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https://www.doi.org/10.56830/IJSOL062025

Augmented Reality and Strategic Organizational Learning:

A Design-Based Prototype Applied to a Printed Novel Book

Augmented Reality…..
doi.org/10.56830/IJSOL06202505

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Received: 20/03/2025
Revised: 17/05/2025
Accepted 28/06/2025

Abstract

This article examines the strategic potential of augmented reality (AR) as a tool to foster organizational learning in the cultural and publishing sectors. Grounded in a doctoral research project in design, the study presents a prototype developed for José Saramago's novel *'Clarabóia'*, aimed at enhancing engagement among digital natives and promoting long-term knowledge management through immersive reading experiences. The AR-enhanced book integrates interactive content and theatrical adaptations, creating a hybrid platform that functions simultaneously as a literary object and a digital knowledge archive.

The prototype enables multi-layered access to the novel, offering readers not only visual and auditory enhancements but also links to curated theatrical interpretations and authorial archives. This design-led approach facilitates a double-loop learning process within organizations by capturing reader interactions, enabling adaptive publishing strategies, and preserving institutional memory related to literary heritage.

The article discusses how the use of AR supports organizational learning at three levels: (1) by extending the value chain of printed literature through digital augmentation, (2) by cultivating new competencies related to immersive media production and content curation, and (3) by systematizing cultural knowledge in reusable digital formats. The findings suggest that such hybrid media prototypes can serve as strategic assets for organizations seeking to innovate their educational and cultural engagement models while preserving historical continuity.

This study contributes to the intersection of design research, learning organizations, and cultural innovation by proposing a framework where traditional literary forms are not only preserved but strategically reimagined to meet contemporary audience behaviours and digital learning ecosystems.

Keywords: Augmented Reality, Organizational Learning, Design, Immersive Books, Cultural Engagement.

THE SCIENCE
PUBLISHING HOUSE
International Journal of Strategy and Organisational Learning

Vol.2 No.1

1. Introduction

The cultural landscape is undergoing a significant transformation driven by digital technologies, particularly in the fields of literature and publishing. Traditional print literature is grappling with the challenges posed by immersive digital platforms that cater to the preferences of a generation of digital natives. Their exposure to multimedia-rich content necessitates that literary formats evolve to meet new engagement expectations. This research investigates how augmented reality (AR) can serve as a bridge, linking the tactile satisfaction of print novels with the engaging potential of digital technologies.

This study centers on a prototype developed for José Saramago's novel ‘*Clarabóia’*, which utilizes AR to create an immersive reading experience. By embedding digital enhancements into the traditional narrative structure, this research not only seeks to engage contemporary readers but also aims to facilitate the process of organizational learning within cultural institutions. The intersection of design and AR technology offers a unique opportunity for organizations to reimagine how literature can engage readers and encourage long-term knowledge retention.

2. Theoretical Background: Organizational Learning and AR

2.1. Organizational Learning Framework

Organizational learning is an essential concept that encompasses how institutions adapt to change, innovate, and enhance their capabilities. According to (Garad, 2021), organizations benefit from fostering a learning culture that encourages knowledge sharing, collaboration, and reflection. This aligns with research by (Mousa, Elmahdawy, & Sabry, 2021), which articulates how learning processes within organizations contribute to effective adaptation and innovation.

AR technologies can serve as a vehicle for facilitating organizational learning by providing real-time feedback, improving communication, and enhancing engagement through immersive experiences. For instance, AR's ability to overlay digital information onto the physical book allows organizations to create interactive learning environments in which readers participate actively. This level of engagement can lead to deeper understandings of narratives and themes, ultimately enriching educational experience.

2.2. Benefits of AR in Literature

Research indicates that AR enhances learning outcomes by making educational content more engaging and accessible. A meta-analysis of AR studies shows that it significantly increases overall learning effectiveness (Yu-Peng & Yu, 2023). Incorporating AR into traditional narratives not only aids retention but also involves various cognitive faculties, promoting a more active learning process.

3. Advantages of Printed Books: Sequence, Materiality, and Continuous Reading

Despite challenges from digital formats, printed books, particularly novels, retain distinct advantages in fostering immersive reading experiences. This section delves into the attributes that contribute to their efficacy as educational and engagement tools.

3.1. The Linear Structure and Page Sequence

The linearity of printed books facilitates an uninterrupted reading experience, which is pivotal to ensuring reader immersion. The organization of chapters and sections within a novel guides reader along a coherent narrative path, enabling them to engage deeply with the text without distractions. Wolf (2007) highlights that this "deep reading" process allows for a critical internalization of meaning, enhancing comprehension and emotional connection.

3.2. Materiality of the Printed Book

The physicality of printed novels, the texture of the paper, the weight of the book, the tactile sensation of page-turning, binds the reader to the narrative in a way that digital formats often fail to replicate. (McLuhan, 1962) argues that this "hot medium," as opposed to the detachment of digital screens, creates a rich sensory engagement essential for fostering meaningful connections with narratives. Studies indicate that tactile interaction contributes positively to retention, as readers can spatially locate significant passages throughout their journey.

3.3. Continuous Reading and Immersive Experience

The structure of printed novels promotes sustained focus and immersion, allowing readers to transcend the external world. As (Nell, 1988) posits, narrative immersion arises from the ability to lose oneself in the story, a feat made simpler by the linear, distraction-free environment of printed texts. The absence of notifications and multifaceted distractions present in digital formats delineates the printed book as a conducive medium for deep engagement.

3.4. Comparative Analysis: Printed Books vs. Interactive AR Formats

As technology advances, so do the formats in which stories are told. Interactive AR books aim to merge the strengths of both print and digital, offering immersive and engaging content. However, the challenges presented by these formats must be considered in relation to the advantages of traditional printed books discussed previously.

4. The Value of Interactivity in AR

Augmented Reality (AR) offers significant opportunities for interactive engagement, particularly within educational and cultural learning environments. By enabling readers to interact with content—through visual overlays, multimedia elements, or spatial enhancements—AR has the potential to extend narrative possibilities and enrich the reader’s cognitive and emotional connection to the material. When implemented with strategic intent, coherence, and validated frameworks, AR can support not only individual learning but also broader forms of *societal learning* (Costeira & Lameiro, 2025), fostering collective knowledge exchange and cultural preservation across generations. Moreover, its integration into editorial and creative workflows presents an opportunity for *organizational learning*, encouraging institutions to rethink their roles in curating, preserving, and transmitting cultural value. However, this interactivity also introduces challenges for storytelling—especially in genres like fiction—where uninterrupted immersion, narrative pacing, and emotional continuity are critical. Without thoughtful design, AR risks fragmenting rather than enhancing the narrative experience. Therefore, its success depends not on the novelty of the technology itself, but on how deliberately and meaningfully it is embedded within the narrative and editorial structure.

4.1. Sequenced Reading vs. Non-Linear Navigation

Interactive AR literature introduces dynamic and participatory reading experiences but often disrupts the linear narrative structure that underpins emotional immersion and character development—especially in fiction. Non-linear navigation enabled by augmented elements can lead readers to diverge from the central storyline, potentially diluting narrative coherence. (Baron, 2015) warns that such fragmentation can impede critical focus, reducing the capacity for sustained narrative absorption and reflection.

From a strategic and organizational learning perspective, this tension calls for careful design strategies that align technological affordances with editorial intent. AR should not replace narrative structure but rather enhance it through a guided, sequenced approach that supports comprehension and continuity. Organizations engaging with AR storytelling—particularly publishers and cultural institutions—must embed content development within a validated framework that balances interactivity with narrative progression. Doing so encourages a culture of learning and adaptation, where teams collaboratively refine content to serve both educational and emotional engagement goals.

4.2. Material Experiences and Reader Connection

The sensory and material qualities of printed books—such as the texture of paper, the rhythm of page-turning, and the tangible sense of narrative progress—play a crucial role in fostering reader immersion. While AR offers visually compelling extensions of story worlds, these experiences can risk substituting, rather than complementing, the material connection that supports emotional resonance and cognitive mapping.

To harness AR's potential without undermining the physical reading experience, organizations must strategically position AR as a *layered enhancement* rather than a replacement. Integrating AR in ways that respect the material affordances of prints such as anchoring digital content to specific tactile cues or spatial moments in the physical book—can preserve the multisensory engagement essential to deep reading. Strategically embedding such practices within publishing workflows fosters *organizational learning*, allowing teams to iteratively test, refine, and share models that optimize the balance between digital immersion and physical connection.

4.3. Studies on Efficacy of AR in Reading

Empirical studies on AR's impact on reading reveal a dual reality. In educational contexts, where goals are often functional and segmented (e.g., vocabulary, concepts, visualizations), AR has been shown to enhance comprehension, motivation, and recall. However, in narrative genres that rely on affective continuity and sustained emotional engagement, the results are more mixed. (Piper & Hollands, 2018) note that frequent interruptions or shifts in modality can fragment the reading experience, undermining the immersive qualities that fiction demands.

This complexity points to the need for strategic alignment between technological design and narrative function. AR should not be deployed merely as a demonstration of capability but as part of a validated editorial methodology that considers learning outcomes, user experience, and content integrity. For organizations, this means developing cross-functional capacities—bridging editorial, design, and technical teams—to collaborate experiments, evaluate, and systematize practices that preserve narrative depth while unlocking AR's transformative potential. In this way, AR becomes a catalyst for *organizational learning* and innovation, enabling institutions to not only adopt new tools, but to evolve how stories are conceived, curated, and experienced.

5. Case Study: AR Prototype for *Claraboia*

The development of the AR prototype for Saramago's '*Claraboia'* served as a pivotal case study illustrating the integration of augmented reality into narrative literature. As described by (Costeira & Lameiro, 2025), the '*Claraboia Immersive Book'* merges the physical experience of printed literature with augmented reality by transforming the book into a controller of a scenic, audiovisual environment. Using AR smart glasses and full-page image tracking—without altering the original structure or requiring reprinting—the system recognizes typographic patterns to overlay digital content in real time. This method allows for a seamless fusion of the author's narrative with a director's scenic vision and dramaturgical interpretation, enriching the literary experience and connecting print, theatre, and cinema within a single immersive framework. Unlike conventional AR books that depend on specific visual markers, *Claraboia'* preserves the integrity of the printed book while enabling a layered, multisensory form of storytelling.

This section will outline the design, implementation, and outcomes of the prototype to assess the efficacy of AR as a strategy for enhancing reader engagement and organizational learning.

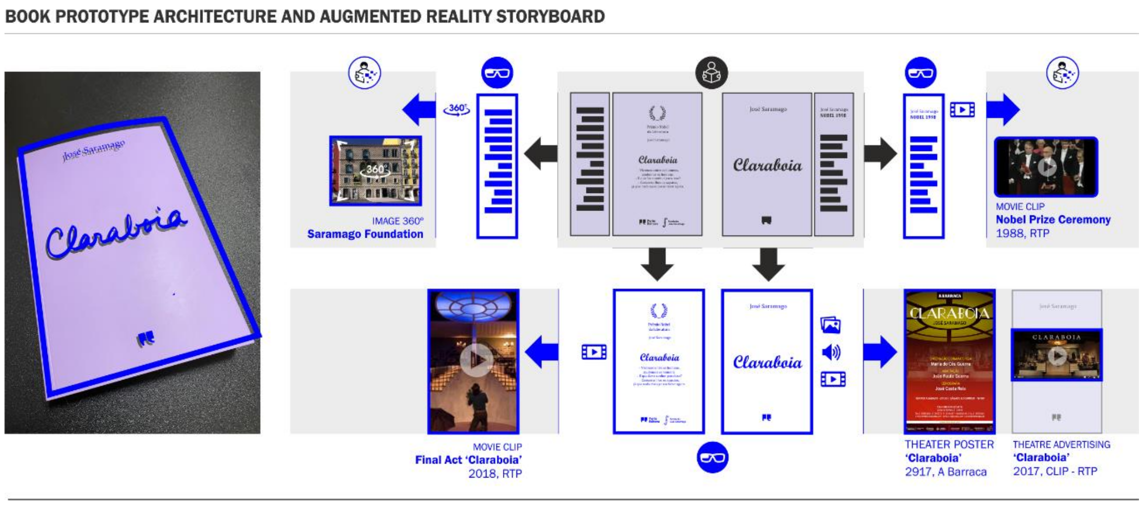

Fig. 1. Excerpt from the Prototype Architecture of the 'Claraboia' Book and Augmented Reality Markers Applied to Printed Books. Source: Author.

The prototype development (fig.1) involved designing an editorial plan based on the structure of the printed book (2017 edition by Porto Editora, Portugal). This plan cross-referenced the archive of the theatrical adaptation directed by Maria do Céu Guerra (*Clarabóia* by José Saramago – Theatre 'A Barraca', 2017), which faithfully adapted the original narrative. This phase included editing the book's content to select the most suitable excerpts for incorporating AR elements, carefully balancing the preservation of the traditional reading experience with the immersive potential of augmented reality, guided by key moments from the theatrical performance (Costeira & Lameiro, 2025).

5.1. Conceptual Framework: Design and Interdisciplinary Approach

The design process incorporated principles of UX, dramaturgy, and emerging AR technologies. This interdisciplinary framework permitted the AR integration to happen harmoniously, ensuring that the enhancements did not overshadow the narrative. The historical context surrounding the original novel, combined with the adaptation's theatrical elements, offered rich material for devising engaging content within the AR prototype.

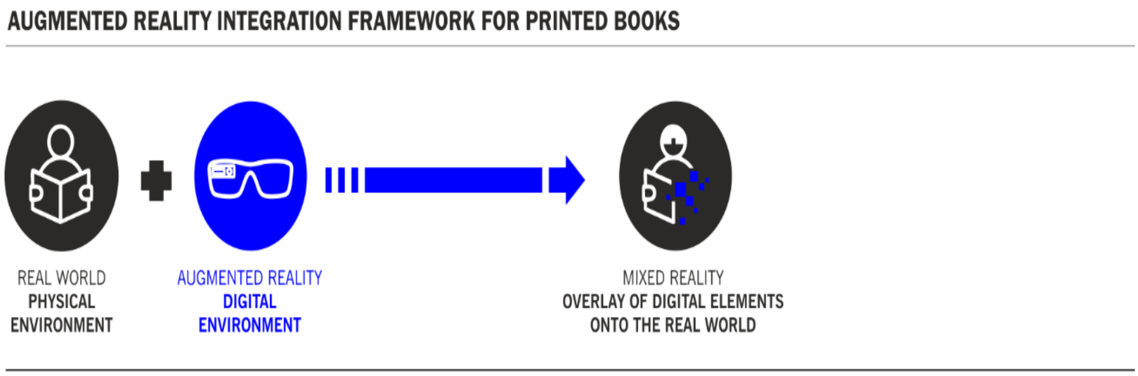

Fig. 2. Augmented Reality Integration Framework for Printed Books. Source: Author

5.2. Development Process: Prototyping and User Testing

Following design strategies from the literature, the prototyping phase included iterative testing with potential readers and stakeholders. Their feedback collected during focus groups shaped the final prototype configuration. Incorporating theatrical adaptations allowed for the use of AR to amplify emotional storytelling without requiring a complete redesign of the printed book.

5.3. Outcomes of the Prototype Development

The outcome of implementing AR into '*Claraboia'* was a complex interaction of emotional engagement and cognitive retention. Readers appreciated the visual and auditory enhancements that deepened their understanding of character arcs and thematic depth. Evaluation metrics determined heightened engagement levels during AR-enhanced reading sessions compared to traditional reading experiences.

The prototype, designed and developed as a research project by this article author, culminated with the conception of a *Development Framework for Immersive Books*, which holds strategic value in applying Augmented Reality (AR) to printed literature. Central to this framework is the integration of the dramaturgist or stage director into the editorial process, where they take on a curatorial role — identifying key moments in the narrative that are enhanced through digital augmentation, including images, videos, 3D models, audio, and other sensory elements that enrich the emotional and contextual layers of the printed work. This model that is complemented by the *Algorithm for AR Functionality Applied to Printed Books* (Costeira & Lameiro, 2025), not only bridges the physical and digital reading experience but also introduces a new strategic dimension of *organisational learning* for sectors such as publishing, theatre, culture, and the audiovisual industries (fig. 3).

Importantly, the framework supports the creation and curation of an unprecedented type of digital repository — a structured archive of curated, enriched content born from theatrical adaptations of literary works. Traditionally, the cultural value embedded in such performances is ephemeral, fading once the final curtain falls. This model, however, offers a way to capture, document, and preserve the intangible heritage of theatrical interpretation, transforming it into a lasting, accessible, and contextually rich collection. It enables these performative insights and creative reinterpretations to be recorded, archived, and shared across time, thus extending their cultural relevance and educational value well beyond the stage.

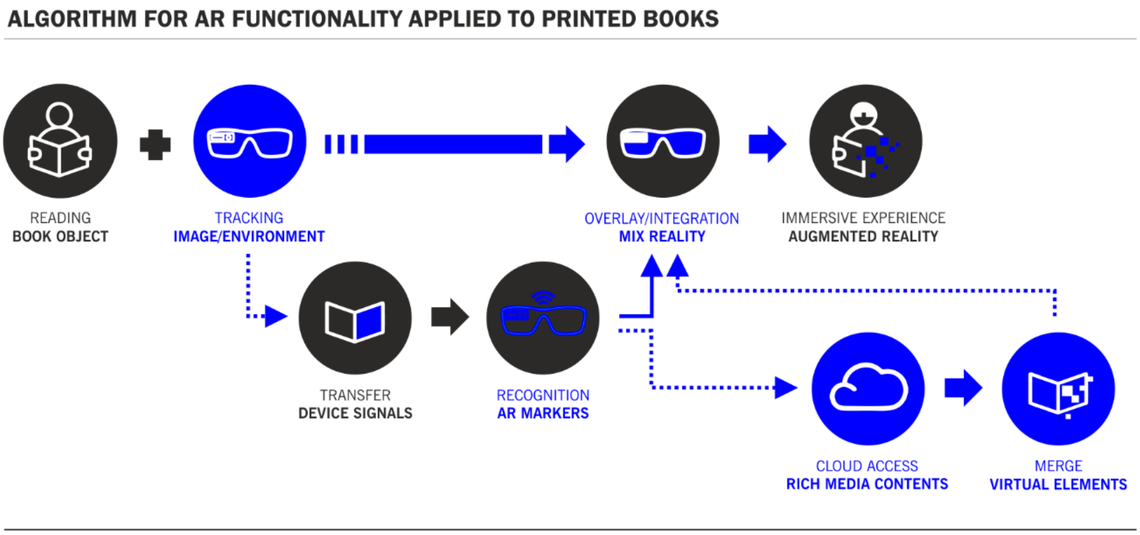

Fig. 3. Algorithm for AR Functionality Applied to Printed Books. Source: Author

Furthermore, by embedding immersive and interactive digital elements into printed books, this approach has the potential to attract and engage digital-native audiences — readers who might otherwise overlook traditional cultural forms. In doing so, the framework not only revitalizes the experience of reading and theatre but also repositions both as dynamic, participatory, and enduring cultural practices for the 21st century.

5.4. Reader Interaction Metrics and Feedback

Follow-up surveys indicated that user interactions with AR content facilitated not just engagement but deeper emotional connections with the material. Immersive experiences encouraged readers to foster personal connections with the text as they navigated AR elements that enriched their understanding of the plot.

6. Implications for Organizational Learning and Strategic Change

The findings from the *Claraboia* case study have significant implications for organizational learning paradigms within cultural institutions. As organizations adapt to an increasingly digital landscape, they must harness the potential of emerging technologies to enhance the learning and engagement of their audiences.

6.1. Enhancing Organizational Learning Through AR

AR technologies could serve as fertile ground for fostering a culture of learning within organizations. The ability to leverage AR as a storytelling medium provides opportunities for organizations to facilitate experiential learning, thus ensuring audiences not only engage with content but also participate in a broader narrative within institutional contexts. The proactive adaptation of technologies aligns with findings posited by (Mousa, Elmahdawy, & Sabry, 2021), suggesting that training programs and organizational culture play a crucial role in facilitating effective learning.

6.2. The Role of Leadership in Cultivating Learning Environments

Leadership styles that prioritize transparency, collaboration, and continuous learning can enhance an organization's ability to adapt to change (Verma, 2024). Organizations that employ transformational leadership should explore AR technologies as a means to lead by example and promote innovative practices, which is critical for cultivating a resilient and adaptive workforce.

6.3. Strategic Planning for AR Implementation

Strategically integrating AR into learning frameworks necessitates thorough planning to incorporate user feedback and iterative testing. Organizations can employ systems thinking and adaptive learning strategies to ensure that content remains pertinent and enriching (Thomas, 2021). Actively engaging stakeholders and aligning technological innovation with learning objectives facilitates sustainable adoption.

7. Conclusions

This research demonstrates the transformative potential of augmented reality (AR) in redefining the future of printed novels, creating a new paradigm for storytelling that bridges the tactile appeal of physical books with the immersive possibilities of digital technology. By integrating AR into printed novels, this study has shown how the traditional reading experience can be enriched with interactive and multisensory elements, offering readers a dynamic and emotionally engaging journey through the narrative.

7.1 Interdisciplinary Approach: Design Thinking and User Experience

The interdisciplinary framework employed in this research—combining design thinking, user experience (UX) principles, and dramaturgy—has proven essential in crafting AR-enhanced books that are both intuitive and deeply immersive. This combination not only enhances the aesthetic quality of the reading experience but also ensures that users engage with the material in a meaningful and impactful way. The case study of the AR prototype for José Saramago’s *Clarabóia* exemplifies how AR can seamlessly enhance printed novels without altering their physical structure. By leveraging dramaturgical techniques, such as staging and character interaction, the prototype transforms the reader into an active participant in the narrative, offering a hybrid experience that respects the autonomy of the reader while enriching the story with audiovisual layers.

7.2 Cultural and Emotional Value of Print

The findings of this research underscore that AR-enhanced books not only preserve the tangible and emotional value of print but also introduce new dimensions of storytelling that resonate with digital-native audiences. This suggests a need for cultural institutions to embrace these advancements to revitalize their offerings, ensuring literary heritage remains relevant in today’s digital landscape. Moreover, the engagement metrics collected during the case study indicated that readers felt more connected to the narrative when interactive elements were applied, thus affirming AR's role in fostering emotional investment.

7.3 Development Framework and Methodological Contributions

The proposed Development Framework for Immersive Books and the Algorithm for AR Functionality Applied to Printed Books provide a structured methodology for designing AR-enhanced novels. These tools emphasize the critical role of the dramaturgist and director in curating digital content and ensuring a harmonious integration of physical and digital elements. By identifying key narrative moments and enriching them with AR overlays—such as 3D models, soundscapes, and interactive animations, this framework enables the creation of immersive books that appeal to modern readers while maintaining the integrity of the printed medium.

The structured approach illustrated through this research provides a scalable model for other authors and educators seeking to explore AR in narrative contexts. With a clear methodology, future projects can build upon this framework to enhance literary experiences in various genres, elevating reader engagement from passive consumption to active interaction.

7.4 Revitalizing Print Media and Cultural Preservation

Moreover, this study highlights AR's capability to revitalize print media, offering a middle ground that merges the best of tactile engagement with the interactivity of digital platforms. This symbiosis not only enhances the reading experience but also opens up new possibilities for cultural preservation. Particularly, AR can play a crucial role in documenting theatrical adaptations of classic works, ensuring that their vivid representations are not lost to time. The transformation of traditional literature into immersive learning tools illustrates how educational frameworks can adapt evolving storytelling methodologies to enrich cultural learnings.

7.5 Significance for the Publishing Industry

In conclusion, AR-enhanced books represent a significant opportunity for innovation in the publishing industry. By merging design, technology, and dramaturgy, this research paves the way for a new generation of immersive books that captivate readers, preserve the value of print, and adapt to the evolving expectations of a digitally inclined audience. This progressive endeavor aligns with current trends in digital literature, which emphasize experiences that are participatory, interactive, and deeply engaging.

7.6 Future Directions and Research Opportunities

Future research may investigate how AR can be applied in various organizational contexts beyond literature, including corporate training, educational frameworks, and collaborative learning settings. Research avenues proposed by (Kazimi & Khorshid,

2023) suggest that understanding the dynamics of knowledge transfer can amplify the benefits of AR technologies in learning environments. Furthermore, understanding the pedagogical outcomes of AR in educational settings could provide additional insights into its potential as a learning facilitator in varied academic disciplines.

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