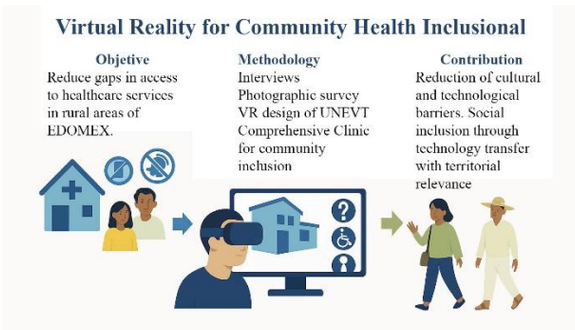
Abstract

Design of a virtual tour as a tool for inclusion in community healthcare, developed for the Comprehensive University Clinic of UNEVT, within the framework of the TIAPYC Node. The proposal integrates technological innovation and territorial relevance through the use of 360° photography, institutional narrative, and accessibility strategies. The study is based on the recognition of inequalities in access to healthcare services in rural areas of the State of Mexico and draws on concepts such as digital literacy and emerging technologies with an educational focus. It also considers previous experiences with the use of virtual reality in clinical settings, although the present case has not yet been evaluated with users. Furthermore, the importance of technology transfer models with social impact is discussed. The virtual tour is projected as a replicable tool that strengthens the relationship between the university and the community and promotes digital and territorial inclusion.



Virtual Reality, Technology Transfer, Community Health

Resumen

Diseño de un recorrido virtual como herramienta de inclusión en salud comunitaria, desarrollado para la Clínica Integral Universitaria de la UNEVT, en el marco del Nodo TIAPYC. La propuesta articula innovación tecnológica y pertinencia territorial mediante el uso de fotografía 360°, narrativa institucional y estrategias de accesibilidad. El estudio parte del reconocimiento de las desigualdades en el acceso a servicios de salud en zonas rurales del Estado de México y se apoya en conceptos como alfabetización digital y tecnologías emergentes con enfoque educativo. También se consideran experiencias previas del uso de la realidad virtual en entornos clínicos, aunque el presente caso aún no ha sido evaluado con usuarios. Además, se discute la importancia de los modelos de transferencia tecnológica con impacto social. El recorrido virtual se proyecta como una herramienta replicable que fortalece la relación entre universidad y comunidad y promueve la inclusión digital y territorial.

Realidad Virtual, Transferencia Tecnológica, Salud Comunitaria

Area: Development of strategic leading-edge technologies and open innovation for social transformation

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Introduction

Equitable access to health services is a fundamental human right. However, in many regions of the State of Mexico—especially in rural and peri-urban areas—significant gaps persist in the use and utilisation of these services. Among the factors that limit effective access are misinformation, geographical distance, lack of trust in medical institutions, and low digital literacy [Arteaga-Yánez, Mocha-Román, Vélez-Castillo & Zambrano-Requelme, 2025]. These elements, combined with contexts of structural poverty and cultural diversity, exacerbate inequalities in community health.

Against this backdrop, emerging technologies, particularly virtual reality [VR], offer a strategic opportunity to improve the relationship between health institutions and the communities they serve. VR allows the creation of immersive environments accessible from any device with an internet connection, providing users with a visual and spatial experience that facilitates understanding and symbolic appropriation of institutional places before visiting them in person [Yañez-Santaolalla, Gómez-Dantés, Piña-Pozas, Lloyd, Betanzos-Reyes & Arenas-Monreal, 2025].

In this context, the State University of the Toluca Valley [UNEVT], in collaboration with the TIAPYC Node [Technology, Innovation, Productive Autonomy and Consumption], accredited by the National Institute of Social Economy [INAES], is promoting the design of an interactive virtual tour of its Comprehensive University Clinic.

This initiative is part of a broader strategy of digital transformation and social inclusion that links university education with territorial development. The virtual tour is conceived as an educational and social tool aimed at reducing cultural, cognitive and technological barriers, while strengthening links between the university and the communities that use its services. The project is based on a vision of technology transfer with regional relevance, where the knowledge generated in the classroom is converted into concrete solutions to improve people's quality of life.

This article aims to describe the design process of the virtual tour, detail the pedagogical and technological foundations that support it, and reflect on its potential as a training tool.

Although the resource is still in the development phase and has not been evaluated by end users, it is projected as a replicable and scalable model, whose next application is planned at the Intercultural University of the State of Mexico [UIEM], adapting it to contexts with cultural and linguistic diversity.

Theoretical foundations

The design and implementation of digital technologies with a social focus requires conceptual support from multiple perspectives: technological, educational and community. In this sense, virtual reality [VR] has gained relevance in recent decades as a tool with high educational potential, due to its ability to simulate environments, facilitate discovery learning and generate meaningful experiences. Its use has spread to various fields, including health, architecture, tourism, education, and professional training. VR allows the creation of immersive environments accessible from any device... facilitating understanding and symbolic appropriation [Yañez-Santaolalla, Gómez-Dantés, Piña-Pozas, Lloyd, Betanzos-Reyes & Arenas-Monreal, 2025].

In the field of community health, VR has been used to recreate hospital tours, teach preventive practices, and train medical staff in complex procedures. For patients, the ability to virtually explore a clinical space before visiting it helps to reduce fear, familiarise them with the services and build trust in the care process [López-Isola, F. S., & Íncera-Fernández, D. 2025]. In communities with low exposure to technology, these experiences also help to introduce the use of digital tools in an intuitive way.

On the other hand, the concept of digital literacy plays a central role in this project. According to UNESCO [2022], digital literacy is not limited to the technical use of devices, but involves the ability to access, understand, use and transform digital information into useful knowledge. From this perspective, the virtual tour is not only an informative tool, but also a means of digital inclusion that enables the population to develop basic skills in navigation, interpretation of multimedia content and informed decision-making regarding their health.

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The approach of this project is also aligned with the principles of socially meaningful technology transfer, understood as the process by which knowledge and products developed at the university are transferred to the environment to solve specific needs. Through the TIAPYC Node, this transfer is articulated under a model of territorial innovation, where the participation of community actors and the local relevance of knowledge are fundamental elements.

Likewise, the project is part of university-community outreach strategies promoted by public policies for social inclusion, regional development and the knowledge economy. The participatory methodology adopted for the design of the tour reinforces this link, as it actively involves institutional staff and students in the joint construction of technological solutions with a direct impact on the territory.

Design methodology

The methodology used to design the virtual tour followed a mixed and participatory approach, combining elements of qualitative research, instructional design and technological development. This approach made it possible to build a meaningful tool for both the user community and the educational actors involved [Kouijzer, M. M. T. E., Kip, H., Bouman, Y. H. A., & Kelders, S. M. 2023].

Contextual analysis and narrative design

As a first phase, semi-structured interviews were conducted with the head of the UNEVT Comprehensive University Clinic and the university rector. These interviews provided key information about the functioning of the medical service, relevant spaces and the institutional vision of community outreach. Based on these inputs, a storyboard was developed to structure the tour, define the visual narrative and plan the navigation points.

Note: *The interviews were conducted in June 2025 and documented as part of the narrative design process for the tour. Internal project records are available for methodological traceability purposes.*

Content planning

The essential spaces of the clinic [reception, consultation rooms, pharmacy, common areas] were identified and organised into a logical sequence. The key messages to be conveyed by the tour were also defined.

Content capture

360° photography technology was used to document the spaces, ensuring sharpness, clear visual orientation, and institutional neutrality. Technical aspects such as lighting, angle, and visual cleanliness were carefully considered.

Technological integration

The images were integrated into an accessible web platform, adapted for mobile and desktop browsers. An intuitive interface was designed, with interactive elements that allow for smooth navigation through the different spaces.

Accessibility and cultural adaptation

Although the tour was designed in Spanish, its translation into indigenous languages is being considered for future replicas. In addition, audio guides and subtitles are planned. The entire tour was designed with diverse audiences in mind, with special attention to digital inclusion.

Box 1

Figure 1

First version of the virtual tour of the integral university clinic

Source: Own elaboration

Results

Although the virtual tour has not yet been formally evaluated with end users, the design and pedagogical planning process has allowed us to anticipate a series of positive impacts, both for the community and for the university environment.

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Reduction of access barriers

It is hoped that previewing the clinic's spaces and services will reduce fear, uncertainty, or cultural prejudices that may limit the use of medical services. This tool could be especially useful for older adults, indigenous populations, or individuals with low functional or digital literacy.

Appropriation of the university space

The tour promotes a sense of belonging between the community and the university by representing the clinic as an accessible, reliable place that serves the collective well-being.

This symbolic appropriation can strengthen institutional identity and foster university-community collaboration.

Development of student skills

The project has been a learning experience for the students involved, who have been able to apply technical knowledge of web design, audiovisual production and interdisciplinary work. They have also reflected on the social use of technology and their role as agents of change in territorial innovation processes.

Scalability and intercultural adaptation

One of the main objectives is to adapt the tour model for implementation at the UIEM Intercultural Health Clinic. The lessons learned during the design phase will be used to incorporate linguistic criteria, cultural narratives and local knowledge that respond to the worldview of the indigenous peoples of the State of Mexico.

Discussions

The design of the virtual tour has been an opportunity to reflect on the relationship between technological innovation, social inclusion and university education. Although there are still no empirical results from the community's use of the tour, the design phase allowed us to identify good practices, needs and opportunities for improvement.

From an academic point of view, the process made it possible to identify how projects with a social purpose can be integrated as pedagogical strategies in curricula, promoting active learning, teamwork and commitment to the environment [Hoffman et al., 2023]. The teaching of web design and emerging technologies was enriched by a methodology based on real problems, linking professional practice with social transformation.

From an institutional perspective, the course can be considered a tool for guidance, service promotion and strengthening university identity [INAES, 2023]. Its digital dissemination allows it to reach populations that do not have direct access to the facilities and offers a bridge between the physical and virtual worlds.

Finally, future evaluation with users will be essential to validate the effectiveness of the course.

Finally, future evaluation with users will be essential to validate the effectiveness of the tour. This follow-up research is expected to focus on the browsing experience, understanding of the services offered, and perception of trust.

The findings will guide the continuous improvement of the tool and its replicability in intercultural contexts.

Conclusions and future work

The development of the virtual tour has made it possible to combine technological innovation with community engagement, generating both educational and institutional benefits. Beyond the final product, the process has been formative, reflective and proactive.

Among the main contributions are:

- The application of virtual reality as an educational and social strategy.
- The creation of a replicable, scalable and low-cost tool.
- The active participation of students in real projects with social impact.
- The integration of the university into territorial outreach processes through technological solutions.

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Future lines of work include:

- Validating the tour with users through pilot tests, using qualitative and quantitative methods.
- Incorporating universal accessibility elements, including indigenous languages, visual contrast, screen reading and audio guides.
- Documenting institutional learning and publishing the experience as an academic reference.
- Adapt and implement the model at the UIEM Intercultural Clinic, in collaboration with community actors and with a focus on cultural relevance.

Declarations

Conflict of interest

The authors declare that they have no conflicts of interest. They have no competing financial interests or known personal relationships that could have influenced the content of the article presented in this document.

Contribution of the authors

Flores-Azcanio, Nancy Patricia: Led the technological and pedagogical planning of the project. Conducted the photographic survey and interviews with the main actors of the clinic. Coordinated the design, development and implementation of the virtual tour, and was in charge of the writing and main editing of the article.

González-Hernández, Jorge Daniel: Participated in gathering information through institutional interviews. Collaborated in defining content and the overall structure of the tour.

Echevarria-Chan, Ivonne: Actively participated in designing the storyboard for the virtual tour, contributing to the narrative and visual construction. Also supported the organisation of content and review of the manuscript.

Availability of data and materials

Survey_Students.xlsx
Survey_ClinicUsers.xlsx
Interviews_Doctors.xlsx

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Abbreviations

CSS	Cascading Style Sheets
DOI	Digital Object Identifier
HTML	HyperText Markup Language
INAES	National Institute of Social Economy.
NODESS	Nodes for the Promotion of the Social and Solidarity Economy.
RV	Virtual Defendant.
TIAPYC	Technology and Innovation in Productive and Consumer
UIEM	Autonomy Intercultural University of the State of Mexico
UNEVT	Toluca Valley State University

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Background

Arteaga-Yánez, Y. L., Mocha-Román, V., Vélez-Castillo, A. E., & Zambrano-Requelme, J. [2025]. Educación continua del profesional de salud para la prevención de enfermedades crónicas no transmisibles en comunidades vulnerables. Revista Mexicana de Investigación e Intervención Educativa, 4[S1], 241–248.

Basic concepts

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Supports

Hoffman, J. L., Wu, T.-Y. & Argeros, G. [2023]. An Innovative Community Health Nursing Virtual Reality Experience: A Mixed Methods Study. Creative Nursing, 29[3], 303–310.

Differences

Kouijzer, M. M. T. E., Kip, H., Bouman, Y. H. A., & Kelders, S. M. [2023]. Implementation of virtual reality in healthcare: A scoping review on the implementation process of virtual reality in various healthcare settings. Implementation Science Communications, 4, 67.

Discussions

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