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# PeterPandemic: A Serious Game for Pandemic Management

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**Abstract.** The COVID-19 situation shows that a deep understanding of how pandemics spread and how they can be managed is important in a multitude of domains. Various studies have shown that students benefit from game-based learning approaches. Therefore, we introduce the concept of a web-based serious game to teach students important aspects when dealing with pandemic situations.

**Keywords.** Serious Game, Gamification, Pandemic Management.

## 1. Introduction

The benefits of a game-based learning approach are already investigated in various studies [1]. PeterPandemic aims to facilitate those benefits to teach medicine students how viruses spread and difficult challenges when managing a pandemic situation in a game-based fashion.

## 2. Methods

*PeterPandemic* is part of the National Digital Education Platform in Germany. The technical game design was developed in close cooperation with experts from epidemiology. When playing multiple rounds with students, the concept was continuously refined.

## 3. Results

This chapter presents the core game design of *PeterPandemic* (Figure 1). Each team gets a specific country scenario randomly assigned. The outbreak scenario will be the same for every team and describes a disease leading to a pandemic situation (1). Every team member fills a specific role (e.g., politician, researcher) and must act accordingly (2).

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The team has to discuss possible counter measures (3) to contain the virus. To do so, players have access to a knowledge database and the currently known facts about the disease. During decision-making, players can simulate (5) different counter measures (e.g., mandatory face masks, invest in research). After the team has decided on counter measures (4), the outcome is calculated by the game engine (6). The new situation depends on a SEIR-type disease model [2], which describes different health states (e.g., individuals at risk, infected, vaccinated) and transitions between them. The outcome represents epidemiological, social, and economy factors. If the outcome exceeds certain cut-off values (e.g., to many deaths, massive economic downturn), the game is over. The outcome may be changed by global interdependence or random events (7), such as virus mutations, vaccines, or others. Global interdependence accounts for the outcomes of other teams. For example, one team could heavily invest in research and find a vaccine, which may be used by others. Also, a mutation occurring for one team, will influence the other teams after some time, so that communication between teams becomes necessary. The disease model takes different interdependencies into consideration (e.g., depression). The outcome is measured in disability-adjusted life years [3].

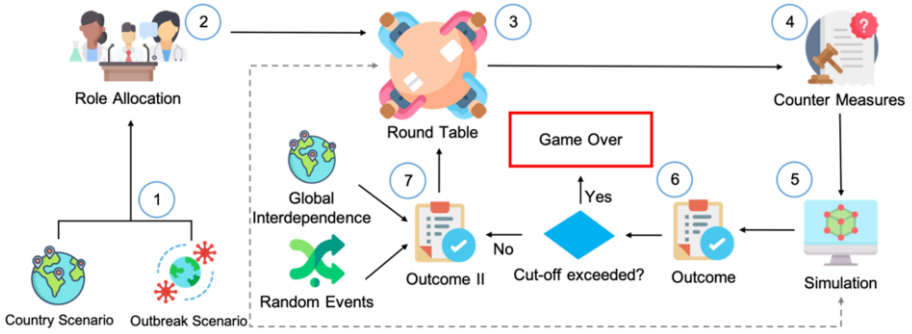


**Figure1.** Procedure of a complete game cycle in PeterPandemic.

## 4. Conclusion

We presented the serious game *PeterPandemic*, which teaches students fundamentals of pandemic management. We believe that serious games will play a major role in teaching students how to handle issues in a timely fashion. Currently, we are implementing the game. The applicability will be evaluated in studies with students from medicine.

## References

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