

Immersive Game-Based Experiential Learning for International Business Challenges

Aline Castillo Moreno¹ and Mario Alberto Caudillo Melgoza²

¹Tecnologico de Monterrey, Estado de México, México

²Cleaders, Estado de México, México

acastillo@tec.mx

mcaudillo@cleaders.mx

Abstract: Higher education increasingly demands innovative instructional strategies that bridge the gap between academic theory and professional practice. In international business programs, access to real-world environments such as ports, customs facilities, and production centers has become progressively limited due to logistical and institutional constraints. As a result, educators are exploring alternatives that maintain experiential richness while adapting to evolving conditions. This paper presents an educational innovation that applies game-based learning and experiential learning frameworks through immersive virtual reality (VR). Two interactive VR simulations were developed to enhance student engagement and skill acquisition. The first experience focuses on individual decision-making in a global logistics scenario, requiring students to complete documentation, coordinate shipments, and solve operational challenges. The second emphasizes collaborative learning, guiding teams through the regulated production and export of a culturally significant product with protected designation of origin. Both simulations embed pedagogical objectives within dynamic, narrative-driven environments that reflect real-world complexity. By leveraging existing VR infrastructure across multiple campuses, the project aligns technological capability with curriculum needs to create scalable, high-impact educational experiences. These tools promote critical thinking, problem-solving, and communication while offering a viable substitute for traditional fieldwork. The paper concludes by outlining future research directions focused on implementation and impact evaluation. These efforts aim to contribute to broader conversations about the role of virtual reality and game-based methodologies in transforming experiential learning in higher education.

Keywords: Higher education, Educational innovation, Game-Based learning, Virtual reality, Experiential learning

1. Introduction

International business education increasingly requires innovative approaches to bridge the gap between theoretical instruction and real-world practice. However, access to operational environments such as ports, logistics hubs, and manufacturing facilities has become increasingly restricted due to institutional, logistical, and security-related constraints. These limitations have reduced opportunities for students to observe and engage with the complex systems that underpin global trade.

In response, educators are turning to immersive technologies that enable active, experiential learning beyond the physical classroom. Game-based learning (GBL) and experiential learning (EL) models provide a framework for students to develop decision-making, problem-solving, and collaborative skills through interactive scenarios. When combined with virtual reality (VR), these approaches can replicate key aspects of international trade environments in a controlled and scalable format.

This paper presents two VR learning experiences designed to support international business programs at Tecnológico de Monterrey. Each simulation integrates game mechanics with curriculum-relevant content, offering students the opportunity to engage in authentic logistical and regulatory challenges. These experiences aim to enhance engagement, reinforce conceptual knowledge, and offer viable alternatives to traditional field-based learning.

2. Context

Since 2023, the National Customs Agency of Mexico (ANAM) has militarized customs zones, effectively ending student visits to ports and customs facilities—once essential components of international business education in Mexico (Rionda, 2023). This shift has limited students' ability to understand critical operational procedures involved in international trade.

To address this gap, a virtual reality (VR) prototype is proposed, comprising two distinct experiences. The first is an individual, homework-style escape room where the student must facilitate the shipment of automotive parts from a factory in Puebla through the Interoceanic Corridor toward their final destination in Germany. Within the simulation, the student must make strategic decisions involving documentation, port procedures, and shipping

logistics. This experience leverages game-based learning to immerse students in real-world challenges otherwise inaccessible due to field visit restrictions.

The second experience is designed as a collaborative, in-class team activity. It focuses on the creation and export of a Caja de Olinalá, a handcrafted item with protected designation of origin from Guerrero, Mexico (Secretaría de Economía, 2016). In this scenario, one student navigates a VR environment using a headset and treadmill, while teammates—equipped with printed manuals—support the decision-making process. The objective is to select raw materials, prepare them according to traditional processes, comply with designation requirements, and complete the logistics for international shipment. Communication is essential, as only the student in VR can see the environment, and only the team can interpret the reference materials.

These immersive experiences offer a scalable and pedagogically grounded alternative to site visits, enabling students to engage with complex international trade operations and culturally significant logistics processes through experiential and game-based learning.

2.1 Game-Based Learning and Experiential Learning

Recent literature reviewed highlights the integration of game-based learning (GBL) and experiential learning (EL) to enhance student engagement, critical thinking, and knowledge retention across educational contexts. GBL emphasizes active learning through simulations and interaction, allowing students to “learn by doing.” This aligns with Kolb’s (1984) experiential learning cycle, which consists of four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

Audu and Asino (2024) demonstrate how embedding ethical content in game-based environments can influence student behavior, resonating with Kolb’s framework. Similarly, Spiteri and Vella (2024) show that simulation games in vocational education support formative assessments through experiential inputs. Mahunyag et al. (2024) and Varman et al. (2021) further reinforce how GBL promotes active experimentation and reflection, facilitating deeper understanding of theoretical content.

Mega-games represent a dynamic subset of GBL. These experiences fuse role-play, social interaction, simulations, rule-based systems, economic dynamics, political scenarios, and decision-making processes into immersive narratives (Castillo & Caudillo, 2024). Such complexity enhances analytical skills and real-world problem solving. Their versatility has been evidenced in multiple contexts: Ainul Nur Khusna et al. (2023) employed a Mega Monopoly Game to teach disaster preparedness to children, while Buenaño, Warner, and Moore (2024) found improved student confidence and practical competence through mega sporting event simulations.

Technological advancements have expanded experiential learning through emerging platforms. Gatsakou et al. (2025) explore the use of AI and VR in role-playing games to personalize learning based on student input. Emotional dynamics in gameplay, such as those studied by Sumi and Sato (2022), and collaborative mobile escape games (Trinh, 2021), illustrate how narrative and emotional engagement support reflective learning. This is echoed by Falk et al. (2023) and Stewart and Wang (2023), who emphasize the importance of feedback loops and shared experiences in professional training contexts.

Domain-specific applications also validate the adaptability of experiential GBL: Komaini et al. (2021) improved children’s motor skills through game-based interventions, and Tran (2021) demonstrated its value in hospitality education. Across these studies, a consistent theme emerges—when experiential principles are combined with interactive game mechanics, students develop practical and conceptual skills more effectively. Mega-games, in particular, illustrate how immersive, narrative-rich learning environments can simulate complex real-world challenges, making them especially relevant in international business education (Castillo & Caudillo, 2024).

2.2 Immersive Virtual Reality in Higher Education

This section reviews recent studies on immersive virtual reality (VR) in higher education, based on literature retrieved from Scopus and Web of Science databases. The findings highlight the growing use of VR to enhance teaching and learning across disciplines through interactive, multi-sensory environments.

Mallik and Aithal (2024) show that VR enables students to engage with complex academic scenarios by simulating real-world situations. Its multimodal features—visual, auditory, and kinesthetic—support deeper cognitive engagement and improved retention by allowing learners to interact with challenging content in a virtual setting.

Cai (2024) demonstrates how institutions use VR and artificial intelligence (AI) to support internationalization strategies. Immersive tools, such as virtual customer research platforms, allow institutions to design more globally relevant programs while improving students' cross-cultural communication and adaptability.

Tao (2024) focuses on human–computer interaction (HCI), emphasizing the importance of user-centered design in educational VR. Features like natural language processing and gesture-based interfaces help reduce cognitive load and enhance usability. These design elements are crucial for fostering collaboration and sustained engagement in diverse academic settings.

Overall, the reviewed studies suggest that VR offers substantial benefits for higher education by enabling experiential learning, increasing accessibility to complex content, and fostering collaboration. While challenges such as cost and infrastructure persist, VR represents a promising tool for enriching the educational experience across disciplines.

3. Rationale for the Virtual Reality Experience

The proposed virtual reality (VR) prototype consists of two distinct experiences designed to address the growing gap between classroom theory and real-world international trade practices. These immersive learning environments enable students to engage with complex logistics and cultural export scenarios through interactive, decision-driven simulations that promote experiential learning.

The first experience is a single-player, homework-style escape-room simulation set in a port logistics context. The student assumes responsibility for coordinating the export of automotive parts manufactured in Puebla, destined for Germany via the Interoceanic Corridor. Within the VR environment, the student must make time-sensitive decisions on documentation, customs procedures, shipment routes, and carrier selection. The objective is to “escape the port” by successfully completing the required trade operations without errors or delays. This simulation reflects real-world constraints, such as documentation errors, shipment bottlenecks, and schedule changes, offering students the chance to navigate dynamic logistics challenges that are no longer physically accessible.

This experience enhances students' strategic thinking and decision-making under pressure. It allows them to visualize cause-and-effect relationships in logistics, reinforces procedural knowledge, and offers repeated practice in a low-risk setting. By simulating what they cannot access in person, students gain operational insight, improved confidence, and a clearer understanding of the documentation and coordination required in international trade.

The second experience is a team-based, in-class simulation centered on the production and export of the Caja de Olinalá, a culturally significant wooden craft with a protected designation of origin (DO). In this activity, one student enters the VR environment using a headset and treadmill, interacting with virtual objects, locations, and decisions. The remaining team members, who cannot see the VR world, are given printed manuals containing critical information about the traditional crafting process, required materials, designation criteria, and logistics documentation.

The objective is to successfully produce and prepare the Caja de Olinalá for international shipment by guiding the VR participant through the correct sequence of actions—from selecting the appropriate wood and preparing it with natural treatments, to mixing traditional pigments and ensuring DO compliance. Success depends on precise communication between the student inside the VR and the team outside it. This experience fosters collaboration, reinforces verbal and written communication, and requires attention to complex procedural and regulatory steps—key skills in international business operations involving culturally protected goods.

Both VR experiences integrate game-based learning mechanics, such as progress feedback, reward systems, and challenge escalation. These features align with experiential learning theory, specifically Kolb's (1984) four stages: concrete experience (active simulation), reflective observation (feedback and team debriefing), abstract conceptualization (connecting actions to trade theory), and active experimentation (repeating and refining decisions). The result is a learning model that encourages deeper engagement, higher retention, and skill transfer to real-world business contexts.

Ultimately, these simulations provide scalable, immersive alternatives to field visits. They equip students with the critical thinking, procedural fluency, and collaborative problem-solving skills needed to navigate modern international business environments.

3.1 Challenges in Traditional International Business Education

Traditional methods of teaching international business increasingly struggle to prepare students for operational complexity. Access to key industrial settings—such as ports and customs facilities—has diminished due to security restrictions, reducing opportunities for direct observation and experiential learning.

Even when universities provide access to laboratories or simulation tools, these experiences are often fragmented. Students are typically exposed to isolated roles or processes without a holistic view of the system. Furthermore, these sessions are bound by limited schedules and cannot be easily repeated, weakening reinforcement and retention.

Online simulators offer theoretical training but often lack the visual and contextual elements necessary to simulate operational decision-making. When students encounter outcomes such as delivery delays or document errors, they receive alerts rather than experiencing how those failures unfold. This leads to reduced engagement and limits the development of applied problem-solving skills.

These constraints contribute to a growing disconnect between what is taught in the classroom and what students encounter in professional practice. To address this, alternative approaches must create space for interactive, repeatable, and context-rich learning—bridging academic content with the realities of international trade.

3.2 Technological Context and Feasibility

The technological infrastructure at Tecnológico de Monterrey provides a solid foundation for the integration of immersive virtual reality (VR) experiences in international business education. In 2017, the university established Mostla, an innovation space inaugurated during the International Congress of Innovation and Educational Research in December of that year. Although the inauguration was held at the end of 2017, Mostla officially opened its doors to students, faculty, and staff in January 2018. By October 2018, it had already served more than 5,000 members of the university community, demonstrating significant early engagement.

In subsequent years, Mostla expanded to 20 campuses of the Tecnológico de Monterrey, setting up dedicated VR Zones. Each VR Zone features four stations equipped with HTC Vive Pro headsets, enabling users to explore immersive digital environments. The name "Mostla," meaning "tomorrow" in Nahuatl, reflects its mission: to foster curiosity and digital fluency among students and professors, thereby strengthening a culture of innovation. This goal is pursued through four key strategies: facilitating the use of emerging technologies in learning activities and projects, supporting students in the use of technology for multidisciplinary projects, advising faculty and researchers on incorporating innovative technologies into their work, and integrating these tools into high-impact institutional projects.

Mostla offers a range of services, including group visits and explorations, consulting for academic and institutional projects, and the reservation and loan of VR equipment and spaces for academic purposes. This infrastructure has created an environment where emerging technologies are increasingly accessible for educational use across disciplines.

Building upon this foundation, in 2024 the Business School of Tecnológico de Monterrey made a significant investment in four of its campuses: Monterrey (Nuevo León), Guadalajara (Jalisco), Querétaro (Querétaro), and Estado de México (State of Mexico). These campuses now feature International Business Laboratories equipped with advanced immersive learning technologies. Each laboratory houses four VR stations with HTC Vive Pro 2 headsets and VR omnidirectional treadmills (KAT Walk C 2), allowing users to move freely, running, jumping, walking, and navigating as they would in a physical space. This level of physical immersion positions the institution to offer highly dynamic learning experiences.

However, despite the availability of innovative hardware, there is currently a gap in educational software tailored to international business courses. The existing VR application in use, a crane operation simulator for container management, while sophisticated, does not align with the learning objectives of international business programs. This situation presents a clear opportunity: while the hardware infrastructure is robust, the absence of appropriate software limits the educational value that can be derived from these investments. Developing or adapting VR content specifically for international business learning could thus significantly enhance the use of these technologies and maximize the impact of the resources already in place.

4. Discussion

The integration of immersive virtual reality into international business education at Tecnológico de Monterrey is both timely and feasible. The university has made significant infrastructure investments—through Mostla and the International Business Laboratories—that support the use of advanced VR equipment. However, a lack of curriculum-specific software has limited the pedagogical value of this hardware. The development of tailored VR content responds directly to this gap.

The proposed prototype includes two distinct learning environments. The first is a solo VR escape-room experience focused on port logistics. Students interact with a shipment scenario in which they must make real-time decisions involving documentation, transport coordination, and export protocols. The game mechanics allow learners to engage independently, reinforce procedural knowledge, and develop decision-making skills critical to international trade operations.

The second experience is a collaborative, classroom-based simulation involving the production and export of the Caja de Olinalá. This team-based task requires coordination between a student immersed in the VR world and peers navigating printed manuals. The activity is structured to simulate a complete supply chain, reinforcing teamwork, communication, and regulatory understanding in cultural goods exports.

These experiences leverage game-based learning to facilitate active experimentation and reflection—key stages in experiential learning. By aligning infrastructure with tailored content, the institution is positioned to bridge the divide between theoretical instruction and operational practice.

Future work will focus on implementing and evaluating these VR experiences in higher education classrooms. Subsequent studies can examine their impact on learning outcomes, skill acquisition, and student engagement. Publishing findings from these implementations will contribute to the growing body of research on immersive learning in international business education.

5. Conclusions

The development of immersive, game-based learning experiences offers a concrete response to the limitations faced in international business education today. By designing virtual reality simulations that integrate decision-making, collaboration, and regulatory processes, this initiative aligns innovative technology with pedagogical needs.

Rather than replicating field visits, these experiences aim to create new pathways for engagement—leveraging narrative, interactivity, and experiential structure to foster applied learning. The work presented here sets the foundation for evaluating how immersive tools can enhance conceptual understanding and operational thinking in academic contexts.

Continued efforts will focus on implementation and assessment, contributing to future research on immersive learning in higher education.

Acknowledgements

We want to acknowledge the technical and financial support of the Writing Lab, Institute for the Future of Education, Tecnológico de Monterrey, Mexico, in the production of this work. Also want to acknowledge the financial support of the Publishing Help Fund, Tecnológico de Monterrey, and CLeaders for the financial support.

Ethics Declaration: This is to acknowledge that the authors report there are no competing interests to declare.

AI Declaration: The authors used OpenAI's ChatGPT to assist in organizing ideas, for grammar and style editing without generating substantive content. Additionally, the Scite platform was employed to perform intelligent searches for relevant, recent papers indexed in Scopus and Web of Science. Outputs from these tools were used solely to inform structural organization and language refinement; all analytic content and interpretations remain the author's own.

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