



Immersive Media and Acting: The Transformation of Audience Experience in the Age of VR and AR

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Abstract

The article examines the transformation of acting and audience experience in the age of immersive media grounded in virtual and augmented reality technologies. The study aims to identify the specific shifts in theatrical and cinematographic practices that occur in the transition from traditional spectating to interactive, bodily engaging formats. The relevance is driven by the rapid development of the XR industry, its integration into the performing arts, and the growing cultural demand for participatory forms in which the spectator ceases to be a passive observer. The novelty of the work lies in a comprehensive analysis of actorly and audience transformations, with emphasis on the phenomena of agency, bodily involvement, and personalized contact, as well as in a systematic comparison of artistic and technological factors that influence the new grammar of stage action. The analysis shows that the implementation of XR alters dramaturgical architecture itself: the spectator gains the opportunity to actively affect the course of the narrative, while the actor masters a choreography of presence that requires plastic legibility and coordination with the digital layers of the stage. The level of embodiment enhances emotional response and empathy for the audience, as proven experimentally and by case studies. This means that collective experience is of a different nature. Immersive practices are not matters of technological renovation but represent a structural change in the culture of staging interaction that presupposes new professional competencies for actors, institutional forms of training, and codes of ethics in working with audiences. It will be helpful to researchers in theatre studies and media arts, educators at creative universities, producers, and directors while finding strategies of adaptation to the XR era.

Keywords: Immersive Media, Acting, XR, Virtual Reality, Augmented Reality, Audience Experience, Embodiment.

INTRODUCTION

Extended reality (XR) unites virtual, augmented, and mixed reality, creating a continuous spectrum of perception in which the material and the digital cease to stand in opposition and become a single stage space. XR technologies are already applied in telemedicine, engineering modeling, and education. Yet, it is within cultural practices that they have acquired particular symbolic force: headsets become not merely an interface but a new portal into a collective imaginary where the spectator enters into dialogue with the author on equal footing (Novosel & McCrone, 2024).

Theatre and cinema have found themselves at the epicenter of these shifts. With the Apple Vision Pro headset came the debut of a volumetric Metallica concert, filmed with fourteen special cameras and shown in 180° along with spatial audio; the effect is as though the only place on stage (Kahn & Schubert, 2025). On the other hand, Cosm and

the Sphere cluster dome venues use huge 16-K screens for showing movies like *The Matrix*, making watching an all-out audiovisual ritual instead of just sitting back and consuming a reel (Landrum, 2025).

A different immersive ecology is evolving on the live stage. These are not peripheral formats anymore but draw investment from Netflix, Layered Reality, and other studios banking on the emotional capital found within well-known franchises.

On the audience side, there is a marked reorientation. Research by the Immersive Experience Network, based on nearly two thousand surveys, shows that the key motive for spectators is a sense of participation with the body, rather than detached contemplation; furthermore, the demographic reach of such projects is broader than that of traditional museums and drama theatres (IEN, 2024). Paradoxically, the more actively the spectator is involved in the process,

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the higher their willingness to pay for a ticket—a factor that heightens producers' interest in interactive formats.

Thus, the relevance of the topic for the performing arts is determined by a triad of causes: technological accessibility of devices, the sector's economic expansion, and the cultural demand for an experience in which the boundaries between spectator and performer dissolve. XR ceases to be merely an effect of presence and becomes a new grammar of narration, where sensors extend the actor's body and the authorial statement acquires multilayered materiality.

MATERIALS AND METHODOLOGY

The research materials draw on a broad corpus of sources, including academic publications, industry reports, empirical cases of XR implementation in theatrical and cinematographic practices, and survey data from audience studies. The theoretical foundation comprises works at the intersection of theatre pedagogy, cognitive sciences, and digital technologies: in particular, the study by Novosel and McCrone (2024) defined XR as a new model of convergence between the material and the digital within cultural industries, while Kahn and Schubert (2025) examined the practice of Metallica's volumetric concert in the context of the Apple Vision Pro launch as an emblematic case of technological and cultural shift. Additionally, Landrum's materials (2025) on Cosm and Sphere dome venues made it possible to register a trend toward large-scale audiovisual rituals in which the screen ceases to be a backdrop and becomes the stage space itself.

The methodology combines three analytical strategies. First is a comparative analysis of technologies, juxtaposing the effects of implementing VR panoramic perception in educational and theatrical contexts (Brown et al., 2024) with those of AR hybrid formats involving live actors (Johnstone, 2024). Media representations and industry reports comprise the second avenue. Content analysis exposed market dynamics of motion capture and volumetric video as indicators of technological institutionalization (MGR, 2025; FMI, 2024). Third is an embedded description of cases on how the interaction between spectator and performer may be modulated through the parameters of agency, corporeality, and personalized contact, reinforced further by neurocognitive data on the impact of embodiment on empathy (Yang & Xiao, 2024).

RESULTS AND DISCUSSION

When a spectator dons a headset and finds themselves in a fictive hall without a fixed seat, the familiar director-actor geometry is reconfigured: the camera is now controlled by the participant, who turns their head through the full three hundred and sixty degrees. A study by a British group led by A. Brown showed that, under such panoramic perception, student-observers extract more semantic detail from dramatic fragments than in ordinary and even stereo film viewing, precisely owing to the freedom to choose angle

and distance (Brown et al., 2024). This freedom, however, becomes a challenge for the actor. Every movement is read as a close-up, and the spectator's elusive gaze trajectory can deprive the climax of tension if the articulation of gesture is not sufficiently circular.

The response has been the formation of a particular choreography of presence, whereby the performer operates inside a cube of sensors, orienting not to a frontal point but to a dynamically shifting center of mass of the audience. In the Royal Shakespeare Company's project Dream, the troupe was placed in a seven-meter motion-capture cube where the entire physical vocabulary is instantly transformed into three-dimensional models on the Unreal Engine and broadcast to the public in real time; thus the actor can perform not only with their body but with the digital wake of that body, which the spectator may examine from above, from the side, or from within a forest glade conjured from particle clouds (RSC, 2021).

The spread of such methods is supported by economic inertia: the global market for motion capture technologies, according to Verified Market Research, is estimated at USD 110.89 million in 2024 and could grow to USD 810.94 million by 2033 at a compound annual rate of 24.1%, as shown in Figure 1 (MGR, 2025).

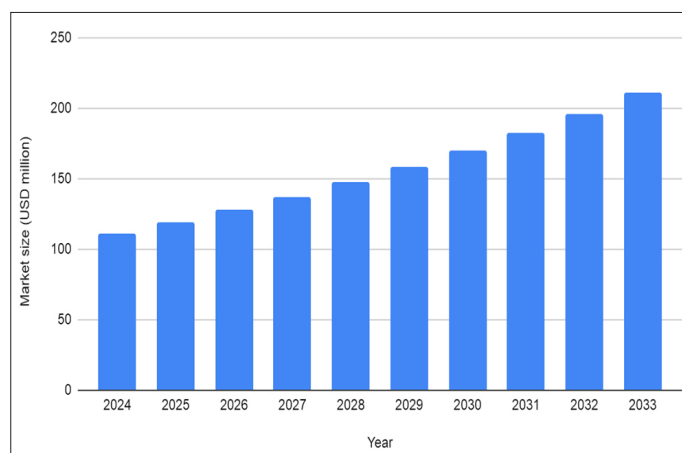


Fig. 1. Market Size of Motion Capture Technology (MGR, 2025)

A qualitative leap is ensured by the paired use of motion capture and facial capture: if a suit with inertial sensors records limb trajectories, then a mask with optical markers transmits micro-tensions of lips and eyelids, allowing the rendering of a character's breathing or the tremor of eyelashes, which in a stereoscopic field is felt almost physically.

The next tier is volumetric recording, in which dozens of cameras surround the actor, and their figure is reconstructed as an integral point cloud. According to a report by Future Market Insights, the global market volume for such recording reached USD 2.7 billion already in 2024 and will continue to grow by nearly 30% annually over the next decade, as shown in Figure 2 (FMI, 2024).

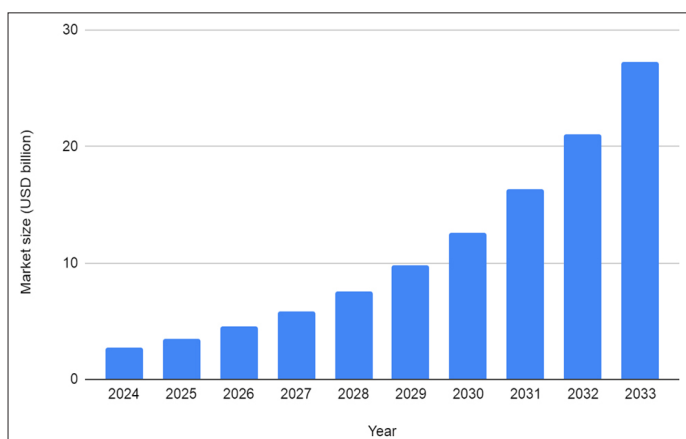


Fig. 2. Volumetric Video Market Size (FMI, 2024)

The National Theatre of Great Britain employed this technology in the musical mono-performance *All Kinds of Limbo*: the singer was captured in full-body volume and then placed in an interactive hall where spectators could shorten or increase the distance up to breathing down one's neck, without losing the photorealism of the performance (Dimension Studio, n.d.).

However, digital precision by itself does not guarantee emotional response if the performer fails to achieve embodiment—a state in which the spectator experiences the digital figure as an extension of their own corporeality. A 2024 neurocognitive meta-analysis records that a high level of such embodiment markedly intensifies empathy and even affects participants' subsequent behavior outside the virtual environment, for example, increasing the drive toward social interaction (Yang & Xiao, 2024). For the actor, this means the need not merely to execute a gesture but to encode plausible kinesthetics into it—to account for system latencies, the inertia of virtual muscles, and the weight of the digital costume that the spectator senses as their own. Thus, a new performance idiom emerges: a hybrid of bodily memory, algorithmic precision, and perpetual tactile dialogue with an invisible yet ever-moving camera-spectator. As shown in Figure 3, the most regular usage is noted for AR filters and virtual tours, whereas more specialized formats (immersive theatre, mixed reality) remain rare (Bennett et al., 2021).

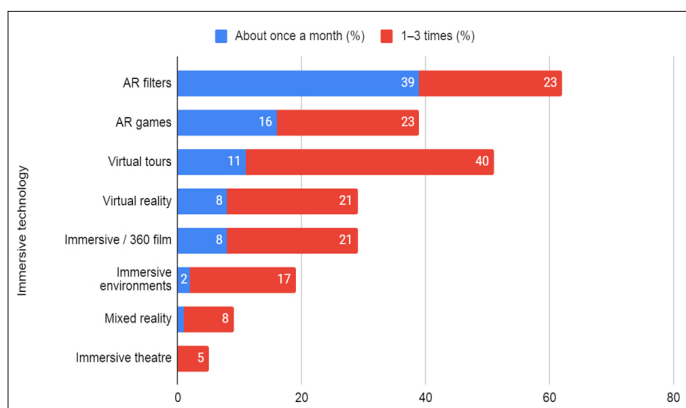


Fig. 3. Frequency of Immersive-Technology Use in the UK (Bennett et al., 2021)

The augmented stage operates on a different principle than the virtual one: whereas in a VR headset, actor and spectator find themselves inside an entirely constructed universe, an AR production depends on the unstable equilibrium of two layers—tangible scenery and the holography that remains unseen until it flares into visibility. Technically, this entails continual redistribution of focus: the live actor plays in close-up for spectators in front of them while simultaneously serving as a positioning marker for the engine that overlays virtual props, fog, or explosions legible only through the lenses.

The most oft-cited example of such hybridity remains London's attraction, *The War of the Worlds: The Immersive Experience*. Live performers guide participants through corridors of a Victorian quarter into which, thanks to projection domes and wearable headsets, Martian tripods break; the spectator is allowed to see a performer extend a real hand, behind whose contour a heat ray immediately ignites (Johnstone, 2024).

The key advantage of the in-glasses layer is arbitrary scale. In the RSC's *Dream* project, an actress clad in sensors could, in the blink of an eye, transform from a tiny fairy into a gigantic arboreal entity; the algorithm deformed proportions without breaking plasticity, so that any gesture remained recognizable at fourfold magnification (Audience of the Future, n.d.). The physical stage remains unchanged—transformations occur exclusively in the spectator's field—liberating the director from heavy scenery while imposing new demands on the performer: each step must be readable across scales, and axial symmetry becomes critical, since model rotation may be instantaneous.

The subtlest task is synchronization. The actor interacts not only with partners of flesh but with animated layers launched on rigid timing. Thus, a new professional discipline takes shape—frame-fraction precision—where the organicity of gesture is determined not only by psychophysics but also by the processor's latency as it renders an alien tripod behind the actor's back.

While the augmented stage compels the performer to stretch the border between concrete and illusory, so-called live mass multiplayer networked theatre demands even greater plasticity: the performer becomes not merely a participant in dramaturgy but its master of ceremonies. The spectator, armed with the right to swivel the head and press the haptic controller, literally lays a path through the narrative. To keep the fabric of the performance from fraying, the actor-curator must continuously scan audience reactions, anticipate each participant's intention, catch their cue, and invisibly weave it into the general pattern of action. Words are spoken as if to a score that emerges on the fly: any sigh from the public shifts the scene's tonality, so the artist must hold in mind entire constellations of possible lines, poses, and gestures distributed over a hidden grid of conditional coordinates.

This mobile dramaturgy resembles the maneuvering of a conductor before an orchestra, where, instead of written parts, there are pulse streams of user choices. A spectator may at any moment open a different door, linger over a random prop, or engage a not-so-central character. The hidden script's branches depend on this: one path engenders a lyrical monologue, another provokes a group collision, a third leads to silence, when the digital environment reacts to quiet and dims with the audience's breath. The actor who has just set a pearl of emotion into the role is already obliged to fold it into a new shell and launch a fresh storyline, preserving longitudinal plausibility.

Simultaneously, a strict rhythm of invisible signals operates. A system of distributed servers dictates the space's internal laws. If spectators in one wing choose to accelerate the tempo, the program sends to the headsets of another group an impulse of calm to balance the narrative pendulum. The artist must feel this undertow of synchronization and discharge emerging dissonances like a lightning rod, lest the performance's two strata—human and computational—disintegrate into noise. Paradoxically, the spectator's freedom of choice increases the performer's responsibility: a tiny inflection of intonation, an imperceptible slackening of step can bend the direction of collective movement and open a door whose existence even the author did not imagine.

Thus, a different type of acting is born, in which the capacity for instantaneous composition coexists with a deep trust in technology, and the sense of stage extends not only to the boards underfoot but to the space between signals. The performer becomes strategist, medium, and jester at once; they embrace the play's design like a labyrinth with many exits, leaving at each loop a mark of their presence so that the spectator, returning to the action, again and again encounters the living breath of the custodian of this mutable universe.

Though the schools of live performing arts keep relying on *étude*, partner attention, and traditional stage direction techniques, new pedagogy is already quietly emerging in the rehearsal rooms - where an optical marker sits next to *mise-en-scène* and the director's baton is replaced with a hyperlens, more of a tablet. Leading studios gradually introduce dedicated modules on the live avatar: in the first semester, the student learns to compose movement, keeping in mind that their gesture turns into a point cloud; later come classes in vocal depth, since timbre must cut through (the digital fabric as it cuts air on an ordinary stage. Professional theatres open short-term laboratories in which the young artist masters hybrid plasticity under the guidance of visual-effects curators as routinely as fencing or acrobatics in conservatories of the previous era.

Technology, once hidden backstage, now bursts into the classroom. A sensor suit becomes a role in itself: the student senses on the shoulders an invisible corset that tracks every micro-dynamic and remorselessly outputs a frame-by-frame

diagram of truth and falsity. On the same screens, trainers teach anticipation of delay: the actor rehearses a phrase knowing that a second later it will reach the spectator's ears at a different angle, and the entire respiratory setup must adjust to the jitter of data flow. Virtual light from all sides forces the development of circular attention; the familiar sense of the proscenium stratifies as the performer locates the invisible partner not just ahead but behind, above, and below, launching a line into space as if throwing a ball to four directions at once.

Understanding the laws of the new space is impossible without those who compose the engine of this presence-work. Hence, rehearsal sessions increasingly take the form of mixed crews: a game developer sits beside the playwright; a costumer stands before the render station; a haptics engineer fingers coils of vibro-motors in search of the optimal wave for the scene's final accent. Such collaboration breeds strange dialogues: the actor speaks of Chekhov's pause, the programmer replies with an interpolation formula, the director asks to drop the whisper by half a dB so it will not collide with the echo of virtual columns. In these crossings, a standard grammar is born in which data packets become notes and the actor's improvisation flows into an algorithm of adaptive staging.

Gradually, a new sense of responsibility forms: technique once enclosed within the actor's body now continues into the digital reflections that respond to every spectator's glance. Training thus extends beyond the personal studio: it requires a laboratory that can simultaneously measure cable impedance and the temperature of emotion. When such synthesis succeeds, the stage comes alive—as if another nerve awakens in the theatre's organism—and the audience member who considered themselves a bystander suddenly realizes that their very shoulder movement completes the performance's final line.

As the actor-curator opens an interactive labyrinth, the spectator steps across an invisible threshold and acquires a new kind of freedom akin to the right to inscribe one's own line into an already printed text. One may linger by a pulsing path, change the narrative tempo with a single tilt of the head, or send by a quiet inhalation a wave signal that reroutes a line onto another dramaturgical branch. The sense of fate, previously fixed in the director's score, splinters into many fragile crystals, each passing into the participant's palm. Yet this power is not a cold menu of options; it hides in micro-movements, in the very manner of being inside the unfolding, so that the story seems to breathe with the spectator's skin rather than enumerate alternatives.

Such freedom would remain theoretical if the body did not feel it with the whole receptor system. As the performer leads a character through the hall, the air can cool as before a storm, and the spectator unconsciously shrugs; underfoot, a faint tremor pulses as if a train rises in the depths of the

stage; an invisible wave of heat embraces the nape when a fictive desert speaks its line. Tactile backpacks, vibrating rails, and directed gusts of wind are not mere tricks: they become a grammar that invites the participant to answer not with words but with movement. In that moment, perception ceases to be observation and becomes co-performance, where every muscle joins the orchestra.

The deeper the spectator dissolves into the sensuous environment, the more surprising the emergence of intimacy, uncommon in the classical hall. Where hundreds of seats once kept people at a safe distance, a single look from a digital shadow of the actor now pierces straight to the heart, as if the entire action were addressed to you alone. The sense of personal address is intensified as the system instantly adapts brightness, sound, and even the plane of the frame to the individual trajectory of the pupil; the actor feels each participant pass through an invisible funnel of emotion and tunes vocal temperature to that singular response without losing the rest of the audience's voices. A finest network of private threads arises, which simultaneously sustains the collective drama.

Thus, the spectator undergoes a triple metamorphosis: gains the power to change the legend, lives the story through the body, and enters a dialogic contact comparable in closeness to a whisper in the ear. And when the final light sinks into half-darkness, one carries away not only the memory of spectacle but the experience that reality can reveal additional layers, if only one extends to it a living hand.

CONCLUSION

In sum, the shift to immersive means does not serve merely as a technological modernization of theatrical practice; it is a structural displacement in the grammar of stage utterance itself, whereby the spectator ceases to be a passive onlooker and becomes a co-author of experience. The merging of material and digital forms a new space of agency in which scale, point of view, and tactile impulses become variable parameters of dramaturgy, and the actor is compelled to operate not only with the crafts of plasticity and voice but also with a network of technical coordinates that set the form and rhythm of audience response.

Empirical and descriptive materials show this transformation to be multilayered: at the level of execution, a choreography of presence arises, requiring the actor's circular legibility of gesture and the ability to write kinesthetics with due regard to latencies and digital inertia; at the level of rehearsal, cross-disciplinary laboratories emerge, where dramaturgy is interwoven with engine development and the engineering of haptic effects; at the level of performance organization, algorithmic synchronization mechanisms distribute tempo and emotional coloring among groups of spectators, underscoring the need for a new kind of stage hearing and sensitivity to invisible data flows.

An ethical-practical dilemma follows: the expansion of audience rights and capacities is accompanied by the growth of performer and producer responsibility for the coherence of narrative and the safety of experience. Interactivity multiplies outcomes and makes the stage a maze of possible branchings; therefore, maintaining dramaturgical continuity requires from practitioners a prognostic plasticity—the ability to anticipate and delicately rework countless micro-interventions by participants without destroying the ensemble's sense of co-presence.

The educational dimension of the transformation should also be emphasized: the formation of a new acting craft is unthinkable without systemic changes in training curricula that must integrate work with sensors, vocal exercises for the digital fabric, skills of cooperation with technologists, and an understanding of principles of network synchronization. As theatre pedagogy transforms, it must provide an environment in which students learn to be simultaneously body, interface, and composer of interaction flows.

Ultimately, immersive practices open a rich field for artistic experimentation and economic expansion, but at the same time require from the stage and its institutions a new combination of artistic acuity, technical literacy, and institutional responsibility. Only under such synthesis will the stage preserve its capacity to elicit genuine embodiment and intimacy—qualities that make the immersive experience not a trick but a profoundly human encounter.

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