



Review Article

Game on: The gamification of the pharmacy classroom

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ARTICLE INFO

Keywords:

Pharmacy education
Gamification
Active learning
Game-based learning

ABSTRACT

Background: Gamification is the use of game mechanics to promote engagement and enjoyment of problem-solving in non-game situations. Gamification has been used widely in recent years in industry and academia as a tool for training and education.

Objective: The aims of this paper are to provide an overview of gamification and digital game-based learning (DGBL), review the use of digital games in health professional education, and provide suggestions for future use in pharmacy curricula.

Discussion: Many examples of game-based learning in pharmacy and other health professional curricula have been published, however the body of literature on DGBL is less developed. Overall, evaluations of these techniques show that students find them engaging and enjoyable. A recent meta-analysis of studies comparing DGBL to non-game based learning in primary, secondary, post-secondary education found that DGBL significantly enhances learning. Challenges to implementing game-based learning are financial, cultural, and technological.

Conclusion: Many areas of the pharmacy curriculum could be appropriate for digital gamification. With more students entering pharmacy school familiar with video games and game-based living the time has come for pharmacy educators to explore how these instructional technologies could benefit a new generation of pharmacy students. As serious games are developed and researched in pharmacy curricula, test scores, student confidence in knowledge and skills, and retention of knowledge and skills are all outcomes that, if published, will help advance the adoption of DGBL into the pharmacy school classroom.

Introduction

“Gamification” is a modern term for an idea that has been around for centuries. Examples of early gamification date back to the 1800’s when Sperry and Hutchinson used trading stamps as a rewards program for consumers based on the dollar amounts they spent at supermarkets, filling stations, and shops.¹ The term “gamification” was coined in 2003 by Nick Pelling, but was not commonly used to describe gaming in training and education until 2010.² Other terms currently in use include “educational games,” “serious games,” and “game-based learning.”

The characterization of gamification has evolved from “the use of game thinking and game mechanics in non-game contexts” into “the use of game mechanics and experience design to digitally engage and motivate people to achieve their goals.”³ Although not all present-day game-based learning is digital, the evolving practice of utilizing computers and mobile devices has made digital game-based learning (DGBL) an emerging trend in training and education.

The number of colleges and universities finding ways to incorporate these tools into their courses is growing. According to the

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<http://dx.doi.org/10.1016/j.cptl.2016.08.046>

NMC (New Media Consortium) Horizon Report: 2013 Higher Education Edition, 31% of gamers is age 18–35.⁴ The report also states the effective implementation of gamification helps students to acquire new skills and increases their motivation to learn by utilizing diverse teaching and learning methods.⁴ Game-based learning is a current teaching and learning trend spanning a range of academic studies from architecture to zoology. The aims of this article are to provide an overview of gamification and DGBl, review the use of digital games in health professional education, and provide suggestions for future use in pharmacy curricula.

Using game mechanics in educational processes

Gamification relies on the use of tools, techniques, and applications collectively called “game mechanics.” Game mechanics increase interactivity, rewards, and motivation.⁵ Many of these mechanics support assumptions that adult learners come to the table with previous life and learning experiences, are largely self-directed, expect learning to help with real world problems, and are often externally motivated.⁶

Game mechanics can be used to adapt the learning experience to different kinds of learners, recognizing the diverse knowledge, abilities, and experiences of the individual learners. Initial knowledge is taken into account when learners are able to select a starting point. As an example, a more experienced learner may have the option to bypass introductory information or exercises. Varying difficulty levels and introducing different skill-based challenges are other ways to adapt the learning experience to individual learners.⁷

Game mechanics also give the learner the freedom of choice. The game environment may allow the learner to explore different areas, and quests or challenges can be presented to allow the learner the opportunity to complete tasks of choice. Milestones, such as successfully completing a quest, are often incorporated to provide the learner with timely feedback, as well as to allow the learner to achieve goals and manage learning by completing tasks in chunks. “Chunking” is a term used to explain the limited ability of the working memory to hold more than approximately seven pieces, or “chunks” of information, at a time.⁸ Role-playing allow learners to assume new identities and roles, asking them to make in-game decisions from alternate perspectives.⁹

Many game environments make it possible to immerse individual learners into collaborative environments. Within these environments, learners can work together to construct new knowledge, experience simulations, and/or solve real-world problems. Kahoot![®] is one example of educational software, which utilizes a game-based pedagogy allowing students to work collaboratively to research topics and create quizzes, online discussions, or surveys.¹⁰ Another collaborative game environment was built in World Without Oil, in which participants were tasked with creating possible solutions during a 32-week countdown to a world-wide oil crisis.¹¹ This approach to real-world problem solving incorporated the game mechanic of role-play. People from around the world used social media, videos, and blogs to communicate, collaborate and problem-solve as they played themselves in an alternate reality.

Motivators are some of the more popular game mechanics used. These include ranking, badges, leader boards, achievements, levels, and bonuses.² Learners can be ranked according to how many articles they read. Badges can be awarded for completing the most quests. Learners can level up once they complete specific learning tasks or successfully complete a quiz. These types of game mechanics can be highly motivating to those with a competitive nature or a need to be recognized.

Examples of digital gaming in health professions education

Pharmacy education

Over a dozen publications between 1995 and 2014 have evaluated the use of serious games in pharmacy curricula, primarily examining student satisfaction, participation, and changes in knowledge and attitudes.¹² However, few of these publications describe or evaluate digital games. A web-based game was developed to allow pharmacy students at a school in the United Kingdom to review various aspects the curriculum in preparation for their licensing examinations.¹³ The game was designed as timed multiple choice trivia quiz. Students playing the game had a bank of 50 points that they could use to bet on their answers. Selecting the correct answer doubled the bet; selecting the wrong answer forfeited the bet. Extra points were awarded if the player answered the question correctly within 60 seconds and the player had a maximum time limit of three minutes to answer each question. During the study period of one week, students were able to access the game via a web browser any time they wanted and as much as they wanted, either individually or with other students. A sampling of 500 questions revealed that 77% of given answers were correct, 19.2% were incorrect, and time ran out in 3.4% of questions. A post-intervention survey found that 59.3% of respondents claimed they would use the game in the future for other work and 60.4% of respondents would appreciate a similar activity for other pharmacy modules.

Other health professions

Other health professional education programs have also published examples of digital game-based learning, some of which move beyond trivia-based challenges. Instructors in a nursing pharmacology course utilized a human patient simulator (manikin) and the university's learning management system (LMS) to reinforce pain management lessons delivered in the course.¹⁴ During the simulation students logged into the LMS to vote on the best course of action as the case unfolded. These decisions, called “gaming decision points,” are created in order to “affect outcomes, advance the story, and set up the next decision point until students win or lose.” In addition to the participating in the game itself, students completed pre- and post-game knowledge assessments, an evaluation of the simulation as an effective learning tool, and an evaluation of satisfaction and self-confidence in learning. Scores on

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