INNOVATIVE TEACHING AND LEARNING PROJECT

Zombies, space stations and a mysterious virus! An online game for teaching outbreak management to medical students

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Abstract

We created an online educational game to teach outbreak management principles to first-year medical students. A post-game survey was administered to evaluate the learning experience and identify areas for improvement. Our results show the game was well received, indicating its acceptability and effectiveness as an educational tool. This supports a growing body of literature demonstrating the positive results of gamification in not only medical teaching but also health education more broadly.

Keywords: gamification; outbreak management; medical education; public health; evaluation

Introduction

Medical education can be enhanced with innovative teaching methods that students find both interactive and engaging. Gamification, the application of game design principles in non-game contexts, is one such example and has shown increasing use as an educational tool for health (van Gaalen et al., 2021). By incorporating game elements, such as levels and challenges, gamification can increase motivation, engagement and retention of information and lead to improved learning outcomes (Gentry et al., 2019).

The COVID-19 pandemic has underscored the importance of healthcare students being equipped with necessary knowledge and skills regarding outbreak management. This is because healthcare workers, including those who are still in training, are essential to the frontline response during such crises. This paper describes a new online educational game designed to achieve the learning outcome of investigating and managing an outbreak, which is delivered as part of the public health curriculum in a postgraduate medical course.

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Innovation

The game was developed by public health teaching staff. It simulated an infectious disease outbreak with a creative storyline in which the student assumes the role of a lead clinician investigating an outbreak set in outer space that turns people into zombies. Gamification was considered an ideal method for teaching outbreak management, as it could replicate a real-world outbreak scenario through an immersive problem-based approach, with progressive delivery of learning material, story and challenges as the game progressed.

The game had five levels covering key elements of outbreak management, with each level delivering the story and educational content through text and instructional videos. Players had to answer a series of questions within each level to progress to the next level. The questions were in a multiple-choice question format and tested factual knowledge, information recall and the ability to perform basic epidemiological calculations.

The game was hosted on Google Forms®, a free web-based tool. The tool was chosen because of its ease of use, accessibility, ability to scale, easy integration of multiple-choice questions, compatibility with various operating systems and ability to collect and analyse data for evaluation. The game was offered during June–July 2022 to a cohort of 220 first-year medical students at Griffth University, who were invited to participate voluntarily within an 8-week completion period.

Ethics approval was obtained from the Griffith University Human Research and Ethics Committee (Reference Number 2022/29).

Evaluation

At the game's completion, learners were invited to participate in a voluntary online post-game survey on the acceptability and effectiveness of the game as a public health teaching tool. Question types included Yes/No (n = 2), Likert scale (n = 5) and open-ended (n = 2) questions. Quantitative responses were analysed using Microsoft Excel. Qualitative responses were thematically analysed via manual coding and thematic analysis of the data.

Forty responses were received. Most students reported that the game was enjoyable, helped them understand outbreak management, had all the information required to complete it and was relevant to what they had been learning (Table 1). Ninety percent of students said they would recommend the game to others, and 92.5% said they would like games similar to this format to be used in future teaching. Just over half of students surveyed rated the difficulty of the game as "easy" or "very easy" (Table 1).

Table 1

Results for Questions in the Post-game Survey That Involved a Likert Scale Response

Question No.	Statement	Very Easy	Easy	Neither Easy nor Hard	Hard	Very Hard
1	Degree of difficulty	6 (15%)	16 (40%)	14 (35%)	4 (10%)	0

Question No.	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
2	I had all the information required to complete the game successfully	0	4 (10%)	2 (5%)	18 (46%)	15 (38%)
3	The game was enjoyable	0	3 (8%)	0	29 (74%)	7 (18%)
4	The game helped me understand outbreak investigation	0	0	2 (5%)	24 (62%)	13 (33%)
5	I found the game relevant to what I have been learning	0	0	4 (10%)	21 (54%)	14 (36%)

Note: Question 1: n = 40; Questions 2–5: n = 39

The open-ended questions were: "How do you think the game can be improved?" and "Do you have any other comments?". Analysis of this data showed common themes, such as "content", "praise" and "usability". Some respondents requested more difficult questions and questions to "help solidify the content". Praise was given for the method of delivery: respondents "liked the story" and the "production value" and found the level progression system motivated them to "keep going". Some usability concerns pertained to errors, such as broken links and inadequate information to complete some exercises.

A limitation of the evaluation was that it was not possible to ascertain the number of students who played or their extent of progress with the game, as registration was not a requirement.

Lessons learned

Noting the limitations, our results show that the game was well received, indicating its acceptability and effectiveness as an educational tool to teach outbreak investigation and management to medical students. Gamification elements made the experience enjoyable and enhanced student learning, which is consistent with existing literature (Gentry et al., 2019).

The low response rate presents issues related to validity, particularly selection and response bias. To address this, future efforts can be made to increase participation. Future revisions of the game will also address issues raised, such as broken links. Given players generally found the questions easy, questions should be further developed in ways that sufficiently challenge players but not to the extent that it discourages or demotivates them.

What next?

To objectively evaluate the game as a learning tool, future evaluations should adopt other methodology, such as analysing assessment results pre and post game using a randomised controlled study.

The game was well received, supporting gamification as a viable public health teaching tool for educating medical students about outbreak management. Together with the positive findings of gamification in existing research, this suggests that gamification has promising potential for future teaching of not only medical students but also health professionals more broadly.

Conflicts of interest and funding

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