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SCIENTIFIC LETTERS

Gamification, serious games and action video games in optometry practice

Gamificación, juegos serios y videojuegos de acción en la práctica optométrica

Introduction

Gaming mechanisms applied in other non-game context, and the use of specific games to raise health conditions are becoming more and more popular in our society. In this article we suggest why it might be interesting to introduce gamification, serious games and action video games in order to know why these topics may help our optometry practice or future research in vision science.

Gamification

Gamification is a term for the use of video game elements in non-gaming systems in order to improve user experience and engagement.[1] Videogames use a specific pattern to improve motivation and create a positive experience to keep players immersed in the game and even feel the sensation of contributing and being a part of it. There are some studies that show the positive results of applying gamification for health interventions,[1] therefore, the aim of this letter is to suggest how and why it could be important to implement gamification for optometry purposes. One important factor, for instance, might be the use of game elements to increase the patients' compliance for occlusion in amblyopia, contact lens replacement or vision therapy home-exercises. We might be able to create game mechanisms to keep our patients more engaged for our clinical purposes. Game tips[2] might be: (a) create a points score when patients achieve some levels or objectives, (b) create performance graphs to show the patients their improvement or (c) have some positive reward when patients reach a threshold of points or hours. Let's show an example using game mechanisms in contact lens care compliance. If the patient comes to our store every adequate lens replacement time, we can reward them with an extra contact lens solution.

Serious games

Another important thing related to gamification is the term ''serious games'', which means a specific game applied to purposes other than entertainment.[3] For instance, in health, there are some games designed to improve attention and cognitive resources, such as Akili[4] or games to manage your pill routine, like Mango Health.[5] Serious games (or applied games) have to be designed with some premises: (a) fair design for every customer, (b) fair challenges, (c) significant decisions, (d) points and rewards and (e) some details and secrets in the game. Not every game would be useful to improve some specific health conditions, because commercial games are designed to be played, not to improve health. However, some commercial games have been used to improve reading performance in dyslexia[6] or visual acuity, spatial attention and stereopsis in amblyopia.[7] In their study, Li et al.[7] demonstrated an improvement in a wide range of visual functions in adult amblyopia using action-video games (Medal of Honor Pacific Assault) in contrast to non-action video games (SimCity Societies) with a cross-over experimental design.

There is a growing amount of research showing serious games related to visual system such as visual deficit in brain lesions[8] or vision screening.[9] New applied games might also be useful to improve visual skills, or increase the compliance to contact lens care or even employ them for myopia management (re-educate distance viewing or screen-time exposure). Learning through games for optometry purposes could be the next step to develop more strategies in our practice. Let's show another example in contact lens care compliance. Think about a game where the main character has to save the world solving puzzles related to contact lens replacement. Maybe the contact lens care education could be better with this applied game and then the compliance might increase (also the real challenge here is to create an engaging game with this idea).

Action video games

Another aspect to be considered as optometrists is the amount of research showing that action video games (AVG) could increase visual attentional resources, thereby being an interesting tool to use in vision therapy, for example. It is important to know that not all genres of video games are

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equal, since only action video games seem to be effective as a tool to improve some visual functions. AVG can be characterized according to their perceptive content with four specific points[10]: (1) extraordinary speed both in terms of very transient events and in terms of the velocity of moving objects, (2) a high degree of perceptual, cognitive, and motor load in the service of an accurate motor plan, (3) unpredictability, both temporal and spatial and (4) emphasis on peripheral processing. Searching for commercial games with these specific points could be useful to improve visuo-cognitive skills such as perception, attention and eye-hand coordination. For instance, in one study[11] they observed an improvement of visuo-motor control after 10 h of playing a first-person-shooter game (Unreal Tournament) in contrast to the other group who played a non-action video game (The Sims 2) for the same time. Both groups were previously equal and had no experience in action video games. This lead the authors to establish a causal relationship between action gaming and the visuomotor control gains.

Conclusions

Gamifications, serious games and action video games seem to be a promising area for research especially in optometry and vision sciences. Raising specific visual skills using games are more motivating and engaging, paving the way to better learning processes. Future work such as randomized clinical trials and intervention studies must be addressed in order to provide more evidence using these mechanisms for clinical purposes.

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