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Possible impact of Virtual Reality and Augmented Reality on Media Society

Abstract

Ever since various technologies started to develop at such a rapid pace, people's lives have been forced to adapt to a new reality. For over a decade now, people have spent significantly more time using digital devices. Following Jung (2005), interactivity is what most attracts people to digitality. As is commonly known, although digital devices seemingly give us an opportunity to keep in touch with friends all day long, they may produce feelings of loneliness. While smartphones and computers are already part of human life, a technology that has been developed in the past years and has found another use is Virtual Reality (VR). The possible junction of Diamandis (2020) and Marr (2020) ideas may lead to a change of the world as we know it. Although its impact is not yet fully present in our lives, the author believes it necessary to discuss the possibilities and dangers that may appear in the next few years, assuming the constant development of technology. VR technology is already present in specialized professions such as aviation (Lele 2011), the armed forces and medicine (Müller-Wittig 2011). Moreover, while VR has found interest in other industries, it is not always effective, as without special training the user might experience a kind of information overload (Yen *et al.* 2012). Nevertheless, not only training can be conducted, as VR also finds interest in the educational sector and might be used in virtual lessons (Du 2014). The article strives to presents a new look at the issue of VR's and AR's possible influence on media society. In this article, the advantages and disadvantages of Virtual Reality and Augmented Reality are gathered, analyzed, and then assessed. The author believes that this paper constitutes an attempt at highlighting the most important issues from an interdisciplinary perspective, linking a scientific perspective with a humanities-based viewpoint.

Keywords: virtual reality, augmented reality, development, impact, society, interdisciplinary perspective

Introduction

This publication intends to help to understand the social impact of Virtual Reality and Augmented Reality possible future due to its development. VR and AR are gaining more popularity what forced the author to gather and analyze the current state of studies in the field. The author did exploratory research to gain an overview on its possible outcome on different people and possible future.

In the modern world, people depend on digital devices in order to carry out their daily activities. Technological development has led to a situation where a person who does not possess a phone or a computer is not able to perform many activities necessary in various professions. As we know, mankind does not stand still and is constantly striving to develop. Thus, devices that are initially beyond one's imagination or considered novelties, soon become essential elements of our lives. With subsequent technological progress, the use of three-dimensional graphics, popular in recent years, no longer produces satisfactory results. Hence, in an effort to achieve a better experience for the viewer, a technology was developed to involve not only one's sense of sight but also one's body movements.

As Jung (2005) wrote, it is interactivity that is the future of television. Connecting the computer and TV in a one place can significantly encourage the user to spend time on a such an activity. In turn, the transfer of media to one location results in a reduction of time spent on movement between various places, thus allowing its user to spend more time in the Virtual Environment (VE). Therefore, it is possible to boost sales of multimedia services by increasing the time spent in the VE. Such a development would lead to the creation of a new sales model based on solitude and virtuality, a phenomenon which will be further discussed in this article.

Difference between Virtual Reality and Augmented Reality

The technology which is constantly evolving, gaining use in more and more industries and combining interactivity with rendering 3D graphics surrounding its user is Virtual Reality (VR). The first projects involving the creation of a virtual world based on real feelings, sounds and interaction with the user began to appear in the 1950s (Mazurczyk 1999). On the other hand, it is hard to pinpoint a specific date of its invention, as the way of defining the virtual space has significantly changed in the meantime. It is worth emphasizing, however, that it is the development of the technology and the equipment that is used to create such a space which has had the most important impact on our perception of VR.

According to Gregory Coats (1992), a pioneer of live theatre using HMD (head-mounted display), virtual reality can be defined as the electronic construction of an experience through a digital display in the form of goggles (HMD) facilitating movement in a three-dimensional surreal world.

On the other hand, Myron W. Krueger, an artist who uses virtual reality in his works defined it as a term that "(…) typically refers to three-dimensional realities implemented with stereo viewing goggles and reality gloves" (Krueger 1991: xiii). Therefore, by gathering all the perspectives together it can be demonstrated that defining VR itself is not a simple task and varies depending on the person defining it, which, of course, can lead to problems in how it should be properly understood. As VR has been evolving for many years now, recently this technology has been extended to include Augmented Reality (AR). The latter, which does not exclude the user from the real world, only adds extra elements to it. Ronald Azuma, who has made significant contributions to the development of AR defined it as:

> [A] variation of Virtual Environments (VE), or Virtual Reality as it is more commonly called. VE technologies completely immerse a user inside a synthetic environment. While immersed, the user cannot see the real world around him. In contrast, AR allows the user to see the real world, with virtual objects superimposed upon or composited with the real world. (Azuma 1997: 2)

Human senses in Virtual Environment

While VR and AR are possible to define, the question subsequently arises as to how the virtual environment works. It is worth noting that, in both cases, these technologies require more space than a standard computer, as they produce something that surrounds the user in space. In order for a person to interact with an artificially created world, it is necessary to have specific software. This focuses on user eye movement data collection with the use of a tracking device in the HMD and then instantly processing it, which in turn allows one to create a projection of virtual surroundings for the user. For the whole process, this software must use both input and output devices, first collecting the gaze direction data and then processing and projecting it as a 3D space (Krueger 1991). Longer delays in processing the data and producing the image may disrupt the experience of transferring to VR or may interfere with the process of properly overlaying objects in AR, due to incompatible stimuli being perceived differently by various senses (Sherman and Craig 2003).

Sherman and Craig (2003) indicate three senses – visual, aural and haptic that generates most of VR experience, enhancing the immersion. Nevertheless, they do not point out the importance of each one as the feeling is created together. Having a look on visual presentation properties color, spatial resolution, contrast and brightness do really matter and affect the accuracy of VR in a specific industries. Its importance is slightly smaller in entertainment, however it still does matter. On the other hand aural part of VR is not such a big worry of the designers as it requires less computation. Nonetheless important aspects of aural presentation are number of display channel, sound stage and localization. The last of highlighted senses is not neglected, however engineers focuses mostly on a stimuli send to fingers. They are used to perform most of daily activities as well as have lots of tactile nerves.

On the other hand, according to VR technology pioneer Morton Heilig (1992), the dominant human sense is vision, which provides more experience to the brain than all other senses combined. Hence, it is worth emphasizing, that during the construction of HMD devices, attention is mostly focused on the organs of sight which, using the appropriate software, aim to convince our brain to find itself in this other reality, or to contribute to its expansion. While analyzing visual issues, as in the real world, objects located at distances other than the fixation point will be seen double by the brain. The difference between the real world and the virtual world is outlined when it comes to acuity, as in VR whether one's gaze is focused on something at a far or near distance, all objects are seen clearly. However, this also causes a problem as if the eyes are not aligned properly, all objects will be seen out of focus (Rolland & Gibson 1995). Hence, an important aspect in the design stage of HMDs is to pay attention to the proper functioning of the user's accommodative-vergence system. On the other hand, regardless the effort of maximizing efficiency, the excessive use of the technology may cause vision problems (Takaaki *et al.* 2018).

Nowadays, our limitation of the virtual world is determined by the time spent using VR glasses. Furthermore, not maintaining visual hygiene can lead to nausea, dizziness, asthenopia (eye-strain) problems, orientation disorders or binocular vision disorder (Kim *et al.* 2012). A possible cause of such symptoms is accommodative-vergence conflict, commonly referred to as accommodative-vergence mismatch. This involves a difference in the stimulus for accommodations related to viewing distance and the stimulus for vergence, which in turn requires the eyes to be directed in the intranasal direction according to the viewing distance. While this problem does not occur in the real world in people without visual impairments, it is common in virtual reality, where the brain is not always able to match stimuli appropriately (Kramida 2015).

VR applications

The primary goals of designers of virtual spaces change depending on their purpose. In seeking an environment where VR and AR technologies are widely used, the field of medicine is a good place to start. Both technologies are extremely helpful in conducting training techniques and in practical real-time use. In medicine, VE engineers not only seek out opportunities to create virtual models of the human body, but also to detect changes in the patient's body during surgery. In addition, the use of this technology supports the activities of medical specialists, giving them the ability to accurately x-ray the patient's body (Müller-Wittig 2011). This is undoubtedly a huge technological step compared with what the work of doctors looked like before its arrival. When analyzing the use of such technologies in medicine many beneficial aspects can be found. In fact, they are not only limited to minimizing errors, increasing efficiency and safety, but in some cases could result in saving one's life.

The next field where VR and AR have found application is in the military. Its popularity in the above-mentioned field is determined by the possibility to conduct risk-free military training. During such activity, virtual conditions of threat or danger can be generated using the latest equipment. Meanwhile, the soldier's life and equipment used are not endangered. However, despite its undoubted advantages and low costs of virtual reality these days, VR cannot fully eliminate real training due to physiological factors. The use of VE in the armed forces is not only limited to training as AR can be extremely useful in real combat, whether on the ground, in the air, or on water (Lele 2011). Considering the multitude of benefits, the technology still needs to be refined. Thus, research in this field aimed at improving VR and AR is being conducted.

In analyzing the common denominator of the industries discussed here, it can undoubtedly be seen that the process of learning professional skills links them together. Education conducted in conditions similar to those in the natural world, at the same time extending it with additional ones, provides one with the possibility of learning quickly. Furthermore, the learning process is not limited to medicine or the military, but has significantly broader prospects, such as the idea of its use in high-school or university teaching (Freina & Ott 2015). Research shows that using additional stimuli during learning engages the viewers more, allowing them to gather new experiences. However, as Xiao Du (2014) pointed out, as VR blocks the possibility of communication between students, AR is gaining more popularity in education. In following the studies of this Chinese researcher, we note that providing new technology to users delivers enough interest to increase not only their engagement and facilitate understanding, but also to enhance their learning effectiveness. Also, Darlene Christopher (2015) showed that VR might be used during lessons to enhance the interest in some topics as in history. However, this raises the question of whether the new technology works this way because it is still a curious novelty to the subjects involved or because it is able to create memorable experiences for them that they are not able to experience having only contact with stimuli produced in the real world.

In educational sector, there is another possible usage of VR. Teachers can check themselves and practice how to organize lessons with bots to see they understanding of material. Such an idea gives a space for them to enhance their teaching skills and get prepared for a real lessons. (Gregory *et al.* 2016) Nonetheless bots can never substitute real people so their comprehension of provided material might differentiate. Thus, its important to bear that in mind.

In examining VR and AR's possible expansion into tourism, various advantages may be found. At first, customized virtual environments might help to attract one's attention and produce pleasant experiences. In addition, transferring one's experience to VE can significantly lower the cost of travel, while at the same time being extremely convenient. Thus, such benefits might enhance people to do so. On the

other hand, the Virtual Environment is not yet able to bring out the same emotions as visiting a location in the real world would. This is why virtual environment developers still strive to enhance the sensation of immersing oneself in the real world (Guttentag 2010). For now, an interesting option seems to be promoting a 'try before you buy' experience, which could allow users to see the place they want to visit before going there (Flavian *et al.* 2019).

New communication type

In viewing VE technologies from another angle, extending reality with virtual additions may, at the same time, cause some risks. As Eric Sabelman and Roger Lam noted, augmented reality:

> [O]verlays information on a person's view, obscuring it to some extent and potentially causing distraction. The difference is that an aircraft head-up display typically shows information in a highly symbolized and minimalistic way, with little text and no images of people. (Sabelman and Lam 2015: 50)

The use of this technology by people specialized in fields such as aviation can produce a wide range of benefits. In contrast, most people, without special training, may experience a kind of information overload. AR and VR are, for now, directed towards specific industries, varying with the software required. Indeed, if this technology was more widely used in everyday life than it already is, people could have trouble assimilating the amount information being produced. This in turn could lead to even greater problems with interpersonal communication. In recent years, with the huge increase in the popularity of the Internet, it has been observed that a new type of communication has been created. Thus, previous face-to-face conversation is no longer the only communication type (Yen *et al.* 2012).

As the overuse of smartphones and other electronic devices is already causing communication problems among young people, we can only imagine what the spread of augmented reality could lead to. Since the use of digital devices has spread far and wide, the current object of interest is the impact of social media on society. On the one hand, it allows people to communicate, while on the other it disrupts their mental health. Based on the research of Hou *et al.* (2019), it is noticeable that social media addiction is linked with the low self-esteem of the user. This is why social media is now actually being used to raise self-esteem and to improve mental health, especially by people who struggle with such issues. Furthermore, it has a negative impact on learning results. A study conducted by Wang *et al.* (2011) shows that decreasing the time spent online raises school grades. Thus, the authors link it to distraction and argue that multitasking actually works against achieving good results. However, social media platforms try to attract their target audience the best they can. Bearing in mind how badly social media can impact students' lives, it is important not to neglect this phenomenon while considering VR and AR. Indeed, if we consider that for now we struggle with information overload significant enough to disrupt our studying practices, then what can the possible further development of VE do?

There are possible extensions of the above-mentioned technologies that at the same time bring about advantages and disadvantages. Peter Diamandis (2020) in his '20 metatrends for the 2020s' suggested two possible trends in VR and AR technology. One of these involves a combination of AR technology with 5G technology, which could change many areas of transmitting data. Fast data transfer could provide one with a space to play, learn and shop using data superimposed on the real world. The second of these presumes that the use of VR technology could change current shopping methods. There would be no need to leave the house to buy clothes, or even real estate, by combining Artificial Intelligence with

VR. This could possibly result in enhancing sales of myriad products. Moreover, the perspective of VE development presented by Bernard Marr assumes that:

> Eventually, AR lenses could potentially be used to augment the world around us, so we could see whatever we wanted. Let's say you hate the garish paint job your neighbors have done on the exterior of their home. In the future, your lenses could change it for you, and you'll see whatever color house you choose. (Marr 2020)

While analyzing his thoughts here, it is worth emphasizing that Marr proposes excluding uninteresting images from our sight. Such an idea could make an area seem more beautiful to a particular person. However, this way of imposing elements on reality could generate myriad solutions to perceived problems of one's neighborhood being seen by different people. Even without the use of this technology, one's perception is a task for each individual and every person perceives the world differently. Although the above-presented solution sounds interesting on the one hand, on the other it could create a huge disorder.

Delivering too many changes at one moment could possibly lead to a disruption of reality or an even greater sense of isolation among society. Currently, more than half of UK respondents between the ages of 18-34 report that they often feel lonely, while in the U.S. the percentage of lonely people is close to 50% for society as a whole. (Kurzgesagt 2019). It is interesting to note that a relatively large group of respondents who are in constant contact with society through social media report this problem. In turn, this raises the question about the limits of decency and when a new technology could achieve the opposite of the intended effect. Thus, instead of making our lives easier, it could end up complicating them. Therefore, the question arises whether it is not worth having boundaries imposed from above. Should we not follow the prototype of the real world in order that we stick to laws which limit our actions, and not break them in all sorts of ways?

Homo sapiens predominance

In observing the evolution of the species *Homo sapiens*, one can demonstrate that human beings gained their evolutionary advantage thanks to working in groups and their development of the ability to communicate in a common language. These are the factors that set Homo sapiens apart from *Homo rudolfensis*, *Homo erectus* or *Homo neanderthalensis* and led to them gaining control over wild animals. All the combined factors together led to a change in lifestyle from nomadic to sedentary and contributed to the establishment of cities (Harari [2014] 2019). The development of language, in turn, led to the development of technology and thus the development of humanity. At the same time, it has contributed to a remoteness, or even isolation, from other species inhabiting the planet.

Human nature has always tried to get rid of limitations and achieve the unachievable. The only limitations opposing human beings are the laws of physics, which could not be overcome until now. However, using the advantages of the technology mentioned by the author, in Virtual or Augmented Reality such laws can now be conquered. Once a person has been immersed into a virtual world, the only limitations to be met for the participant are those imposed by the creator of the virtual software. With such technology, one can achieve virtually anything, such as passing the speed of light or disabling gravity to a level achievable only in space. Going beyond the boundaries of the laws of physics that have always limited humanity could lead to a situation which can cause people to fear for the future. According to Yuaval Noah Harari ([2015] 2018), humanity in its development cannot predict where it is going, and it is impossible to determine what the world will look like in the near future. Looking at the future of our species, it is necessary

to distinguish over what period of time we want to see possible changes occur. In the view of this Israeli historian, we will notice that the problem in the coming months will center on internal human conflicts. However, if we shift the horizon and look further ahead, the problem may be a situation where extremely intelligent algorithms without self-awareness know our species better than we do.

Conclusion

In following these new technologies, the question arises whether they will contribute to our development or stop our development and lead to internal divisions. In analyzing AR, we should consider whether it will be able to reach everyone and be adopted by them, or whether it will lead to a division of society into those who will use it, those who will shy away from it, or those who will be excluded from it. Thus, will constant technological progress develop or limit us?

To sum up, mankind has been struggling to communicate and has felt lonelier since digital devices have spread far and wide all over the world. We are faced with the paradox that the longer people can keep in touch, the lonelier they feel. Indeed, it is this aspect that concerns the author about the further development of VR and AR technology. Assuming their constant development and possibilities of using them in everyday life, they could affect one's vision and disrupt human communication with information overload. However, there is a place for its proper use in training and education, while not causing eye-related problems. Furthermore, going beyond the boundaries of the human imagination and overcoming the laws of physics may prove to be a frightening prospect. On the other hand, if this technology develops gradually, it could be widely beneficial and lead to further development. Thus, it is worth seeing both sides of the coin and being conscious about its possible development.

Finally, it might be an interesting idea to set up an interdisciplinary group of researchers from various universities, consisting of opticians, humanists, and maybe even futurists to investigate the problem of VR presence in our life. Such a look would give an opportunity not only to clarify the collected information, but also help to understand different aspects of that topic.

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