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## Miscellaneous

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## Immersive journalism research dominated by media effects: A call for expanded frameworks, methodologies, and narrative designs for news stories

### Abstract

Immersive journalism is a recent field of research focusing on digital technologies such as augmented reality (AR), 360° video, and virtual reality (VR). This research analyzed 69 academic articles published in the Web of Science from January 1, 2010, to December 31, 2021, using a systematic review of scientific literature (SLR). The prevalence of media effects and quantitative methodologies in investigating immersive journalism was demonstrated. The corpus analysis shows the recurrence of some key macro-concepts. We propose grouping these macro-concepts into affordances (presence, embodiment, and interactivity) and gratifications (comprehension, credibility, emotional engagement, and empathy), which affect in different extents the cognition, affectivity, and behavior of the users. This review highlights the need to expand and combine different theories and methodologies. Another important recommendation is to create specific frameworks for analyzing immersive news stories and examining their various narrative and aesthetic characteristics during both production and post-production. This article discusses the ethical and normative concerns of journalism in relation to current and future research in VR.

### Keywords

**Immersive journalism, effects theory, gratifications, affordances, virtual reality, augmented reality, 360° video.**

## 1. Introduction

The journalism industry is in a perpetual state of uncertainty, and rapid changes in audience behavior in today's digital ecosystem have only intensified this phenomenon. Research suggests that users distrust the media and their content (Hernández-Rodríguez & Londoño Pardo, 2023). Users not only report feeling overloaded with information (Tandoc & Kim, 2023), but they are also actively avoiding the news (Newman *et al.*, 2023). They consume products, but they prefer experiences (Lee *et al.*, 2020). Furthermore, their attention is fragmented across a broad spectrum of content, with users spending a significant amount of time consuming content produced by celebrities or social media influencers (García, 2021; Newman *et al.*, 2023).

Uncertainty is not necessarily harmful. On the contrary, it can be a catalyst for innovation. In the journalism industry, uncertainty has led to what is known as the “audience turn.” This shift involves moving away from focusing exclusively on the production of information and instead placing the audience and its needs at the center (Swart *et al.*, 2022). This “turn” entails engaging and captivating users through experiences that establish cognitive, emotional, and behavioral connections with news events (Hernández-Rodríguez, 2023). Achieving this level of experiences requires, among other strategies, a firm commitment to “immersive forms” of nonfiction narratives, as suggested by Rose (2018). Rose uses the term “immersion” to refer to the ways “in which a lone audience member moves from being a viewer to become an active participant or player in the story world.” (p. 134).

De la Peña *et al.* (2010) popularized the concept of “immersive journalism” as “a form in which people can gain first-person experiences of the events or situation described in news stories” (p. 291). The user is immersed in a spatial and sensory narrative (Domínguez, 2015), which creates the sensation of “being there” within the news event as a witness or protagonist rather than a passive consumer (Slater *et al.*, 2009; Steinfeld, 2023). While many genres and formats fall under the umbrella of immersive journalism, there is some agreement that this label refers to journalistic stories that are produced with a “continuum” of technologies such as 360° video, augmented reality (AR), and virtual reality (VR) (Aitamurto *et al.*, 2020; Vázquez-Herrero & Sirkkunen, 2022). Immersive journalism particularly appeals to younger generations, including millennials and centennials, who are more drawn to virtual and gamified environments; are accustomed to the simultaneous use of platforms (multi-screen); and value visual, interactive, and affective content (Evens *et al.*, 2021; Goutier *et al.*, 2021; Herrera & Benítez, 2022).

In academia, immersive journalism is considered to be “one of the areas attracting most interest among researchers,” as highlighted by Salaverría (2019, p. 7) in a review of the main lines of study in digital journalism over the last 25 years. Previous scholarly research on immersive journalism has primarily examined the impact of 360° videos on user behavior, the role of the audience and its experience, the interplay of technologies and empathy, ethical dilemmas, and the development of conceptual and narrative frameworks (Pérez-Seijo *et al.*, 2020).

To expand the study of immersive journalism, it is necessary to move beyond descriptive information and bibliometrics when reviewing the literature. Hence, this systematic literature review sheds light on the theoretical discussions in which immersive journalism is framed, the most prominent methodological approaches, and future paths that are envisioned for the advancement of scientific practice in this field. To this end, the following research questions are asked:

- RQ1. What types of a) articles, b) research scope, c) immersive technology formats, d) methods, and f) techniques (quantitative and qualitative) have been used the most in the study of immersive journalism?
- RQ2. What paradigms of communication/journalism (audience effects, production and design practices, technologies, or content and narratives) have been used the most to conduct research on immersive journalism between 2010 and 2021?
- RQ3. How can the body of research on immersive journalism be categorized in terms of main theoretical approaches and how does this categorization allow us to classify the main research findings?
- RQ4. What are the main recommendations for future research and ethical concerns that emerged from the literature review in the field of immersive journalism?

## **2. Immersive journalism and News industry**

The evolution of immersive journalism has been dynamic but unsteady. Initially, from 2010 to 2014, exploration of immersive journalism primarily occurred in academic laboratories before transitioning to and experiencing some success (2015–2018) in legacy media outlets –including

*The New York Times*, *The Washington Post*, *The Guardian*, BBC, *El País*, RTVE– with backing from major tech companies such as Google, Samsung, Microsoft, HTC, and Meta Platforms, Inc. (formerly Facebook) (Pérez-Seijo, 2021; Watson, 2017). A brief period of waning interest in the field followed (2019–2020) until immersive narratives regained momentum with the announcement of the Metaverse by Facebook co-founder Mark Zuckerberg (2021–2022). Although the emergence of artificial intelligence has somewhat overshadowed interest in immersive platforms, recent developments in datafication and automation show potential for real-time volumetric capture of the physical world, which could enhance mixed reality experiences, and for the instant generation of 3D images, which could simplify the creation of virtual environments (Lee *et al.*, 2021). An “experimentation era” in immersive journalism has been unfolding since 2023 (Herrera & Benítez, 2022), driven by the expanding capacity and speed of the Web and advancements in technologies such as the Internet of the Senses (IoS) looming on the horizon (Panagiotakopoulos *et al.*, 2022).

This marks an opportunity for media outlets to gradually experiment with immersive content, avoiding large hasty investments while enabling them to: a) design relevant and useful news experiences that add value for audiences, b) shape users’ consumption behaviors, c) explore novel distribution and monetization strategies, d) develop the technical and narrative capabilities of their news teams, and e) establish partnerships beyond the journalism industry (García-Avilés *et al.*, 2024; Herrera & Benítez, 2022; Doyle *et al.*, 2016). In fact, media managers who have ventured into immersive journalism recognize its strategic role in positioning their companies as creative and innovative, thus boosting their reputation in the market (Pérez-Seijo *et al.*, 2022). This era also presents an opportunity for academia to integrate immersive journalism into curricula and research agendas (Herrera & Benítez, 2022).

Some of the most recent concerns in the news industry is informative fatigue among audiences, who claim that news is unintelligible and depressing; the continued loss of users’ trust in news due to suspicions of inaccuracy and political bias; and disinterest in following “breaking news” because some topics are not perceived as relevant or useful to their lives (Newman *et al.*, 2023). These challenges could justify and accelerate the adoption of immersive journalism, though it would not be the industry’s only lifeline. Immersive narratives appear to facilitate the comprehension of news because of the breadth of the field of view, sensory richness, and spatial exploration (Pérez-Seijo *et al.*, 2023; Rose, 2018). They can stimulate enjoyment and positive emotions due to the aesthetic impact of three-dimensionality and interactive options (Yang, 2023; Dincelli & Yayla, 2022). Furthermore, they contribute to restoring credibility to the news through the proximity to events and their protagonists provided by the illusion of narrative transport and the adoption of a first-person point of view (Pérez-Seijo *et al.*, 2022; Ri, 2018). Immersive narratives also favor coverage of timeless topics, human stories, and explanatory and constructive approaches to news (Dowling, 2022; Hermans & Prins, 2022).

However, there are current barriers and risks in the process of adopting immersive journalism. Technologies are still expensive; production times for immersive content are longer than for conventional products; few professionals know how to produce this type of content, and financial rates of return are not clear (de Bruin *et al.*, 2020; Herrera & Benítez, 2022). On the other hand, audiences may not be familiar with immersive environments, the accessibility and affordability of immersive devices are questionable, and usability issues persist, which tend to cause vertigo, headaches, or eye strains (Doyle *et al.*, 2016). In addition, immersive journalism presents ethical dilemmas, such as the authenticity of the journalistic event, the mediation and role of journalists, the potential agency of the user, and the supersaturation of stimuli experienced by audiences (Aitamurto, 2023). In short, immersive journalism cannot be taken lightly, as it is a sociotechnological practice that transforms how reality is (re)constructed in the production of news (Pérez-Seijo *et al.*, 2022; Steensen & Westlund, 2021).

### **3. Method**

#### **3.1. Methodological Design**

To answer the research questions, a systematic review of scientific literature (SLR) was conducted. This methodological design is used to identify, select, and appraise previous academic work to address questions related to a field of study, and it seeks to observe theoretical and methodological patterns of certain phenomena (Codina, 2017). SLR is particularly useful in fields that are undergoing transformation, like communication and journalism (Guirao-Goris *et al.*, 2008).

This research follows the SLR protocol of Kitchenham (2004), which proposes systematically reporting aspects such as research questions, research methods, results, main discussions, and conclusions. This protocol has recently been adopted and endorsed by several scholars in the field of journalism (Calvo-Rubio & Ufarte-Ruiz, 2021; López-García *et al.*, 2019), who have suggested that there is a need to examine themes, research scopes, methods utilized, and main contributions (or findings) of research.

SLRs can be conducted using quantitative, qualitative, or mixed methods (Sobrido & Rumbo-Prieto, 2018). The current study used a mixed approach, which deemed appropriate to address our research questions, as the quantitative content analysis sought to provide “the objective, systematic, and quantitative description of the manifest content of communication” (Berelson, 1952, p. 489; Krippendorff, 2018), while the qualitative textual analysis helped us answer inquiries requiring a more inferential and deeper examination of the articles (Schutt, 2012).

#### **3.2. Timespan of the Analysis and Database**

This paper compiled all academic articles published in Web of Science (WoS) from January 1, 2010, to December 31, 2021. The starting year, 2010, was chosen because that was when De La Peña and her colleagues (2010b) published a widely cited and pioneering article on the conceptualization of immersive journalism: “Immersive Virtual Reality for the First-Person Experience of News.” We chose the WoS as a source for several reasons. Firstly, WoS is one of the most reputable and reliable academic databases. Secondly, it indexes high-quality scholarly literature and ensures extensive coverage of peer-reviewed academic journals across multiple disciplines. Lastly, WoS proved to be a relevant repository for addressing our research questions in the field of journalism VR.

#### **3.3. Systematic Search**

During the systematic search stage, we used the English-language terms “immersive journalism” and “virtual reality journalism” because of their relevance to this field of study (Owen *et al.*, 2015; Pavlik, 2020). Additionally, we searched for the word “journalism” in combination with the descriptors “immersive narratives,” “virtual reality,” “augmented reality,” and “360° video.”

The search yielded a total of 129 articles. Presentations, editorial materials, and book reviews were excluded. Only articles considered scientific were included. Subsequently, titles and abstracts were examined to refine the corpus and ensure that their content referred exclusively to research on immersive virtual journalism rather than immersive fiction narratives or the use of immersive technologies in other fields. Articles using immersive journalism as a synonym for traditional literary journalism were also omitted. Finally, sixty-nine articles met the criteria for inclusion in the review.

### 3.4. Variables

#### 3.4.1. Descriptive Information

- a. Article Type: Each article was classified according to the following typology: Scientific research articles, review articles, reflection articles, and other articles.
- b. Research Scope: It follows Velázquez and Del Río (2005)'s categorization: exploratory research as studies on novel and understudied phenomena; descriptive research as studies that detail the characteristics of the phenomena; explanatory research, which points out why phenomena occur and their causes and effects; and correlational research, which establishes linkages or associations between concepts or variables.
- c. Method: Research methods were classified as quantitative, qualitative, or mixed (Hernández *et al.*, 2010).
- d. Quantitative Techniques: The use of quantitative methods –e.g., surveys, experiments, and quasi-experiments– was coded (present=1, not present=0) based on Schutt (2012). This also included content analysis (Krippendorff, 2018), systematic literature analysis (Codina, 2017), and other techniques.
- e. Qualitative Techniques: The use of qualitative methods –e.g., in-depth interviews, focus groups, participant observation, and case studies– was indexed (present=1, not present=0) based on Schutt (2012). This also included systematic literature analysis (Codina, 2017) and other methods.
- f. Communication Paradigms: 1.) Technological, which focuses on the artifact that facilitates immersion; 2.) production practices and design of the immersive piece; 3.) immersive content/narratives; 4.) effects of the immersive experience on the audience (Gitlin, 1978).

#### 3.4.2. Qualitative Categories

For the qualitative analysis, all the articles published in WoS were loaded into the Atlas.ti software and the following variables were open coded:

- a. Theories Used: The conceptual and theoretical frameworks through which authors analyzed the phenomenon of immersive journalism (Kerlinger *et al.*, 2002).
- b. Key findings: It highlights main findings that researchers identified after conducting empirical or conceptual research (Merrigan & Huston, 2009).
- c. Future research: Recommendations made by scholars on new lines of inquiry on the topic of interest (Merrigan & Huston, 2009).

### 3.5. Data Analysis

Descriptive statistics of the dataset were generated using the SPSS statistical software. Subsequently, for qualitative analysis, the 69 articles published in high-impact journals were imported into the Atlas.ti software to identify relevant patterns through the systematic reading of these articles (Sobrido & Rumbo-Prieto, 2018).

## 4. Results

### 4.1. Quantitative Analysis

To address research questions 1 and 2, a statistical descriptive analysis was conducted. Among the 69 texts analyzed, 77% (n=53) were classified as scientific articles, meaning that they presented the findings of a research study in a structured format following the traditional introduction–method–findings–discussion–conclusions sequence. Reflection articles comprised 16% (n=11) of the texts, while review articles accounted for 7% (n=5).

Of the 59 articles that reported research findings, 84% (n=49) were exploratory, while only 16% (n=10) were descriptive. Although the scientific production on immersive journalism has grown gradually since 2010, particularly since 2018, the preponderance of articles with an

exploratory scope of research indicates that this field is still in its early stages. The findings also suggest a preference for quantitative methods, with 51% of the studies (n=31) using quantitative methods, while 37% (n=21) used qualitative and 12% (n=7) used mixed methods.

Many studies used more than one research method. Among quantitative studies, 45% (n=18) were experimental, which usually include control and experimental groups and use pre- and post-test questionnaires to measure participants' reactions to a stimulus and changes in dependent variables. In terms of methodological instruments, 22% (n=9) of the studies used content analysis, while 13% (n=5) were systematic analyses of scientific literature, 10% (n=4) used surveys, and 10% (n=4) utilized other techniques, including quasi-experiments or non-systematic literature reviews. Although less frequent, the primary techniques used in the qualitative research were case studies, 34% (n=8), and in-depth interviews, 34% (n=8), followed by textual analysis and systematic literature reviews, 17% (n=4) each. Other qualitative techniques accounted for 15% (n=3).

Considering that some studies looked at more than one immersive technology, results show that 64% (n=44) of the articles analyzed focused on VR, followed by 360° video at 49% (n=34) and AR at 19% (n=14). This suggests that researchers are more interested in deeper immersive virtual narratives than narratives that blend the external environment or context.

Indeed, some researchers (e.g., Caerols *et al.*, 2020) distinguish between “virtual virtual reality” (VR2) and “real virtual reality” (VRR). The former refers to computer-designed stories that ensure deep immersion or complete detachment from the physical world, while the latter equates to the use of 360° video that provides superficial immersion (De la Peña *et al.*, 2010). AR similarly offers a superficial experience, as it does not seek to replace real environments but rather to interact with it. This partly explains the proliferation of studies focused on VR2, as it is the highest level of immersive journalism. However, as Mabrook and Singer (2019) and Nielsen and Sheets (2019) observed, most of what is called VR journalism turns out to be 360° video because it is the format that media outlets most frequently use due to its low technological and production costs (Paíno & Rodríguez, 2019).

This systematic review of research also identified two primary areas of inquiry. On the one hand, there is a significant portion of articles that focus on the impact and development of specific immersive technologies (VR, 360° video, or AR). On the other hand, there are several studies that concentrate on audiences and their expectations regarding immersive technologies. However, both categories of articles –which represent 67% of the total corpus– pay particular attention to the effects of immersive journalism on users.

This finding is significant because it shows that research on immersive journalism over the last decade has meaningfully contributed to reinforcing the dominant paradigm in communication studies since World War II; namely, the examination of media effects on users that may influence attitudes, beliefs, and behaviors. The predominance of media effect research has spurred discussion among communication scholars, albeit not without criticism. The tendency of studies on immersive journalism to focus on media effects not only measures short-term behavioral outcomes in a superficial way but also exclude crucial sociological dimensions and inquiries related to culture, society, communities, actors, symbolism, and media production (Gitlin, 1978).

#### **4.2. Qualitative analysis**

Through an inductive analysis (Schutt, 2012), we examined the main concepts associated with immersive journalism. As these terms were consistently emerging from our analysis, we classified them as macro-concepts and organized them into two categories according to the literature. The first category includes macro-concepts that can be regarded as specific “affordances” of immersive technologies (Shin, 2017; Steffen *et al.*, 2019): presence, embodiment, and interactivity. The second group of macro-concepts is related to “gratifications,” or the benefits users derive when exposed to VR (Nielsen & Sheets, 2019):

comprehension, credibility, emotional engagement, and empathy. This classification, informed by the theoretical reflection of Hernández-Rodríguez (2023), serves to organize concepts that previously appeared scattered. Additionally, the inductive analysis identified ethical and normative concerns that will be briefly discussed.

#### 4.2.1. Affordances

Affordances refer to properties of technology that generate a new set of possibilities and opportunities for users; affordances can shape users' uses and gratifications (Sundar & Limperos, 2013). Affordances are not determined exclusively by the design of the devices but rather are the result of the interaction between technologies and people's cognitive, affective, and sensory factors (Nagy & Neff, 2015). In this literature review, we found that immersive technologies have affordances such as presence, embodiment, and interactivity.

One of the key elements of immersive journalism is the 'presence' or sensation of "being there," a psychological state in which the mind and emotions are engaged (Bowman & McMahan, 2007). A significant number of articles (Benítez *et al.*, 2019; de Bruin *et al.*, 2020; Green *et al.*, 2021; Steed *et al.*, 2018) have drawn upon the work of Slater and colleagues (2009) to define the concept of presence, noting that it encompasses illusions of place (PI) –believing that the virtual world is real– and plausibility illusion (Psi) –believing that the mediated scenario is truly occurring in real time. To investigate the concept of presence, Jeong *et al.* (2020), Kang *et al.* (2019) and Palmer (2020) adopted Steuer's (1992) Telepresence theory, while Aitamurto *et al.* (2020), Vettehen *et al.* (2019), and Ma (2020) followed the six conceptualization of presence developed by Lombard and Ditton (1997).

Findings regarding presence are promising. Van Damme *et al.* (2019) found that the greater the degree of immersion provided by the technology, the stronger the sense of presence. This holds true for stories viewed with VR goggles and 360° videos as opposed to those consumed in plain text with photos (Sundar *et al.*, 2017). Similarly, Kang *et al.* (2019) demonstrated that telepresence is more pronounced for individuals watching 360° videos versus those watching traditional or 2D videos. Additionally, the sense of presence is heightened for viewers who watch VR news using headsets compared to those who do not use any device. Participants also reported that events occurring in the virtual world felt "more real" than events in the physical world. In the same vein, stories in immersive environments evoke greater social and spatial presence compared to stories broadcast by traditional media (Ma, 2020) or physical presence (Aitamurto *et al.*, 2020).

Secondly, embodiment, or the perception of having one's own body in a virtual environment, ensures the sensation of presence, along with the illusions of place and plausibility, according to some of the research analyzed (Colussi & Assunção-Reis, 2020; De la Peña *et al.*, 2010). Meanwhile, Steed *et al.* (2018) and Shin and Biocca (2018) have conceptualized embodiment as an autonomous variable, rather than an equivalence or constitutive element of presence. Slater and Sánchez-Vives (2016) and Laws and Utne (2019) recognized as a key antecedent of the concept of presence, the idea of the "Proteus Effect" (Yee & Bailenson, 2007), which posits that a person's so-called digital self-representation influence their behaviors in real time both within and outside the virtual world. There is limited research on the topic of embodiment. Steed *et al.* (2018) found that the sensation of a virtual body moderately influences place and plausibility illusions. Shin and Biocca (2018) found that confirmation –users' evaluation of a standard performance– affects embodiment, which in turn influences user satisfaction.

Third, Green *et al.* (2021), Jeong *et al.* (2020), and Palmer (2020) often invoke the work of Steuer (1992) to conceptualize interactivity as the degree to which "users can participate in modifying the form and content of a mediated environment in real time" (p. 14). The literature reviewed in this study distinguishes between technological and narrative interactivity (de Bruin *et al.*, 2020; Hassan, 2020). However, the development of interactivity in immersive

journalism remains limited, according to the research analyzed in the current study. In 360° video reporting, the user primarily assumes the role of passive observer (Benítez *et al.*, 2019; Benítez & Herrera, 2018). In other words, the point of view that the user adopts is that of a witness-spectator (Paíno & Rodríguez, 2019), and the user's agency is confined to exploring the virtual environment while moving the body or receiving cues from the protagonists of the story (Pérez-Seijo, 2018). The user cannot actively alter the content or trajectory of the story (Martínez-Cano *et al.*, 2020; Palmer, 2020).

Results of this study suggest that there are two primary explanations for the reduced role of the audience in interacting with VR content. Firstly, producers or media outlets want to maintain editorial control (Mabrook, 2021). Secondly, any changes to journalistic fact made by the audience would [inevitably?] raise ethical and quality-related questions. Nevertheless, from the user's perspective, stories experienced through highly immersive devices are more interactive than traditional video, and this interactivity significantly influences the degree of satisfaction with the product (Shin & Biocca, 2018).

#### 4.2.2. Gratifications

The Uses and Gratifications (U&G) theory posits that users choose one form of technology or media over another based on their needs or motivations (Rubin, 2009). The reward obtained after media consumption is called gratification. We found that researchers have examined whether users receive gratifications such as comprehension, credibility, emotional engagement, and empathy when exposed to immersive experiences.

Scholars have also sought to test the extent to which immersive narratives make it easier for audiences to acquire knowledge about journalistic events (Barnidge *et al.*, 2021; Jeong *et al.*, 2020), understand them (Vettehen *et al.*, 2019), and better recognize and remember story details (Barnidge *et al.*, 2021; Barreda-Ángeles *et al.*, 2020b; Vettehen *et al.*, 2019). To examine the comprehension issue, scholars have used the cognitive theory of multimedia learning (Mayer, 2005), the cognitive load theory (Sweller, 2011), and the limited capacity model of mediated message processing (Lang, 2000).

Despite Pavlik's (2020) assertion that immersion can improve news comprehension, this systematic review found more evidence to the contrary. For example, Vettehen *et al.* (2019) found no significant differences between 2D video and 3D video regarding information recognition or comprehension of nonfiction stories. For their part, Barreda-Ángeles *et al.* (2020b) noted a decrease in focused concentration, recognition, and recall of stories viewed with VR headsets. Sundar *et al.* (2017) also observed reduced memory capacity of subjects when consuming VR products and 360° videos due to the limited processing capacity and depletion induced by the media saturation of virtual environments. According to Jeong *et al.* (2020), VR even had a negative impact on knowledge acquisition. Aitamurto *et al.* (2020) concluded that AR neither facilitates nor hinders knowledge acquisition compared to other less immersive formats. However, Barnidge *et al.* (2021) noted a relevant exception, which Nielsen and Sheets (2019) also supported: news presented in a VR format can be effective learning tools if individuals have prior knowledge of the subject matter or journalistic event.

Moreover, regarding the conceptualization of credibility, scholars such as Vettehen *et al.* (2019) adopt the distinction made by Hovland *et al.* (1953) between the ability of the journalist to reach the truth and the audience's perception that the journalist is reporting the facts accurately. Kang *et al.* (2019) specified that audiences evaluate the credibility of the source of information, the medium that broadcasts it, and the content that is presented.

Shin and Biocca (2018) and Wu *et al.* (2021) have found that VR news stories with high levels of interactivity are perceived as more believable than those that are not interactive. This phenomenon is attributed to the sense of presence and the large number of details (Wu, Cai, Luo *et al.*, 2021), as well as the realism heuristic (Sundar *et al.*, 2017) that underpins certain narratives. Credibility, in turn, shapes audience satisfaction when consuming an immersive



journalism product (Shin & Biocca, 2018). In other experiments, telepresence has been shown to increase credibility among individuals who watch news with VR equipment compared to a control group, although these studies did not find significant differences with the group watching 2D videos (Kang *et al.*, 2019). Other research has found that 360° videos are perceived as more credible than traditional videos. (D. Shin, 2018; Vettehen *et al.*, 2019). Aitamurto *et al.* (2020) found no differences in the perceived authenticity, accuracy, and credibility of AR stories, whether they were interactive or static visualizations.

In addition, although there is concern about the study of emotions in the field of immersive journalism, there is no solid theoretical development in this area. U&G is the main theory that Nielsen and Sheets (2019) and van Damme *et al.* (2019) invoked to explain that negative or positive emotions and enjoyment are expected gratifications of the immersive experience. De Bruin *et al.* (2020) examined the concept of emotional engagement, highlighting that it encompasses subjective emotional, behavioral, and physiological responses. Wu *et al.* (2021) emphasized that VR is an unparalleled multisensory experience that triggers multiple emotions.

Nielsen and Sheets (2019) found that emotional experiences are one of the gratifications that users derive from engaging with news stories in VR. Wu *et al.* (2021) contended that full-immersion VR, with its freedom and autonomy, increases the interest of audiences compared to low-immersion VR and 2D video. The authors also concluded that the 2D video format is more effective at generating nervousness, while no significant differences were observed in stimulating fear, distress, excitement, or hope. Kukkakorpi and Pantti (2020) noted that experiencing VR news from a first-person perspective enhances emotional reaction, which may either benefit or impair information processing. Other studies have indicated that, while moderate, the degree of enjoyment of a 360° video story is heightened as immersion increases (van Damme *et al.*, 2019). This format tends to elicit greater enjoyment than 2D videos, with the sense of presence significantly mediating enjoyment, albeit not directly (Barreda-Ángeles *et al.*, 2020a; Vettehen *et al.*, 2019).

Lastly, empathy has stirred debate among researchers. Sánchez Laws (2020) asked whether immersive journalism could improve audience empathy, while Barreda-Ángeles *et al.* (2020a) examined whether 360° videos were actually “empathy machines” or just “amusement machines.” It is worth noting that empathy is not strictly an emotion. The literature on this subject (Barreda-Ángeles *et al.*, 2020a; Benítez *et al.*, 2019) highlights that empathy has both a cognitive dimension –also known as perspective-taking– and an emotional dimension –or empathic concern– as outlined by Igartua and Paez (1998). Moreover, Sánchez Laws (2020) has classified the commitment to another person, ranging from perspective-taking and empathy to sympathy and compassion, as formulated by Brandt (1976). Seinfeld *et al.* (2018) cautioned that empathy can be “transformative,” leading to changes of opinions and attitudes, or “passive,” reflecting little genuine commitment, according to Rodino-Colocino (2018).

Research findings regarding empathy have varied. On one hand, Shin (2018) and Sundar *et al.* (2017) contend that stories presented in VR and 360° video evoke greater empathy toward the characters among audiences than stories in plain text, and Barreda-Ángeles *et al.* (2020a) suggest that these technologies facilitate the direct effects of immersive environments on perspective-taking and empathic concern. On the other hand, some studies have found no significant differences in empathy across formats such as total VR (or interactive VR), 360° video, and 2D video (Steinfeld, 2020; Wu, Cai, Liu *et al.*, 2021) and suggested that VR does not shorten the emotional distance between the audience and the suffering portrayed in, for instance, disaster news (van Damme *et al.*, 2019). Moreover, it is worth considering what Shin and Biocca (2018) point out: empathy is determined by people’s preferences and beliefs.

### 4.2.3. Ethical and Normative Concerns

Some debates surrounding immersive journalism have emerged from a deontological point of view on immersive journalism. Nash (2018) summarizes the main concern: “I see as an important moral risk associated with VR by virtue of the fact that it is often deployed as a platform of simulation rather than representation” (p. 129). Simulation, of course, contradicts some normative principles of journalism such as objectivity, accuracy, transparency, and accountability (Aitamurto, 2019; Rodríguez-Fidalgo & Paíno-Ambrosio, 2020). Additionally, Nash (2018) expresses concern with virtual reality’s potential to enable audiences to adopt the perspective of story protagonists, which may not take “the appropriate distance” to fully distinguish, for instance, the pain of others, and end up superimposing their narcissistic experiences instead. Journalists also worry about losing control over their news narratives when providing audiences with multiple opportunities to interact (Goutier *et al.*, 2021).

Using 360° videos sometimes requires editing the footage to eliminate the presence of production team members to ensure they do not disrupt with the users’ sense of immersion. However, Aitamurto (2019) highlights that modifying images or adding text or other elements not originally captured by the camera would violate the current codes of ethics of several news organizations, which ask journalists not to deliberately distort the facts, manipulate images, or alter sounds to avoid misleading the audience. Mabrook and Singer (2019) pose the question of whether there should be specific ethical guidelines for creating and consuming immersive news products, and if so, who should establish and monitor compliance.

### 4.3. Future Research

The recommendations for further research that emerged from the systematic review can be summarized as follows: First, scholars should increase the size and diversity of their samples. While there is no strict rule for determining the minimum and maximum number of participants in an experiment, several researchers advocate for bigger and diverse samples (Bujic *et al.*, 2020; Vettehen *et al.*, 2019; Jeong *et al.*, 2020; Kang *et al.*, 2019; Shin & Biocca, 2018). This suggestion stems from observations by Barreda-Ángeles *et al.* (citing Reeves *et al.*, 2016) that “the low number of subjects in media psychology studies is a recurrent problem that then limits the external validity and generalizability of the results” (p. 14).

Second, research types and techniques could be diversified. Some scholars suggest conducting longitudinal studies to measure the effects of immersive narratives on audiences over time (Shin & Biocca, 2018; Wu, Cai, Liu *et al.*, 2021), using psychophysiological tests to measure in real time the impact of virtual journalistic narratives (Barreda-Ángeles *et al.*, 2020b), as well as questionnaires and focus groups after experiments to get more in-depth explanations (Steinfeld, 2020).

Third, other variables of analysis must be considered. Several researchers have called for delving further into cognitive categories –comprehension, cognitive absorption, and information processing– as well as emotional categories and empathy (Aitamurto *et al.*, 2020; Pavlik, 2020). However, some scholars also suggest exploring variables such as user experience (UX) (Paíno & Rodríguez, 2019), motivation, interest, and curiosity (Barnidge *et al.*, 2021), distraction and disorientation (Pjesivac *et al.*, 2021), as well as how personal traits and contextual factors influence the immersive experience (Shin & Biocca, 2018). In addition to journalists, Goutier *et al.* (2021) suggested to research the role of other actors (e.g., video producers and editors) in the development of immersive stories.

And fourth, research should focus on the type of content that is broadcast using immersive technologies, as success in immersive journalism is not so much about the technology but rather the quality of the stories. Jeong *et al.* (2020), Kang *et al.* (2019) and Shin and Biocca (2018) have proposed reviewing which topics could be most effective in synthetic environments to capture the interest and participation of audiences.

## 5. Conclusions

This systematic review aims to provide an overview of the current state of the literature on immersive journalism to understand main research trends and new opportunities for future research. This study contributes to a growing body of research on immersive journalism by examining the main theories, methodologies, concepts, approaches, and technological frames used by scholars in previous research on augmented reality (AR), 360° video, and virtual reality (VR). By examining 69 academic articles published in the Web of Science from 2010 to 2021, this systematic review of research makes an important contribution by disaggregating the various types of affordances and gratifications identified consistently in prior empirical explorations. Moreover, this study offers specific recommendations to expand the approaches to unpack immersive journalism and technologies.

Advances in immersive journalism research hinge partly on transitioning from exploratory and descriptive studies to explanatory and correlational studies with multiple variables. This systematic review underscores the considerable potential for integrating a combination of methods and instruments to collect quantitative and qualitative data from different actors involved in VR production and consumption, including digital and legacy media, journalists, other professionals, and audiences. For instance, in experimental studies, it would be important to complement survey methods with psychophysiological tests using tools such as electroencephalograms (EEG), galvanometers (GRS), and eye tracking (ET), among others, to measure cognitive changes during the experience. Additionally, researchers conducting experiments should delve deeper into “conditioning variables” that affect the individual immersive experience as they need further analysis. Personal factors such as age or gender, contextual factors including education and news consumption, and technological factors such as familiarity with immersive platforms warrant more thorough examination.

The predominant theoretical frameworks used in immersive journalism research focus on media effects, yet it would be great to explore other perspectives. Socio-technology approaches, for instance, could help researchers to unpack producers’ and audiences’ platform-dependency on major tech companies to promote immersive journalism (Poell *et al.*, 2023). Moreover, media economics would offer insights on how to ensure the sustainability of immersive journalism and what distribution and monetization strategies could be employed by news media (Ilvonen *et al.*, 2021). Similarly, innovation management can help identify added value in processes such as audience engagement, storytelling and reporting, products, and technology (García-Avilés, 2021). This study has taken a step forward by proposing the classification of macro-concepts within the categories of affordances and gratifications in immersive journalism, which could be further expanded upon with additional elements mentioned in the literature. This could also form the basis of our own theoretical framework for the analysis of specific immersive fields.

According to our findings, the success of immersive journalism appears to depend less on technology than the quality of the stories. This observation has implications for producers and audiences alike. As media continue to adopt diverse platforms and practices to respond to the digital disruption of the profession and the industry (Deuze *et al.*, 2018), journalists tend to place more attention to devices, hardware, and software than fundamental practices like storytelling, reporting, sourcing, and fact-checking. This tendency of privileging technology over storytelling may go against both the future autonomy of journalism and audiences’ need of consuming reports that stoke their interest and help them to take informed decisions.

As suggested in the future research section, the characteristics of the journalistic stories affect the immersive user experience. Academic studies and producers should explore stories with news values and frames that differ from those typically employed in VR (e.g., scenarios of exploration, war experiences, or situations of confinement or kidnapping). Additionally, more attention should be given to understanding the impact of multimedia grammar on

immersive storytelling and the resources used in production and post-production. For example, it would be appropriate to investigate how the user experience is affected by the combination of spherical video (180° or 360°) and computer-generated 3D images, changes in point of view, the presence or absence of the journalist, the use of artificial graphic and text elements, degrees of interaction and agency, among other factors.

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