Serious Games in Healthcare

Authors: Saadatfard O, Årsand E.

Serious games are defined as games in which education is the primary goal rather than entertainment [1]. E-Learning, military training and healthcare are examples of disciplines where serious games are used to combine novel interfaces (e.g. virtual reality headsets, mobile devices and wearable sensors) with a wide range of pedagogic approaches to deliver high-fidelity multimedia content for educational purposes. The following are the main areas [1,2] of using serious games in healthcare:

Serious games for rehabilitation:
The main aim of these games is to improve cognitive and motor skills of patients during the rehabilitation process by making the exercises easier and more fun compared with the traditional methods through using simulation and virtual reality (VR) environments. Computer Assisted Rehabilitation Environment (CAREN) [2] is an example of use of serious games in rehabilitation.

Serious games for health promotion and education:
Depending on the target population, these games focus on aspects such as raising awareness, diet, exercise, hygiene and social abilities. *Air Academy™: The Quest for Airtopia*, to raise awareness for asthma symptoms among primary school students and *The Fantastic Food Challenge*, to educate mothers between the ages of 18 to 50 on healthy food choices are examples of such games [3]. Diabetes self-management is another area that can benefit from serious games to motivate patients for treatment adherence. A review of serious games for adolescents with type 1 diabetes identified significant gameplay features of games for health and presented an example of a smartphone serious game developed for children with type 1 diabetes [4].

> Serious games are defined as games in which education is the primary goal rather than entertainment. Serious games are used in healthcare mainly in the following four areas:
> 1. Improving cognitive and motor skills in rehabilitation
> 2. Health promotion and education
> 3. Medical education
> 4. Patient distraction during painful treatment

Use of virtual reality-based training for medical education is on the rise. Photo: Colourbox.com

Serious games for educating and training healthcare professionals:
These games form training tools that provide a simulated environment directed at reducing medical errors and subsequent healthcare costs [4]. Using game-based simulation to train interdisciplinary

teams of healthcare professionals on topics such as acute and critical care (e.g. *Virtual ED*), triage and incident response (e.g. *Code Orange^TM*) as well as simulation based virtual operating rooms for surgical trainees (*Total Knee Arthroplasty* game) are a few examples of using serious games for medical education [5].

Video games for distracting patients during painful medical procedures:
The immersive characteristic of video games and virtual reality have been shown to be effective in focusing a patient's attention away from the pain caused by their treatment. For example *Street Luge*, a fast-moving reality-based world in which the player races downhill lying on top of a big skateboard by Fifth Dimension Technologies (5DT), showed positive outcomes in a study [6] to test the efficacy and suitability of virtual reality (VR) as a pain distraction mechanism during paediatric intravenous (IV) placement.

For more information, contact:

Eirik Årsand, Professor
+47 992 43 592
eirik.arsand@ehealthresearch.no

References

1. Michael D, Chen S. Serious Games: Games That Educate, Train, and Inform. Thomson Course Technology PTR; 2006. P17 and P180. ISBN: 1592006221
2. Bartolomé NA, Zorrilla AM, Zapirain BG. Can game-based therapies be trusted? Is game-based education effective? A systematic review of the Serious Games for health and education. In: Computer Games (CGAMES), 2011 16th International Conference on 2011 Jul 27 (pp. 275-282). IEEE.
3. Papastergiou M. Exploring the potential of computer and video games for health and physical education: A literature review. Computers & Education. 2009 Nov 30;53(3):603-22.
4. Makhlysheva A, Årsand E, Hartvigsen G. Review of serious games for people with diabetes. Handbook of Research on Holistic Perspectives in Gamification for Clinical Practice. 2015 Sep 1:412.
5. Graafland M, Schraagen JM, Schijven MP. Systematic review of serious games for medical education and surgical skills training. British journal of surgery. 2012 Oct 1;99(10):1322-30.
6. Primack BA, Carroll MV, McNamara M, Klem ML, King B, Rich M, Chan CW, Nayak S. Role of video games in improving health-related outcomes: a systematic review. American journal of preventive medicine. 2012 Jun 30;42(6):630-8.