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**DIGITAL SHIFTS IN CONTEMPORARY  
THEATRE: INTERMEDIALITY,  
IMMERSION, AND INSTITUTIONAL  
TRANSFORMATION**

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**Abstract:** This article examines the impact of digital technologies on contemporary theatre, exploring how augmented and virtual reality (AR/VR), artificial intelligence (AI), intermedial performance, and participatory formats are reshaping theatrical creation, aesthetics, and institutional practices. Building on a semi-systematic literature review complemented by reflective insights from the European project *TabThePAST*, the study traces the intersections between digital innovation, cultural policy, and artistic experimentation. By situating recent technological developments within a historical continuum of theatrical adaptation, the article argues that digital theatre represents not a rupture but an extension of theatre's enduring dialogue with technology. Through comparative analysis and case studies from both Western and Eastern Europe – particularly the Romanian context – the research highlights the dual dynamics of resilience and vulnerability that characterize the digital turn in performing arts. While technological integration opens new avenues for creativity, participation, and sustainability, it also raises critical challenges related to aesthetic homogenization, ethical authorship, accessibility, and institutional inertia. The findings advocate for a holistic approach to digital transformation – one grounded in ethics, education, and collaboration – to ensure that innovation strengthens rather than compromises theatre's live, human essence. Beyond mapping current transformations, this article contributes to ongoing debates on the ethics and sustainability of digital theatre practices in both institutional and independent contexts.

**Keywords:** digital theatre; augmented reality (AR); virtual reality (VR); artificial intelligence (AI); intermediality; participatory performance; cultural management; Romanian theatre; digital transformation; *TabThePAST*; *TabThePAST.IMMERSED*.

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## ***Introduction***

The contemporary world is profoundly shaped by digital technologies in a wide range of forms, contexts, and applications, as digitalization, virtual environments, and the condition of being constantly online are increasingly becoming widespread norms (Sá, Santos, Serpa, & Ferreira, 2021). In this digital society, also called Society 5.0 (Sá, Santos, Serpa, & Ferreira, 2021), which proposes a deepening of the potential of the relationship between individuals and technology (Serpa, Sá, & Ferreira, 2022), theatre and the arts inevitably remain integral components.

Theatre has always functioned as a mirror of its time – an art of presence, of collective emotion (between performer and spectator, spectator and spectator, performer and performer), and of immediate sensoriality. However, in recent decades, the rapid and constant development of digital technologies has changed both the tools and the ways in which theatre works and expresses itself. Technologies such as augmented reality (AR), virtual reality (VR), generative

artificial intelligence (AI), and participatory digital platforms have opened up unprecedented opportunities for experimentation in the performing arts as well – offering new perspectives to stage direction, scenography/set design, dramaturgy, and even the way theatre performances are managed and produced. Alongside their potential, these developments have also raised critical challenges regarding traditional distinctions between performer and audience, reality and virtuality, liveness and mediation through various technological devices. Simultaneously, the incorporation of emerging technologies within the artistic process prompts a critical examination of the relationship between the artist and the creative tool, which must be extended beyond technical considerations to include issues of artistic authenticity, control, and ownership of the work produced (Abuzurairq & Pasquier, 2024).

The reflections developed in this article are informed by the experience of *TabThePAST* (2024), a European collaboration project that explored the intersections of digital technology, memory, and documentary performance. The project's artistic outcomes – including *Controverse. 1961. Cum vă place?*, *Nostalgia Up&Down*, and the immersive installation *TabThePAST.IMMERSED* – offered direct insight into how theoretical models of intermediality, participation, and ethical performance operate in real creative and educational contexts.

From this vantage point, the article revisits the broader academic debate on digital transformation in the performing arts, framing it as both a theoretical and a reflective inquiry grounded in lived research practice. At the same time, by mirroring Eastern European experiments with Western VR productions, the discussion highlights an essential asymmetry: while Western institutions often explore technology as expansion, Eastern contexts tend to use it as critical reflection and a survival strategy.

Drawing on recent international literature, the analysis focuses on four main directions of innovation: (1) the digital transformation of theatre institutions, (2) the use of AR and VR in scenographic design and in the concept of the performance, (3) the emergence of intermedial theatre, which combines live performance with digital media, and (4) the expansion of participatory formats, facilitated by interactive technologies and artificial intelligence-based systems. The article also critically examines the tensions and risks generated by these shifts, including concerns around aesthetic homogenization, digital inequality, and the erosion of theatre's liveness.

The digitalization of the performing arts should not be seen as a rupture of theatrical tradition, but rather as a continuation of theatre's ongoing dialogue with technology. Envisioning the future of theatrical art means approaching digital innovation with both curiosity and caution – recognizing its transformative potential while safeguarding the human essence at the heart of this art form.

The theoretical orientation of this study draws from cultural studies, media theory, and cultural analysis, treating technological innovation not as an external force, but as an integral part of theatre's evolving language. Building on the work of scholars such as Dixon (2015), Kozel (2008), and Lavender (2016), this article approaches digital tools as agents of mediation that transform space, time, presence, and authorship within performance.

Additionally, it draws on the new concepts of intermediality and participatory culture. Intermedial approaches, as discussed by Scheer and O'Gorman (2021), position theatre as a hybrid art form that blends live presence with digital layers, destabilizing medium-specific boundaries.

Following Jenkins (2006, p. 3–4), who argues that “media producers and consumers [...] are participants who interact with each other according to a new set of rules that none of us fully understands,” participatory culture can be seen as replacing the passive spectator with an active co-creator of meaning. Schäfer (2011, p. 12–13) complements this view, noting that “participation unfolds not only in the co-creation of media content and software-based products, but also in the development and defence of distinctive media practices”, thus emphasizing that participation and co-creation remain shaped by technological design and institutional constraints.

These theoretical coordinates frame the central question of the study: can technology remain a tool for creativity and research, rather than a new form of standardization and control? The answer depends, as the following study will suggest, on the ethical, educational and institutional contexts in which innovation occurs.

### ***Literature Review***

While the entire article draws from scholarly sources, this section consolidates the key directions of existing research on digital theatre, clarifying what is known and where significant gaps remain regarding the integration of new technologies into the performing arts.

The intersection of theatre and digital technology has been explored from multiple disciplinary perspectives over the past two decades. It is an evolving artistic language, not a radical break from theatrical traditions, that scholars such as Steve Dixon (2015), Sarah Kozel (2008), and Andy Lavender (2016) speak of when referring to digital performances or the digitization of performances. Their analyses foreground the ways in which digital technologies reconfigure presence, spatiality, temporality, and authorship in contemporary theatre practices, contributing to what Lavender conceptualizes as “theatres of engagement”.

Later contributions from scholars have advanced this discourse and established interconnections across diverse fields, pointing to a notable broadening of both the thematic and methodological frameworks.

**Performance and intermediality** are key areas of interest for scholars such as Scheer and O’Gorman (2021), Rixon et al. (2022), and Granjon (2008), who examine hybrid forms of performance that integrate multiple media to create complex artistic experiences. These works dissolve the traditional boundary between performer and media, emphasizing co-presence and spatial hybridity as essential aesthetic elements.

**Digital tools and audience engagement** in the artistic process are central themes in the work of Jenkins (2006) and Schäfer (2011), who examine paradigm shifts in participatory art within the context of digital platforms. Their research laid the groundwork for later studies by Burnett et al. (2019) and Overend and Heath (2021), which explore how interactive technology reshapes audience roles, blurring the boundary between creation and reception.

**The institutional and managerial perspective** on the digitalization of theatre institutions – although less explored in the existing literature – has been addressed by scholars such as Castelo (2019), Karcz-Ryndak (2025), and Cerquetti (2023). Their work highlights persistent gaps between creative experimentation and organizational adaptability, often driven by financial constraints, lack of digital literacy, and institutional inertia.

Studies by Bernstein (2017), Lee (2022), and Abuzurairq and Pasquier (2024) critically engage with **the ethical and epistemological implications** of digital integration, drawing attention to the risks of aesthetic homogenization, the automation of creative processes, and the ecological footprint of technologically intensive productions. Their analyses call for a more critically informed and ethically responsible engagement with innovation in the performing arts.

AI creativity seems to have found its way under the overall conceptual umbrella of cultural democracy; however, this challenges the very idea of cultural democracy by revealing the latter’s lack of capacity to discern the actually - existing everyday cultural and creative environment of contemporary society, in which advanced technologies are utilised to assist and even replace human creative labour, to offer new types of commercial cultural commodities, and to analyse/shape cultural tastes of users (Lee, 2022, p. 608).

Even though the technologization of the performing arts has gained increasing momentum, certain persistent gaps can still be observed. Studies in

the performing arts tend to focus largely on high-tech, well-funded productions supported by major institutions – a tendency that is understandable given their increased visibility – while often overlooking independent or resource-limited contexts. When it comes to empirical research centered on Eastern Europe, including Romania, such studies are still rare and, in some cases, virtually nonexistent. Such an absence constrains scholarly insight into the ways in which digital innovation operates and generates impact in contexts shaped by distinct cultural and structural conditions.

These academic perspectives were also tested within the project *TabThePAST*, which revealed their practical implications and limitations. The tension between live embodiment and technological mediation, often discussed theoretically, emerged as an ethical and dramaturgical question in the rehearsal room. Likewise, the literature's emphasis on participatory co-creation found direct resonance in the project's pedagogical workshops, where young artists engaged with digital archives and immersive environments as spaces for critical inquiry.

### ***Methodology***

This article adopts a qualitative methodology based on a literature review to examine how the theme of “*digital technologies and the transformation of theatrical practices*” is addressed. Following the framework proposed by Snyder (2019), the review employs a semi-systematic approach, suitable for investigating interdisciplinary topics, with a focus on publications in the fields of performance studies, digital media, cultural management, and theatre technology. Semi-systematic reviews are particularly well-suited for mapping the evolution of an interdisciplinary research field, synthesizing existing themes, and identifying gaps for which further academic research is needed (Snyder, 2019).

Articles were selected according to their relevance to the research questions, academic rigor, and publication date – as recent studies often provide the most up-to-date insights in rapidly evolving fields. Sources were drawn from major academic databases, including Scopus, JSTOR, Taylor & Francis Online, and Google Scholar, using keyword combinations such as “digital theatre,” “theatre and augmented reality,” “intermediality,” “artificial intelligence in the performing arts,” and “audience interaction.” The literature reviewed consisted of academic articles published in English between 1999 and 2025, analyzed during the period February – June 2025.

The analysis addresses three research questions: (1) How do digital technologies transform contemporary theatrical practices in terms of scenography,

dramaturgy, audience engagement, and institutional management? (2) What opportunities and challenges arise from the integration of technologies such as AR/VR, artificial intelligence, and intermedial media in live theatre performances? and (3) In what ways can independent theatre initiatives develop resilient and innovative approaches to digital integration within structurally precarious cultural contexts? The interpretation of sources was guided by three analytical principles: the historical continuity between theatrical innovation and technological progress; the tension between co-presence and mediation; and the balance between technological potential and ethical, aesthetic, and organizational constraints.

The study is structured around four thematic areas that emerged from the review of articles addressing new technologies in theatre: institutional digitalization; the use of AR/VR in directing concepts and scenographic design; intermedial theatre practices; and participatory theatre formats involving artificial intelligence. The resulting corpus is summarized in **Table 1**, which offers a structured overview of the selected works and highlights geographical and thematic imbalances across the field.

**Table 1. Overview of Reviewed Literature on Digital Theatre (1999–2025)**

Artistic Innovation				
Author(s)	Year	Focus Area	Thematic Axis	Region/Case
Kuksa	2009	VR in theatre education	Artistic / Educational	UK
Kozel	2008	Technologies and phenomenology in performance	Artistic / Ethical / Aesthetic	Global
Ma & Kang	2025	Digital theatre landscape	Artistic / Immersive Design	Asia / Global
Rixon, Brumpton & Morton	2022	Sustainable intermedial theatre	Artistic / Sustainability / Intermedial	Australia
Bernstein	2017	Technology and presence in theatre	Artistic / Ethical / Aesthetic	Global
Dixon	2015	History of digital performance	Artistic / Ethical	Global / Theoretical
Peukert	2019	Digital change in cultural industries	Artistic / Economic / Structural	Germany / Global

Panagou, Kamtsis & Gourgoulianni	2021	Technologies and costume in theatre	Artistic / Technical	Europe
Kattenbelt	2008	Definitions of intermediality in theatre	Artistic / Intermedial / Theoretical	Europe
Scheer & O’Gorman	2021	Transmedial theatre and truth	Artistic / Intermedial / Epistemological	Europe
Pike	2023	AR/VR and future of theatre	Artistic / Participatory / Ethical	Australia
Jin et al.	2024	AR localization in live events	Artistic / Technical / Mobile Interaction	Global
Xu & Zhang	2022	AR in stage design	Artistic / Technical	China
Abuzurairq & Pasquier	2024	AI co-creation in the visual arts	Artistic / Participatory / Ethical	Global / Experimental
Lavender	2016	Theatres of engagement in 21st century	Artistic / Aesthetic / Epistemological	Global
Borsuk	2019	Technological partnership in RSC’s The Tempest	Artistic / Institutional	UK
<b>Audience and Participation</b>				
<b>Author(s)</b>	<b>Year</b>	<b>Focus Area</b>	<b>Thematic Axis</b>	<b>Region/ Case</b>
Schäfer	2011	User participation in cultural production	Participatory / Critical	Global / Platform Critique
Almeida	2021	Theatre as negotiation and co-creation of knowledge	Participatory / Ethical	Global / Theoretical
Overend & Heath	2021	Performing referenda through participatory tech	Participatory / Political Performance	UK
Kang, Chen & Kang	2019	Audience behavior in social media art	Participatory / Interaction	Global / Social Media
Burnett et al.	2019	Digital technology in participatory theatre	Participatory / Theatrical Practice	UK
Jenkins	2006	Participatory culture and convergence	Participatory / Media Theory	Global

<b>Institutional Management</b>				
<b>Author(s)</b>	<b>Year</b>	<b>Focus Area</b>	<b>Thematic Axis</b>	<b>Region/ Case</b>
Karcz & Jabłoński	2024	Key aspects of theatre management	Institutional / Strategic	Central-Eastern Europe
Aebischer & Nicholas	2024	Resilience in the performing arts	Institutional / Strategic	UK / Eastern Europe
TNC	2025	Romanian digital theatre platform – ACuTe	Institutional / Case Study	Romania
Cerquetti	2023	Skills for the digital era in CCS	Institutional / Capacity-building	Europe
Castelo	2019	Digitalization of theatre organizations	Institutional / Strategic	Europe
Kapsala	2018	Digital transformation in theatre	Institutional / Artistic	Europe
Lazzeretti et al.	2022	Digital transformation in creative industries	Institutional / Critical	Europe
Serpa et al.	2022	Digital organizational culture	Institutional / Management Theory	Europe
Carson	1999	Theatre and technology	Institutional / Aesthetic Critique	Global
Sá, Santos, Serpa & Ferreira	2021	Digital literacy in Society 5.0	Institutional / Educational / Digital Culture	Europe
Karcz-Ryndak & Zapata-Aguirre	2025	Theatre management and new technologies	Institutional / Management Implications	Eastern Europe
Sovhya et al.	2023	Challenges of digital technologies in performing arts	Institutional / Technical / Artistic	Ukraine / Europe
Margaux, Ouazzani & Pulh	2025	Impact of digital technology on performing arts	Institutional / Artistic	Europe

In addition to the semi-systematic review, the study incorporates a reflective perspective drawn from the *TabThePAST* experience. This dual approach – analytical and experiential – situates theoretical findings within the lived realities of artistic research. The reviewed publications span the fields of performance studies, digital media, and cultural management, while the reflective component builds on the project's practical engagements with AR/VR technologies, archival dramaturgy, and participatory theatre.

### ***Historical context***

William Shakespeare, through the voice of the character Hamlet, suggests that theatre is a mirror of society. Historically, society has constantly integrated new technologies, and theatre, similarly, has harnessed technical innovations to achieve its artistic and social aims.

Technological innovation has profoundly influenced theatre over time, starting with the use of natural acoustics in ancient amphitheatres and various stage mechanisms in Ancient Greece, continuing with the Renaissance, when complex scene-changing machinery, such as the chariot and pole system, was introduced, and until the advent of electric lighting.

This evolution continued with the incorporation of sound amplification and projection technologies, ultimately leading to the present day, where emerging technologies such as virtual reality (VR), augmented reality (AR), and the Internet of Things (IoT) are increasingly integrated into theatrical experiences. In light of this evolution – which has significantly reshaped how narrative is presented and perceived in the performing arts – the history of theatre may be understood as a continuous narrative of technological innovation and artistic experimentation.

The historical evolution of technology in the performing arts can also be approached through a cyclical model, such as the one proposed by Geraint D'Arcy (2011), which highlights how technologies often progress through three aesthetic phases. Initially, technological elements are introduced for specific technical functions (such as trap doors, gas lighting, or motion capture). Over time, these tools become organically integrated into the artistic language of performance, taking on expressive roles. Some technologies are, over time, rediscovered and reinterpreted in new aesthetic contexts, acquiring a symbolic or experimental value. This historical cycle shows that innovation in theatre is not simply about replacing old tools with new ones, but about the creative and contextual use of technology to generate new forms of expression and scenic meaning.

Over time, artists have shown a constant interest in collaborating with technology, integrating innovative elements into the visual language, scenographic

design, and sound architecture of theatrical productions. The synergy between human and technology functions not merely as a means of easing the artistic process, but also as an extension and enhancement of the communication of artistic vision.

Where previously the sound of a storm was made with a large sheet that was shaken violently, all of a sudden there was the tape recorder that presented the storm with recorded natural sounds. The same happened with the wind, the rain etc. , but also with the music. That is, while before the relative technological innovations, a fairly large orchestra with natural instruments had to be inside the proscenium and at a depth of about 1.5 meters, with the tape recorder and its evolution (cassette, cd and finally computer with the appropriate software) the orchestra was repealed and replaced with bulky speakers and amplifiers (Panagou, Kamtsis, & Gourgoulianni, 2021, p. 3124).

These historical developments established the groundwork for contemporary digital integration, illustrating that theatre has historically served as a venue for negotiation and technological adaptation (Kozel, 2008). Furthermore, the ongoing digital transformations should not be viewed as a radical departure, but rather as an evolution of the enduring interaction between theatre and media (Dixon, 2015).

The digital revolution significantly impacts theatrical art – an art form that manifests in the present moment, directly before the audience’s eyes – introducing not only innovative tools but also novel insights into presence, time, and interaction.

### ***Key Areas of Technology Integration in Theatre***

#### ***Digital management of theatre institutions***

In recent decades, digital technologies have increasingly found their place in the artistic realm – as shown in the previous chapter, artists are often among the first to adopt innovation within the creative process to enhance the communication of their message – the digital transformation of theatre institutions at the organizational level remains a partially explored territory. This dimension of digitalization, which must be integrated into all internal administration, production, distribution and communication processes, is essential for the long-term sustainability of performing arts institutions.

However, there is a tension between technical efficiency and artistic integrity, as Christie Carson (1999) highlights, drawing a clear distinction between

the operational advantages of digital technologies and their impact on the artist's creative dimension. A study conducted by Ikerne Acha Castelo (2019), involving 53 European theatres, reveals a widespread perception that theatres are not at the forefront of organizational digitalization. While theatre institutions use various digital tools, it is important to note that many of these tools are primarily designed for creative purposes rather than for effective information management and communication. This is not inherently negative; however, it often proves to be insufficient. This limited effectiveness often stems from the fact that "theaters tend to implement digital tools without an overall strategy, often responding to immediate needs rather than following a clear digital transformation plan" (Castelo, 2019, p. 64), while "resistance to change and lack of time are seen as the main barriers to digitalization in theaters" (Castelo, 2019, p. 75).

As Jabłoński and Karcz-Ryndak (2024) argue, theatre management remains a poorly developed research field within management science, characterized by significant fragmentation in definitions, roles, and strategic orientations, which impedes the systemic integration of digital tools into institutional practices.

Although most theatres already employ basic information systems (IS), these tools are rarely applied in an integrated or efficient manner. Karcz-Ryndak (2025) notes that while artistic teams may not benefit directly from productivity-enhancing technologies, digital transformation offers significant potential for improving technical and administrative workflows, especially through automation. Among the major obstacles identified are the lack of time to find suitable solutions, staff resistance to change, and, most notably, insufficient financial resources for investment in specialized technologies.

The digital transition in cultural and creative sectors has revealed persistent skill gaps – especially in digital, entrepreneurial, and project-based competencies – exacerbated by structural vulnerabilities such as freelance dependence, external labour markets, and unequal access to digital infrastructure (Cerquetti, 2023). As highlighted in recent studies on independent theatre resilience, the precariousness of infrastructure and limited funding access often inhibit the strategic integration of digital technologies, particularly among non-institutional actors (Aebischer & Nicholas, 2024).

These structural challenges were also visible in the project *TabThePAST*, where independent and public institutions collaborated to share technological resources and expertise. The project demonstrated that digital transformation is not merely a technical evolution but also a cultural and managerial process that requires coordination, adaptability, and collective learning.

Recent literature introduces the concept of "digital organizational culture". Somewhat ironically, the term "culture" – which encompasses the entirety of

material and spiritual values generated by humanity, along with the institutions necessary to transmit these values – is now employed across a wide range of domains. The concept highlights how the integration of new digital processes is embedded not only in tools and systems, but also in the values, behaviors, and institutional structures. Serpa et al. (2022) highlight that „digital organizational culture” is defined by a set of specific characteristics, including openness to innovation, collaborative capacity, the rapid processing of large volumes of data and information, and the ability to operate in complex environments while assuming new forms of risk.

Today, it is a well-established and accepted fact that organizations of any kind need to be part of and embrace digital transformation, otherwise they cannot strive and succeed in the digital society we live in. For that to happen, organizational culture needs to reshape and be innovative in order to welcome and accommodate all the shifts that digital transformation brings about (Serpa, Sá, & Ferreira, 2022, p. 31).

In the context of performing arts institutions, fostering such a culture involves openness from leadership as well as the professional development of staff in the direction of digital competencies, addressing resistance to change, and redefining internal processes in a collaborative and agile manner. Without this cultural shift, digitalization risks remaining superficial, fragmented, or even counterproductive. You start to wonder who a performance is really for when it includes elements of new technologies, which are, however, acquired, activated, or integrated through an analog system, and promoted to the public using printed posters and flyers.

### ***Augmented and virtual reality***

Augmented Reality (AR) and Virtual Reality (VR) technologies are progressively being integrated into theatrical productions to expand scenographic possibilities and enhance audience immersion. At the same time, by replacing consumable materials with programmable digital scenographies, AR/VR supports more sustainable production practices (Pike, 2023). AR-based stage design has become very important in developing dynamic and interactive stage environments that adapt to the movements of both the audience and the performers (Xu & Zhang, 2022), while in theatre education, the application of virtual reality (VR) has significant potential for scenographic experimentation, historical reconstruction, and interactive learning (Kuksa, 2009).

The immersive features of these technologies facilitate audience engagement in the narratives of a theatre performance on a sensory level, frequently blurring the lines between observer and participant. Numerous productions have incorporated augmented reality (AR) and virtual reality (VR) as core conceptual components that shape the aesthetic and narrative structure of the performance.

One of the most notable examples is the 2016 collaboration between the Royal Shakespeare Company, Intel, and The Imaginarium Studios for *The Tempest*, which integrated real-time motion capture to merge live acting with digital animation. The technology captures the actor's facial expressions and body movements, allowing the complete performance to be transferred onto the animated character. In this production, Ariel was portrayed through a live performance seamlessly blended with real-time digital animation (RSC, 2025). Utilizing 27 projectors, Ariel is intermittently transformed from a physical presence into a digital avatar, hovering above the actors in a manner that evokes uncertainty and intrigue. In this production, technology – referred to as "digital magic" – is employed by Prospero and Ariel to subjugate the "primitive", analog characters, positioning it simultaneously as a tool of control and discipline within the narrative, and as a spectacle of innovation from the perspective of the creative team (Borsuk, 2019).

Beyond institutional contexts, several independent collectives have experimented with VR as a performative medium. The production titled *Loveseat* (2019) by the Ferryman Collective represents a groundbreaking integration of live theatre and virtual reality technologies. Premiering at the Venice Film Festival in 2019, the performance featured live actors engaging with the audience in Venice while donning VR headsets. Simultaneously, their performances were broadcast within the virtual reality environment of High Fidelity, which was notable for its VR components prior to its transition to spatial audio. Another notable production is *Welcome to Respite: The Severance Theory* (2019) by CoAct Productions, initially conceived as an immersive theatre experience designed for a single spectator who would embody the character of Alex – the seven-year-old protagonist – interacting with actors playing his parents. In 2021, the piece was adapted into a VR format with the support of Ferryman Collective, specifically for the social platform VRChat, accessible to a global audience. The 45-minute VR version was designed to accommodate up to ten spectators simultaneously, depending on the ticket type: a premium ticket allowed one audience member to assume the role of Alex, while a general ticket offered a more conventional and passive viewing experience (Garson, 2022).

Innovative use of AR also extends to live events. ARShow, a company based in Tel Aviv, has developed a groundbreaking method to utilize Mobile Augmented Reality (AR) technology to elevate live theatre, concerts, sporting events, and

various special occasions. Such an innovative approach provides artists with a novel medium for embedding virtual content within live performances, enabling audiences to engage with real-time, precisely synchronized visual elements and special effects that are seamlessly interwoven into the theatrical experience (Jin, Wu, Dasari, Apicharttrisorn, & Rowe, 2024).

Within *TabThePAST.IMMERSED*, from the *TabThePAST* project, AR and VR technologies were used to reconstitute archival materials related to censorship and surveillance, allowing participants to navigate interactive memory spaces. This artistic experiment demonstrated that immersive technologies can sustain both aesthetic innovation and ethical reflection when grounded in historical research. This aligns with Dixon's (2015) argument that the integration of technology into performance acquires meaning only when embedded in dramaturgical and ethical frameworks. In this sense, *TabThePAST.IMMERSED* demonstrates how VR can operate as an epistemic, rather than spectacular, tool.

Taken together, these examples illustrate the growing potential of augmented reality (AR) and virtual reality (VR) to transform not only the stage design, but also the way audiences engage, experience, and interact with performing arts. The integration of collaborative digital media into theatre can support not only aesthetic innovation, but also ecological responsibility, by distributing cultural products on virtual or immersive platforms, conducting the first rehearsals in digital spaces, experimenting with different scenographic elements in the virtual environment, and facilitating remote audience access. As Ma and Kang (2025) observe, virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies are not merely tools of enhancement but mechanisms of spatial transformation that expand the theatre's physical and conceptual boundaries, fostering immersive dramaturgies and multi-sensory audience engagement. The integration of augmented reality (AR) and virtual reality (VR) necessitates meticulous calibration to prevent overshadowing the narrative or alienating the audience from the emotional essence of the production. As Sovhyra et al. (2023) emphasize, digital technologies – particularly immersive visuals, holographic projections, and AI-enhanced robotic performers – contribute to a new stage aesthetic in which virtual elements do not merely support but fundamentally reconfigure the relationship between space, time, and audience perception. Striking a balance between technological spectacle and dramatic substance is a critical consideration for creators delving into these hybrid formats within the performing arts.

Virtual reality in theatre has begun to explore increasingly immersive formats, where the combination of real and digital elements offers the audience various "unexpected emotional experiences" without relying on hardware such as headsets or glasses, thanks to projection-based VR illusions (Tajtáková, 2014).

## ***Digital media and intermedial theatre***

Intermedial theatre is a form of performance that skillfully integrates multiple media – such as film, video, digital sound, projections, and internet technologies – into a dynamic interplay, where the media elements influence and interact with one another to create layered aesthetic experiences (Kattenbelt, 2008).

From a trans- and intermedial perspective it is important to examine to what extent these changes and correlations have been decisive for the development of new modes of experience and expression. We need also to question how much the ontology of media is relevant, assuming that the dynamics of trans- and intermedial processes primarily concern the mutual relations between materiality, mediality and aesthetic convention of making and perceiving. However, for research on media changes and co-relations between media, the interdisciplinary arts practice is the main point of reference (Kattenbelt, 2008, p. 27).

As Peukert (2019) notes, the proliferation of digital tools and generative technologies has begun to decentralize authorship and disrupt traditional production hierarchies, enabling collaborative or even automated content development within hybrid performance formats.

Scheer and O’Gorman (2021) alongside Rixon et al. (2022) investigate the emergence of intermedial theatre across Europe and Australia. Their research highlights the role of digital media – from projections and live video to sound design – not only as aesthetic elements, but also as dramaturgical tools that add depth to the narrative and reveal multiple layers of understanding of diverse meanings. The fusion of digital image and live performance generates complex narratives, which nevertheless question the idea of a unique theatrical experience. Moreover, the integration of set design with responsive digital systems opens new avenues for innovative collaborations between technologists and theatre practitioners.

Prominent instances of intermedial theatre productions encompass Rimini Protokoll’s *Remote X* series, which integrates audio walks with GPS tracking and smartphone interaction to facilitate a participatory experience tailored to specific urban environments. Another significant work in the field is Katie Mitchell’s *Miss Julie*, from 2010, which integrates live performance with real-time video production, thereby highlighting the constructed nature of media representation. The performances exemplify the capacity of intermedial theatre productions to enhance thematic concerns while reshaping audience perception and spatial dynamics.

Paul Granjon (2008), performer and visual artist, explores in his research the interaction between humans and machines in such a way that the machine is not merely a technical component, but an entity with stage presence and partial autonomy – without turning the human/artist into a “slave” to technology, merely receiving commands instead of exercising control.

Both the performance machines which I activate in front of a live audience and the autonomous performing machines provide a field of experimentation and reflection with a direct, embodied impact. In the case of performance machines, the robots’ performance and the concept they illustrate are largely conveyed by the human performer (Granjon, 2008, p. 55).

Within *TabThePAST*, intermediality served as a key conceptual and creative framework. Production such as *Nostalgia Up&Down* combined archival documents, live acting, and digital projection to interrogate cultural memory and censorship. These performances demonstrate how intermedial theatre can function simultaneously as historical research, aesthetic innovation, and ethical reflection, bridging digital mediation with embodied storytelling.

### ***Participatory and interactive formats***

Theatre is increasingly integrating interactive technologies to enhance audience engagement in innovative ways. The integration of generative AI systems, which can be adapted using small data sets, opens up new possibilities for participatory performances based on co-creation. Unlike static algorithmic responses, these adaptive systems allow artists to align the participation of AI with dramaturgical intentions or specific stage direction choices, thus transforming technology from a simple tool into an active co-creator. As Abuzurairq and Pasquier (2024) observe, “supporting personalization (whether a human personalizes an AI model, or the AI partner personalizes itself) can lead to an evolving collaboration between the human(s) and their AI partner(s) in co-creative settings” (Abuzurairq and Pasquier, 2024, p. 3), pointing toward a closer relationship between artificial intelligence and human contribution, in pursuit of a more balanced integration between audience interaction and the artists’ own aesthetic identity.

Burnett et al. (2019) and Overend and Heath (2021) examine the implementation of voting systems and iPads within participatory performances, elucidating the dual nature of audience agency as both empowering and intricately complex in terms of dramaturgy. Technologies such as digital polling,

real-time data visualization, and networked interaction empower audiences to influence the direction of a performance, thereby transforming the conventional actor-spectator dynamic into a collaborative and co-authored experience. As Kang, Chen, and Kang (2019) demonstrate, the most-liked and most-commented artworks on social media platforms such as Instagram are those that generate deep mutual interaction – through tutorial sharing, direct questions, or emotionally resonant storytelling – suggesting that participatory engagement is now a central driver of digital art reception.

Interactive tools like mobile and voting systems are not only reshaping audience roles but are also redefining the experiential structure of performances by transforming spectators into active participants, as emphasized by Karcz-Ryndak (2025) in her study on technological implications for theatre functions.

A notable example is the National Theatre of Scotland's *The Justice Syndicate*, in which audience members become jurors and are invited to deliberate on a legal case, using iPads as interaction tools. Another example is *The Twenty-Sided Tavern*, first presented at the Philadelphia Fringe Festival in 2021 – a production inspired by the Dungeons & Dragons universe, in which viewers can influence the characters' decisions and the course of the action through votes transmitted from their own phones. Furthermore, *You Me Bum Bum Train*, an interactive theatre performance conceptualized by Kate Bond and Morgan Lloyd in 2004, provides audiences with a sequence of unexpected immersive scenarios. This approach positions them at the core of the theatrical experience, effectively blurring the distinction between performance and reality.

Moreover, Pulh et al. (2025) emphasize that digital tools reconfigure the relationship between artists and audiences by enabling co-construction and deepening participatory dynamics. Yet this shift also raises questions about emotional authenticity and sustainability in mediated environments. In addition to enabling audiences to directly influence what happens in a theatre performance through mobile voting or real-time inputs, AR/VR technologies also open up new possibilities for interactive theatricality, as emphasized by Shane Pike (2023). He identifies three key interactions of AR/VR in the theatrical context: branching narratives shaped by audience choices, immersive spatial positioning of the spectator within the story, and a form of interactive theatricality specifically designed for responsive virtual environments.

However, this collaborative process does not constitute a truly equal form of participation, as both "sides" do not have equal access to the creative space, nor do they contribute freely, actively, and meaningfully to the performative outcome. As Mirko Tobias Schäfer (2011) warns, this vision is often idealized because participation is pre-structured by the platform's design – determining

what can and cannot be done – while key structural decisions remain in the hands of developers, curators, or algorithms rather than the users themselves. Although ethical concerns are not always explicitly addressed by practitioners, Karcz-Ryndak (2025) underlines the necessity for theatres to develop internal policies and risk awareness strategies – particularly in the application of artificial intelligence or robotics – to anticipate legal, ethical, and reputational challenges during the design phase of technologically mediated productions. Moreover, not all users possess the same level of competence. In interactive theatre, even if the audience feels they are decisively influencing the performance, their intervention is often limited by pre-coded systems that simulate, rather than enable, true co-creation.

The *TabThePAST* project also encountered these dynamics in its participatory workshops, where students and audiences engaged with archival materials and digital tools. While technology facilitated interaction, the process highlighted the limits of algorithmic participation and reaffirmed the importance of critical pedagogy and human agency in co-creative performance.

### ***Case Insight: Digital Practices in Romanian Theatre***

While much of the literature on the integration of new technologies in the performing arts focuses on projects or institutions in Western Europe, where resources enable such experimentation, the performing arts sector in Romania – both public and independent – nonetheless offers small-scale examples of digital experimentation carried out under conditions of structural precarity.

Public institutions such as the theatres in Craiova, Timișoara, and Sibiu have each developed initiatives demonstrating adaptability and innovation within their local contexts, while in the independent sector, the Replika Centre stands out for its sustained exploration of digital mediation as both an aesthetic and educational tool.

The Marin Sorescu National Theatre in Craiova has been involved in digital theatre projects such as *Reconstituirea* (Reconstitution), part of the European initiative ACuTe (Culture Testbeds for Performing Arts and New Technology). This project explores new creative tools and processes, as well as artistic languages and expressions enabled by emerging technologies such as virtual and augmented reality. Additionally, the *Hektomeron* project brought together audiences from around the world in an online format, demonstrating the theatre's capacity to reach a global public through digital platforms (TNC, 2025). These initiatives have significant implications on two levels. Institutionally, they reflect a growing openness to experimentation and digital innovation within a public theatre, positioning it both as a beneficiary of European funding and as an actor capable of

institutional adaptation and strategic alignment with the evolving digital cultural agenda. At the audience level, both *Reconstituirea* (Reconstitution) and *Hektomeron* contribute to redefining the role of a public theatre not only as a cultural producer, but also as a platform for international dialogue and audience diversification.

In Timișoara, the Mihai Eminescu National Theatre has contributed to digital accessibility through the CLOUD virtual library, while projects like Spotlight Heritage Timișoara have integrated AR and digital media into community-engaged performance and inclusive cultural practices. At the same time, the Radu Stanca National Theatre in Sibiu has developed the digital streaming platform "Scena Digitală" (Digital Scene) and has integrated international performances that incorporate new technologies in experimental artistic formats within the prestigious Sibiu International Theatre Festival.

Within the independent sector, the Replika Educational Theatre Centre can be regarded as a model of good practice in terms of locally grounded innovation, maintaining a sustained commitment to integrating new technologies throughout the entire process of cultural production. Operating – both administratively and artistically – within the constraints of non-institutional, project-based funding, the centre has, over the course of its ten years of continuous activity, become a model of adaptive cultural infrastructure. It utilizes limited resources to explore digital mediation not merely as a technical tool, but as a means of artistic expression. A key example is the 2017 production *Familia fără zahăr* (The Sugar-Free Family), which used both the set design elements and the actors' white costumes as projection surfaces for a virtual scenographic environment. The performance also featured a poignant scene in which an actor improvises a conversation with a voice assistant device – Amazon's Alexa – revealing themes of loneliness and cultural alienation, while simultaneously suggesting that connection and family can be reimaged through technology. Since 2021, Replika developed the Digital Re-Generation Lab for the Performing Arts – a project that encourages collaboration between theatre professionals and specialists in emerging technologies (VR, AR, IoT, etc.). This initiative aimed to stimulate digital transformation in the performing arts, develop production and digital literacy skills, and broaden access to culture. Within the project, artists from Replika Centre collaborate with IT specialists to identify optimal solutions that improve the accessibility of theatre performances – in particular through the use of smart glasses that provide real-time subtitles.

This interdisciplinary approach continued with *Nostalgia Up&Down*, developed within the European collaborative project *TabThePAST*, which bridged artistic innovation and institutional fragility by uniting the research capacities of UNATC with the collaborative philosophy of Replika and the experimental approach of Citizen.KANE.Kollektiv. The performance combines digital design

and new media art to explore the artistic and political challenges of 1980s communist Romania – such as censorship, migration, and civil rights violations – bridging historical research with contemporary artistic innovation.

These initiatives to integrate new technologies into creative processes, however, comes at a cost – one that is particularly high for cultural institutions in Romania, both public and independent, when compared to the state’s limited budgetary allocations for culture. As Aebischer and Nicholas (2024) note, many companies in Eastern Europe operate without stable public support for digital infrastructure, forcing them to rely on temporary grants or voluntary labor. Even so, the *TabThePAST* project has demonstrated that digital experimentation can thrive even under such constraints, when guided by collaboration, ethics, critical pedagogy, and, of course, within the framework of a European-funded project.

In this landscape, the integration of new technologies in Romanian theatre reveals a dual condition: resilience and vulnerability. On one hand, artists and institutions continuously reinvent theatrical forms through digital mediation; on the other, they remain dependent on external support and improvisation. This tension encompasses the broader challenge of ensuring sustainability and equity in the digital transformation of the performing arts.

### ***Challenges and criticisms***

As promising as the integration of new technologies into the entire theatrical production chain is, it is not without its critics. As Lee (2022) argues, while AI-driven creativity can help us reflect more deeply on the unique qualities of human artistic labour, its increasing use in cultural production also threatens to dissociate creativity from its human dimension and further deepen the precariousness of artistic labour, as creative work is gradually replaced by technological capital.

Scholars such as Bernstein (2017) and Pulh, Vales, and Ouazzani (2025) caution that digital innovation may privilege spectacle over substance, leading to a diminished sense of presence and the homogenization of aesthetic practices – particularly when virtual or non-human performers dominate the stage. Similarly, Abuzurairq and Pasquier (2024) warn that large-scale generative models such as GPT or DALL·E, while praised for their creative potential, can undermine artistic individuality. They advocate for a small data and slow technology mindset as an antidote to such standardization. Carson (1999) also addresses the issue of aesthetic standardization, criticizing productions like *Beauty and the Beast* and *The Lion King*, which transform theatre into a controlled, predictable experience, where technology replaces spontaneity and diminishes the “here and now” that is essential to the theatrical experience.

Many of the currently running large and expensive musical extravaganzas have incorporated a significant proportion of computer-generated movement on stage as well as backstage. The introduction of the world of Disney to the world of West End musical has significantly increased the movement towards the artificial animation of the on-stage action both moving it closer to the movie screen and the theme park ride. This movement as a whole towards the use of technology to enable the theatre to mimic film characters and conventions must be seen to be a threat to creativity in the theatre. (Carson, 1999, p.130)

Beyond aesthetic concerns, the digital transformation of cultural and creative industries also exposes deep structural challenges. Lazzeretti et al. (2022) argue, the digital transformation of cultural and creative industries has not only redefined production models and audience relationships, but also exposed deep structural challenges – including the widening digital divide, the commodification of attention in platform economies, and growing risks of cultural homogenization through data-driven spectacularization. Echoing concerns about the evolving nature of theatre, Shane Pike (2023) warns that AR/VR technologies – often reliant on pre-defined structures – risk undermining the ephemerality that defines live performance, while Andy Lavender (2016) explores how the integration of technology into contemporary theatre generates significant aesthetic, spatial, and epistemological transformations.

This integration is accompanied by various challenges that significantly impact the creative process. Within the context of hybrid theatre and intermediality, creators face both conceptual and practical obstacles that complicate the interactions among the actor, the performance space, the audience, and digital media. There is a perspective that digital performance may exacerbate social inequalities by favoring individuals with access to reliable technology and robust internet infrastructure. Furthermore, there is an increasing concern about the ecological ramifications of technology-driven productions, which has led to a demand for more sustainable practices in scenographic design and tour logistics (Rixon, Brumpton, & Morton, 2022).

From an institutional perspective, the organizational integration of digital tools remains uneven. Castelo (2019) notes that while most theatres use information systems, they do so inefficiently, constrained by limited staff training, budget restrictions, and insufficient managerial engagement. This gap between the artistic side – more inclined to embrace new technologies in the creative process – and the administrative side – more reluctant to digitize – risks undermining the transformative potential of digital strategies within the theater sector. As

Waldfoegel (2017) shows, digitization weakens traditional gatekeeping structures while increasing the diversity and volume of cultural output, enabling high-quality works that were previously marginalized or rejected to reach audiences and enrich the cultural ecosystem.

Ultimately, the deep integration of new technologies in theatre requires more than hardware or software investment. As Tajtáková (2014) and Kapsala (2018) also emphasizes, the deep integration of new technologies into the performing arts requires not only investments in appropriate hardware-software infrastructure and qualified personnel, but also a continuous and complex collaboration between artists and audiences.

Therefore, a rigorous and strategic approach to digital integration must take into account ethical aspects, accessibility standards, sustainability practices, and cultural sensitivities.

### **Conclusions**

Theatre is a deeply human and collective art, based on the direct transmission of emotion from the artist to the spectator and back again. Each performance is unique – no two are ever the same – and is built in close connection with the audience’s reactions, transforming (for better or worse, as the context dictates!) based on the emotional exchange between actor and spectator. Theatre has always evolved in an ongoing dialogue with the technological possibilities of its time. The current integration of digital tools such as augmented and virtual reality, artificial intelligence, and interactive media should not be seen as a rupture with tradition, but rather as a continuation of this constant process of adaptation and reinvention.

Reflecting on the practical experience of the European project *TabThePAST*, it becomes clear that digital theatre deepens this relationship between art and technology. The stage becomes an interface, the archive a site of encounter, and the audience an active co-creator. Theoretical insights from performance and media studies acquire new meaning when tested through artistic research, revealing the potential of digital experimentation to function simultaneously as creation, education, and critical reflection.

As this study has argued, new technologies have the potential to amplify and diversify theatrical expressiveness, to encourage new forms of audience participation, and to contribute to the development of more sustainable production models. However, these opportunities brought by new technologies come with significant challenges. Theatre creators must carefully negotiate the balance between technological spectacle and the essential elements of live

performance, such as presence, spontaneity, and the authentic and constant exchange of emotions. In addition, the adoption of digital technologies must take into account issues related to accessibility, cultural relevance and the risk of standardization of artistic expression.

From an organizational perspective, many theatre institutions still face substantial obstacles in adopting new technologies in a coherent and strategic way. This discrepancy between artistic innovation and institutional inertia risks affecting the long-term sustainability of the sector. As such, digital integration must be approached holistically – not merely as a technical upgrade or adaptation, but as a cultural shift that requires new competencies, new models of leadership, and new ethical frameworks. Echoing the call for strategic alignment, Karcz-Ryndak (2025) highlights that theatre managers must skillfully adapt to technological change in order to sustain and expand the institution's functions in a rapidly evolving cultural and technological landscape.

Ultimately, envisioning the future of the theatrical stage means recognizing technology not as a replacement for the human element, but as a partner in co-creation. Only through critical reflection, inclusive practices, and strategic vision can digital innovation truly enrich the theatrical experience without compromising its unique essence - the live moment.

Building on the perspectives developed through this literature review, it becomes evident that a more in-depth, multi-layered approach is required in order to understand both theoretically and practically the impact of new technologies on the performing arts. Although interactivity and audience participation within theatrical performances have been addressed, relatively few studies explore how spectators engage emotionally, cognitively, and socially with technologically mediated performances.

Greater scholarly attention is also needed to examine alternative digital practices, context-specific innovations, and resilient strategies emerging from structurally precarious environments – whether from independent institutions operating within advanced cultural economies or from public and grassroots initiatives in geographically marginalized regions marked by limited resources and fragile infrastructures.

Ethical questions around authorship, emotional authenticity, and audience consent represent another important field of inquiry, especially within performative contexts where AI technologies are increasingly embedded in creative processes and conceptual frameworks.

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