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Reality Reimagined: Tracing the Evolution and Anticipating the Future of Virtual and Augmented Reality in Media

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Abstract

This review article offers an in-depth examination of the integration of Virtual Reality (VR) and Augmented Reality (AR) within the media sector, concentrating on film, television, news production, and gaming. The data synthesis process was meticulous, involving a detailed analysis to identify patterns, correlations, and insights from a variety of sources. In the realms of film and television, VR and AR have revolutionized traditional storytelling by providing immersive experiences that captivate audiences. News production has begun to harness the transformative potential of such immersive technologies in exploring new ways to engage the viewers. The gaming sector showcases innovative cross-reality interactions that connect players across different technological platforms. Key lessons highlight the importance of aligning technology with narrative goals to enhance the art of storytelling. However, challenges persist, including technical limitations and the need for standardization across platforms. The analysis underscores the importance of seamless integration for maximizing storytelling impact and audience engagement, offering valuable insights for content creators and industry professionals navigating the evolving landscape of immersive media.

Keywords: augmented reality, media, storytelling, technology, transformation, virtual reality

Introduction

The media sector, a constantly changing and developing environment, holds significant importance in influencing public conversation and distributing knowledge. Time-honored media platforms, such as print and broadcasting, have experienced considerable changes with the introduction of digital technology. The shift towards an increasingly digitalized world has dramatically transformed content delivery methods and encouraged

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continuous adaptation to new technologies (Napoli, [2011](#)). Transformation is reshaped by advanced technology outbreak. Notably, Virtual Reality (VR) and Augmented Reality (AR) have emerged as significant forward-movers in modern media. VR immerses users in virtual environments, providing a fully immersive experience, while AR overlays digital information onto the physical world.

Beyond entertainment, these technologies have found applications in education, healthcare, and journalism. Advancing the development and grasping the influence of VR and AR in media is crucial for understanding the current position and predicting future trends (Dragoni et al., [2016](#)). This study explores evolution of technological phases, highlighting how the media industry has adapted these innovations over the course of time. To achieve the study's objectives, several of previous studies have been reviewed and has used them as benchmarks to analyze the ongoing transformation.

This examination aims to comprehensively analyze the technological transformations of Virtual Reality (VR) and Augmented Reality (AR) within the media industry. It aims at analyzing how these technologies have been implemented in media in the past and how they have revolutionized the production, distribution, and reception of information. The following are the opportunities and developments created by the VR and AR as discussed in this analysis. This probe will also discuss how their application has raised unique issues and ethical concerns in media practices.

Evolution of Virtual Reality (VR) and Augmented Reality (AR) in Media

Implications of VR and AR on Media Production and Audience Engagement

As technology changes the media, it becomes clear that the processes of production and reception are affected to a great extent. Both, Virtual Reality (VR) and Augmented Reality (AR) offer new ways of storytelling as they bring the audience into the center of the action and provide more experiences (Baikulova & Suderevskaia, [2019](#)). Both of them play important roles in presenting information and analysis. A good understanding of these adoptions is crucial for media practitioners, content developers, and academic scholars. The way such changes impact the audience is discussed in detail during the thorough review. Therefore, when

examining media and technology consumption, especially through VR and AR, it is pertinent to understand how audiences' behaviors and preferences change, as well as the future implications for media strategies (Tussyadiah et al., [2018](#)).

The Transformative Impact of VR and AR on the Media Sector

The media sector is at a crossroads and has been influenced greatly by the advancements that have been brought by both the technologies. Through analyzing the developments in technology and how they affect content creation and the audiences, the research explored the dynamics of contemporary media environment. This analysis will provide a basis of discussions to speculate on the future potential of media, will be a reference note to inform strategic decisions, and lastly, it will encourage new developments (Kubitschko, [2017](#)).

Historical Integration and Evolution of VR and AR in Media Production

Virtual environments in media production began in the late 20th century with the help of Virtual Reality (VR) and Augmented Reality (AR). Technologists and those who were pioneers in the entertainment industry, wanted to use these technologies for new forms and methods of narration and content production. It was called VR because of the capacity to fully immerse users into new worlds as it was originally useful for games and simulations. While AR was investigated for possibilities to superimpose contextual data onto the real environment, which contributed to the creation of a mixed reality (Rubio-Tamayo et al., [2017](#)). The first uses of VR and AR were in the media industry, in which it was just a pilot and considered more as an exploratory practice. Technology was gradually introduced into the film industry and in the late 1980s, there was a development of V R. First it began to integrate very rudimentary initial degrees of VR into films such as 'The Lawnmower Man' with the purpose of improving the aesthetic experience. AR, on the other side, made its first launch in television broadcasts, in which the experimental overlays were aided with additional information during live programs. These pioneering efforts laid the foundation for the subsequent evolution and integration of VR and AR in the media (Freyermuth, [2016](#)). Several scholars, including Kirby, Tamayo, and Garcia, have extensively discussed the development of media through the use of immersive technologies. They have not only examined the

advancements brought by VR and AR but also highlighted the significant challenges these technologies present.

Challenges and Technological Constraints in Early VR and AR Integration

Despite the visionary applications, the early integration of VR and AR faced significant technological constraints and challenges, such as the hardware required for effective VR experiences was cumbersome, expensive, and above all limited in graphics and processing power (Mihelj et al., [2014](#)). This primarily hindered the widespread adoption of VR in media production. Similarly, AR encountered challenges with real-time tracking and seamlessly integration of digital elements onto the physical world. These limitations slowed down the spread of mainstream application of VR and AR technologies in media. However, these challenges caused further research and development, causing the way for subsequent advancements.

Advances in Storytelling Techniques

As technology is progressing, the impact of VR and AR on storytelling techniques within the media is also becoming more visible and applicable. VR, with its immersive nature, has enabled storytellers to move beyond traditional linear narratives. Viewers have now transitioned into active participation, navigated within story, and interacted within the story environment (Dooley, [2017](#)). This shift from conventional storytelling formats reshapes narrative structures and fosters non-linear and multi-dimensional storytelling experiences.

Impact of AR and VR on Narrative and Media Experiences

AR has transformed the integration of supplementary information into narratives. News broadcasts, for instance, began utilizing AR overlays to display real-time data, maps, and graphics, which enhances the audience's comprehension of complex story sets. The spatial capabilities of AR revolutionized information presentation which in return provided a more contextualized and engaging storytelling experience (Rauschnabel et al., [2017](#)).

The emergence of new technologies of VR and AR has led to the appearance of more progressive and set-aside media productions. Especially, VR has proven to be a rather useful tool in developing a whole array of

simulations, which are not only entertaining, but rather useful in teaching and educational processes. Together with learning largely stayed home, several virtual tours and simulations were introduced to users, enabling travel through the historical events or to the different countries or cities without leaving their houses (Garcia et al., [2020](#)). AR, however, has gone from being the simple overlays to fully imbedded into users' physical world. AR as showcased by games, such as Pokémon GO is capable of placing digital information on a real-world environment in a manner that fashions a different mode of game narratives (Paavilainen et al., [2017](#)). Such progresses of immersing media experiences have provided an anthropological shift in the reception of the content, especially the improvement of real-virtual boundary elimination (Yilmaz & Goktas, [2017](#)).

Technological Components in Media Applications

Advancements in VR and AR Hardware for Media Production

Due to specialized hardware design and sophistication in advancement, the integration of Virtual Reality (VR) and Augmented Reality (AR) within the applications of media has become possible and has a purpose. These devices have been the main drivers in expanding creative possibilities. VR has benefited from the development of high-end headsets like the Oculus Rift and HTC Vive Pro, which feature precise motion tracking and high-resolution displays (Desai et al., [2014](#)). Such devices allow content producers, including filmmakers and game developers, to engage in virtual environments during production, making them indispensable tools for crafting immersive narratives. AR has also seen the emergence of specialized devices, notably the Microsoft HoloLens. These AR headsets overlay digital elements onto the user's physical environment. They provide content creators with a unique perspective. For instance, journalists can use AR headsets to visualize data overlays or enhance live reporting by superimposing relevant information onto the camera feed (Sirkkunen et al., [2016](#)). These advanced devices represent the cutting edge of hardware development, expanding the boundaries of what is possible in media production.

Expansion of Consumer-Oriented VR and AR Hardware

As VR and AR technologies have become more widespread, consumer-oriented hardware has evolved to cater to a broader audience, which is expanding the reach of immersive experiences. VR headsets, such as the

Oculus Quest and PlayStation VR, both bring immersive content directly to consumers in their homes. These devices provide access to a wide range of applications, from gaming to virtual tourism (Tussyadiah et al., [2018](#)), making VR experiences more accessible to a diverse audience.

Democratization of AR through Everyday Consumer Devices/Gadgets

AR has seamlessly integrated into everyday consumer devices, primarily through smartphones and tablets. As these devices are equipped with AR capabilities, they enable users to access augmented content via dedicated apps. For example, users can scan QR codes with their smartphones to access AR-augmented experiences, which bridges the gap between digital overlays and the physical world (Palmarini et al., [2017](#)). This democratization of AR through consumer devices have significantly expanded its accessibility and impact on media engagement. The creative process in VR and AR media applications relies heavily on advanced software tools and content creation suites, which provide content creators with the essential tools to develop immersive experiences.

Software Tools for VR and AR Content Creation

For VR, platforms, such as Unity (Kim et al., [2014](#)) and Unreal Engine (Chen et al., [2017](#)) are know as comprehensive development environments. These tools provide functionalities, such as 3D modeling, animation, and scripting, which are essential for creating complex and interactive virtual reality experiences. These tools enable developers to build simulated environments with high levels of accuracy and interactivity. This serves as robust foundations for VR content creation. AR content creation also involves specialized software solutions designed to seamlessly integrate digital overlays into the real world. Applications, including Aurasma (Holzschuh & Bogoni, [2017](#)) and ZapWorks (Yepez-Reyes et al., [2020](#)) help create and adapt the AR content in real world. Some features like image recognition, location-based triggers, and animation tools are often included that provide a user-friendly interface to developing AR content. Hence, these tools allow journalists and media professionals to enhance their stories with interactive elements.

Distribution Platforms for VR and AR Content

The distribution of VR and AR content to end-users relies primarily on dedicated platforms and applications that connect content creators with their audiences. VR experiences are often disseminated through specialized app

stores, for instance the Oculus Store and SteamVR (Murray, [2020](#)). These platforms smartly curate and distribute VR content to users with suitable headsets, which ensure a seamless experience. Web-based VR (Ma et al., [2018](#)) has also gained significant popularity. This is enabling users to access immersive content directly through web browsers, which reduces entry barriers. AR content distribution is effectively integrated into mobile app ecosystems. Apps, such as Snapchat and Instagram, incorporate AR filters and effects (Herrington, [2022](#)). Such mobile applications deliver augmented reality experiences to a broad audience. News organizations also utilize AR content distribution through their mobile applications and allows users to access augmented information directly related to news stories. Social media platforms, including Facebook and Twitter, support AR content sharing. They try to enhance the reach and virality of augmented reality experiences.

Integration of VR and AR in Media Production Processes

The adoption of VR and AR in media industry has kicked off the transformative era in content creation styles. Media production processes have evolved significantly because professionals are increasingly integrating VR and AR technologies into their toolkits. In VR, content creation work-style has shifted towards immersive experiences, that has enabled creators to develop narratives. Such narrative styles cross the limited traditional boundaries (Bucher, [2018](#)). Virtual reality has become vital in the pre-production, production, and post-production stages. During pre-production, virtual environments can be critically designed and visualized, which will aid in the detailed planning and conceptualization of scenes. In the production phase, VR plays a critical role in real-time monitoring and feedback. This allows directors to make informed decisions on the set. Post-production also benefits from VR, as it provides editors with an immersive platform for reviewing and refining the content. This integration enhances collaboration among team members, which fosters a more efficient and dynamic content creation process.

Challenges and Innovations in Integrating AR into Media Production

In the area of AR, media professionals have included augmented elements in various phases of production. Commonly, the extension is used in such a way that the base info is given in media, which is then overlaid with more data by the reporters on the field for example a journalist adding more details on the newspaper or on-screen text on the TV. The application

of reality augmented in media creation broadens new horizons to a story. They attempt to give the audiences better and more contextually meaningful content (Park et al., [2015](#)). However, when it comes to content creation tasks, VR and AR technologies themselves have an array of problems. One conspicuous impediment is the time that it takes to acquire new set of skills in using such tools. AR and VR need a change in the organizational point of view and a new set of competencies. Therefore, the professionals have to prepare themselves for the specifics of working with space narrative, 3D modeling, and interactive content (Vituccio et al., [2018](#)).

Cost and Compatibility Challenges in Immersive Content Creation

Among many other problems, the issue of cost is a prominent one and linked to the expenses of the specialized equipment and applications used during the creation of the immersive content (Ikei, et al., [2019](#)). Quality VR cams, augmented reality dev kits, and good computers, all amount to the high costs of production. This financial aspect becomes a limitation towards the implementation of VR and AR, especially for those who work for small media or are self-employed artists. Also, the processes of standardization and interoperability problems can cause much integration, since the competitors often use different hardware and software bases, which means fragmentation within the industry. Eradicating these hurdles requires sustaining industry cooperation, training programs funding, as well as creation of new and affordable tools (Ikei et al., [2019](#)).

Discovery of paradigm shifts in consumption patterns of the audience due to the integration of virtual reality and augmented reality technologies. This has changed the conventional consumption of media in the past modes. Py: VR is different from other views as it engages the audience in a more active manner as compared to the passive consumption of content. The audience being capable of putting on the VR helmets can move around the virtual space, manipulate objects in the environment, and sometimes decide the flow of action. Thus, the transition from passive reception to active interaction with the content of media messages has changed the viewer's position fundamentally.

Impact of AR on Audience Engagement and Interaction

It has been discussed earlier that AR can be utilized directly in real-life experiences through the gadgets, such as smart phones and tablets. This availability has revolutionized the ways through which the audience

consumes information. For example, AR-integrated print media (Singh et al., [2022](#)) or AR advertisements let the users to interact with the content just by pointing at a target with a device. This interactive and dynamic form of engagement has become increasingly prevalent. This has further reshaped the audiences' expectations regarding information accessibility and presentation.

The interactive nature of VR and AR has also led to enhanced feedback mechanisms and the rise of user-generated content. With VR, audiences can provide feedback not only on the narrative but also on the immersive experience itself. This direct interaction between creators and viewers fosters a more interactive and collaborative approach to content development, which in return enables creators to refine and improve their work based on real-time user input (Wu et al., [2023](#)).

Impact on Audience Engagement

This study argues that VR has a profound influence on its audiences, which includes the use of technologies, such as the 360° videos in presenting compelling and engaging stories. This procedure enables creators to embody the actual contexts or develop scenarios that are actualized for users to interact within a 360-degree premise. This is particularly the case for 360-degree videos and videos produced specifically for VR consumption, because of the heightened presence that the videos allow.

It has been observed that the 360-degree video for VR (Yaqoob et al., [2020](#)) is a very effective and versatile way to take the viewers to such places or events which may be distant or difficult to reach. For instance, travel programs incorporate 360-degree videos to create a sense of experience where interested individuals can view Morocco from the viewpoint of an actual traveler. Above mentioned new way is more close to an actual touch and present actually than an advertising message broadcasted through any form of a media channel. This is a departure from conventional narratology as it not only enshrouds the viewer in an omnipresent story but requires them to actively guide themselves through the tale. This, in the end, enhances engagement and therefore, adds as a bonus aspect in establishing emotional bonds with the content.

Emotional and Psychological Impact of VR in Media and Beyond

A primary reason for this is the ability of VR, blended with 360 video capture, which has a strong psychological impact on viewers. Compared to other visual media, viewers are positioned on the center of a virtual reality which triggers passionate reactions. For example, media outlets can employ VR to present detailed coverage of displaced people crises or war-affected countries. This makes it possible for the viewers to fully comprehend and identify with the impacts synonymous to the victims.

The psychological effect is even more profound when VR is implemented in areas like the healthcare sector or therapy or education systems. Virtual simulations hold the capability to socialize the participants into situations, which may evoke some form of emotion. They, in return, help in the rehabilitation and learning process. This emotional factor also increases the narrative value of VR because it helps the audience to empathise with the story.

Evolving Engagement Metrics in VR and AR Experiences

VR applications have revolutionized user engagement metrics owing to the emergence of immersive storytelling experiences. Previously, simple parameters, such as views and click-through rates were used whereas the new parameters looked at the level of interaction as users immersed themselves in the virtual environment. Immersive storytelling involves the time spent by users on the content area, the gaze tracking of users over the complete 360-degree viewpoint, and the rate of interactions of the users in the VR space. Such metrics can be very useful to assess the efficacy of immersive narratives.

Augmented Reality (AR) provides computer generated graphics onto real-life scenes enabling users to interact or play along with the content on screen within their environment. For instance, in museums, augmented reality applications may provide supplementary information or a component that is not real in the exhibit when the screen of the device is aimed at it. This augmentation of reality turns the observers into active participants who suddenly become engaged and much more involved.

VR and AR technologies raise a social component for media experiences to accommodate collective interaction from the users. Multiplayer virtual reality is a type of VR encounter whereby users are closely related in virtual environments, implying simultaneous participation.

Such communal aspect is not just limited to leisurely purposes and entertainment but to working environments, schools, and even online meetings and conferences.

Immersive media transform notions of what can be considered as ‘shared’ experiences through the communal components. For instance, imagine virtual concerts, which let people from different spatial zones attend and engage in an event in a shared space. This aspect increases the appreciation for the content shared, as well as fosters an element of togetherness among the participants, thereby making the activity more rewarding and social.

Research Methodology

The approach used was a rigorous search conducting strategy that engaged prominent research databases, including the Web of Science. These databases were chosen because they offered a large amount of full-text coverage of peptides, articles, and conference papers and industry reports regarding the implementation of Virtual Reality (VR) and Augmented Reality (AR) in media industry.

To retrieve the articles, a systematic search strategy was used based on these keywords , “VR,” “AR,” “media industry”, and others. The search terms used beloned to those articles and papers that were produced in a certain time period and provide information about relevant and latest interventions. The criteria for choosing articles and sources included focusing on articles published in reputable academic journals and conference proceedings, as well as the reports that offered comprehensive overviews of the trends, challenges, and effects of VR and AR implementation in media.

The process of selecting articles was a highly selective one based on the titles, abstracts, and keywords in order to find pieces relevant to the research goals. The criteria for selecting the articles that were to be included in the analysis centred around the exploration of VR and AR within the media landscape, including uses within journalism, content production, and audiences.

Data extraction required analyzing and sorting out the main themes and trends presented in the chosen body of literature. Such topics included latest technologies, specific industries, issues that reach media practitioners, and interaction with the audience with the aid of VR and AR technologies. By

analyzing the results and graphs, the extracted data was compiled into a clear and concise summary of the current state of media investment in VR and AR technologies. Due to this structure, the synthesis sought to show how these various topics are related and present a comprehensive approach to how these technologies are influencing the media sector.

Data Analysis

All of the gathered data went through a special analysis procedure of abstracting information from various sources and highlighting the tendencies, connections, and the most significant findings disclosed by the chosen sources. Some of the strategies aimed at matching involved examining previous research and classifying the results outlined most often, innovations, and directions for future research. This assessment proved to be quite helpful in arriving at new conclusions and possibilities of VR and AR adoption in the media industry in the future.

In movies and television series, Virtual Reality (VR) and Augmented Reality (AR) have been used to revolutionize the art of storytelling and to appeal to people's sentiments, this experience is going further than the mere limit. From a number of studies chosen for this study, it can be stated that the media industry chooses VR and AR technologies both for production and for the purposes of the storytelling. This integration eventually opens new horizons and opportunities for better and more engaging narratives.

As such some of these technologies have been effected into the development of AR and VR complete Audio Visual virtual discourses and films with a pro social theme. Incorporation of VR digital storytelling continues to evolve with more content creators developing the form of media to be highly interactive with viewers tasking them with other tasks and viewing it from the first person point of view. These developments have contributed to outlining certain features and tips for designers of VR and AR media experiences in various scenarios, such as cultural heritage.

A notable VR project is "Collisions" documentary by Lynette Wallworth. This VR is centered on Martu Aboriginal people of Western Australia and their interactions with the contemporary world and technology. Through the use of these technologies, the audience can directly transport themselves into the Martu community's environment, therefore increasing cultural empathy.

The Impact and Integration of AR and VR in News Production and Gaming

The integration of AR and VR in news creation, according to previous studies, proved to be revolutionary in changing the media production and consumption processes, as well as in improving users' engagement. Experiential Media (EM) technologies comprising the VR, AR, and 360° video have been used to capture news content visualizations and information content. It was used most effectively for information regarding COVID-19 and the virus, as well as the necessary precautionary measures.

Location-based AR storytelling has been spearheaded as distribution of local news and these have been tested through the use of VR simulations for prototyping purposes. Such simulations have also been employed to investigate potentials for new interaction with news, moving out of typical mobile applications into virtual environments. Nevertheless, it is important to take into account the narrative, emotional appeal, and attention elements within the context of immersive journalism in order to achieve the greatest extent of integration of VR and 360-degree video in the field of news reporting.

Research has revealed that, although users get the feeling of presence while being exposed to VR news, the method of information dissemination might not yet be perfect. Improving these aspects can further raise the quality of immersive journalism, thus making it a more effective means for generating news and influencing viewers.

Similarly, such innovations (VR and AR) help to provide revolutions in gaming industry, which create an improved and highly engaging activity. Players are able to interact while playing different games from various platforms, including VR, AR, or PC, providing inter-platform integration. The scholarship concluded that unevenness in the spatial dimensions, interfaces, modes of interaction, information acquisition, and narrative components may influence the player experience but can reach, collectively, a user experience level suitable for non-VR gamers.

Additionally, incorporating airflow generators into AR or VR controllers or head-mounted displays can enhance the gaming experience by providing airflow effects based on the content. This sensory experience can be further enriched with liquid and/or scented additives. By integrating AR and VR applications into a single environment, players can choose their

interface based on hardware availability, environment, and personal preferences. This approach provides a multiplayer system that caters to different user needs, making the gaming experience more versatile and inclusive.

Challenges and Opportunities in VR and AR Integration in the Media Industry

AR has demonstrated that successful integration is often tied to user familiarity and accessibility. Pokémon GO's widespread popularity (Rauschnabel et al., [2017](#)) was partly due to the user-friendly nature of the app and its compatibility with everyday mobile devices. This accessibility opens new avenues for audience interaction. It is breaking down barriers to allow entry for immersive experiences. Despite these success stories, the implementation of VR and AR in the media industry faces several challenges. Technical constraints remain a significant hurdle. VR experiences often require high-end hardware, such as VR headsets and powerful computing systems, which limits its accessibility. The resolution, latency, and field of view of VR devices also affect the quality of the immersive experience hence, posing challenges for widespread adoption. These technical issues must be addressed to ensure the broader accessibility and usability of VR and AR technologies in the media industry.

AR experiences several difficulties connected to real time tracking and the merging of digital layers (Wang, [2009](#)). For instance, there are affairs that occur during the occlusion, when digital entities must naturally engage with physical space and objects, for which it is also necessary to develop technology. Moreover, since mobile devices are often used for AR experiences, the performance of the applications and the battery life of a device can become a challenge to the AR experience.

There are some important technical difficulties for the gaming industry that is currently under research and development. Such development is done by improving the peripherals and the basic faculties of VR devices and the standalone nature of the VR headsets and AR glasses. Thus, the media business sector has several strong and weak points when applying VR and AR innovations. Another issue is that formats and platforms for data sharing have to be unified. The one problem that consistently affects VR and AR content creators is the lack of compatibility because of the large variation of devices and operating systems. Standardization would simplify

distribution of contents and improve compatibility between platforms, which in return would make it easier for creators to offer user a uniform quality of immersive content across different platforms.

Conclusion

The analysis done in this review article helps to gain an understanding of VR and AR integration in the media sector and highlights how the discussed topic constantly evolves. Reading through all the datasynthesized results patterns, correlation and insight has emerged, this is beginning to paint insightful picture of future of VR and AR in film, television news production, and gaming.

The application of VR and AR technologies in film and television presentation are beyond the conventional telling of a story in that they provide perception of the environment, thus advancing audience participation. Some of the examples where these technologies are used in production and narration revealed that they are capable of forming interactive stories.

The usage of VR and AR in news production offers solutions for changing the media consumption practices and improving users' experiences. The review recognizes the applicability of integrated immersive environment in building content involving COVID-19, however, there is a need to underscore its exposition in visualizations and information delivery. At the same time, it also states that the narrative, emotional, and attention aspects of immersive journalism will also need to be approached with the right level of attention to really unlock the potential of the likes of virtual reality and 360 video.

In gaming, VR and AR supplement the basic immersion paradigm by offering engaging and interactive gaming environment. These technologies enable inter-reality, in return creating the opportunity for players using different system platforms to communicate and even interf />"

Additional development of new technologies in the form of airflow generators in VR or AR devices only adds to the already existing potential for entertainment.

In general, many opportunities of using the VR and AR in media sector are opening up with new dimensions of interactions and engagements. This is significant in pointing to future work, which will continue to address the

technical issues in this application while working towards standardizing these technologies so that they can be more widely incorporated into the fabric of people's lives. In this category, VR and AR are realized to improve profoundly the gaming facilities. The review stresses upon the opportunity to play with people who have various equipment: the cross-reality feature is presented as one of the key experience. The findings of the gaming applications are instructive because narratology is once again put in spotlight as a way of framing the handling of technology and learning to achieve certain objectives in the story.

However, there are still some issues in applying VR and AR even today. The hardware problem can be considered as one of the main challenges that feature real-time tracking capabilities. This also becomes a disadvantage, through increasing accessibility and standardization, constant Research and Development efforts are needed to overcome the problems that it places. As is reiterated in the conclusion, the integration of VR and AR must be done more intricately as they are not gimmicks but rather instruments that allow for telling stronger stories and relating them to the audience. This review gives an insight of the present development in the use of VR and AR in the media industry with core strengths, weaknesses, opportunities and threats highlighted. They are useful to content developers, practitioners, and scholars interested in the configuration of immersive content in a dynamic environment.

It is evident that ethical concerns are prospective determinants of personal/information content generation and utilization in the immersive media environment by considering the aspect of privacy and content originality. These ethical issues must be resolved to ensure that truth and integrity are not compromised when using VR and AR. In conclusion, it is evident that the review portrays a positive picture about the future of VR and AR in the media industry but which at the same time recognizes the fact that there are quite a number of hurdles that must be crossed in order to realize the potential of VR and AR.

Recommendations

Future studies should concentrate on extending important knowledge gaps within the genres of VR, AR, and media. The following recommendations aim to guide future research endeavors.

There is a necessity to explore the additional information concerning the details of the users' experience and their interactions within VR and AR spaces. The adaptation of the analytical knowledge about how users interact with content, decide in interactive narratives, and develop certain emotions in front of augmented content will help in improving the storytelling approaches.

1. It is now important to start working on standardization of the industry and enhancement of the connection between VR and AR systems. Further studies should focus on the elaboration of the regular patterns, which will allow successful content distribution and increase the compatibility with other platforms considering the existing fragmentation in the field.
2. New studies need to be carried out to address issues of inequality in a context of creating physically embodied environments related to media. Some of the important aspects that should be taken into account include aspects of users with disabilities, cultural aspects, and equal opportunities for employing the new technologies. Further research should look into the ways of developing special content, for example, virtual content for the target population.
3. There is still the need to expand on the ethical issues that arose from the use of social media which include issues to do with privacy and the credibility of the content being posted on the social media platforms. It also gave the researchers direction on how to conduct research in the aspects of safe media creation and responsible media consumption in the immersive media environment to promote accountability in the use of VR and AR technologies.
4. Further study on how to break through the technical barriers and overcome the problems relating to areas, such as the confined hardware platform and real-time identification will be necessary. Standalone VR headsets and AR glasses are forecasted to continue developing with better resolution, less latency, and wider field of view, which in turn will improve usability of these devices.

Thus, future research should further explore these areas so that the effectiveness of VR and AR in the media industry can be full realized and also create and offer innovation and inclusion of a large population to experience media immersion.

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

Data availability is not applicable as no new data was created.

References

- Baikulova, M., & Suderevskaia, E. (2019). *Futures research: The application of VR and AR emerging technologies in new media: Future of immersive visuals online* [Bachelor thesis, JAMK University of Applied Science]. Jamk.fi Thesus. https://www.theseus.fi/bitstream/handle/10024/267568/Suderevskaia_Elizaveta_Baikulova_Madina.pdf
- Bucher, J. (2018). *Storytelling for virtual reality methods and principles for crafting immersive narratives*. Routledge.
- Chen, X., Wang, M., & Wu, Q. (2017, November 11–13). *Research and development of virtual reality game based on unreal engine 4* [Paper presentation]. Proceedings of 4th International Conference on Systems and Informatics. Hangzhou, China
- Desai, P. R., Desai, P. N., Ajmera, K. D., & Mehta, K. (2014). A review paper on oculus rift—a virtual reality headset. *ArXiv*, Article earXiv:1408.1173. <https://doi.org/10.48550/arXiv.1408.1173>
- Dooley, K. (2017). Storytelling with virtual reality in 360-degrees: A new screen grammar. *Studies in Australasian Cinema*, 11(3), 161–171. <https://doi.org/10.1080/17503175.2017.1387357>
- Dragoni, M., Ghidini, C., Busetta, P., Fruet, M., & Pedrotti, M. (2015, October 9–10). *An ontology for supporting the evolution of virtual reality scenarios* [Paper presentation]. Proceedings of International Experiences and Directions Workshop on OWL. Bethlehem, USA
- Freyermuth, G. S. (2016). From analog to digital image space: Toward a historical theory of immersion. In F. Liptay & B. Dogramaci (Eds.), *Immersion in the Visual Arts and Media* (pp. 164–203). Brill
- Garcia, A. D., Schlueter, J., & Paddock, E. (2020, January 6–10). *Training astronauts using hardware-in-the-loop simulations and virtual reality*

- [Paper presentation]. Proceedings of AIAA Scitech 2020 Forum. Orlando, FL.
- Herrington, J. (2022). Face filters as augmented reality art on social media. In V. Geroimenko (Ed.), *Augmented reality art: From an emerging technology to a novel creative medium* (pp. 297–310). Springer International Publishing.
- Holzschuh, V. R. B., & Bogoni, T. N. (2017, November 1–4). *Aurasma: A tool for education* [Paper presentation]. Proceedings of 19th Symposium on Virtual and Augmented Reality (SVR) Conference. Curitiba, Brazil
- Ikei, Y., Yem, V., Tashiro, K., Fujie, T., Amemiya, T., & Kitazaki, M. (2019, March 23–27). *Live stereoscopic 3D image with constant capture direction of 360 cameras for high-quality visual telepresence* [Paper presentation]. Proceeding of IEEE conference on virtual reality and 3d user interfaces (VR) (pp. 431–439). Osaka, Japan.
- Kim, S. L., Suk, H. J., Kang, J. H., Jung, J. M., Laine, T. H., & Westlin, J. (2014, March 6–8). *Using Unity 3D to facilitate mobile augmented reality game development* [Paper presentation]. Proceedings of IEEE World Forum on Internet of Things (WF-IoT) (pp. 21–26). Seoul, Korea.
- Kubitschko, S. (2018). Acting on media technologies and infrastructures: Expanding the media as practice approach. *Media, Culture & Society*, 40(4), 629–635. <https://doi.org/10.1177/0163443717706068>
- Ma, X., Cackett, M., Park, L., Chien, E., & Naaman, M. (2018, April 23–27). *Web-based VR experiments powered by the crowd* [Paper presentation]. Proceedings of the 2018 World Wide Web Conference. Lyon, France.
- Mihelj, M., Novak, D., & Beguš, S. (2014). *Virtual reality technology and applications*. Springer.
- Murray, J. W. (2020). *Building virtual reality with unity and steam VR*. CRC Press.
- Napoli, P. M. (2011). *Audience evolution: New technologies and the transformation of media audiences*. Columbia University Press.
- Paavilainen, J., Korhonen, H., Alha, K., Stenros, J., Koskinen, E., & Mayra, F. (2017, May 6–11). *The Pokémon GO experience: A location-based*

- augmented reality mobile game goes mainstream* [Paper presentation]. Proceedings of the 2017 CHI conference on human factors in computing systems. New York, United States.
- Palmarini, R., Erkoyuncu, J. A., Roy, R., & Torabmostaedi, H. (2018). A systematic review of augmented reality applications in maintenance. *Robotics and Computer-Integrated Manufacturing*, *49*, 215–228. <https://doi.org/10.1016/j.rcim.2017.06.002>
- Park, S. B., Jung, J. J., & You, E. (2015). Storytelling of collaborative learning system on augmented reality. In D. Camacho, S. Kim & B. Trawiński (Eds.), *New trends in computational collective intelligence*. Springer.
- Rauschnabel, P. A., Rossmann, A., & Dieck, M. C. T. (2017). An adoption framework for mobile augmented reality games: The case of Pokémon Go. *Computers in Human Behavior*, *76*, 276–286. <https://doi.org/10.1016/j.chb.2017.07.030>
- Rubio-Tamayo, J. L., Gertrudix Barrio, M., & García García, F. (2017). Immersive environments and virtual reality: Systematic review and advances in communication, interaction and simulation. *Multimodal Technologies and Interaction*, *1*(4), Article e21. <https://doi.org/10.3390/mti1040021>
- Singh, J., Singh, G., & Maheshwari, S. (2022, September 21–23). *Augmented reality technology: Current applications, challenges and its future* [Paper presentation]. Proceedings of 4th International Conference on Inventive Research in Computing Applications (ICIRCA). Coimbatore, India.
- Sirkkunen, E., Vääätäjä, H., Uskali, T., & Rezaei, P. P. (2016, October 17–18). *Journalism in virtual reality: Opportunities and future research challenges* [Paper presentation]. Proceedings of the 20th international academic mindtrek conference. Tampere, Finland.
- Tussyadiah, I. P., Wang, D., Jung, T. H., & Tom Dieck, M. C. (2018). Virtual reality, presence, and attitude change: Empirical evidence from tourism. *Tourism Management*, *66*, 140–154. <https://doi.org/10.1016/j.tourman.2017.12.003>
- Vituccio, R., Cho, J., Tsai, T. Y., & Boak, S. (2018, August 7–11). *Creating compelling virtual reality and interactive content for higher education*:

A case study with carnegie mellon university [Paper presentation]. Proceedings of ACM SIGGRAPH 2018 Educator's Forum. Columbia, Canada

- Wang, X. (2009). Augmented reality in architecture and design: Potentials and challenges for application. *International Journal of Architectural Computing*, 7(2), 309–326. <https://doi.org/10.1260/147807709788921985>
- Wu, W. C. V., Manabe, K., Marek, M. W., & Shu, Y. (2023). Enhancing 21st-century competencies via virtual reality digital content creation. *Journal of Research on Technology in Education*, 55(3), 388–410. <https://doi.org/10.1080/15391523.2021.1962455>
- Yaqoob, A., Bi, T., & Muntean, G. M. (2020). A survey on adaptive 360 video streaming: Solutions, challenges and opportunities. *IEEE Communications Surveys & Tutorials*, 22(4), 2801–2838. <https://doi.org/10.1109/COMST.2020.3006999>
- Yepez-Reyes, V., Cevallos, P., & Córdova, D. (2022). Hijacking art: Murals as an interface toward augmented reality. In P. C. López-López, D. Barredo, Á. Torres-Toukoumidis, A. De-Santis & Ó. Avilés (Eds.), *Communication and applied technologies: Proceedings of ICOMTA 2022*. Springer Nature Singapore.
- Yilmaz, R. M., & Goktas, Y. (2017). Using augmented reality technology in storytelling activities: Examining elementary students' narrative skill and creativity. *Virtual Reality*, 21, 75–89. <https://doi.org/10.1007/s10055-016-0300-1>