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Immersive Technologies (AR/VR) for Enhancing Learning in Multicultural Classrooms: Addressing the Needs of International Students

Abstract

As a result of globalization, European universities now attract students from all over the world, enriching the campus community with their different backgrounds and perspectives. However, they frequently face challenges to involvement and well-being due to language obstacles, cultural mismatch, and social isolation. The new trends of innovative tools, immersive technologies like AR and VR, have arisen to meet these problems head-on. Immersive technologies have the potential to improve learning experiences, facilitate more culturally and linguistically inclusive instruction, and impact the motivation, engagement, and overall health of international students. This theoretical study delves into these themes, giving the theoretical aspect of this domain. The paper analyses current literature in a thematic manner within the European context, specifically focusing on Italy, drawing on sociocultural theory, cognitive load theory, and self-determination theory. Additionally, it highlights important difficulties and solutions for using immersive technology in multicultural classrooms. The results show that when created with inclusivity in mind, AR/VR spaces have the ability to revolutionize universities by promoting psychological safety, intercultural competence, and deep learning.

K e y w o r d s: Immersive technologies, AR/VR, Multicultural Classroom

Introduction

Greater international student mobility over the last 20 years has caused a sea change in European higher education. There is a wide range of linguistic, cultural, and pedagogical backgrounds represented among the more than 1.5 million international students attending EU institutions in terms of both language and cultural background (Bakay, 2023; Kassim, 2023). Because of this shift, institutions now have to find new ways to teach that value diversity while still pushing students to do their best academically (Starck et al., 2021). Cultural dissonance, social isolation, language barriers, and unfamiliar academic standards are common challenges for international students (Mulyadi et al., 2024). International students at European institutions report more stress and less involvement than their local colleagues, which is supported by research (Alharbi & Smith, 2018). As pointed out by Moskal and Schweisfurth (2018), these difficulties are worsened in Italy due to the lack of institutional readiness for culturally responsive education.

Rigidity, reliance on texts, and cultural monolithicity are common complaints leveled against traditional lecture-based pedagogies (Tshering, 2024). Inadvertently, these methods put some students at a disadvantage because students are more proficient in the target language and have more exposure to local cultural allusions (Abduqodirova et al., 2025). As a result, not only are fewer opportunities for intercultural learning presented to domestic students, but also fewer opportunities for involvement from overseas students are reduced (Oduwaye et al., 2023). Emergence of AR/VR presents a game-changing option (Ali et al., 2025). In contrast to virtual reality (VR), augmented reality (AR) superimposes digital information on top of the actual world (Dargan et al., 2023). Rather than passively interacting with content, learners can engage experientially through the use of these tools, which can mimic real-life cultural and linguistic situations (Akçayır & Akçayır, 2017). A trend towards experiential education is being signaled by the proliferation of immersive learning labs in European universities (Hawkinson, 2025).

According to Di Natale et al. (2020), immersive environments are designed to accommodate multiple learning styles by delivering knowledge through visual, aural, and kinesthetic channels. This approach decreases the reliance on verbal proficiency (Ngo et al., 2025). This is in line with the concepts of universal design for learning (UDL) which stress the need of offering many types of representation, interaction, and expression to cater to the diversity of learners (Evmenova, 2018). Using augmented and virtual reality, educational materials can incorporate culturally diverse scenarios, characters, and stories, which can make a positive impact on international pupils (Yeh et al., 2022).

Culturally responsive pedagogy (Gay, 2015) is in line with these methods since it places an emphasis on recognizing and incorporating students' cultural identities into the classroom experience. A sense of community and smaller cultural distance

can result from this (Iv, 2017). Determination Theory (Deci & Ryan, 2012) states that relatedness, competence, and autonomy are the three main components of motivation. Virtual reality and augmented reality meet these demands by providing students with social bonding opportunities through collaborative simulations, adaptive challenges, and learning routes depending on their own choices (Scavarelli et al., 2021). The immersive nature of AR/VR makes people feel more socially present, which is crucial for meaningful interaction, according to Garrison et al. (2000), Community of Inquiry theory (Cho et al., 2023).

One of the most important conditions (including psychologically safe learning environment, an inclusive teacher-student relationship, and culturally responsive pedagogy, opportunities for meaningful interaction, equitable participation practices, clear communication and language support and positive classroom norms and values are essential) for multicultural classrooms is to feel emotionally and socially present in the classroom so that they can actively participate in learning (Xiong, 2025). Anxiety, homesickness, and loneliness are common among international students and can hinder their ability to learn (Dost, 2025). As a result of providing safe places to practice, experiment, and connect with others, immersive settings promote emotional health and self-assurance (Tay et al., 2025). Research on the effects of augmented and virtual reality on the motivation, engagement, and well-being of international students in multicultural European contexts is limited, despite the abundance of evidence documenting the cognitive benefits of these technologies. While the use of augmented and virtual reality in classrooms is still in its early stages, very few studies have focused on this country (Alalwan et al., 2020; Al-Ansi et al., 2023).

This paper presents a new theoretical framework for augmented and virtual reality in higher education. It improves upon previous models by taking an equity-driven approach rather than focusing just on technological or cognitive outcomes. This framework integrates several theories into a single paradigm, unlike previous research that has focused on immersive tools as supplementary learning tools. These theories include Experiential Learning Theory, Cognitive Load Theory, UDL, CRP, and SDT. By drawing from a variety of theories, AR/VR can be seen as an inclusive educational ecosystem that aims to improve students' motivation, cultural representation, cognitive comprehension, and social and emotional health all at once. Instead of viewing immersive technologies merely as means of disseminating information, the framework reimagines them as agents of cultural inclusion and psychological support, with the enhancement of a sense of belonging, affirmation of identity, and emotional safety as central goals. Moreover, it provides a context-sensitive roadmap for universities that aim to support diverse and multicultural cohorts, as it is firmly rooted in the European and Italian higher education landscape and aligns with policy initiatives like the Erasmus digitalization agenda and the European Higher Education Area (EHEA). Students from other countries studying in Italy have unique challenges in conventional, lecture-

based classes, including language limitations, cultural dissonance, and social isolation.

This approach can help them overcome these obstacles. The framework helps students connect more fairly with academic subject by including multilingual support, culturally varied narratives, and multimodal visual content. This decreases cognitive burden while affirming students' cultural identities. Following SDT's lead, it demonstrates how immersive environments can inspire more intrinsic motivation by strengthening competence through scaffolded feedback, relatedness through collaborative tasks, and autonomy through tailored learning paths. For students who might otherwise feel disengaged, these design elements enhance social, cognitive, and instructional presence (Community of Inquiry model). In addition, the framework emphasizes how immersive settings can construct emotionally safe spaces with low stakes, which can help international students overcome fear and boost their confidence. This will improve their mental health in addition to their academic performance. This way, immersive technologies are positioned as a strategic route for inclusive and globally competitive higher education, which not only tackles individual learning impediments but also coincides with Italy's broader internationalization drive.

Purpose and Objectives

This paper therefore aims to: (1) explore how AR/VR enhances learning experiences; (2) investigate how AR/VR supports culturally and linguistically inclusive teaching; (3) examine impacts on motivation, engagement, and well-being; and (4) identify challenges and best practices for integration in multicultural higher education classrooms, especially in Europe and Italy. Based on research objectives, the following were the research questions of the study;

RQ1: In what ways does AR/VR improve students' learning?
RQ2: How does AR/VR support teaching for students from different cultures and languages?
RQ3: How does AR/VR affect students' motivation, engagement, and well-being?
RQ4: What challenges and best practices are found when using AR/VR in multicultural classrooms in Europe and Italy?

Significance

The purpose of this study is to develop a theoretical framework that addresses the unique educational requirements of international students enrolled in multicultural universities by combining inclusive pedagogy with immersive technology (AR/VR). Universities in Europe are becoming more globalized, attracting

students from all over the world with a wide range of cultural, linguistic, and academic backgrounds (Robertson & Kedzierski, 2016). Unfortunately, these students are frequently under-engaged, unmotivated, and academically unsuccessful since conventional teaching approaches do not adequately engage or support them (Zhiqiao et al., 2025).

To fill this important need, this study theorizes how augmented and virtual reality (AR/VR) technologies can revolutionize education by fostering more inclusive classrooms. Its major contribution is the way it integrates several theoretical frameworks, including UDL, SDT, CRP, and Social Constructivism, into a unified whole. The research conceptualizes the potential of immersive technologies to erase cultural and language barriers, increase engagement, and personalize learning routes by integrating these viewpoints. Importantly, this theoretical integration lays out a conceptual road map for lawmakers and teachers to follow to include immersive technologies into inclusive teaching rather than viewing them as standalone digital tools.

Equally important is the study's emphasis on Europe. Policy initiatives in higher education throughout Europe have emphasized diversity, equity, and inclusion (Siri et al., 2022). Examples include the Bologna Process and the European Higher Education Area (EHEA), both of which promote student-centered learning and international mobility (Li, 2023). Even if there has been an increase in the number of international students, studies show that many of them still experience cultural marginalization, language barriers, and lower engagement in classroom discussions (Tavares, 2024). This article coincides with and advances Europe's strategic goal of constructing cohesive multicultural learning communities by framing AR/VR as methods to bridge these gaps.

When researchers narrow our focus to Italy, the study becomes even more relevant. International students, especially those participating in Erasmus+ and similar mobility programs, have been steadily increasing their enrollment at Italian universities. Many international students, however, have reported having trouble adjusting to Italian language classes, culturally unfamiliar pedagogical techniques, and the lack of social inclusion as obstacles to integration (Bianchi & Martini, 2023). Supporting its globalization drive and tackling persistent equity inequalities, this study offers a theoretical perspective for AR/VR-supported inclusive education and recommends a strategic solution for Italy.

By drawing attention to the motivational and emotional aspects of learning in addition to the cognitive ones, the article adds to the larger academic conversation. Studies have shown that a sense of belonging, cultural safety, and identity affirmation have a significant impact on the engagement and well-being of international students (Corney et al., 2024). Immersive environments can improve academic and emotional inclusion by simulating culturally contextualized scenarios, multilingual support systems, and collaborative virtual spaces (Yeganeh et al., 2025). Current

theoretical models frequently fail to account for the social and emotional components of inclusion, so this focus on students' overall health is an essential addition.

This paper proposed framework that has real-world applications for universities in Europe and Italy, including policymaking, teacher education, and course creation. It provides a theoretical framework for the development of immersive education policies, programs, and practices, as well as for the acquisition of necessary technology. Universities can benefit from the study's theoretically informed approaches to AR/VR integration into multicultural pedagogy and away from superficial or fragmented adoption of these technologies. The study also contributes to the growing body of literature on the topic of educational technology adoption.

While interest in augmented and virtual reality (AR/VR) is on the rise in the academy, most of the current research is either technology- or outcome-driven, with an emphasis on tools or exam scores (Shadiev et al., 2025; Yeganeh et al., 2025). Few studies connect immersive technology directly to issues of diversity, inclusiveness, and the lived experience of international students (Siddiqi, 2024; Zhang et al., 2017). Filling that void, this study broadens the theoretical discussion surrounding technology's role in inclusive education by reimagining AR and VR as equity-driven educational interventions rather than digital breakthroughs in and of themselves. Finally, this paper is important for reasons outside of academia.

In doing so, it provides indirect support for larger social goals, such as cultural pluralism, intercultural communication, and global citizenship education, all of which are fundamental principles within the social and educational agenda of the European Union. Future citizens who are more socially cohesive and culturally aware can be helped by immersive technologies that encourage deeper engagement, cultural sensitivity, and collaboration among various learners.

Literature Review

Augmented and virtual reality (AR/VR) and other immersive technologies have piqued a lot of interest in the realm of higher education, particularly in multicultural classrooms where students come from a variety of cultural and linguistic backgrounds (Baxter & Hainey, 2024). From a focus on the novelty of AR/VR to a more methodical examination of their pedagogical potential, the literature on AR/VR in education has progressed significantly. The use of augmented and virtual reality (AR/VR) to meet the educational goals, interests, and needs of overseas students is becoming more important as more European universities open their doors to students from all over the world. Italy is dealing with the problem of accommodating an influx of international students by creating welcoming and stimulating classrooms for all students (Mohajeri et al., 2025). The purpose of this literature study is to investigate, using examples from Europe and Italy, how immersive technologies might improve education in multiethnic classrooms.

Enhancing Learning Experiences through Immersive Technologies

A large amount of research presents augmented and virtual reality as potent resources for developing context-specific learning spaces (Chamusca et al., 2025). Meaningful learning takes place via direct experience, reflection, and theory-building, as stated in Kolb's Experiential Learning Theory (1984) (Doherty, 2023). Virtual reality (VR) environments help students make the transition from classroom theory to practical application by simulating real-world situations in which they can hone their abilities and put their notions into practice (Marougkas et al., 2023). Immersive simulations are more effective than traditional methods of training in fostering spatial awareness, conceptual mastery, and problem-solving abilities, according to studies conducted in STEM and health sciences across European universities (Chasokela, 2025).

The worth of AR/VR is further supported by constructivist learning theory, which places an emphasis on the learner's active engagement and knowledge production (Scavarelli et al., 2021). This experience component helps foreign students understand and remember more information by reducing the need of textual or lecture-heavy delivery formats, which can be difficult for students learning a second language (Hajian et al., 2021). Research found that students learning multiple languages were more engaged and understood more in virtual reality engineering labs (Aruanno et al., 2025).

An additional viewpoint is provided by Cognitive Load Theory (Sweller, 1994). This theory states that AR/VR can alleviate unnecessary mental strain and enhance relevant processing by utilizing many sensory channels, such as sight, sound, and spatial perception (Sweller, 2020). This is of utmost importance for foreign students, since they frequently face a heavy cognitive burden while attempting to comprehend academic material in a language other than their native tongue. Optimal design of immersive platforms allows for visual scaffolding of complicated knowledge, which improves conceptual clarity and learning performance (Ouwehand et al., 2025).

Supporting Culturally and Linguistically Inclusive Teaching

Being sensitive to cultural representations, providing help in several languages, and ensuring equal participation are all necessary for inclusive education in multicultural settings. The concepts of Universal Design for Learning (UDL), which are in line with the affordances of AR/VR, place an emphasis on different modes of representation, engagement, and expression (Fortes, et al., 2024). To help students of different linguistic abilities understand instructional content, key concepts, classroom interactions and immersive platforms can incorporate features like audio narration, visual hints, captions, and subtitles in real-time (Poggianti et al., 2025).

Evidence from studies conducted in European universities on augmented reality language learning tasks shows that foreign students are able to overcome language obstacles through multimodal design, since they acquire new vocabulary more quickly and retain more of what they learn (Rudnik, 2023).

Analyzing immersive design can also be done via the viewpoint of Culturally Responsive Pedagogy (La Serna, 2020). According to the research, virtual reality (VR) simulations can either support or undermine students' different identities depending on the cultural material and visual representations they contain (Mills et al., 2020). Collaborating with students, using case studies from many cultures, and working to eliminate prejudices are all parts of inclusive immersive design. Italy is home to new programs like "Immersive Italy" that aim to help international students feel more at home by creating virtual reality (VR) cultural heritage courses that incorporate stories from a variety of ethnic backgrounds (Freina & Bottino, 2016).

Equalizing participation dynamics in multicultural classrooms is another benefit of immersive platforms (Siddiqi, 2024). Theoretically, learning takes place in a cultural setting through interactions between people, according to Vygotsky's Sociocultural Theory (Marginson & Dang, 2017). International students can participate actively alongside their native-speaking classmates in multi-user virtual reality (VR) environments that promote collaborative problem-solving using visual actions, shared virtual artifacts, and gestures, thus decreasing the need for sophisticated language skills.

Impact on International Students' Motivation, Engagement, and Well-being

Problems with language and cultural adjustment stress can lead international students to feel lonely, anxious, and less motivated than their domestic counterparts (Mesidor & Sly, 2015). Using the concepts from Self-Determination Theory, research indicates that AR/VR can have a positive impact on their motivation and engagement (Deci & Ryan, 1985). Student intrinsic motivation is enhanced by the three pillars of immersive learning: autonomy (the ability to choose one's own learning path), competence (the gradual mastery of tasks), and relatedness (the ability to collaborate in shared virtual spaces).

Studies conducted in European universities found that virtual reality (VR) learning interventions significantly improved engagement, attention, and perseverance when compared to more conventional approaches (Di Natale et al., 2020). While research in Italy is still in its early stages, what little there is suggests comparable trends; for instance, international students reported less language-related anxiety and higher attendance and task perseverance in virtual reality (VR) anatomy labs at the University of Bologna. Low-stakes practice settings provided by AR/VR can help students overcome performance anxiety and safely practice

presentations or social interactions, which in turn supports emotional well-being (Zielke et al., 2025).

To aid the mental health of overseas students, some European pilot programs have implemented virtual reality stress-reduction modules, including guided mindfulness simulations (Kampa et al., 2022). These results are in line with the beliefs of Pleasant Psychology, which state that happiness can be enhanced through participation, achievement, and pleasant emotions. International students can indirectly benefit from AR/VR's ability to create immersive places that boost belonging and decrease fear, which in turn improves their academic achievements.

Challenges and Best Practices for Integrating AR/VR in Multicultural Higher Education

Everyone agrees that AR/VR has great potential, but there are a lot of obstacles to overcome, according to Creed et al. (2024). High software and hardware expenses, insufficient digital infrastructure, insufficient teacher preparation, and worries about accessibility and equity are common obstacles. Faculty members' opinions on the usefulness of technology and how easy it is to use it have a significant impact on whether they choose to incorporate AR/VR into their lessons (Bermejo et al., 2023). Despite interest in immersive tools among Italian professors, polls reveal that their use is limited due to a lack of institutional support and training opportunities.

The best practices that have been found in European initiatives involve a gradual rollout (beginning with affordable mobile AR and working up to more complex VR), seminars for faculty professional development, and the alignment of immersive activities with specific learning goals (Kuhlmann & Rip, 2014). It is crucial to take accessibility into account; the Universal Design methodology suggests features like compatibility with screen readers, alternate input devices, and motion sickness reduction to make sure that students with disabilities may participate.

To combat cultural bias and promote diversity, institutional policies should back cross-cultural co-design of immersive content. International student involvement in content production teams is highly recommended by the Europe collaboration. This will help ensure cultural sensitivity and give students a stronger sense of ownership and belonging. Such procedures are vital in Italy, a country with an increasingly diversified international population and still-developing formal structures for the culturally inclusive integration of AR and VR.

Synthesis and Research Gaps

A consistent theoretical pattern emerges from the literature review: immersive technologies can help international students learn more effectively by empowering them to take an active role in their own learning, lowering the threshold for linguistic and cognitive barriers (Cognitive Load Theory, UDL), and promoting social presence and cultural inclusion (Sociocultural Theory, Culturally Responsive Pedagogy) (Shadiev et al., 2025). But these advantages can only be realized with careful planning, backing from institutions, and evaluation tailored to each individual situation.

International students in multicultural classrooms, especially in Italy, have not been the subject of many empirical investigations, despite the growing body of literature on immersive learning in Europe (Bakay, 2023). Considering the mental health challenges experienced by mobile student populations, it is crucial to address the lack of research that connects AR/VR-based learning to students' well-being address these deficiencies, the current theoretical framework was developed. It compiles and synthesizes previous research to provide guidelines for the culturally inclusive, motivational, and wellbeing-oriented integration of AR/VR in higher education (Di Natale et al., 2020).

Theoretical Framework

To better understand how augmented and virtual reality (AR/VR) might improve the learning, motivation, engagement, and well-being of foreign students in multicultural classrooms, this paper presents a theoretical framework that combines important ideas and results from the theme literature. The framework fills in deficiencies in the Italian higher education setting while also aligning with Europe's dedication to digitalized and inclusive education.

Fundamental to the framework is the Experiential Learning Theory (Kolb, 1984) that places an emphasis on learning via the repeated cycle of doing, reflecting, thinking, and trying again (Morris, 2020). Accelerators in this cycle include augmented and virtual reality systems, which allow foreign students to interact with content beyond language barriers using realistic and contextual rich simulations (AlGerafi et al., 2023). To ensure that students with different language proficiency levels have equal access to difficult academic content, Cognitive Load Theory (Yang & Farley, 2019) provides support for this experiential core by arguing that AR/VR materials should be multimodal and spatially arranged to avoid superfluous load.

An inclusive teaching framework based on the concepts of UDL and Culturally Responsive Pedagogy (Kieran & Anderson, 2019) surrounds this experiential core. Teaching in these approaches places an emphasis on recognizing and respecting

students' cultural identities, facilitating their knowledge acquisition and expression through a variety of means, and removing language barriers. The capabilities of augmented and virtual reality, such as culturally varied avatars, visual-gestural interactions, and multilingual narration, put these concepts into practice and make them real in virtual worlds (Rahmanu et al., 2024). This layer of design makes sure that immersive learning spaces are welcoming to many languages and cultures, in addition to being successful for cognitive learning.

Integrating the Community of Inquiry model (Garrison, 2000) with Self-Determination Theory (Deci & Ryan, 2012), the third component of the framework focuses on psychosocial dynamics. International students can experience more autonomy, competence, and relatedness with augmented and virtual reality technology (Zhang & Miao, 2025). This, in turn, can lead to greater intrinsic motivation. At the same time, immersive platforms boost engagement with avatars and real-time interaction, cognitive presence is enhanced using problem-based immersive tasks, and teaching presence is enhanced using guided virtual scaffolds (Baxter & Hainey, 2024). International students, who frequently struggle with feelings of loneliness, fear of the unknown, and lack confidence in their abilities while immersed in a new culture, greatly benefit from these engagement and motivational strategies. Aspects of emotional safety and well-being, influenced by theories of social and emotional development, encircle these three fundamental levels (Childs et al., 2023).

Supporting mental health and emotional resilience, immersive environments can lessen acculturative stress, promote belonging, and establish low-stakes areas for exploration. Immersive experiences can support social integration and reduce anxiety among Erasmus students, according to research from Italian institutions, including the University of Bologna's VR-based orientation programs (Faraoni & Battaglia, 2025). Lastly, the framework recognizes institutional and systemic conditions as elements that can either facilitate or hinder progress.

Funding constraints, the lack of faculty training, and gaps in technology infrastructure are some of the obstacles that Italian universities continue to encounter despite EU policy measures (Martins et al., 2025) that encourage digital transformation and inclusiveness. The efficacy of the inner layers learning design, engagement mechanisms, and emotional supports is influenced by these structural variables, which are seen as external modifiers. Therefore, for AR/VR adoption to be successful and long-lasting, there needs to be institutional preparation and policy backing.

Therefore, the suggested paradigm views augmented and virtual reality (AR/VR) immersive learning as a system of interdependent parts, including experiential learning procedures, inclusive instructional design, engagement and motivational mechanisms, supports for emotional health, and enabling institutional settings (Yeganeh et al., 2025). This multi-tiered paradigm provides a theoretically sound means for institutions in Europe, and Italy in particular, to use immersive

technologies to help international students succeed in multicultural classrooms by increasing their equity, inclusion, and academic achievement.

Methodology

The research design is theoretical and literature-based of the research, which is aimed at the synthesis of the existing body of research and does not presuppose the collection of primary empirical information. The design was target at creating a conceptual framework that offers some explanations on how augmented and virtual reality (AR/VR) can enhance multicultural higher education classrooms, in particular, Europe and Italy.

Research Design

The study was founded on the qualitative and thematic literature review paradigm. This choice of design was made due to the fact that the research incorporates multiple theoretical perspectives as Experiential Learning Theory, Universal Design for Learning (UDL), Culturally Responsive Pedagogy (CRP), Cognitive Load Theory (CLT), and Self-Determination Theory (SDT), into one theory of inclusive and immersive pedagogy.

Data Sources

The peer-reviewed journal articles, conference papers, and policy papers published in the years between 2015 and 2025 were going to be analyzed. The search in such databases as Scopus, Web of Science, Google Scholar, and ERIC was conducted with the help of keywords such as AR/VR in higher education, immersive learning, inclusive pedagogy, international students in Europe, and Italy multicultural classrooms. The conducted studies in the European context were taken into account first and other sources all over the world were utilized to present comparative facts.

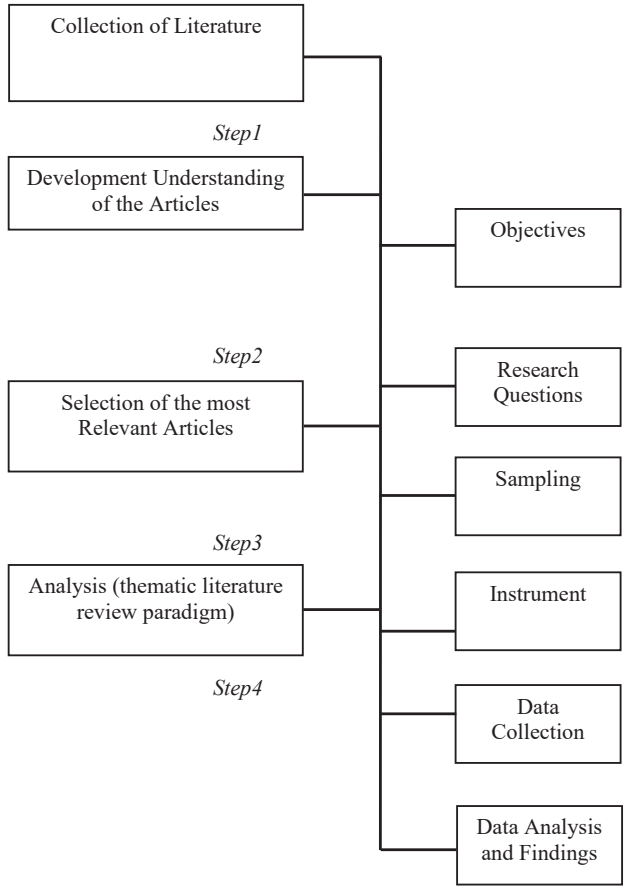

Figure 1. Framework of the study

S o u r c e: Own work.

The search employed combinations of key terms such as *"AR/VR in higher education," "immersive learning," "inclusive pedagogy," "international students,"* and *"multicultural classrooms in Europe and Italy."*

Inclusion and Exclusion Criteria

Inclusion: The application of AR/VR in higher education, multicultural/multilingual classroom, student motivation, engagement, and well-being. A total of 154 records were initially identified; after screening for relevance and removing duplicates, 78 studies met the inclusion criteria and were analyzed in depth. This process is summarized in a literature selection flowchart (Figure 1), illustrating the stages of identification, screening, eligibility, and inclusion.

Exclusion: The literature search was limited to the K-12 setting, sources that concentrate on the technical aspects of the AR/VR but lacks the actual application of the matter in a pedagogical setting.

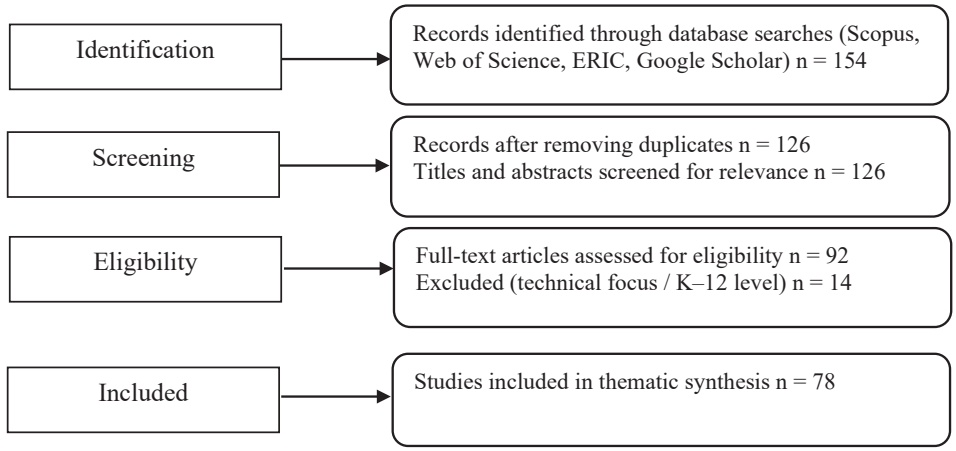

Figure 2. Demonstration of inclusion and exclusion criteria

S o u r c e: Own work.

Analytical Approach

Table 1
Summary of the database search strategy and inclusion parameters for transparency and replicability

Parameters	Description
Databases Searched	Scopus, Web of Science, ERIC, Google Scholar
Search Terms Used	AR/VR in higher education, “immersive learning”, “inclusive pedagogy”, “international students”, “multicultural classrooms”, “Europe”, “Italy
Time Frame	2015–2025
Inclusion Criteria	Studies on AR/VR use in multicultural or multilingual higher education; focus on learning, motivation, engagement, or well-being
Exclusion Criteria	K–12 studies, purely technical/engineering AR-VR studies without educational focus
Total Records Retrieved	154
Final Studies Analyzed	78

S o u r c e: Own work.

Thematic synthesis method was undertaken. The literature was coded (table 1) in accordance with four general themes in accordance to the research objectives and questions:

1. Enhancing the learning process with AR/VR.
2. Fostering language and cultural inclusion teaching.
3. Impact on engagement, commitment and health.
4. Challenges and best practices of integration.

The themes were examined with reference to the relevant educational theories in order to create convergences, gaps, and opportunities to support inclusive higher education.

Validity and Trustworthiness

In order to be rigorous, the review was carried out using theories and source triangulation. The more recent policy documents were also cross-referenced with academic research, off-the-record to place findings into perspective and include documents published by Europe and Italy (e.g., Erasmus+ digitalization agenda, European Higher Education Area framework).

Thematic Literature-Based Analysis

Theme 1 (RQ1): Enhancing Learning Experiences through Immersion (Baxter & Hainey, 2024; Wang & Huang, 2025)

Augmented and virtual reality (AR/VR) and other immersive technologies have the potential to revolutionize education by facilitating the development of learning environments that are both experienced and contextualized. Knowledge is built through a recursive process of direct experience, introspective observation, conceptualization, and subsequent active experimentation, according to Kolb's Experiential Learning Theory. Using augmented and virtual reality technologies, students can engage in simulated real-world experiences, reflect on those experiences in safe digital settings, develop conceptual understanding with the help of interactive feedback, and try out new strategies without realizing the consequences (Dolby & Rahatzad, 2018).

Students from other countries benefit greatly from this immersive learning cycle since linguistic and cultural barriers make it hard for them to connect classroom theory with real-world applications (Shadiev et al., 2025). In addition, according to Kanokpermpoon (2013), unnecessary cognitive load can overwhelm working memory and make comprehension difficult. Therefore, it is crucial to reduce this

burden to maximize learning efficacy. Less reliance on dense text and abstract explanations is achieved through the spatial and visual distribution of information in well-designed immersive content. Because it offers visual scaffolding that is both obvious and easy to understand, this method is particularly helpful for children who struggle to fully understand the instructional words. Augmented and virtual reality (AR/VR) multimodal representations help overcome language barriers and promote equal access to subject knowledge. All these theoretical assertions are backed by evidence from the European environment.

Students from different countries were able to close the accomplishment gap by using visual-spatial representations to follow complicated operations without listening to spoken directions. Similarly, international students at Italy's Polytechnic di Milano who had trouble comprehending Italian technical terms at first were able to make great strides forward with the use of virtual reality (VR) architecture and design simulations (Baxter & Hainey, 2024). These results provide evidence that immersive technologies have the potential to improve educational results by providing experiential, language-independent means of acquiring new information.

Theme 2 (RQ2): Supporting Culturally and Linguistically Inclusive Teaching (Doran, 2017; Reddig et al., 2021)

Augmented and virtual reality has the potential to greatly benefit education in areas such as cultural responsiveness and language inclusion, in addition to cognitive advances. The Culturally Responsive Pedagogy approach proposed by Iv (2017) stresses the significance of relating course material to students' real-world cultural experiences and backgrounds. To validate students' identities and promote inclusivity, AR/VR settings have unique opportunities to add culturally relevant features. These elements can include bilingual narration, culturally varied avatars, and case studies set in students' home areas (Guberina, 2023).

These tools make it easier for international students to feel more connected by placing them in familiar cultural settings. Meyer et al. (2014) cite Universal Design for Learning (UDL) as an additional key lens that supports diverse learners by advocating for multiple forms of representation, participation, and expression (Rao et al., 2023). By making content available in multiple languages, improving it with subtitles, and adding visual or gestural interactions that do not rely on verbal fluency, AR/VR is highly congruent with UDL principles. International students are given the opportunity to demonstrate their understanding in multiple ways with multimodal affordances, which lower linguistic barriers.

Several projects across Europe have shown how AR/VR can be used for inclusive education (Poggianti et al., 2025). Virtual reality (VR) learning modules implemented in the Netherlands, Spain, and Germany as part of the EU-funded "INCLUDE-VR" project, for instance, incorporate intercultural narratives and multilingual support (Analytics et al., 2023). Results from using these courses to foster multicultural classroom collaboration and intercultural awareness have been encouraging. Even while colleges in Italy are welcoming more students from Asia

and Africa, most classes are still taught in Italian, which makes it difficult for some of these students to participate. One possible strategic approach to this gap could be to use AR/VR multilingual modules. These modules could assist instructors in creating classrooms that are more welcoming to students of different language backgrounds, raising levels of engagement and equity.

Theme 3 (RQ3): Impact on Motivation, Engagement, and Well-being (Jedwab et al., 2023; Kessels & Van Houtte, 2022)

Important components of effective international education include students' motivation, engagement, and social and emotional health, all of which can be profoundly affected by immersive technologies. According to Deci and Ryan (2000), who developed the theory of self-determination, intrinsic motivation can be best nurtured when one has a sense of relatedness, competence, and autonomy. Virtual reality (VR) and augmented reality (AR) tools promote independence through tailored learning paths and choice-based exploration, competence via the use of scaffolding to acquire skills and immediate feedback, and relatedness using collaborative virtual projects to foster a feeling of community.

Those motivational affordances can have a profound impact on overseas students' self-efficacy, which can be a challenge in new academic environments. Further explanation of how involvement arises from the interaction of social, cognitive, and instructional presence is provided by the Community of Inquiry (CoI) paradigm (Yulianti & Maghfiroh, 2023). Augmented and virtual reality technologies improve students' social presence through avatars and embodied interactions, students' cognitive presence through immersive problem-based assignments, and teachers' presence through guided virtual scaffolds.

All these things work together to make it easier for overseas students to feel accepted, challenged, and supported in their online communities of learners, regardless of language or cultural hurdles. Considering the cultural and psychological obstacles that many international students encounter, well-being is an additional crucial component. According to research by Guberina (2023), people who experience immersive surroundings report less fear, more feelings of belonging, and more emotional safety while trying new things. For instance, Rossi et al. (2022) found that Erasmus students who participated in trial virtual reality programs at the University of Bologna during the COVID-19 epidemic reported less anxiety and better social integration. Based on these results, augmented and virtual reality technologies have the potential to greatly benefit international students' emotional resilience, mental health, and academic performance in multicultural classrooms.

Theme 4 (RQ4): Challenges and Best Practices for AR/VR Integration (Ashtari et al., 2020; Creed et al., 2024; Dembe, 2024)

Immersive technologies have great promise, but there are still a few obstacles that need to be overcome before they can be widely and effectively used. In underfunded universities, access to AR/VR solutions is generally limited due to their high costs and the advanced technical infrastructure required. Many teachers do

not have the necessary training in immersive pedagogy, which adds to their digital competency issues and faculty opposition to integration. Inadequately diversified augmented and virtual reality content raises ethical concerns with cultural stereotyping and bias.

Further exclusion cannot happen unless we fix the accessibility problems that handicapped students continue to face. Institutional and policy changes are necessary to address these problems. One way to make sure that material is culturally relevant and accurate is to co-design it with different student groups. One way to help people with language and cognitive challenges is to provide them with multilingual support, adjustable difficulty levels, and an inclusive interface design. To develop competence and self-assurance in immersive instruction, faculty training on inclusive digital pedagogy is crucial. In addition, review procedures and ethical standards should be put in place to prevent cultural misrepresentation and the reinforcement of stereotypes.

Italian institutions are way behind the curve when it comes to funding and training for the adoption of AR/VR, even while legislative frameworks like the European Education Area (2025) promote digital innovation at the European level. Erasmus+ digitalization grants and cross-university cooperation could speed up capacity-building and resource sharing through strategic investment. To support Europe's larger dedication to diversity, equity, and inclusion in higher education, institutions must eliminate these systemic obstacles before they can develop long-term strategies for using immersive technologies.

Discussion: European and Italian Context

The wider aims of digital transformation and inclusion in higher education in Europe are congruent with the deployment of AR/VR. Germany, the Netherlands, and Finland are at the forefront of immersive education programs. While there has been some success, adoption has been slower in Italy owing to a lack of funding and more traditional teaching practices. However, there is a need for more culturally sensitive methods due to the increasing number of international students, particularly from Africa and Asia. Italian colleges can use augmented and virtual reality to overcome traditional obstacles by incorporating an inclusive, bilingual, and immersive curriculum that caters to the demands of different student populations (Alalwan et al., 2020).

Higher education institutions throughout Europe are starting to see the potential of augmented and virtual reality (AR/VR) as a tool to promote digital transformation and educational equity. For the future of education across Europe, digital innovation, mobility across borders, and equity are the cornerstones of the European Education Area (EEA) 2025 and the Digital Education Action Plan (2021–2027) of the European Commission. The policies have spurred significant investment

in immersive learning ecosystems, particularly in nations leading the way in incorporating AR/VR into university curricula, such as Germany, the Netherlands, and Finland.

These examples show how augmented and virtual reality (AR/VR) are being used in the classroom to create welcoming spaces for students of all language backgrounds and cultural backgrounds, as well as to facilitate internationalization through hands-on learning (Aruanno et al., 2025). The Italian market for immersive technology, on the other hand, has been slow to catch on and even more disjointed. While there are some innovative initiatives, such as the virtual reality architecture programs at Polytechnic di Milano and the virtual reality orientation modules for Erasmus students at the University of Bologna, these are still small-scale trials rather than system-wide changes (Fricano et al., 2025). There are other elements that are interacting with this slower uptake:

- **Resource constraints**, including limited funding for educational technology infrastructure.
- **Traditional pedagogical cultures** that still favor lecture-based, teacher-centered instruction.
- **Insufficient faculty training** and digital competence for designing inclusive AR/VR content.
- **Regulatory and administrative inertia**, which slows curricular innovation.

There is an urgent need for culturally and linguistically inclusive approaches of education in Italy notwithstanding these obstacles. The number of international students studying in the country has been on the rise, particularly from Africa and Asia, although many programs still only offer instruction in English and are focused on teaching students' European history and culture. This poses serious problems for overseas students, who frequently have difficulties with communication, social integration, and cultural marginalization, all of which have a negative impact on their participation, motivation, and overall health. With AR and VR, Italian colleges can bypass conventional wisdom and join the rest of Europe in adopting cutting-edge practices.

In contrast to more traditional methods, immersive tools can be added to current courses as supplemental treatments that improve them instantly, rather than as a complete revamp of the pedagogical culture. Augmented and virtual reality systems can validate cultural identities while providing international students with equal access to content by incorporating multilingual support (e.g., subtitles, audio in students' native languages), culturally varied avatars and scenarios, and immersive simulations. These elements can alleviate the mental and emotional strain that international students experience by increasing engagement, decreasing cognitive load, and fostering a safer environment.

The strategic objectives of Italy's government regarding the globalization of higher education are compatible with AR/VR. A more international student body and more internationally competitive university system are priorities for Italy's

Ministry of Universities and Research. Italian educational institutions might stand out from the competition by embracing immersive technologies, which would highlight their innovative spirit, inclusivity, and appeal to international students. Additionally, this would help achieve goals set out by the Erasmus+ digitalization agenda, which is open to all EU member states and encourages the use of collaborative and immersive technologies to foster understanding and appreciation of different cultures. But fundamental adjustments are required to go ahead.

To scale AR/VR initiatives, train faculty on culturally responsive digital pedagogy, and collaborate with European immersive learning networks to create inclusive content, Italian universities need to adopt institutional strategies and funding models. One way to speed things up would be to use the Erasmus+ digital transformation funding and the research consortia financed by the EU. If Italy does not make these efforts, the gap between its internationalization goals and what international students experience will only grow. While the rest of Europe is establishing augmented and virtual reality as essential components of accessible online higher education, Italy is at a critical juncture. Universities in Italy can modernize their teaching methods and better accommodate their increasingly diverse student body by adopting immersive technologies as tools for cultural inclusion and experiential learning. This will help fulfill Europe's goal of creating a higher education system that is inclusive, innovative, and globally linked.

Conclusion

Immersive technology has the potential to revolutionize multicultural higher education classrooms, according to this theoretical analysis. With its foundations in experiential learning, UDL, sociocultural theory, and self-determination theory, AR/VR has the potential to elevate foreign students' learning experiences, encourage inclusivity, and cultivate motivation, engagement, and overall wellness. However, training for professors, institutional support, and culturally relevant design are all necessary for a successful rollout. Using immersive technologies may be a smart move for Europe and Italy to get to internationalized education systems that are inclusive.

Immersive technologies hold transformative potential for multicultural higher education classrooms. Drawing upon experiential learning, Universal Design for Learning (UDL), sociocultural theory, and self-determination theory, this theoretical analysis demonstrates how AR/VR can enhance learning experiences, promote inclusivity, and strengthen motivation, engagement, and student well-being.

However, for these benefits to be fully realized, practical steps must be taken by educators and policymakers. Universities should invest in faculty development

programs that train teachers to design and facilitate immersive lessons using inclusive pedagogical principles. Faculty training should include strategies for integrating multilingual support, culturally diverse scenarios, and adaptive feedback mechanisms into AR/VR learning environments.

At the policy level, higher education authorities and institutions are encouraged to establish guidelines for inclusive AR/VR design that emphasize accessibility, cultural representation, and ethical use of immersive technologies. Collaborative initiatives between educators, instructional designers, and international students can help co-create immersive content that reflects cultural diversity and promotes belonging.

Furthermore, policymakers can support these efforts through funding frameworks and institutional incentives aligned with the European Higher Education Area's digitalization and inclusion agendas. By translating theoretical insights into concrete institutional practices, immersive technologies can become a cornerstone of equitable and globally responsive higher education.

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Sobia Yasmeen

Technologie immersyjne (AR/VR) dla poprawy jakości nauczania w klasach wielokulturowych: zaspokajanie potrzeb studentów zagranicznych

S t r e s z c z e n i e

W wyniku globalizacji europejskie uniwersytety przyciągają obecnie studentów z całego świata, wzbogacając społeczność kampusu o ich różnorodne pochodzenie i perspektywy. Często jednak napotykają oni trudności w zaangażowaniu i samopoczuciu z powodu barier językowych, niedopasowania kulturowego i izolacji społecznej. Nowe trendy w zakresie innowacyjnych narzędzi, technologii immersyjnych, takich jak AR i VR, powstały, aby stawić czoła tym problemom. Technologie immersyjne mają potencjał, aby poprawić doświadczenia edukacyjne, ułatwić bardziej inkluzywne kulturowo i językowo nauczanie oraz wpłynąć na motywację, zaangażowanie i ogólny stan zdrowia studentów zagranicznych. Niniejsze studium teoretyczne zgłębia te zagadnienia, ukazując teoretyczny aspekt tej dziedziny. Artykuł analizuje aktualną literaturę w sposób tematyczny w kontekście europejskim, ze szczególnym uwzględnieniem Włoch, odwołując się do teorii socjokulturowej, teorii obciążenia poznawczego i teorii samostanowienia. Ponadto, artykuł wskazuje na istotne trudności i rozwiązania związane z wykorzystaniem technologii immersyjnych w klasach wielokulturowych. Wyniki pokazują, że przestrzenie AR/VR, stworzone z myślą o inkluzywności, mają potencjał zrewolucjonizowania uniwersytetów poprzez promowanie bezpieczeństwa psychologicznego, kompetencji międzykulturowych i głębokiego uczenia się.

S ł o w a k l u c z o w e: Technologie immersyjne, AR/VR, Klasa wielokulturowa, Studenci zagraniczni

Sobia Yasmeen

Tecnologías Inmersivas (RA/RV) para Mejorar el Aprendizaje en Aulas Multiculturales: Abordando las Necesidades de los Estudiantes Internacionales

R e s u m e n

Como resultado de la globalización, las universidades europeas atraen a estudiantes de todo el mundo, enriqueciendo a la comunidad universitaria con sus diversos orígenes y perspectivas. Sin embargo, a menudo enfrentan desafíos para la participación y el bienestar debido a las barreras lingüísticas, la desigualdad cultural y el aislamiento social. Nuevas tendencias en herramientas innovadoras, como las tecnologías inmersivas como la RA y la RV, han surgido para abordar estos problemas. Las tecnologías inmersivas tienen el potencial de mejorar las experiencias de aprendizaje, facilitar una instrucción más inclusiva cultural y lingüísticamente, e impactar en la motivación, el compromiso y la salud general de los estudiantes internacionales. Esta revisión teórica profundiza en estas cuestiones, presentando el aspecto teórico de este campo. El artículo analiza la literatura actual temáticamente dentro del contexto europeo, centrándose específicamente en Italia, basándose en la teoría sociocultural, la teoría de la carga cognitiva y la teoría de la autodeterminación. Además, destaca importantes desafíos y soluciones para el uso de la tecnología inmersiva en aulas multiculturales. Los resultados muestran que, cuando se crean priorizando la inclusión, los espacios de RA/

RV tienen el potencial de revolucionar las universidades al promover la seguridad psicológica, la competencia intercultural y el aprendizaje profundo.

P a l a b r a s c l a v e: Tecnologías inmersivas, Realidad virtual/Realidad aumentada, Aula multicultural, Estudiantes internacionales

Собия Ясмин

Иммерсивные технологии (AR/VR) для улучшенного обучения в мультикультурных классах: удовлетворение потребностей иностранных студентов

А н н о т а ц и я

В результате глобализации европейские университеты превратились в глобальные студенческие сообщества, объединяющие университетские сообщества с разным опытом и взглядами. Меню было введено без каких-либо ограничений, без учета необходимости участия и биеннализации, решения языковых барьеров и необходимости культурной и социальной интеграции. Для решения этих проблем были разработаны новые инновационные тенденции, такие как встроенные технологии, такие как дополненная и виртуальная реальность (AR) и виртуальная реальность (VR). Иммерсивные технологии повышают образовательный потенциал, облегчают обучение, учитывают культурные и языковые аспекты, а также влияют на мотивацию, способность к компромиссу и общую дружелюбность иностранных студентов. Данное углубленное теоретическое исследование рассматривает эти темы, предлагая теоретический взгляд на это преобладание. В данной статье анализируется соответствующая литература в тематическом формате в европейском контексте, в частности, в Италии, с опорой на социокультурную теорию, когнитивную теорию и теорию самоопределения. Однако существуют важные проблемы и решения, связанные с использованием иммерсивных технологий в мультикультурной среде. Таким образом, уделяя первостепенное внимание инклюзивности, пространства для отдыха и путешествий позволяют инновационным университетам развивать психологическую безопасность, межкультурную компетентность и углубить обучение.

К л ю ч е в ы е с л о в а: Инклюзивные технологии, Виртуальная реальность/Дополненная реальность, мультикультурная гостиная, иностранные студенты