

# Chapter 17

## Serious Games and Virtual Reality for Education, Training and Health

**Ronei Marcos de Moares**

*Laboratory of Technologies for Virtual Teaching and Statistics (LabTEVE), CCEN, Federal University of Paraíba, Brazil*

**Liliane S. Machado**

*Laboratory of Technologies for Virtual Teaching and Statistics (LabTEVE), CCEN, Federal University of Paraíba, Brazil,*

**Fátima de Lourdes dos Santos Nunes**

*University of São Paulo, Brazil*

**Rosa Maria Esteves Moreira da Costa**

*Institute of Mathematics and Statistics – UERJ, Brazil*

### ABSTRACT

*Since the first electronic game produced in the 40s, a large market of entertainment games has been established. Since then, the main focus of games continues to be provide fun for users. However, Serious Games (SG) have been developed as a special class of games devoted to join fun activities with specific content. The multidisciplinary aspects necessary to the development of such applications is enhanced when they are devoted to training and education purposes. This chapter presents details of development of five serious games in which intelligent methodologies and/or virtual reality techniques were incorporated. The games include education for children and adults and training for professionals.*

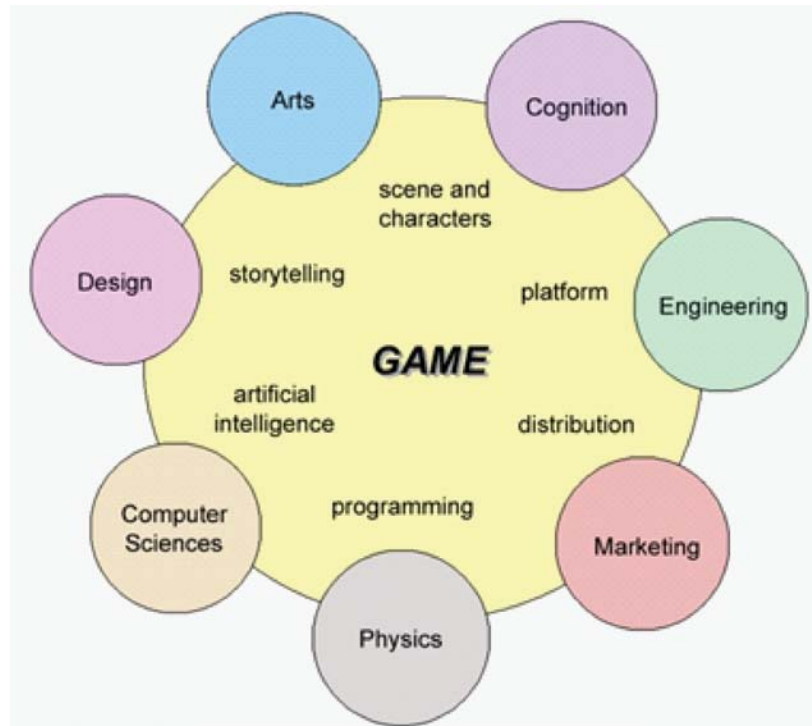
### INTRODUCTION

Games are voluntary activities that stir imagination and motivate people from all ages. The creation of games depends on professionals of different expertise. The designing of scenarios, setting of

platform, implementation, distribution strategy, and programming of intelligence are examples of tasks present in the development. These needs evidence the multidisciplinary approach that characterizes this activity (Figure 1). It also highlights the main problem related to game development:

DOI: 10.4018/978-1-4666-0149-9.ch017

*Figure 1. Example of some expertise necessary to the development of a game*



the synergy among teams and distribution of tasks are elements that affect the success of a game.

The serious games (SG) have been developed as a special category of games devoted to increase a fun activity with specific content (Blackman, 2005). In fact, SG have been used to provide training, education, advertisement, planning and awareness (Michael & Chen, 2006). They use a playful and/or challenging approach to motivate users. It demands a careful strategy in their development in order to achieve good results. Thus, experts in the subject approached by the game must be included in the development team. Additionally, SG can demand the use of artificial intelligence (AI) to identify users knowledge in the specific content and use it to advancements in the game.

Several Virtual Reality (VR) techniques have been used in games, mainly in visualization and navigation techniques and also in interaction approaches with special devices. VR refers to

interactive and immersive environments that involve users in a real-time computational simulation (Burdea & Coiffet, 2003). In the beginning of games history was not possible to associate them to VR, mainly due hardware limitations that demanded high costs platforms and advanced processing capability. This relationship began to change with advancements in hardware and processing techniques. Thus, off the shelf games started to demand other issues inherent in Computing, as three-dimensional environments, rendering quality, non-conventional interaction and real-time feedback. Those issues started to become interesting research subjects for Computer Science and, particularly, for VR area researchers (Machado & Moraes, 2010).

In fact, VR did not accomplish the promise of changing the way users communicate with computational applications (Stone, 2009) and provided a set of achievements and failures throughout the 1990s. However, games requirements offered an

20 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:  
[www.igi-global.com/chapter/serious-games-virtual-reality-education/64262](http://www.igi-global.com/chapter/serious-games-virtual-reality-education/64262)

## Related Content

---

### Educational Simulations: Learning from the Past and Ensuring Success in the Future

David A. Guralnick and Christine Levy (2010). *Design and Implementation of Educational Games: Theoretical and Practical Perspectives* (pp. 32-46).

[www.irma-international.org/chapter/educational-simulations-learning-past-ensuring/42444](http://www.irma-international.org/chapter/educational-simulations-learning-past-ensuring/42444)

### Research Note: Narration vs. Simulation:

Kostas Anagnostou (2011). *International Journal of Gaming and Computer-Mediated Simulations* (pp. 67-77).

[www.irma-international.org/article/research-note-narration-simulation/54352](http://www.irma-international.org/article/research-note-narration-simulation/54352)

### Design of a Socioconstructivist Game for the Classroom: Theoretical and Empirical Considerations

Margot Kaszap and Sylvie Rail (2010). *Educational Gameplay and Simulation Environments: Case Studies and Lessons Learned* (pp. 159-174).

[www.irma-international.org/chapter/design-socioconstructivist-game-classroom/40881](http://www.irma-international.org/chapter/design-socioconstructivist-game-classroom/40881)

### Challenges of Introducing Serious Games and Virtual Worlds in Educational Curriculum

C. Ribeiro, J. Pereira, C. Calado and C. Ferreira (2013). *Cases on Digital Game-Based Learning: Methods, Models, and Strategies* (pp. 425-450).

[www.irma-international.org/chapter/challenges-introducing-serious-games-virtual/74218](http://www.irma-international.org/chapter/challenges-introducing-serious-games-virtual/74218)

### Towards Games for Knowledge Acquisition and Modeling

Stijn Hoppenbrouwers, Bart Schotten and Peter Lucas (2010). *International Journal of Gaming and Computer-Mediated Simulations* (pp. 48-66).

[www.irma-international.org/article/towards-games-knowledge-acquisition-modeling/47205](http://www.irma-international.org/article/towards-games-knowledge-acquisition-modeling/47205)