

From Theatre to XR: Shaping Immersive Storytelling Design Education through Artistic and Analogue Insights

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Abstract

In an increasingly technology-driven world, this study examined how communication design students can critically and creatively master advanced digital tools to craft immersive storytelling experiences, drawing upon an 'analogue' mindset. While immersive experiences are often associated with XR technologies, true immersion transcends the medium: it involves fostering a profound sense of engagement, presence and embodiment that shifts the user's perspective. In this context, theatre, with its empathetic and deconstructive nature, provides valuable insights by fostering emotionally rich, analogue experiences that deepen students' understanding of immersive storytelling. This study presented an educational experiment conducted within a communication design seminar, where students participated in a blended theatrical storytelling exercise. By fully immersing themselves in this experience, they unlocked their imagination and developed a deeper understanding of how emotional and sensory involvement can elevate storytelling design, regardless of the use of advanced technologies. Acting as audience members allowed future communication designers to grasp the engaging potential of these encounters, enriching their ability to create compelling, emotionally resonant narratives. The methodology, while not without challenges, was highly appreciated, demonstrating the powerful synergy between advanced digital design and performative arts. This approach introduced a new paradigm in experience design, offering future creators innovative pathways to redefine storytelling boundaries and craft meaningful, human-centred interactions.

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Introduction

Within the expanding realm of extended reality (XR), a critical question emerges: how can storytelling design students be empowered to critically and strategically harness advanced tools to foster empathetic communication? Paradoxically, this may require taking a step back: adopting an analogue mindset and drawing inspiration from theatre to fully harness the profound technological and immersive potential at their disposal. While immersive technologies are undoubtedly opening new frontiers for engagement, it is becoming increasingly evident that the education of designers and developers of these experiences is not adequately prepared to address the challenges and opportunities they present (Liu 2020). Digitalisation has become increasingly significant over the past few decades, with immersive technologies poised to play a transformative role, particularly in communication design. These technologies are projected to contribute \$1.5 trillion to the global economy by 2030 (PWC 2020) and are expected to significantly impact employment in the coming years (OECD 2020), largely due to their growing accessibility across sectors and demographics (Angelov *et al.* 2020). Despite the growth of the XR industry, driven by digitalisation, academic and professional programs often place excessive emphasis on technical skills, neglecting the need for a deeper understanding of the social, cultural and emotional contexts in which these technologies are applied (Maldonado 2005). In this rapidly evolving field, technical proficiency alone is insufficient; students must also be trained to design experiences that are innovative while being mindful of their broader societal implications (Polydorou 2024). For communication design students, in particular, this means learning to create ethical, meaningful experiences that strategically employ technology to enhance content, rather than merely relying on its spectacle-driven effects (Spiegel 2018). Advanced digital technologies, while often used for their visual appeal, hold far greater potential: fostering empathy by enabling individuals to experience the world from others' perspectives and immersing them in diverse realities. This research thus makes a timely and relevant contribution to education in XR storytelling design by advocating for a deeper understanding of immersive experiences, emphasising their emotional engagement beyond the surface-level application of digital tools.

The importance of analogue immersion in communicating values: the role of theatre

As such, it is crucial to examine non-digital immersive experiences to equip students and future communication designers with the skills needed to engage meaningfully with multisensory experiences, by understanding that the true 'immersion' transcends the medium itself (McMahan 2003). Therefore, firstly understanding analogue immersion is crucial to fully grasp how these new technologies can be effectively employed. While theatre may seem distant from digital tools (Dixon 2006), it provides a profoundly immersive experience through its emotional and participatory nature (Machon 2013) where individuals explore different roles

and perspectives, creating an immersive experience that transcends the digital realm. The performing arts develop key skills in communication, empathy and collaboration, offering valuable tools for impactful experience design. To design truly impactful experiences, students must be trained to cultivate both critical thinking and creativity, empowering them to create experiences that are not only innovative but also sensitive to the social, cultural and emotional dimensions of immersive technologies. Through theatre, students can explore different roles and scenarios through a process grounded in a solid cultural foundation, which helps develop a critical and interpretative attitude. Germano (2017), citing Kropotkin, argues that true empathy—seeing others as extensions of oneself—could replace the need for laws, making theatre essential in education to foster a more tolerant, inclusive society. Aristotle (330 B.C./2007) highlighted that the effects of theatre, such as eliciting pity and fear (*ἔλεος* and *φόβος*), stem from an extraordinary emotional condition produced by the spectacle itself, impacting participants profoundly at the bodily level, providing a transformative experience. Research highlights the use of role-play and scriptwriting as tools for engaging social debate and fostering a greater sense of 'relatedness' (Duin 2019). Immersion in characters and situations through identification techniques is a powerful way to develop empathy and understand others' emotions and experiences. Gallese & Goldman (1998) suggest that these techniques activate 'mirror neurons' in the brain, enhancing emotional understanding. By temporarily living the lives of characters, individuals can reduce biases and gain new perspectives, making theatrical identification an effective tool for simulating others' experiences and fostering deeper emotional connections. Parker (2014) notes that theatre represents an effective method in this context, offering the opportunity to immerse in completely new experiences and explore an alternative identity, contributing to greater flexibility in understanding identity and perspectives. Stanislavski's concept of 'perezhivanie' (identification) involves a stage process allowing actors to internalise and make the characters' emotions their own (Poliakov 2020). Extending this line of reasoning, a deeper theoretical framing reveals how the analogue nature of theatrical practices enhances their pedagogical relevance in immersive media education. Kolb's (1984) experiential learning model, centred on experience, reflection and conceptualisation, resonates with theatre-based immersion, which offers students tangible, multisensory encounters that support transferable insight for XR design. The approach also aligns with embodied cognition theories, where knowledge arises through sensorimotor engagement (Varela *et al.* 1991). Theatre's senses stimuli activate what Spence (2020) terms multisensory integration, an essential skill for immersive communication design. Additionally, the experience enhances 'narrative transportation' (Green & Brock 2000), enabling learners to emotionally and cognitively engage with stories even without visual input, fostering empathy, a key outcome in XR storytelling (Kidd & Castano 2013). Grounded in the co-presence and immediacy of live performance, this model addresses the growing demand for embodied and affective pedagogies in immersive media education (Obrist *et al.* 2017), and it ultimately advocates a shift from technocentric to holistic educational practices that embed sensory literacy and artistic methods into design curricula.

Bridging the gap: theatre and advanced digital technologies

While discussions on the interconnection between theatre and virtual reality are becoming increasingly prominent, they often adopt a unidirectional perspective, focussing primarily on how VR can enhance theatrical practices rather than

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examining how theatrical methodologies might enrich the VR development and application. This research highlights the mutual potential of theatre and VR to advance immersive communication design. Providing deeply immersive analogue theatrical experiences helps future immersive designers better understand the concept of immersion, regardless of technology, while stimulating their imaginative capacity (Wolf 2012). Understanding theatrical methods supports impactful storytelling and underscores the value of identification techniques for meaningful narrative design. Theatre's focus on role-playing and emotional truth can enhance digital narratives, merging with XR to create immersive experiences that educate, entertain and foster empathy. This interdisciplinary approach underscores the need for a humanistic framework in immersive tech, moving beyond superficial engagement to create meaningful and transformative experiences, driving innovation in digital creativity.

Training immersive storytelling designers through theatrical experience

In this scenario, incorporating theatrical experiences into the training of immersive storytelling designers could offer a vital educational approach, particularly for communication students aiming to design impactful immersive experiences. Theatre could help future designers develop key skills like emotional resonance and relational dynamics, crucial for impactful XR experiences. By engaging in techniques such as role-play and narrative construction, communication students gain hands-on experience in adapting these methods for immersive storytelling. Theatre-based training fosters 'emotional grammar', enabling students to design authentic, empathetic narratives that resonate with audiences for meaningful storytelling. By integrating theatre into curricula, students can go beyond the superficial 'wow effect' of XR, fostering empathy and understanding. This approach prepares the next generation of storytellers to create impactful narratives that build connections and promote positive change.

EXPERIMENTAL PEDAGOGY IN TRAINING FUTURE XR STORYTELLERS

The research explores the integration of theatrical practices into immersive technology design to foster the development of engaging and transformative narratives. Conducted within a communication design seminar at the University of Florence, the study involved structured experimentation to explore analogue, multisensory experiences through theatre inspired methodologies. The primary aim was to identify key principles of immersive design that could enhance the creation of emotionally resonant experiences. The seminar offered an interesting setting to evaluate theatrical techniques, focussing on creating impactful, empathy-driven storytelling over technical aspects. This interdisciplinary approach aimed to deepen user engagement and promote reflective, meaningful interactions with content by blending theatrical methods with digital innovation. The goal has been to train future designers in immersive experiences and digital technologies, showing how theatrical practices can complement digital tools to create engaging interactive experiences by establishing a framework that evokes perspective-taking, thus expanding immersive media's communicative potential and informing key design principles.

The context

This has been explored in a seminar titled 'The body I am (not)' which addresses a pressing contemporary issue of significant social relevance: the (non) acceptance of one's body. The decision to centre the seminar on body acceptance (or the lack thereof) stemmed not only from its relevance in an era increasingly marked by issues surrounding body image and self-perception, but also from a deliberately provocative intention: to spark reflection on embodiment. Virtual reality headsets, by rendering the user's body invisible, challenge traditional dynamics of identification. Paradoxically, the absence of one's own physical presence can intensify immersion and facilitate identification with the protagonist, making the transfer into another body more immediate and less inhibited by bodily awareness or the constraints of reality. As such, students can design immersive experiences where the intentional alienation from one's physical body can be employed as a powerful narrative tool. This concept is particularly used in both the theatrical and digital immersive experiences, where the experience of 'disconnection' from one's physical body served as a trigger for perspective-taking. This theme offers students the chance to explore the complexity of human bodily experiences, focussing on key suggestions, including 'Liberating bodies from gender', which tackles the challenge of overcoming traditional gender stereotypes to promote a more fluid and inclusive society.

Frameworks for designing analogue theatrical immersive experiences

To emphasise the value of perspective-taking, a cornerstone of both theatre and immersive communication, a theatrical experience was created for students around gender issues. The focus was on personification and embodied engagement, deliberately avoiding digital tools. The aim was to cultivate an analogue mindset grounded in presence and sensory awareness, laying the foundation for impactful XR design before introducing technological elements. A structured methodological framework was used to create a comprehensive theatrical experience that engaged multiple sensory modalities. The methodology is systematically organised into distinct phases, each aimed at enhancing the immersive and emotional impact of the experience. The experience involved blindfolding students to remove their sense of sight, encouraging deeper immersion in the narrative: by disconnecting them from visual perception, like the sensation of wearing a VR headset, the exercise aimed to stimulate imagination, enhance engagement and nurture the visualisation skills needed for immersive storytelling design, developing a deeper, embodied understanding of presence and imagination as key elements in creating immersive experiences. The theatrical experience, developed in collaboration with an avant-garde theatre company (LST Teatro), known for its focus on value-driven theatrical experiences, followed a structured and methodical process as outlined below:

Theme selection and theatrical experience design

- a. *Selection of the theatrical monologue*: the theatrical monologue was selected for its themes of body acceptance and identity and its suitability for multisensory, immersive interpretation
- b. *Text analysis and concept development*: a detailed textual analysis identified elements to enhance immersion, forming a framework to translate the text into sensory stimuli for the experience

Sound design

Sound design has been one of the main critical components of the immersive experience with:

- A. *Script analysis for sound design*: the text's auditory elements were analysed to select appropriate soundscapes.
- B. *Creation of diegetic soundscapes*: the soundscapes were designed to reflect actions and settings in the text, enhancing participants' imagination
- C. *Emotive soundscapes*: soundscapes reflecting the protagonist's emotional states, such as fear and anguish, were created to deepen emotional engagement.
- D. *Real-time audio elements*: elements of sound were performed live to adapt dynamically to the participants' reactions and actions

Immersive design

Parallel to the sound design, the sensory involvement of participants was addressed. Specifically:

- A. *Olfactory and tactile elements*: these sensory aspects were integrated to match specific scenes in the text. For example, in a crowded bus scene, participants were physically nudged, while in scenes like a restaurant or clinic, food and medical aromas were used to enrich the experience.
- B. *Sensory integration*: alignment of sensory elements with the narrative, enhancing the overall immersive experience

Execution phase

The execution phase included the following:

- A. *Audio recording*: registration of monologue with professional actor and other descriptive sound, including descriptive sounds like clothing rustling
- B. *Sensory element collection*: essential elements for sensory stimulation were gathered to ensure a cohesive and engaging experience
- C. *Preliminary test*: preliminary testing within the theatre company to assess the effectiveness of the design, gathering initial feedback and making corresponding adjustments.

Preliminary verification

- A. *Test the practical implementation* of the experience, assessing the effectiveness of sensory stimuli (on field)
- B. *Collect feedback* to adjust the intensity of voice, soundscapes and sensory stimuli. This iterative process allows for refinements to enhance the overall impact of the experience.

Implementation

The final phase involved the actual implementation of the immersive experience at the design campus in Florence. Students were organised into groups of 20 to:

- A. *Ensure optimal sensory engagement*: facilitate an immersive environment where auditory, tactile and olfactory elements are effectively experienced.

B. *Manage experience dynamics*: maintain a manageable scale to avoid dispersal and ensure active participation by incorporating moving actors to interact with the audience.

Results

Insights from an analogue immersive experience in XR design education.

The theatrical experience elicited profound responses from communication design students, many of whom had not previously encountered such a multisensory and analogue form of storytelling. The participant sample consisted of 50 communication design students, all enrolled in the final year of the bachelor's programme. The participants were mostly aged 21 to 24, with only two having theatre experience and none familiar with immersive storytelling. About a quarter had some exposure to XR, mainly via gamification, but none had prior immersive XR design experience. This profile situates the cohort as predominantly novice in immersive and theatrical methodologies, which is relevant for interpreting the findings and their transferability within similar educational contexts. Their backgrounds in design and interest in innovative storytelling techniques made them ideal participants for exploring the impact of a multisensory, analogue theatrical experience on both their creative and professional development. The thematic insights presented in this study were derived through a mixed-method qualitative approach to collect and analyse student reflections. First, an open-ended written questionnaire was administered post-experience to elicit personal insights related to design education. Second, spontaneous group 'open mic' sessions enabled freer verbal expression, with facilitators transcribing reflections in real time. Third, informal shadowing techniques captured non-verbal cues and engagement dynamics. This blend of structured and spontaneous inputs, paired with contextual observation, offers a distinctive methodology for exploring analogue immersion in design pedagogy.

Students insights into sensory engagement, emotional response, empathy development and imaginative capacity

Below is an analysis of key themes that emerged from student feedback, organised by their core impacts on sensory engagement, emotional response, empathy development and imaginative capacity.

Sensory engagement and non-visual immersion

A central theme in the student responses is the heightened awareness of non-visual senses. Many students noted that the blindfolded setting intensified their auditory, olfactory and tactile perceptions, effectively replacing visual stimuli and enhancing the realism of the narrative. This approach aligns with immersive storytelling goals, as it required participants to rely on senses other than sight to build a mental image of the story such as reported in this feedback: *'even without being able to see, i remember everything as if I watched a film'*, and *'I felt fully immersed by sounds, smells, and tactile cues, which created a vivid and unforgettable atmosphere.'* The intentional use of scent, sound and touch played a significant role in grounding the participants in the story, simulating a deep and 'almost alienating' level of immersion that encouraged them to actively reconstruct the narrative in their minds. This reliance on multisensory input underscored the role of sensory

engagement in enhancing presence and grounding participants within an imagined environment.

Emotional resonance and empathetic response

Students frequently commented on the emotional depth of the experience, noting that the immersive setup allowed them to feel the emotions of the characters more profoundly. By involving them in a performance that 'rotated around them,' students reported feeling as though they were both participants and observers of the story, thereby fostering an empathetic connection such as '*I could understand the pain of others in a way that felt deeply personal*,' and '*it was astonishing how smells and sounds alone could connect me so directly with the character's experiences*.' The empathy fostered through this experience points to the potential of theatrical techniques in XR storytelling to cultivate perspective-taking, which is essential for fostering tolerance and inclusivity. This empathy-oriented approach was particularly effective in addressing complex topics, such as body acceptance and identity, that benefit from immersive narrative frameworks to encourage personal reflection and connection with others' experiences.

Imaginative engagement and the power of non-digital storytelling

Several responses highlighted how the analogue nature of the experience stimulated their imagination and enabled a deeper engagement with the narrative. By removing digital interfaces, the theatrical setup pushed students to construct and visualise the story internally, demonstrating the potential of non-digital methods in fostering a designer's imaginative capacity i.e. '*the experience allowed me to activate senses I often overlook, making it feel as though I was inside the story*', and '*it was the first time I experienced something so sensorial and real without digital tools*'. This analogue approach underscores a key principle in immersive design: the importance of cultivating an analogue mindset and an understanding of presence mechanics before integrating digital technologies. Students remarked that this 'novel and unique experience' offered new insights into the role of imagination in storytelling, revealing how it can be powerfully immersive through perception.

Participant agency and the construction of embodied presence

The feedback also reflects an increased sense of agency and presence within the narrative. Students described feeling as though they were active participants, rather than passive observers, in the story. This sense of agency was reinforced by the physical components of the experience, such as the sensory cues and occasional physical interactions with facilitators, that is, '*despite being seated and blindfolded, it felt like I was part of the story*' and '*the structured use of smells, sounds, and physical touch made it incredibly real and participatory*'. The sensory cues and subtle touches created a sense of physical presence that helped students overcome initial discomfort, particularly those who usually struggled to 'let go' in immersive experiences. This finding suggests that analogue theatrical techniques may offer a gentler, more accessible introduction to immersive engagement for those new to such experiences, potentially informing future approaches to XR design training.

Reflection on the role of theatre in enhancing immersive storytelling

Several students reflected on the broader significance of the experience in terms of design and storytelling. They recognised the value of integrating

TABLE 1 Key insights into emotional, empathic, and imaginative capacities

Main theme	Sub-themes derived from feedback	Explanation
Insights into sensory engagement, emotional response, empathy development and imaginative capacity	Sensory engagement and non-visual immersion	The blindfold heightened other senses, enabling embodied presence and mental narrative reconstruction
	Emotional resonance and empathetic response	Multisensory immersion deepened emotional connection and empathetic understanding
	Imaginative engagement and the power of non-digital storytelling	The analogue setting stimulated imagination and multisensory narrative processing without digital input
	Participant agency and the construction of embodied presence	Sensory cues and guided movement fostered active, participatory immersion
	Reflection on the role of theatre in enhancing immersive storytelling	Theatrical methodologies as effective catalysts for multisensory engagement and emotional depth in immersive design frameworks

theatrical practices into immersive storytelling, acknowledging how this interdisciplinary approach could enrich the communicative potential of XR by engaging users on a multisensory level and cultivating emotional depth; i.e. *‘this experience highlighted the importance of multisensory design in creating emotionally rich narratives’*, and *‘it provided valuable insights for designing impactful, human-centred immersive experiences’*. These reflections underscore the contribution of theatrical experiences to the foundational understanding of immersive design. By blending analogue practices with digital innovation, students gained practical insights into how non-visual sensory stimuli can elevate the user’s engagement and emotional resonance, critical elements in crafting compelling immersive experiences. (Table 1).

Students insights into the impact of theatrical experiences on immersive design

Moreover, students were asked to reflect on the impact of the theatrical experience and identify the aspects that most influenced their perspectives on the design of immersive experiences. The responses revealed several key insights, including:

Power of sensory engagement

A dominant theme in the students’ responses is the profound impact of engaging multiple senses beyond vision. Many students expressed their surprise and fascination at how the theatrical experience activated a wide range of sensory inputs, including hearing, smell and touch. This multisensory immersion allowed them to experience a story in a profoundly different way, shifting the focus from visual perception to other, often overlooked senses. *‘I was struck by how sound, smell,*

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and touch could transport me into another reality', 'The use of other senses, particularly smell and sound, allowed me to experience the story fully without relying on sight.'

This finding underscores the importance of utilising a broad spectrum of sensory modalities in immersive storytelling. The experience revealed to students that *full immersion* is not solely reliant on visual stimuli; rather, the activation of other senses can create a more holistic and engaging narrative experience.

Challenging the importance of vision in immersive design

Another major takeaway was the realisation of how deeply sensory experiences can be felt even in the absence of sight. Several students noted how powerful the experience was despite the removal of the visual sense, emphasising that emotions and engagement could be sustained through the stimulation of other senses: 'I never thought that one could visualize a scene without actually seeing it. This experience showed me how powerful sound, smell, and touch can be in creating a narrative.', 'The fact that I could feel so immersed without the use of my eyes was truly surprising. It made me reconsider the role of sight in immersive experiences.'

This realisation is particularly important for immersive experience design, as it suggests that creators should not overly depend on visual stimuli (a common approach in digital immersive experiences like XR) but instead explore how other senses can be used to enhance the storytelling process.

Stimulating imagination and mental transport

The theatrical experience also encouraged students to reflect on the connection between sensory input and mental imagination. The use of sounds, smells and tactile sensations stimulated their imaginations, allowing them to construct mental images of the story in ways that were vivid and memorable, despite the lack of visual references: 'What struck me the most was how my mind created vivid images based solely on sensory cues, without needing to see anything.', 'It was amazing how my imagination was activated through sounds and smells alone: this could lead to innovative approaches in immersive experience design.' This feedback highlights the importance of stimulating imaginative thought in immersive design. By focussing on sensory input that is typically secondary (such as smells and tactile sensations), designers can enhance the mental engagement of participants, offering them a more personalised and immersive experience.

Simplifying sensory stimuli for deeper immersion

Students also noted the role of simplicity in sensory design. The use of carefully selected minimalistic sensory stimuli (such as a few well-chosen sounds or smells) contributed significantly to their sense of immersion. This highlights the power of restraint in immersive design: rather than overwhelming the audience with excessive stimuli, carefully crafted simplicity can be more effective in creating a compelling experience: 'What amazed me was the simplicity of the stimuli that created such a deep immersion in the experience.' 'The careful use of only a few sensory elements helped create a powerful sense of presence in the story.' This insight is valuable for designers of immersive experiences, suggesting that it may be more effective to focus on the quality rather than the quantity of sensory input, ensuring that each element contributes meaningfully to the overall experience.

The role of empathy and participant engagement

Several students reflected on the increased sense of empathy and personal connection that the experience fostered. The sensory immersion allowed them to 'feel' the story in a more personal way, making them more attuned to the emotional depth of the narrative. This heightened empathy was particularly evident in the interaction with the story's themes and characters. *'I was able to truly empathize with the characters, as the immersive elements made me feel as though I was part of the story'; 'This experience helped me understand how immersive storytelling can foster empathy and emotional connection by engaging the audience on a deeper level.'*

In the context of immersive design, this is a crucial takeaway: the use of multi-sensory input can heighten emotional engagement and facilitate a stronger connection between the audience and the narrative. For future designers, creating experiences that prioritise empathy and engagement can lead to more impactful and transformative storytelling.

Creating universal accessibility in immersive experiences

Another key insight that emerged was the potential for immersive storytelling to be universally accessible. The theatrical experience highlighted how different participants, regardless of their sensory preferences or capabilities, could engage deeply with the experience. The removal of visual input and the emphasis on other sensory channels may allow for greater inclusivity, particularly for individuals with disabilities: *'I realized how accessible this type of experience could be for people who are visually impaired or who struggle with traditional visual stimuli'; 'The simplicity of using other senses made me think about how we can create more inclusive immersive experiences in the future.'*

This insight points to an important future direction for immersive design: by focussing on sensory diversity, immersive experiences can be made more inclusive, catering to a wider range of users and promoting universal accessibility.

The integration of performance arts and design thinking

Finally, many students were struck by the intersection of performing arts and design thinking. The experience revealed that there are deep parallels between the two fields, particularly in terms of creativity, emotional engagement and the manipulation of sensory elements. Students expressed an interest in exploring this link further, recognising the potential for integrating performance-based techniques into their own design practices: *'I was surprised to see how much design thinking and the performing arts overlap. I will definitely explore ways to bring both worlds together in future projects'; 'The connection between the two fields was an eye-opener; I never considered how performance could inform immersive design.'* This reflection highlights the value of interdisciplinary learning, where students can draw on techniques from the arts to enhance their own creative processes in immersive experience design. As reported in Table 2, it has been evident how knowing disciplines other than design, specifically theatre, has been considered fundamental.

Discussion

The integration of theatre-inspired principles into the design of immersive experiences represents a significant paradigm shift, moving beyond reliance on

TABLE 2 Key insights on the impact of theatre in immersive design

Main theme	Sub-themes derived from feedback	Explanation
Insights into the impact of theatrical experiences on immersive design	Power of sensory engagement	Multisensory activation broadens immersion beyond visual input
	Challenging the importance of vision in immersive design	Absence of vision shows other senses can sustain emotional engagement
	Stimulating imagination and mental transport	Sensory cues enable vivid mental imagery
	Simplifying sensory stimuli for deeper immersion	Minimal sensory input enhances immersion by avoiding overload
	The role of empathy and participant engagement	Multisensory experience fosters deeper empathy
	Creating universal accessibility in immersive experiences	Non-visual cues improve inclusivity for those with visual impairments
	The integration of performance arts and design thinking	Encouraging interdisciplinary approaches that enrich immersive design practices

spectacular digital technologies and emphasising the potential of empathy, sensory richness and emotional resonance in 360-degree experiences. As advanced digital technologies continue to redefine the boundaries of immersive experiences, it becomes essential to acknowledge the value that theatre can offer in deepening designers' understanding of presence, embodiment and emotional engagement. This shift is essential for developing human-centred, emotionally connected immersive experiences, as Thon (2008) notes, immersion must transcend the visual to be truly transformative. While traditional approaches to immersive storytelling often rely heavily on visual stimuli, we should broaden the focus to include the full spectrum of sensory experiences that contribute to a user's overall perception of presence. The deconstructive nature of theatre, its emphasis on sensory engagement beyond sight, and its focus on empathy provide valuable lessons in crafting immersive environments that resonate deeply with participants. By exploring multisensory elements, theatre emphasises the importance of creating experiences that evoke not only mental engagement but also emotional and physical embodiment. The feedback gathered from students participating in the immersive theatrical experience confirms the effectiveness of this approach, as students reported a profound shift in their perspectives on sensory engagement, empathy and imaginative participation. The non-digital, sensory focussed approach, which intentionally removed visual cues and highlighted other sensory stimuli, encouraged participants to move beyond the traditional reliance on sight. Instead, they were prompted to engage their other senses, particularly auditory, olfactory and tactile perceptions. This forced reliance on non-visual stimuli helped students recognise the immense potential of these often-overlooked senses in crafting an immersive narrative. Many students expressed how minimal, yet impactful sensory cues contributed to

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their emotional engagement, fostering a deeper connection with the narrative and its characters. The feedback suggests that immersive storytelling thrives not on advanced digital tools or flashy visuals, but on thoughtful design using minimal sensory cues to create deeper immersion. This highlights the potential for simplicity to foster deeper emotional and cognitive engagement, aligning with the principles of analogue design found in theatre. This pedagogical experiment also revealed that integrating theatrical practices into storytelling design provides students with valuable insights into the design of emotionally resonant XR experiences. By encouraging students to engage with the principles of theatre, this approach not only cultivated their imaginative capacities but also instilled a stronger sense of empathy and emotional awareness in their work. Through this immersive pedagogical approach, students are encouraged to think critically about the emotional and sensory dimensions of storytelling, empowering them to design experiences that engage the whole human experience and remain sensitive to a wide range of participant needs and perspectives.

Conclusion

The experiment conducted at the University of Florence illustrates the transformative potential of integrating theatrical principles into the education of students designing immersive storytelling experiences. Focussing on multisensory engagement, emotional depth and empathy, the study highlights how non-visual senses can enhance narrative presence and audience connection, shifting the focus from digital spectacle to human perception. This approach represents a shift in the field, moving from reliance on visual-digital stimuli to embracing multisensory engagement. By integrating both analogue and digital techniques, it fosters human-centred design focussed on emotional connection and accessibility over technological complexity, equipping future designers with adaptable tools for impactful experiences. While the study has demonstrated these benefits, it also identifies limitations that warrant further exploration such as expanding the participant pool to include diverse demographics. Adapting non-digital techniques to XR poses both challenges and opportunities, highlighting the need for research that bridges analogue and digital methods to develop effective multisensory storytelling strategies. While the study indicates that theatre-inspired techniques effectively foster these qualities, additional research could explore how factors such as narrative complexity, sensory stimulus types and individual participant differences influence these outcomes. Such research would advance understanding of how specific sensory elements shape emotional responses, allowing for more nuanced and targeted approaches to immersive design education. Looking forward, the integration of performing arts into immersive storytelling design education holds immense potential. By instilling values of emotional engagement, this approach can prepare students to craft experiences that are both innovative and deeply resonant. Future studies could further explore how theatrical methods enhance empathy, agency and imaginative participation, contributing to a comprehensive foundation for inclusive and meaningful immersive design practices. Looking ahead, the fusion of performing arts and immersive media holds significant promise for inclusive, emotionally resonant design education. Cross-disciplinary collaborations, such as co-creative projects involving communication design and theatre or XR students, offer a promising path for methodological innovation and mutual learning.

particularly when students are actively engaged as co-creators in shaping experimental and interdisciplinary pedagogies. In conclusion, while this research offers a timely and significant contribution to the field, further studies are needed to investigate its applications across diverse immersive environments and its long-term impact on XR storytelling. By embracing the synergy between performing arts and digital design, educators and designers can chart a path toward creating immersive experiences that are not only technologically cutting-edge but also profoundly empathetic and transformative.

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Conflict of interest

Authors declare that there are no conflicts of interest.

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