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Letter to Editor

Virtual reality: A new window to medical education

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Dear Editor,

In today's world, the technology of "virtual reality" (VR) stands as one of the hottest and most engaging topics in the field of learning technologies. The introduction of this technology and its potential usefulness to medical education practitioners in the developing world has become indispensable; this paper aims to fulfill this objective.

Three decades ago, digital technology in the field of graphics and three-dimensional (3D) photography helped simulate reality (real-life).[1] Such simulation is called VR. In the most commonly used model, VR contents can include layers of images, graphics, or 3D videos inspired by real life, which can be observed in a 360º viewpoint through the operating system of a smartphone, including Android or iOS, together with a special headset, or even interacted with using motion sensors. The 360° view and the ability to track and interact with subjects creates both a deep sense of exposure in a vast and realistic environment and makes the presentation more attractive and more intimate to the user.[2]

Although VR technology was initially costly, had a weak turnover, and its content production required a great deal of work and processing power, recent technological innovations and the rapid and widespread adoption of mobile phones have greatly facilitated access to and feasibility of VR to users. Several huge companies such as Google, Microsoft, Apple, Facebook, Samsung, and even LG Corporation have made considerable investments in VR technology applications[3] with the goal of gaining a major share of the VR market in the near future.

At the moment, VR technology is being used in a variety of areas, such as education, industry, video games, medicine, aerospace, nuclear energy, and tourism, thereby attracting large budgets for its development. For example, the investment made in this area was only $1.2 billion in the first quarter of 2016, and it is estimated that the investment will be $120 billion by 2020.[3] A major part of such a large investment – and profit sector – is the production of VR content and the manufacture of interactive devices, such as relevant headsets (glasses or monitors).

In 2016, it was announced that although VR technology had already come to homes, it will transform in the next ten years into a routine technology encountered in daily life through personal electronic devices such as smartphones.[4,5] Accordingly, creation of more serious applications is expected to accelerate in other sectors such as education. This development is happening much faster than anticipated, as VR applications are now available to educational institutions and learners in advanced countries.[6]

Access by educational designers to VR technology has made it possible to provide learning content in a virtual environment, which is much like what is being performed in the real world. Such simulations become especially important when it is hardly possible to present relevant scenarios in the realm of objective reality, for example, in the classroom or the educational lab. For instance, the simulation of the 360º cytoplasmic bacterial space and the 3D visualization of its components from the perspective of an internal observer make learning about the bacterial cell's structure completely exciting to learners as well as different from what has been possible to present today.[7] It also enables students to enter a virtual lab that facilitates familiarity and interaction with advanced tools and devices and the possibility of carrying out experiments that would normally be performed with hazardous chemicals or harmful microorganisms.[6] Access to clinical simulators

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by medical students and assistants is a further advantage provided by VR whereby physiological examination of rare medical cases or some types of surgeries could be fulfilled in a virtual manner.[8] In addition, access to simulated models of expensive and hazardous machinery has greatly facilitated familiarization with the way these machines operate. For example, learning the principles of practical applications of medical radiation devices, the way radiopharmaceuticals are produced, or control of the flight process by the pilot in these respective simulators are definitely effective ways to reduce costs and eliminate risks in the process of learning such techniques. Studies indicate that learning in the VR environment operates on the basis of constructivist theory: the psychological and cognitive processes that occur when one gets involved in the contents of the VR are very similar to those that happen at the time of constructing knowledge through interaction with subjects and events in the real world.[9]

At present, the production of real-world multimedia is costly compared with other multimedia technologies. While in the short term this has affected the technology's penetration rate in the field of education, the fact still remains that a one-time investment in this area can yield effective, continuous and secure development of virtual learning scenarios over and over again.

The considerable and extensive possibilities provided by VR technology will make it possible to break through boundaries and change styles of education. VR can immerse learners into learning by providing learning environments that are much more exciting and powerful than conventional multimedia, and thereby increase students' eagerness to encounter educational interactions,[10] multiply educational productivity, and increase students' willingness to use e-learning technology.[10-12]

The valuable potential created by VR to redefine learning situations and to deepen learning in the medical sciences, in particular, should be introduced to educators, students, designers and planners in medical universities, and needs to be invested in and planned for on a macro level in order to produce and develop learning content based on this technology. Certainly, facilitating the production of such learning content can increase the capacity to use VR technology in the field of medical education in the country.

Ethical approval

Not required.

Competing interests

None.

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