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Volume 14, Number 5, 2023

URI: <https://id.erudit.org/iderudit/1107927ar>

DOI: <https://doi.org/10.36834/cmej.75475>

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Publisher(s)

Canadian Medical Education Journal

ISSN

1923-1202 (digital)

[Explore this journal](#)

Cite this document

Bialy, S. & Mohammad, I. (2023). Some perspectives on designing effective serious games. *Canadian Medical Education Journal / Revue canadienne de l'éducation médicale*, 14(5), 147–148. <https://doi.org/10.36834/cmej.75475>

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## Some perspectives on designing effective serious games Quelques perspectives sur la conception de jeux sérieux efficaces

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Edited by: Marcel D'Eon (editor-in-chief)

Published ahead of issue: May 24, 2023; published: Nov 8, 2023. CMEJ 2023, 14(5) Available at <https://doi.org/10.36834/cmej.75475>

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Serious games have emerged as a promising educational technique and are widely used in healthcare education. They are defined as an interactive computer application, that has a challenging goal, is fun to play with, incorporates some concept of scoring, and imparts in the user a skill, knowledge or attitude which can be applied in the real world.<sup>1</sup> A study by Abdulmajed found that traditional lecturing used in teaching has the lowest retention rate, whereas the use of games as part of an instruction method creates a dynamic learning environment and enhances long term memory retention.<sup>1</sup> It has also been shown that game technologies can positively affect learning performance, with learners quickly mastering and applying new skills and information, thinking laterally and strategically. The instructional content and the game characteristics are thought to fulfill the needs of adult learners, such as autonomy, control, and sense of achievement.<sup>2</sup>

Experimental studies have largely supported the effectiveness of the game-based learning approach. The problem is, like many rapidly growing industries, advances in video game technology are far outpacing research on its design and effectiveness. Relatively little is understood about how to apply what we know about teaching and learning to optimize game-based learning.<sup>3</sup>

Designing educational games is critical to their effectiveness and the assessment of their effectiveness is crucial to ensure better learning and better health care outcomes. As for the most part, instructional designers know little about game development and video game developers may know little about training, education, and instructional design. As a result, instructional designers may not realize the potential of play, game, and story to

create engaging and memorable learning experiences, and game developers may fail to apply basic pedagogical principles that are vital for facilitating learning.<sup>3</sup>

In this commentary we aim to shed light on some tips that will help the game developers in the design, implementation, and assessment of educational games:

1. Identify the stakeholders (instructional designers, game developers and other stakeholders, for example medical students, organizational management, and administrative staff members). Ensuring their early engagement and collaboration in the implementation of serious games is crucial. The stakeholders must set out and meet goals. This is where a logic model comes in as a very powerful tool for helping meet - and measure - program success. It is a roadmap that will guide game developers through the different steps of the game implementation.
2. The content selected should be aligned with the medical curriculum's objectives and the competencies to be developed should be mapped to specific entrustable professional activities (EPAs). Similarly, each educational game should be based on learning theories to enhance learning. The outcome objectives, models, and theories identified should be mapped onto relevant game mechanics before settling on a particular game genre.<sup>4</sup> Educational games are dependent on creativity and artistry as much as on principles of cognitive science and education.<sup>3</sup> Thus, combining entertainment with the

educational component is required to engage the users in the game cycle. One other essential element of serious games is the immediate reward system for the players, like points, ranking and badges.

3. It is recommended that stakeholders run a pilot study to identify issues before full implementation of educational games. Organizational support is important to amplify support, facilitate communication and to promote engagement of other colleagues.
4. Assessment is crucial in the evaluation of the effectiveness of games, and it should be planned with the end in mind. However, most studies focus on assessing students' satisfaction rather than behavioral changes or patient/health-care outcomes as a result of game implementation.<sup>1</sup> Reviews on the use of Kirkpatrick's original model reveal that most investigators in medical education cease evaluations at Level 2 (Learning). Kirkpatrick and Kirkpatrick imply that this difficulty is often because the evaluation is an afterthought rather than something considered during program planning and throughout phases of program implementation.<sup>5</sup>
5. Since continuing commitment to excellence is a hallmark of medical education, Follow-up and implementation of changes should be done regularly.
6. Lessons learned should be shared within institutions to help other programs at various stages of implementation address challenges more effectively. They could also be transferred to other academic institutions looking at

implementing serious games as an educational tool.<sup>1</sup>

Serious games are a promising tool in healthcare education. However, their design, implementation and evaluation need more robust research. The tips given in this paper will serve as a starting point for implementing games that will serve as future standards of educational gaming in health care.

**Conflicts of Interest:** The authors have no conflict of interest to declare.

**Funding:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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