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Work-in-Progress—Global Citizenship: A Journey Through Immersive Education

Fredrica V. Higgs[1] and Patrick M. O'Shea[2]

[1] University of North Carolina at Charlotte, Charlotte, NC USA
[2] Appalachian State University, Boone, NC USA
higgsfv@appstate.edu

Abstract. As technology and globalization transform education, virtual reality (VR) and augmented reality (AR) emerge as culturally immersive tools that can make the world a classroom. This paper examines how these technologies can facilitate equitable access to international and intercultural learning experiences remotely. Joseph Aoun's [1] "humanics" is a guiding principle of this work, and Chris Dede's [2] criteria for evaluating immersive virtual learning environments provides the basis for an evaluative analysis of VR and AR platforms that simulate study abroad and global experiences. Through a systematic review of international immersive learning experiences using the following criteria: immersion, transfer, environment, customization, scalability, and affordability, the efficacy, affordances, and limitations of these immersive technologies are assessed [2]. The findings offer valuable insights into the most effective features for delivering quality international experiences from a distance. This is particularly beneficial for students encountering financial constraints. Key considerations regarding pedagogy, cost, accessibility, and equity offer deeper insights for effectively integrating VR and AR into higher education's internationalization efforts.

Keywords: Virtual Reality, Augmented Reality, Study Abroad, International Education, Global Learning.

1 Cross-Cultural Learning with Immersive Technologies: Introduction

Traditional authoritarian models of education have been critiqued for stunting the development of democratic citizenship by treating students as passive recipients of information rather than active participants in their learning [3]. According to studies, immersion in a digital environment can enhance education in at least three ways: by enabling multiple perspectives, situated learning, and transfer [2]. VR has been shown to boost motivation by providing learning environments that promote discovery, include natural group interactions, and allow students to experience worlds/objects from new/unique perspectives [13]. Likewise, augmented reality empowers students through interactive learning by overlaying digital information onto real-world environments. Students can be transported to different countries, allowing them to explore diverse cultures, and historical sites, and interact with locals—all from the comfort of their classrooms [19]. Students studying a foreign language can use AR applications to engage in real-time language immersion exercises, virtually placing them in situations where they can practice language skills with simulated native speakers [15]. This research suggests that immersive technologies have the potential to bridge the gap in active learning by simulating real-world scenarios for international learning experiences. UGPN Academy's Collaborative Online International Learning (COIL) Project, further highlights the efficacy of virtual formats in facilitating international student learning experiences and fostering a diverse online community. They support utilizing immersive technologies to transcend physical limitations in promoting global engagement [8].

1.1 Equity

Immersive technologies also have the potential to make global learning experiences more equitable. A long-standing barrier to study abroad for marginalized students is money. Wanger et al.'s study on the barriers hindering African American students' participation in study abroad programs identifies perceived cost and financial aid limitations as significant deterrents [17]. Addressing such barriers furthers the goal of promoting 'Education for All' [16]. By applying Dede's [2] criteria to remote international learning experiences, educators can ensure that marginalized students have access to engaging and enriching educational opportunities regardless of their geographical location or socioeconomic status. Marinoni and De Wit [9] highlighted the stark reality that only 2 percent of the world's student population has the economic resources and the social mobility required to participate in study abroad and benefit from the experience. Virtual reality (VR) and augmented reality (AR) technologies can mitigate this disparity by providing remote immersive experiences and extending global learning opportunities to a broader and more diverse student demographic. These technologies offer a more cost-effective and accessible alternative, allowing students from various backgrounds to engage in cross-cultural experiences without the traditional barriers of travel expenses and logistical constraints.

1.2 Global Citizenship

A spirit of global citizenship can be cultivated through immersive learning as students can gain an understanding of remote lands, countries, cultures, and customs. Digital international environments can offer first-hand experiences in foreign relations, breaking down barriers and contributing to a more interconnected and empathetic global community. I am among those who believe that "it is urgent to act on this aspiration in developing educational programs and civil society to promote world-mindedness" [5]. Then again, is developing programs that promote world-mindedness enough to motivate students to participate or are there other influential factors? According to Simon & Ainsworth [14], research indicates that the decision of students to participate in study abroad is influenced by finances, habitus, social networks, cultural capital, institutional considerations, with race and academic year being the most significant. Allowing students to explore programs remotely could boost their desire to partake. Fisher et al [4] highlight positive outcomes in knowledge, attitudes, and skills domains according to Hunter's (2004) Model of Global Competence as benefits of faculty-led short-term study abroad initiatives. Yet, the extent to which they provide the type of transformative learning necessary to enhance global learning outcomes to meet the needs of the evolving global economy remains underexplored in the research literature [4]. Can the capability of VR and AR to facilitate culturally immersive experiences based on Hunter's Model bolster global learning outcomes? According to Aoun [1, p. 12], by combining technological literacy with human literacy, educational institutions can prepare their graduates not just to get jobs but to become makers of jobs." To contextualize this vision, further insights were drawn from key academic texts.

Table 1. Hunter's (2004) Model of Global Competence.

Attitudes	Knowledge	Skills/Experiences
1. Recognition that one's own worldview is not universal	1. Understanding one's own cultural norms & expectations	1. Ability to identify cultural differences
2. Willingness to step outside of one's own culture and experience life as "the other"	2. Understanding cultural norms & expectations of others	2. Ability to live outside one's own culture
3. Willingness to take risks in pursuit of cross-cultural learning and personal development	3. Knowledge of world history	3. Ability to collaborate across cultures
4. Openness to new experiences, including those that could be emotionally challenging	4. Knowledge of current world events	4. Successful participation in academic or work projects with people from other cultures
5. Coping with different cultures and attitudes	5. Understanding the concept of globalization	5. Ability to assess intercultural performance in social or professional settings
6. A non-judgmental reaction to cultural difference		6. Effective participation in social and professional settings globally
7. Celebrating diversity		

2 Literature Review: Immersive Tech and Their Affordances for Distance Global Experiences

This literature review examines recent studies on using technology to facilitate remote international and intercultural learning. The research explores the efficacy, affordances, and limitations of virtual reality, augmented reality, and online collaboration platforms aimed at simulating study-abroad experiences. While results are mixed, these technologies show promise for increasing equitable access but work best as a complement, not a replacement, for in-person exchanges. This review synthesizes key insights from the research to provide a more comprehensive look at the current state and future direction of technology-enabled global education.

2.1 Virtual Learning Efficacy and Enhancing Learning Practices

Keshishi et al.'s [8] case study examines the UGPN Academy's adaptation to online platforms during the COVID-19 pandemic. Through pre- and post-participation surveys, the study reveals the virtual format's efficacy in maintaining international student learning experiences. The findings highlight features successfully adapted to an online format and shed light on the technology's affordances for distance international experiences. The COIL project, assessed through surveys, demonstrates success in enhancing learning and teaching practices, developing global and cultural awareness, and fostering a collaborative online community. The methodology involves surveys administered before and after participation. The study showcases both the effectiveness of technology and features contributing to distance international experiences.

2.2 Traditional vs. Technology-Enhanced Study Abroad

Fisher et al.'s [4] systematic review, employing Hunter's (2004) Model of Global Competence, investigates the impact of faculty-led short-term study abroad programs on students' global competence. Spanning 92 research articles from 2004 to 2020, the study categorizes outcomes into knowledge, attitudes, and skills domains. Positive impacts on global competence are recognized, while evidence gaps guide future program design. The findings contribute insights into both the effectiveness of traditional study abroad and the features that technology can leverage for distance international experiences.

2.3 Technological Insights for Remote International Experiences

Wu et al. [19] comprehensively explore augmented reality (AR) systems, highlighting their potential to deliver authentic cultural experiences through mobile and location-based technologies. The authors stress AR's ability to simulate international locations, leveraging features such as mobility and contextualization. They further emphasize specific AR features, including 3D visualizations and multi-user participation, enhancing international experiences by virtually transporting students and linking classroom learning to real-world contexts. While acknowledging the benefits, the authors emphasize the need to address challenges for effective AR integration in international education, providing valuable insights for the broader literature review on technology effectiveness for distance international experiences.

2.4 Immersive Technologies for Authentic Remote International Learning

Dede's [2] article provides insights into how immersive technologies like augmented reality (AR) and virtual environments can facilitate authentic remote international learning experiences. Through a review of research studies on educational systems like River City and Alien Contact!, the author highlights immersive interfaces' methodologies of enabling multi-perspective learning, situated experiences in authentic contexts, and near transfer of knowledge to real-world settings. Key findings indicate that immersive simulations can deeply engage learners, build sophisticated skills like scientific inquiry, and allow low-performing students to experience success through virtual identities. Positive impacts include the ability to provide international experiences remotely by contextualizing learning in simulated environments mirroring real-world cultural contexts. However, evidence gaps remain around optimal instructional designs for different subjects/learners, leveraging virtual identities for self-efficacy, blending physical/virtual environments for transfer, and translating immersive environment insights to face-to-face pedagogies.

2.5 The Future of AR/VR

McGrath et. al [10] used the futures framework to analyze how augmented reality (AR) and virtual reality (VR) technologies could enhance international and intercultural experiences in higher education. Though adoption is still early, they identify visualization for presentation and exploration as a key area where AR/VR shows promise for simulating study abroad and providing immersive cultural encounters remotely. Early projects demonstrate VR's ability to virtually transport students to other countries and historical sites, with features like spatial navigation, cultural artifacts, and roleplaying with avatars. The authors conclude AR/VR has significant potential to supplement or expand access to international experiences if health/safety, accessibility, and privacy concerns are addressed.

2.6 Overcoming Barrier

Wanger et al.'s [17] case study investigates institutional barriers hindering African American students' participation in study abroad. Employing a 29-question survey distributed through Qualtrics, the findings identify perceived cost and financial aid limitations as major deterrents. While focusing on barriers, the study indirectly informs features that technology should consider, contributing to a comprehensive understanding of technology's effectiveness and affordances.

2.7 Communication Strategies

Whatley and Stich's [18] mixed-methods investigation explores how postsecondary institutions communicate study-abroad opportunities. Using quantitative regression analysis and qualitative content analysis, the study identifies institutions with high or low study-abroad participation rates. The findings emphasize the role of institutional communication in shaping study-abroad participation. While not directly addressing technology, the communication features identified can inform technology-driven approaches that facilitate international experiences from a distance.

This structured breakdown underlines specific aspects of technology effectiveness and affordances for distance international experiences, offering a comprehensive view of each study's contributions within the overarching research questions.

3 Research Questions

Based on the identified gaps found in the literature, the purpose of this study is to answer the following research questions:

Which technologies are most effective at delivering international experiences remotely?
What are the features and affordances of those technologies?

4 Methodology

4.1 To address research question 1, the following methodology will be used to gather and analyze data:

Available remote international experiences using immersive technologies will be identified through searches on Google, Google Scholar, ERIC, EBSCOhost, Chat GPT, and Claude AI. Search terms will include:

- "Remote study abroad experiences through immersive technologies"
- "International learning using augmented reality"
- "International learning using virtual reality"
- "Study abroad programs using mixed reality"
- "Study abroad using immersive technologies"

A sample of identified experiences will be evaluated against Dede’s seven criteria for effective immersive virtual learning environments.

Table 2**.** Dede's Criteria for Evaluating Immersive Learning Environments.

Criteria	Knowledge
Immersion	The ability of the technology to create a sense of presence and engagement for the learner.
Interaction	The degree of interactivity and manipulation afforded by the technology.
Transfer	The extent to which knowledge and skills can transfer from the virtual environment to real-world situations.
Usability	The ease of use and accessibility of the technology for learners and instructors.
Customization	The flexibility of the technology to adapt to different learning styles, needs, and contexts.
Scalability	The ability of the technology to be implemented and sustained on a larger scale.
Affordability	The cost-effectiveness of the technology in terms of development, implementation, and maintenance.

To address research question 2, the following methodology will be used to analyze the sample of immersive learning experiences:

- An established or customized evaluative instrument will be used to operationalize Dede's criteria and systematically assess how well the experiences align with them.
- If developed then two independent raters will apply the rubric to evaluate the experiences, comparing results to ensure inter-rater reliability.
- The experiences will be rated for their overall effectiveness using the established or customized rating scale to synthesize the evaluation based on Dede's [2] criteria.

5 Findings

The search identified immersive experience platforms as well as remote international experiences that utilize a range of immersive technologies. These technologies include virtual reality (VR), augmented reality (AR), and 360° video. The VR experiences provided 3D simulations for active viewing and exploration. The AR experiences overlaid contextual information but relies on physical printouts. The 360° video experiences offered more passive cultural immersion. None leveraged mixed reality, representing a potential gap in immersive technology applications. Moreover, 15 universities known for their immersive learning labs were identified along with 50 remote study abroad platforms, 42 types of remote study abroad experiences, and 17 examples of individualized international immersive experiences. These immersive learning opportunities offer an array of features, including AR, VR, 360 tours, and other experiences accessible for remote international learning. I want to highlight two representative immersive experience platforms that served as a repository of multiple individual experiences, 360 GLE Virtual Study Abroad and IMEX Lab at Penn State. Within the scope of this study, a sample of 12 individual immersive learning experiences has been identified for analysis.

- The 12 identified immersive experiences include:
- Virtual Architecture Tours - Allows students to tour iconic buildings globally in 3D VR simulations.
- Walking with Dinosaurs - Enables students to observe dinosaur behavior through 3D reconstructed Jurassic environments. Students can examine fossils closely and control views.
- Climate Change in Fiji in Virtual Reality (VR): 'Our Home, Our People' –
- Victorian England - Offers a walk through the Slums in 360 VR.
- Mystical Machu Picchu - Provides an immersive 3D VR tour of Incan ruins at Machu Picchu. Visual realism provides a cultural context for archaeology students.
- Ancient Rome Reborn Through Virtual Reality.
- Ever, Jane - Ever, Jane is a very different type of virtual world set in the works of Jane Austen.
- Amazon Rainforest Ecology - Presents biodiverse plant and animal life through an immersive 3D rainforest VR simulation. Students can interact and conduct experiments.
- Great Barrier Reef Snorkeling - Uses 3D simulation to study coral reef ecology and marine biology up close, with realistic underwater views.
- Louvre Virtual Tours - Enables 360° video tours of the museum with some additional info overlays.
- Exploring the Great Wall of China - Offers a 360° video tour of the Great Wall with historic narration.
- Tower of London Tour - Presents a 360° video tour of the tower with some commentary.

The results of this systematic effectiveness evaluation will be analyzed to identify the most effective approaches to remote international experiences, and how features and affordances of the top experiences align with and leverage Dede's [2] criteria. While these experiences lightly touch on Hunter's global competencies in the realm of knowledge, the analysis will help address the research questions focused on determining which technologies and features are optimal for delivering impactful global learning experiences remotely. The key findings are to be included in the final poster presentation. Beyond the scope of this analysis, findings will provide some context for a descriptive analysis of these tools and an evaluation of their effectiveness using a customized rating scale. The effectiveness ratings will then be correlated with the specific technologies used to determine if any approaches are most effective for remote international learning.

This research represents an initial step towards the larger aspiration of developing immersive learning content that harnesses cutting-edge technologies like virtual reality (VR) and augmented reality (AR). The goal is to create rich, culturally immersive learning experiences that foster global competency and nurture a sense of global citizenship among scholars. By systematically reviewing and evaluating the effectiveness of existing tools through a customized rating scale, this research can identify the most promising approaches for facilitating remote international learning experiences. The findings will also highlight technological features that deliver impactful global learning outcomes in a virtual setting aligned with Dede's [2] framework to ensure a top-rated experience that leverages key criteria like multi-sensory inputs and motivating narratives. The insights gained will guide the development of innovative immersive content that transcends physical boundaries, empowering scholars to authentically explore diverse cultures and cultivate a truly global perspective remotely.

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