VIRTUALITY AS A TRANSFORMATIVE TOOL IN DOCTOR TRAINING

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Abstract

This unpublished article aimed to theoretically explore the challenges and opportunities in the implementation of immersive technologies in the Interinstitutional Doctorate in Education Program (PIDE) of the Universidad Centroccidental Lisandro Alvarado, Universidad Nacional Experimental Politécnica Antonio José de Sucre and Universidad Pedagógica Experimental Libertador. Using a documentary methodology, the logistical, economic and pedagogical challenges in doctoral training in virtuality were analyzed; interprofessionality for collaborative educational virtuality; and learning communities for doctoral tutoring in virtual environments. It was concluded that the integration of immersive technologies in doctoral training facilitates the understanding of complex and abstract concepts, as well as interdisciplinary collaboration in order to interact in a more intuitive and concrete way with constantly evolving knowledge.

Key words: virtual reality; doctoral training; immersive technologies.

VIRTUALIDAD COMO HERRAMIENTA TRANSFORMADORA EN LA FORMACIÓN DEL DOCTORANTE

Resumen

Este artículo inédito se planteó el propósito de explorar teóricamente los desafíos y oportunidades en la implementación de tecnologías inmersivas en el Programa Interinstitucional Doctorado en Educación (PIDE) de la Universidad Centroccidental Lisandro Alvarado, Universidad Nacional Experimental Politécnica Antonio José de Sucre y Universidad Pedagógica Experimental Libertador. Mediante una metodología documental, se analizaron los desafíos logísticos, económicos y pedagógicos en la formación doctoral en la virtualidad; interprofesionalidad para la virtualidad educativa colaborativa; y comunidades de aprendizaje para la tutoría doctoral en entornos virtuales. Se concluyó que la integración de tecnologías inmersivas, en la formación doctoral facilita la comprensión de conceptos complejos y abstractos, así como la colaboración interdisciplinaria a fin de interactuar de manera más intuitiva y concreta con el conocimiento en constante evolución.

Palabras clave: realidad virtual; formación doctoral; tecnologías inmersivas.

Introduction

Doctoral training has undergone a variety of events that manifest a radical transformation in recent decades, driven largely by technological advances in the face of the growing demand for

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accessibility and flexibility in the construction of knowledge. This phenomenon is particularly evident in the training of PhD candidates in education, where virtuality becomes a transformative tool that expands interdisciplinary frontiers in the ways of constructing knowledge given the dynamic introduction, challenges in ideas and new paradigmatic realities.

In the words of Pottle (2019), the adoption of technologies such as virtuality responds to the needs regarding the path towards a more inclusive, effective and adaptable education. In the case of doctoral training, educational institutions must consolidate themselves in the better preparation of future academic leaders to face the complex challenges of doctoral spaces for the construction of contemporary knowledge.

This scenario includes the formative transformation from technological advances such as virtual reality, activating emerging methodologies such as problem-based learning and simulation, by offering immersive experiences that can simulate real situations, allowing doctoral students to acquire practical, effective, economic skills, through complex and critical competencies for research and pedagogical practice. It is there that the commitment to adaptability/flexibility to an evolving educational environment is acquired, by incorporating virtual platforms within the framework of the various doctoral programs accessible to a global audience, eliminating geographical and temporal barriers.

However, one of the significant challenges for PhD candidates in the field of their training with immersive technologies, is the creation of learning experiences that are both realistic and pedagogically effective, in the face of the demands of a significant investment in design and technological development. Hence, the position of Ryan et al. (2022) point out that the heterogeneous demands of the new technological realities in terms of hardware and software are necessary to provide immersive experiences, which could complicate the integration of these technologies in doctoral training. In this sense, doctoral programmes must be designed to provide a clear and coherent understanding of these technologies and their practical application. This situation also characterizes the condition of the doctoral candidate in terms of their access to the necessary equipment, as well as training in their use to ensure the greatest benefits of these tools.

However, the author cited in the previous paragraph, differentiates these technological tools in terms of educational software that includes virtual reality (VR), augmented reality (AR) and mixed reality (MR), collectively known as immersive technologies, with their own characteristics and dimensionalities. Thus, VR offers a completely artificial environment, while AR overlays digital information on top of the real world, while MRI combines elements of both. For doctoral students in education, the idea is to understand these differences, recognize their scope of applicability, and enrich their ways of constructing knowledge.

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By reflecting on these scenarios in the context of virtuality as a transformative tool in the training of doctoral students, the construction of this unpublished article is oriented with the purpose of theoretically exploring the challenges in the implementation of immersive technologies in the inter-institutional program Doctorate in Education of the Universidad Centroccidental Lisandro Alvarado-Universidad Nacional Experimental Politécnica Antonio José de Sucre-Universidad Pedagógica Experimental Libertador (PIDE).

To this end, some research related to this type of doctoral training is integrated into the appropriation of a documentary methodology, emphasizing three core points of analysis: logistical, economic and pedagogical challenges: doctoral training in virtuality, interprofessionalism for collaborative educational virtuality and learning communities for doctoral tutoring in virtual environments.

THEORETICAL DEVELOPMENT

Logistical, economic and pedagogical challenges: doctoral training in virtuality

While virtual reality (VR) and other immersive technologies offer benefits, they also present challenges, such as the need for relevant resources for implementation and maintenance. However, the continued advancement of these technologies and their integration into doctoral programs suggest a promising future. The ability of these tools to provide high-quality education at scale and in an accessible manner is a transformative effect that must be seriously considered in planning.

Thus, from the institutional point of view, this condition around the facts that concretize the incorporation of immersive technologies from the curricular approach, must be part of the managerial decision-making in the face of the digital divide, the high costs of implementation, the need for advanced technological infrastructure and the training of teaching staff. Likewise, in the effects of addressing cultural resistances in the organization within the framework of being able to assimilate technological change, as well as the possible strategies to overcome them. In this regard, Esteve et al. (2022) point out the following:

> From management and administration to teaching and learning processes, the advancement of technologies has resulted in changing the structure of institutions and the work of its members (Jackson, 2019). There have been changes concerning many aspects in the institutions: digital tools can inform teaching and policy decisions, communication tools enable professional collaboration between stakeholders, and education is evolving for the digital age (p. 559).

As well as some significant elements extracted on the incorporation of immersive technologies in the training of PhD candidates in education, when considering dynamic socio-material relationships, and identifying strategic factors in terms of emerging adoption focused on activity, allow institutions to make

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informed and effective decisions to overcome the digital divide, thus improving the quality and equity of doctoral training.

However, the exercise of interactions between institutional and material factors of mutual influence must be activated, which means the recognition by the management of socio-material relationships in order to integrate immersive technologies effectively. In fact, such considerations must be in line with institutional policies, technological infrastructure, and pedagogical practices that interact with new technologies.

Management decisions must include transforming these factors into concrete strategies, such as funding programs. In this way, institutions must be prepared to evolve and adapt as immersive technologies develop in curricular integration, emphasizing the continuous training of the doctoral staff effectively in the relevant pedagogical manifestations.

From this perspective, some representative facts derived from the research of Baals et al. (2024) can be transferred by taking into account the need for funding in doctoral training for the ongoing training of facilitators, in terms of interdisciplinary approaches given the constantly evolving budgetary complexity, so that these requirements are maintained by covering various disciplines including data science, artificial intelligence, machine learning and virtuality in order to facilitate the updating, renewal and modernization of strategies framed towards consultancies in the construction of knowledge.

In the same vein, another representative factor of the logistical, economic and pedagogical challenges for doctoral training in virtuality has to do with the four pillars that the aforementioned authors call in the structure of the curriculum defined in the training that requires investment through research and mandatory scientific training. advanced scientific training, training in transferable skills and incumbent training in the stays, the latter associated with the creation of specialized courses and participation in research centers and industry. This scenario activates the experiences in the facilitators that allow the knowledge to be oriented towards the doctoral students.

Interprofessionalism for Collaborative Educational Virtuality

The concept of interprofessionalism is relevant to doctoral education in virtuality, which in turn facilitates collaboration between different disciplines, allowing doctoral students to work together on projects and case studies, thus enriching their training. The integration of shared learning experiences through immersive technologies also fosters a deep and holistic understanding of educational problems, preparing doctoral students to work in multidisciplinary teams.

According to Dow et al. (2016), approaches in the formation of efficient interprofessional teams are functional to improve results, so it is necessary to be in constant knowledge of key aspects inherent to

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communication and technology, challenging the challenges of performance in terms of asynchronous communication and geographical dispersion. Likewise, non-virtual teams also contribute to specific training needs.

Likewise, the integration of interprofessional and computer skills allows us to visualize the opportunities in the training of the doctoral student to be a member of a team in virtual connections to identify new approaches in the collective construction of knowledge in a coordinated way, which in turn, suggests the development of a system of online cases designed for interprofessional collaborative practices. Overcoming logistical barriers and the adoption of pedagogies based on the profound rethinking of research by taking advantage of a comprehensive vision of how virtuality is redefining doctoral training, its effectiveness and impact on the formation of advanced competencies. In the same singularity of facts, Goble's research reasoning cited in Zhang et al. (2022) is recognized, which provides several significant and pertinent elements referring to interprofessionalism, stating that:

> The terms 'multiprofessional learning' and 'interprofessional learning' have all been referred to and are often used interchangeably. there are slight differences between them. Interprofessional learning suggests two or three professions learning together on an interactive basis, whereas multi-professional learning suggests any number of professions learning together (p. 3).

In this way, pertinent aspects are rescued in the analysis of the new realities regarding training in terms of virtuality and collaboration in doctoral programs, pertinent aspects in the distinctive framework of the meta-analysis developed by these researchers, where it is revealed that virtual simulation significantly promotes interprofessional collaboration, which suggests that virtual simulation is an effective tool to improve interaction and cooperation between different professions.

Therefore, these are the key aspects that doctoral training programs must consider in order to maximize the benefits of virtual simulation. As Díaz-Ortiz et al. (2023) reaffirm, the enhancement of interprofessional training focuses on local and global competencies, thus representing the possibility of better coordination, integration and fusion of useful knowledge that encourages the abandonment of isolationist, fragmented and unidisciplinary practices in research.

In this way, the development of interprofessional competencies is activated, emphasizing virtual simulation in order to help standardize operating methods, stimulate interest in learning, promote efficient team cooperation under a pedagogical approach that prepares PhD candidates to face complex challenges in real contexts, eliminating regional barriers and logistical limitations, as long as you have access to the Internet and the provision of electronic equipment.

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Learning Communities for Doctoral Mentoring in Virtual Environments

The implementation of learning communities in doctoral tutoring within the virtuality approach represents a significant advance in the training of researchers. Although it presents challenges, the benefits in terms of flexibility, diversity and digital skills development are invaluable. To maximise the potential of these communities, strategies must be adopted that foster collaboration, overcome technological barriers, and maintain continuous and structured support for doctoral students. In this way, virtuality is consolidated as a transformative tool in doctoral education, preparing researchers for the challenges of the 21st century. Kaminska et al. (2019) also support the potential of virtual reality in education, highlighting its particular relevance for the training of doctoral students. Indeed, these authors emphasize the fact that:

> Many students have problems understanding issues, especially the science courses, because of its technical complexity, a necessity of abstract thinking and the fact that those concepts are not entirely tangible. Deficiencies in fundamentals prevent further development and exploration of more complicated problems. Practical exercises, mainly based on specialised research equipment, must be carried out under supervision; therefore, students cannot self-configure lab equipment, experience states of emergency or effects of misconfiguration which may lead to equipment damage. Moreover, there is no possibility to practice and catch up outside the laboratory schedule. Currently, the solutions are modern technologies such as online courses (p. 2).

Therefore, in complex conditions of abstract thoughts, virtual reality becomes a pertinent tool for this approach, with the promotion of inclusion, increased commitment and the development of new research methodologies. Doctoral students who are integrated into this dynamic improve their understanding and technical skills, so they must be better prepared to face the challenges and take advantage of the opportunities of an academic and professional world that is constantly evolving.

In this sense, the aforementioned authors show the diverse situations faced by doctoral students in comprehensive scenarios of phenomena due to the complexity and the need to think abstractly and conceptually, a situation that translates to the fact of knowing how to handle and interpret complex concepts and abstractions in their research. Therefore, virtual reality represents a pertinent tool in the possibility of visualizing and understanding these concepts in a more intuitive and concrete way.

In this way, the learning communities for doctoral tutoring in virtual environments is a representative endorsement of relevance for doctoral training, in terms of the visualization of complex concepts, theories and data in an interactive environment, by virtue of seeking the facilitation of a deeper

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understanding of their objects of study, in addition to the promotion of critical thinking. By experiencing simulations in virtual reality, PhD students can develop these skills.

In this order of ideas, the above is complemented in accordance with the research of AlGerafi et al. (2023) regarding the benefits of doctoral training with the implementation of technologies such as augmented reality in addition to virtual reality, as they help to improve knowledge retention, as well as the acquisition of skills, intrinsic motivation, interest and enthusiasm for the study material. The aim is to assess the potential of transforming doctoral education, by providing research experiences that go beyond traditional methodologies, allowing interaction with content, to enrich the ways of addressing the problems studied, within the framework of the creation of learning communities in virtual environments, where doctoral students can collaborate. Share knowledge and receive mentorship effectively.

That is why the use of augmented reality and virtual reality in doctoral training is highlighted under the domain of these collaborative communities that promulgate simulations and interactive experiences, with the implementation of immersive technologies creating communication environments, critical sense of active learning, within simulated participatory scenarios that reflect real situations, which is particularly useful in fields that require a theoretical-practical understanding. Therefore, the ability to interact with virtual elements and to participate in collaborative experiences in real time for the exercise of research tutorials in an integrated and cohesive way is essential for the training of doctors in a global and digitalized environment.

Conclusions

The critical analysis achieved in this unpublished article was proposed with the purpose of theoretically exploring the challenges in the implementation of immersive technologies in the Interinstitutional Program: Doctorate in Education of the Universidad Centroccidental Lisandro Alvarado-Universidad Nacional Experimental Politécnica Antonio José de Sucre-Universidad Pedagógica Experimental Libertador (PIDE), within which significant aspects transferred in the interpretation to this point were assimilated scenario in the following conclusive terms:

The integration of immersive technologies in doctoral training presents logistical, economic and pedagogical challenges that must be addressed from an institutional perspective; These include the digital divide, high implementation costs, advanced technological infrastructure, and teacher training. However, by considering dynamic socio-material relationships, institutions can make informed and effective decisions to overcome these obstacles, thereby improving quality and equity in doctoral education.

Likewise, the development of financing programs allow the permanent training of facilitators in interdisciplinary approaches and emerging technologies; This makes room for the updating and renewal

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of pedagogical practices to effectively integrate immersive technologies into the doctoral curriculum. This involves investing in research, mandatory scientific training, advanced training in science, transferable skills, as well as stays in research and industry centers.

Doctoral training in the field of education through the Inter-institutional Program (PIDE) can obtain benefits from interprofessionalism in collaborative research virtuality, due to the fact of working in multidisciplinary teams, promoting collaboration between various disciplines, enriching training through shared projects in the comprehensive and holistic study of educational problems, that improve outcomes in the context of doctoral education.

Virtual simulation as a tool to promote interprofessional collaboration, attracts interaction between different professions, with the support of advanced competencies, which can maximize interdisciplinary cooperation, facilitating the collective construction of knowledge, under a global and local approach with the coordinated promotion towards the fusion of knowledge, eliminating fragmented research approaches.

The implementation of learning communities for doctoral mentoring in virtual environments represents a significant advance in the training of researchers, because it provides flexibility and accessibility, by fostering diversity and the development of essential digital competences through effective collaboration strategies and continuous support, creating an environment that promotes a deep and holistic understanding of educational problems.

The relevance of the potential of virtual reality in doctoral training facilitates the visualization of complex concepts and abstractions, increasing engagement, as well as the implementation of innovative research methodologies, technical skills and critical thinking, to address constantly evolving academic and professional challenges.

The prospective vision in doctoral training, based on virtuality as a transformative tool, brings a more inclusive, accessible and collaborative educational environment. The implementation of immersive technologies promises to revolutionize the way in which doctoral students interact with knowledge, for the deep and holistic understanding of complex concepts and abstract theories, in order to explore new avenues for interdisciplinary and collaborative research, essential in a globalized academic world. This is the necessary condition for a paradigmatic change in the way of conceiving the doctoral programme, towards the adaptation of virtual collaborative experiences that reflect the redefinition of doctoral training, making it relevant to address the needs of the contemporary world.

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References

AlGerafi, M. A. M., Zhou, Y., Oubibi, M., & Wijaya, T. T. (2023). Unlocking the potential: A comprehensive evaluation of augmented reality and virtual reality in education. *Electronics*, 12(18), 3953. https://doi.org/10.3390/electronics12183953

Baals, L. J., Osterrieder, J. R., Hadji-Misheva, B., & Liu, Y. (2024). Towards a new PhD curriculum for digital finance. *Open Research Europe*, 4, 7. https://doi.org/10.12688/openreseurope.16513.1

Díaz-Ortiz, A., Durand-Rill, R., & Robinson-Jay, F. (2023). La educación colaborativa interprofesional en los estudios de pre y posgrado en Ciencias de la Salud. *Revista Información Científica*, 102(4174). Universidad de Ciencias Médicas Guantánamo. https://doi.org/10.5281/zenodo.7942994

Dow, A. W., Boling, P. A., Lockeman, K. S., Mazmanian, P. E., Feldman, M., DiazGranados, D., Browning, J., Coe, A., Selby-Penczak, R., Hobgood, S., Abbey, L., Parsons, P., Delafuente, J., & Taylor, S. F. (2016). Training and assessing interprofessional virtual teams using a web-based case system. *Academic Medicine*, 91(1), 120-126. https://doi.org/10.1097/ACM.0000000000000912

Esteve, F., Postigo Fuentes, A. Y., & Castañeda, L. (2022). A strategic approach of the crucial elements for the implementation of digital tools and processes in higher education. *Higher Education Quarterly*, Online First. https://doi.org/10.1111/hequ.12411

Kaminska, D., Sapinski, T., Wiak, S., & Tikk, T. (2019). Virtual reality and its applications in education: survey. *Information*, 10(10), 318. https://doi.org/10.3390/info10100318

Pottle, J. (2019). Virtual reality and the transformation of medical education. *Future Healthcare Journal*, 6(3), 181-185. https://doi.org/10.7861/fhj.2019-0036

Ryan, G. V., Callaghan, S., Rafferty, A., Higgins, M. F., Mangina, E., & McAuliffe, F. (2022). Learning outcomes of immersive technologies in health care student education: Systematic review of the literature. *Journal of Medical Internet Research*, 24(2). https://doi.org/10.2196/30082

Zhang, X., Jiang, Y., & Tang, Y. (2022). Research on the effectiveness of virtual simulation in Interprofessional collaboration: A meta-analysis. December 2022. https://doi.org/10.21203/rs.3.rs-2409766/v1

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