

Augmented Reality & Virtual Reality in Teaching, Fact or Truth

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ABSTRACT

Augmented Reality & Virtual Reality are not new technologies. But numerous constraints prevented their tangible acceptance. Recent technological growth added to the large number of reasonable hardware & software have made AR & VR more feasible & required in many area, including teaching; they have been relaunched with new assurance previously incredible. The characteristics of AR & VR promises new teaching & learning models that better meet the needs of the 21st century pupil. We are currently on a path to reinvent teaching. This work consists of amplification the reasons at the back the new increase of AR & VR & why their actual espousal in teaching will be a truth in a near future.

Keywords: -Augmented Reality, Virtual Reality, Teaching, Immersive Learning.

1. INTRODUCTION

Augmented reality & virtual reality are not truly novel technologies. The initial virtual reality headset was produced at the University of Utah in the 1970s by Daniel Vickers. With two screens, the headset provide the chance to user by spinning his head towards the virtual scene. After long time, a new interface which is the data glove (DataGlove) developed. DataGlove produced in 1982, measures the movement of the h& & fingers & commune it to the computer (Fuchs, 2006).

The word "Virtual Reality" was projected in the United States in the 1980s by Jaron Lanier [1]. As for the word "augmented reality", it was invented by researcher Thomas Caudell & David Mizell in 1990 to illustrate how the head-mounted displays that electricians operate when assembling difficult wiring harnesses worked.

The 1990s was previous technological craze of AR & VR. But, at that time, much restraint prevented these technologies from being really adopted by the common public.

In this work, explain why they finally can be implemented in all domains, including teaching & we will dispute in favour of a real advance of AR & VR & We will discover the progress of some technologies that are used in AR. Hence, we will try to verify whether AR & VR are truth & their implementation in teaching is finally possible or are they still a fact.

2. OBJECTIVE

Explain why Augmented Reality & Virtual Reality(AR & VR) can lastly be sincerely included into teaching & learning & show how much their assurance are high.

3. QUESTIONS

There are two vital questions behind this work:

- What makes Augmented Reality & Virtual Reality(AR & VR) a reality no longer just a fact?
- Why Augmented Reality & Virtual Reality(AR & VR) a real new development of teaching & learning? What makes them extra appropriate for the 21st century student than the distinct methods of learning we have known until now?

4. CONSEQUENCES

The characteristics of AR & VR & their recent development thanks to numerous technological development permits a new kind of learning that improved meets the needs of the 21st century learner who wants entertainment, interactivity, participation & manipulation of objects. However, an effectual adaptation of Augmented Reality & Virtual Reality(AR & VR) in teaching & learning will not happen until some technical & social issues are determined & education programs are more modified so as to take full benefit of the capability of these technologies.

5. DISCUSSION

A. Virtual Reality

A desired definition, though restraining, is to consider VR as "human immersion in a synthetic world" [2]. This definition is especially suitable for people who associate virtual reality(VR) with the use of a helmet. &, this is accurately the case that happiness us in this work. contrast to the virtual reality(VR) experiments of the 90s, this technology has enhanced to an imposing degree.

Virtual reality (VR) is a technology that permits us to immerse ourselves in an artificial world; this world can be a completely imaginary universe or only the replica of the real world.

The experience can be visual, auditory &, at times, also haptic¹. This captivation is done using a virtual reality headset that places a stereoscopic 3D display system in front of the eyes (on the nose). Some models are equipped with sensors that detect head tracking to allow the user to look around. The images are then recalculated in real time to synchronize with the direction of the head or gaze. Virtual reality(VR) has required to get the notice of the general public since the 1980s, but without an actual victory. At that time, technologies related to virtual reality(VR) were not known to the general public, but then they stimulate the attention of the media.

Since 2014, virtual reality(VR) dedicated to the general public has been enhance by the arrival of helmets that are both more competent & affordable. The developer edition of the Oculus Rift headset was released in 2013, & it is only in March 2016 that this headset was on the mainstream market. Google was the 1st to play the card of the democratization of this technology by proposing in 2014 a model of VR helmets in cardboard called Google Cardboard & which is used with a smartphone as a display system. Subsequently, other companies have manufactured more advanced versions of the Cardboard, such as Samsung through its Gear VR (the mobile version of the Oculus Rift). Versions of VR headphones connected to a computer or game console are also available on the public market since the year 2016. Besides the Oculus Rift headphones from Facebook, there is HTC's HTC Vive & Sony's PlayStation VR amongst many others. These versions of high-end headsets are more expensive & require the use of a high-performance computer or a recent game console. Less expensive helmet projects that work with underperforming computers are in progress[13].

Giants like Google, Facebook, HTC & Sony (through their Cardboard, Oculus Rift, HTC Vive & Playstation VR helmet) have given a new breath to this technology with promises of real success this time. They are working on gigantic projects to advance this technology & enable its exploitation in several areas, including the field of teaching[13].

The value of adopting virtual reality(VR) in teaching & learning is related in part to the fact that this technology can improve & facilitate learning, increase memory capacity & make better decisions while working in entertaining & stimulating conditions. In fact, when we read textual content (on a printed document for example), our brain uses a process of interpretation of everything we read, which increases our cognitive efforts. In the case of the use of virtual reality, the process of interpretation is reduced because there are fewer symbols to interpret & the

understanding is more direct. For example, it is easier to understand how a machine works by visualizing the process of its operation than by reading a textual explanation. &, when the visualization is in 3D / virtual reality(VR), it is even clearer. Having physical access to all what we learn is not possible, hence the importance of VR, which allows us to access every- thing we want, virtually, as if we really are there. The learner can for example explore the moon or the ocean floor or the state of a place as it has been in the past. This allows a better understanding of things & phenomena with less cognitive efforts on the part of the learner, & less cost for the institute that deals with learning. The learner feels more engaged, more motivated & more receptive & ready to learn & communicate with others. Virtual reality-based learning has been proven to in- crease learners' level of attention by 100% & improve test results by 30%[13].

B. Augmented Reality

Unlike virtual reality(VR) (which leads to total immersion in the artificial world), augmented reality(AR) refers to a virtual interface, in 2D or 3D, that enhances (or augments) what we see by overlaying additional information (digital content) onto the real world. Immersion in the virtual world is not total, because we can always see the real world around us.

augmented reality(AR) works through a device that films the real world & inverts live virtual objects, animations, texts, data or sounds that the user views from the screen of a computer, a smart phone, a tablet, a pair of glasses, a headset or any other on-screen display sys- tem. The real world & virtual information are synchronized thanks to geolocaliza- tion & embedded sensors (accelerometer, gyroscope) that locate the user in relation to his environment & adapt the display to his movements.

Until 1999, AR was confined to scientific research labs. Equipment was expensive & software complicated enough to make the normal user unable to deal with such a technology. The release of ARToolKit2 to the open-source community by H. Kato & Billinghurst in 1999 gave a new start to that technology. At that time already, they proposed an augmented reality conferencing system, which uses the overlay of virtual images on the real world & allows users to collaboratively view & interact with virtual objects using a shared virtual whiteboard [3]. In recent years, AR has attracted the interest of several actors around the world: Total Immersion, Wikitude, Layar & many others. Since then, this technology has evolved & became widespread thanks to the accessibility of smart phones & tablets. The manufacture of AR glasses such as Microsoft's HoloLens has boosted interest in this technology. Promising projects are in progress & will allow the real exploitation of this technology in all areas, including the field of teaching.

Among the works done so far on how advanced technologies can be harnessed to enrich teaching, many see AR as an effective tool [4]. Numerous studies have re- vealed positive effect of VR on the learning process [5]. This technology makes it possible to interact with objects that belong to the virtual or real world, to learn through experimentation, participation & interactivity, to increase motivation & attention of the learner [6]. Learning becomes more enjoyable & effective, even when it comes to exploring & knowing abstract concepts or complex phenomena, & this thanks to the possibilities of visualization & realization of the concepts that this technology makes accessible to the learner [7], [8].

AR tools & applications, including those dedicated to the field of teaching & learning, are numerous & evolve quickly. Experts predict that in the near future, AR will be the new computing platform. Screen machines, such as computers & tele- phones, will be replaced by immersive devices based on VR & AR. The HoloLens augmented reality helmet from Microsoft has already gone in this direction. Accord- ing to Pamela B. Davis (Dean, School of Medicine at Microsoft Build 2016), students will be allowed to learn using the most forward looking teachingal programs & HoloLens is a key part of this. It may be the next big transforming & change in medical teaching & many other fields. Oculus' John Carmack ascertains that the next 5 years will technologically & creatively take this medium some place we have never imagined3 [9].

The areas of application of augmented reality(AR) affect entertainment (including video games) as well as tourism, architecture, medicine, teaching, industry. In the sector of teaching & training, it allows technicians, for e.g., to learn new procedures in real conditions. Faced with a new device, the person can discover the disassembly procedure step by step by seeing the instructions appear in real time.

HoloLens for example allows medical students to manipulate & visualize the human body with unprecedented accuracy [10].

In the cultural field, augmented reality applications allow tourists or museum visitors to discover the history of places or works by simply pointing the camera of their smart phone in their direction.

According to Kurubacak & Altinpulluk [11], AR provides numerous teaching benefits. For students, these benefits can be summarized as: courses' being fun, reducing cognitive load, increase in motivation & interest towards the course, increased opportunity to ask questions, increase in interaction between students, new opportunities for individual learning, concretizing abstract concepts, rise of success. As for teachers, these benefits consist of contribution to the development of creativity in students, ensuring effective participation of students to the course, students' being able to carry out the course with their own pace.

C. Recent Advances & New Perspectives

Advancements in augmented reality(AR) & virtual reality(VR) do not concern only hardware, but also software. Dash takes full advantage of touch & unlocks the entire power of computers allowing the manipulation of desktop apps from inside the VR environment. virtual reality(VR) as a computing platform will soon be no longer just a project, but a reality. Dash is meant to be a massive step forward for VR & will make it a fundamentally new computing platform, one we will use every day to work, Oculus Home & Facebook Spaces5 show that VR is not only for entertainment, but can be used for all our activities, including communication & socialization. This should attract the interest of most of those reticent people who argument against VR as simply an entertainment medium[13].

Accessibility of VR & AR is another element that should help to popularize these technologies. Google was the pioneer in proposing cheap VR platforms & headsets that started with Google cardboard in 2014 (The first VR platform & VR headset). In 2016, Google introduced a new VR platform & headset called Daydream (that costs less than 50 \$).

Accessibility of VR being very important, Oculus has been working on the project of new headsets that are more available. To profit from the best quality VR headsets like Oculus Rift, we had to own an expensive computer (that meets the needs of Oculus Rift). & Oculus Rift itself was proposed for 700\$. The Oculus Gear VR too necessitates the new brand Samsung smart phones (Samsung S6, S7, S8 or Note).

Now, thanks to standalone headsets like the Oculus Go, we no longer need a computer nor a smart phone. Oculus Go allows a high quality VR experience & costs less about 200\$ for the 32GB version & 250\$ for the 64GB one. & the oculus Rift itself is more affordable (about 400\$). Apple is working on a AR glass called iGlass which will be released soon & should open new perspectives for AR. We also notice the accessibility of 360° cameras that allow everybody to take photos or videos in VR/360°. For 170\$, Samsung Gear 360, for example, allows to capture high quality VR photos & videos (4K videos & 15 MP still images). Other VR cameras cost less than 100\$. Few additional improvements on these 360° cameras will make the production of VR videos & photos accessible to everybody[13].

6. CONCLUSIONS

The key purpose of this work was to validate to what extent augmented reality(AR) & virtual reality(VR) have developed & whether they are now established enough to be integrated in teaching programs. Many recent h/w & s/w development show that in a near future reality(AR) & virtual reality(VR) will be reliable enough as new computing platforms. This assure extreme modification & new teaching & learning models that should satisfy the needs of the learner of the 21st century who no longer thinks the same way as in the 20th or 19th century. Engineers must propose augmented reality(AR) & virtual reality(VR) headsets that are more relaxed & understandable. A extended use of the augmented reality(AR) & virtual reality(VR) headsets proposed for now causes some uneasiness. Persons connect to teaching, they must deploy more forward teaching programs that fit well with the nature of these technologies & fulfil the needs of the learner. When use properly, these technologies can create enhanced contemporary educational environments & enriched learning chance for students. In all cases, it is certain that in the next few years augmented reality(AR) & virtual reality(VR) will transfigure the way we interact with the real world & will be widely accepted in all domains. They will no longer be only a fact but a truth.

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