

Systematic Study on Emerging Technologies with Reference to Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR)

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Abstract: *We refer to these three ideas as "immersive technology," drawing on the intensely engaging qualities of virtual reality (VR), augmented reality (AR), and mixed reality (MR). IM are frequently perceived as novel ideas, which may be accurate in their complete, integrated forms. However, both in the media industry and in education, the technological and psychological components of IM have long been studied. We examine how closely historical processes in the growth of established media (EM), such as film, TV, radio, and video games, reflect the current trajectory of IM progress. We conclude that IM are likely to merge with EM over time, therefore they shouldn't be viewed as only a fleeting fad. One obvious application is that educators should not skip out on devoting time and money to investigating the possibilities of IM technology for education.*

Keywords: technology, virtual reality (VR), augmented reality (AR), and mixed reality (MR), EM

I. INTRODUCTION

Traditional and new technology sectors as well as a variety of other academic fields, including business (Burke, 2018), medical science (Mohammadi, Hesami, Kargar, & Shams, 2018), and biology (McGraw, et al. 2018), have shown interest in IM. Due to the growing affordability, accessibility, and sophistication of IM technology, educators are also investigating its possibilities.

As with the introduction of any new technology, the question of whether this specific technology is worthwhile for the budgetary resources, time, and effort invested in exploring its learning potential still exists. Investment in IM technology is now frowned upon since it is presently seen as a novelty. Investigating whether IM are likely to be a transitory fad (referred to as a "trend" in this chapter) or if IM are media that will eventually become widely utilised, comparable to EM, such as cinema, radio, TV, or video games, is thus helpful.

According to the director Chris Milk, VR, together with AR and MR, is the "final medium" since they all work together to create a new, more immersive experience than any previous form of media (Johnson, 2015). In recent times, Facebook employees have referred to immersive media as "a new age of media" . But even before Zuckerberg's comment, it was unclear if instant messaging will one day overtake traditional media.

Today, we can claim that IM are technologies that have moved from research labs and other academic institutions to a larger market, and these technologies may one day become widely available goods. The number of VR users increased from 200,000 to 90 million between 2014 and 2017. There might be an increase in consumers of up to 171 million in 2018. Currently, a wide range of applications and experiences, often based on EM, are represented in the material available in IM.

We first outline the development of EM in order to further explore the subject of the originality of IM. The situation of IM at the moment is then presented. Finally, we examine the future of instant messaging using Bernard Miège's media theory and its two defining characteristics of a medium: distribution and edition.

We define IM as a form of media that heightens our senses to the extent of psychological immersion, also known as telepresence. IM has the power to immerse users in the filmed, photographed, synthetic, or blended world to the point where they feel as though they are physically there in it.

Media that were formerly regarded as novel, inventive, and fashionable are known as EM. However, a mass-market audience is now accustomed to using and accepting EM. EM may also be immersive, much like IM. Their level of absorption is less intense, hence they fall short of achieving telepresence.

The edition and the dissemination are two characteristics that define every media (Miège, 2003). In this sense, "edition" refers to the process of modifying content to fit the medium through editing, shooting, post-production, etc. The diffusion of the modified content so that it is available to the public is referred to as "distribution." We modify this specific concept of media for our discussion. The third feature of media evolution—the aspect of a medium finding its precise position in a physical or virtual form—is demonstrated by examples from the past.

The evolution of the virtual reality (VR), augmented reality (AR), and mixed reality (MR):

It is helpful to look back in time and examine the evolutionary processes that EM underwent in order to investigate the question of whether IM are likely to be a transitory phase. We show how these EM emerged, emphasising on the length of time it took for them to become established and outlining their immersive elements, using examples from film, radio, television, and video games.

Cinema. An exhibition of short films by the Lumière brothers in 1895 is the subject of a well-known industry myth. The crowd raced out of the showroom because they thought they were going to be run over since they were so terrified of the vision of an incoming train. Despite this response, Louis Lumière, one of the Lumière brothers, was not persuaded and referred to cinema as "an creation without a future." It took another ten years for the industry to accept these pictures (Balio, 1985).

Thus, much like in today's IM, immersion has been a critical element in film since its inception. The Lumière brothers created 360-degree photographs for their Photorama at the start of the 20th century (Rittaud-Hutinet, 1985). To provide audiences an even more immersive experience, French inventor Raoul Grimoin-Sanson projected Cinéorama movies in a spherical format in 1900. (MacGowan, 1957). Large-scale 3D IMAX theatres, of which the 2009 film *Avatar* is a notable example, was the final significant step toward immersive forms.

Radio. The development of radio began with Edison's discovery of recording in 1877, followed by Hertz's creation of wireless audio transmission. The technological foundations of radio had been further developed thanks to contributions from Tesla and Popov. Radio was not a popular medium back then, akin to how instant messaging is now.

The first radio transmission took place in 1906, but the first radio firms didn't start broadcasting regularly scheduled programming until the 1920s. In other words, radio didn't become a medium with a large audience for more than ten years. Radio evolved into a shared experience, similar to instant messaging, as the early radio equipment were not accessible to the general population.

In his radio theory, Brecht (2015) outlined a more participatory radio format where listeners may both receive and send signals. This might be interpreted as prophecy regarding instant messaging (IM) and its predecessor, the internet, which are all founded on this participatory premise of both receiving and transmitting information.

TV. The development of TV happened about the same time as the development of radio. However, the emergence of TV as a mass market was slower than that of radio due to the high cost of TV sets. The people gathered at set areas to watch TV together since it was unaffordable, much like location-based IM interactions do now. This practise is referred to as "Fernsehstube" in German, which literally means "TV rooms" in English. Berlin had its first "Fernsehstube" in 1935. These locations were frequently open to the public and accessible to those without access to personal televisions (König, 2004). From a contemporary vantage point, we may state that it was a location-based answer for a new technology.

It's interesting to note that Kapeller (1926) stated that he believed TV was about appealing to all senses with carefully selected and broadcast information. TV is not there at the moment. It is actually more of an audio-visual medium. Interactive elements may only be used in conjunction with other media, such phones, cell phones, or online services. IM is a technique to move television closer to Kapeller's ideal. Similar to IM gadgets, TV devices have evolved throughout the course of their existence to become more practical, inexpensive, user-friendly, and technically advanced. Curved displays are being used to show ultra-high-definition programming in order to create a more immersive experience.

Videogame. Since the first video game patent was issued in the 1940s, video games have developed. Arcade video games in the 1970s signalled the start of a location-based mass market, followed by the affordability of personal home

video game systems in the 1980s, after numerous further academic stages in the design of hardware, early operating systems, and content. Larger 3D displays and multi-screen games enabled greater immersion in the late 1980s and early 1990s. IM gaming is now considered as a new frontier and is following the development of mobile gaming by moving from laboratory to location-based settings.

The evolution of EM in instructional technology:

The development of multiple media inspired educators to use then-novel technology to enhance teaching. Compared to other contexts, including business and entertainment, the adoption of technology in educational settings typically happens later. In 1914, the visual instructional movement was formally studied, which marked the beginning of the promotion of technology in education. However, the use of technology in schools was often limited (Saettler, 1990), perhaps as a result of scepticism and the high cost of new technologies.

When sound recording and transmission technology evolved in the 1930s, educators started using audio resources in instruction more often. The audiovisual instructional movement evolved from the visual instructional movement as a result of the addition of audio (McCluskey, 1981; cited in Reiser, 2001).

The concentration on military training during World War II was notable. Training videos and other instructional material were hurriedly produced to develop soldiers' skills. The continued development of visual resources for tasks like aircraft recognition as well as audio materials for foreign language instruction was driven by the requirement for rigorous and efficient military training. Flight simulators were created to teach pilots using some of the first VR components (Saettler, 1990). These simulators were forerunners of instant messaging, where students could practise handling real-world scenarios in technologically advanced environments.

The 1940s' success of audiovisual training for the military revived educators' desire to use audiovisual resources in the classroom, which in turn sparked interest in instructional television (Reiser, 2001). However, despite TV becoming more and more affordable, the development of educational television remained constrained. Some people criticised educational television for being little more than a screen-based reproduction of lectures rather than adding anything to the educational process (ibidem). However, new interactive technology, like as computers and eventually the Internet, were much better received by educators. As a result, using computers for studying and teaching is commonplace in the present day. Although they are becoming more popular, instructional video games are still not considered to be a reliable educational method.

IM did not catch on in the same way that radio, cinema, and television did as acceptable educational medium. One of the oldest attempts may be seen in the 19th century, when pupils could see and learn about far-off places thanks to stereoscopic vision, a crucial component of VR systems. This method was well-liked in classrooms during the middle of the 20th century (Saettler, 1990), but newer technology like TV eventually took its place. With the advent of the latest generation of IM technology, interest in IM is just now resurging.

The current state of virtual reality (VR), augmented reality (AR), and mixed reality (MR):

As we have seen so far, EM was used for educational purposes far later than it was exploited by industry. By using elements of Miège's theory of edition and distribution, one may assess the likely course of IM. That is, to look at the ways that editors are using to produce material as they change, as well as the features of dissemination related to where and how IM are utilised. An important guide to understanding how to access and potentially use these new technologies is to understand how IM content is produced and disseminated.

VR edition and distribution:

There are two ways to produce VR content. The first makes use of gaming engines like Unreal or Unity. The second technique entails converting video or picture information into a 360° or 180° format. Similar to apps in app stores, game engine-generated content is released with an image, a title, a teaser, and a download link.

An estimated 28 million VR headsets were sold between 2016 and 2017. (statista.com). Even if sales are predicted to increase with more practical and affordable devices, like Facebook's Oculus Go, as well as with comparable products from rival firms like HTC, this industry is still a limited one.

The second method through which VR is distributed is location-based experiences, which is quite similar to the method that existed for TV sets at the beginning of that medium. This implies that the audience travels to the location, pays the

entrance fee, and then engages in offline experiences. Game-based destinations include the VR Zone in Tokyo and VR parks in China or Dubai. Additionally, there are venues built around movie theatres, such MK 2 VR in Paris or EVRBIT in Cologne. Users can have a private experience on their own device at the MK 2 VR site. The EVRBIT strategy is more group-based. A video-based experience is being seen by up to 500 individuals at once in an environment like a movie theatre.

AR edition and distribution:

The editing process for AR material is slightly different from that for VR, and it is mostly delivered through specialised applications and networks, either by companies like Facebook, by individual suppliers via app stores for Android and iOS devices, or by companies in the gaming industry. New possibilities are also becoming available, such as a collaboration between Apple and Pixar, a Disney animation studio, to supply devices and a distribution infrastructure, and Adobe to give tools for generating and editing material. This collaboration serves as an example of a greater movement toward cooperation.

In 2016 and 2017, 500,000 AR gadgets were reportedly shipped, significantly less than the number of VR headsets sold (statista.com). Growth is made feasible moving ahead because of the modest user base. The primary method of distribution is through applications found in standard app stores for Android and iOS, in addition to sites like Facebook, Sketchfab, or the Firefox browser.

MR edition and distribution;

MR combines artificially created surroundings with real-world or photographic settings. Apps are used to deliver the experiences. Some of these applications are also compatible with gadgets like the Magic Leap or HoloLens, which enable content projection onto transparent glasses. This allows the audience to experience MR while still being able to see their surroundings.

In August 2018, MR was still in its infancy. Only specialists should presently use Microsoft HoloLens. Magic Leap, a US-based business, has released the Magic Leap One, a head-mounted virtual retina display. The mass market cannot yet afford this MR technology. However, if we look at other emerging technology, we may expect that the cost will fall fast.

The major channels for MR content distribution are the app stores for connected systems like Magic Leap, Windows MR, and HoloLens. Microsoft claims that as of 2017, less than 100,000 HoloLens devices were sold annually (Warren, 2017). The HoloLens applications are not made available to the general public since they are frequently utilised for business purposes.

II. CONCLUSION

The term "immersive technology" encompasses virtual reality (VR), augmented reality (AR), and mixed reality (MR), which are known for their highly engaging characteristics. Instant messaging (IM) is often seen as innovative concepts, which can be true when considering its comprehensive and cohesive structures. Nevertheless, the media industry and education have extensively researched the technological and psychological aspects of IM. We analyze the extent to which the historical development of established media (EM), including film, TV, radio, and video games, mirrors the current path of improvement in interactive media (IM). Based on our analysis, it is highly probable that Instant Messaging (IM) will eventually integrate with Email Messaging (EM), and as a result, it should not be perceived as a temporary trend. It is imperative for educators to allocate sufficient time and resources to explore the potential of IM technology in education.

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