

Case Study: Killer Fungus

In 2016, Game Doctor was commissioned by University of Aberdeen to develop two educational games on fungi. Both games were released on Google Play and iTunes for tablets, iPads and smartphones. The games were exhibited at a wide range of science festivals including Royal Society Summer Exhibition (2016) and were installed as a permanent exhibit at Aberdeen Science Centre. Over 50,000 people have played the games since 2016.

Background

Digital game-based learning is an emerging trend in science education (NMC Horizon, 2017). Mobile games show great potential for science learning due to the extensive uptake of mobile devices by the current generation of students. 83% of 12-15-year olds own a smartphone and 77% play digital games (Ofcom, 2018). On average, university students (aged 18-34) own seven technology devices (re:fuel 2013) and over 80% use a smartphone or a tablet to study (McGraw Hill, 2014). To engage the current students with science and STEM, we must adopt alternative strategies that include relevant technologies such as mobile games and immersive technology.

Project Design

As part of the Killer Fungus public engagement project, University of Aberdeen aimed to develop two digital games to educate young people (8-16) on two key research themes: 1) Antibiotic resistance in fungi and 2) Mechanisms of fungal infections in the human body. A project team was assembled that included Game Doctor (game developer); Professor Neil Gow (Project lead); Barbara Govan (public engagement manager) and Dr Duncan Wilson (subject matter expert). Utilising the Game Doctor method for game development, two unique digital games were produced on antifungal resistance (*Fungal Invaders*) and fungal pathogenesis (*Killer Fungus: Evolution*). Games were tested with end users and stakeholders during development to ensure effective learning and engagement. The games were released as mobile games on Google Play and iTunes and as PC games for Windows, Mac and Linux.



Fungal Invaders is a space-invaders styled game where players must defend human tissue from invading fungi using antibiotics. During gameplay, fungi may develop antibiotic resistance and players must quickly adapt antibiotic usage.

Killer Fungus: Evolution is a character building game where players design pathogenic fungi against the immune system. Players build fungi by upgrading different traits including toxins (mycotoxin); morph (yeast-hyphae transition) and shield (capsule).



Funding

University of Aberdeen obtained funding from Wellcome Trust Strategic Award for Medical Mycology & Fungal Immunology, British Mycological Society, British Society for Medical Mycology, Microbiology Society, King's College London Dental Institute and International Society for Human and Animal Mycology.

Implementation

Killer Fungus games were implemented at multiple science festivals and events during 2016-2018. Fungal Invaders was installed as a permanent exhibit in 2016 at Aberdeen Science Centre called Kingdom of Fungi. A major exhibition entitled 'Killer Fungus' was held at the Royal Society Summer Science Exhibition in London in 2016. The Killer Fungus exhibition was also held at Manchester Science Festival in 2017 and 2018. Fungal Invaders and Killer Fungus: Evolution were published on Google Play (Android) and iTunes (iOS) mobile application stores. The games were also published on the Killer Fungus [website](#) as PC games.

Reach and Impact

The Fungal Invaders exhibit at Aberdeen Science Centre received approximately **45,000 visitors** between 2016-2018.

The Royal Society Exhibition, held in central London, attracted over **14,000 visitors**.

At Manchester Science Festival 2017, the games were played by 1300 visitors. Due to the success of the exhibition at this festival, the games were exhibited for a second time in 2018. The games continue to be showcased in public engagement events and were exhibited at the Scottish Parliament in March 2019. Fungal Invaders has received approximately 500 downloads on Google Play and iTunes and has been rated as 4 stars (7 ratings). Killer Fungus: Evolution has received 500 downloads and has been rated as 3.5 stars on Google Play (8 ratings).

Researchers and academics have also engaged with the project. Both games were showcased at research focused event, Explorathon in Aberdeen (2016). The mobile games also contributed to a peer-reviewed publication, published in *Trends in Microbiology* (<https://doi.org/10.1016/j.tim.2018.05.014>). The games are also being used internationally. For example, both games have been implemented in a new module at Otego University, *Games for Health*, created by Professor Yang (2019).

Testimonial

Barbara Gorgoni, University of Aberdeen.

"It was really helpful that Game Doctor had the scientific knowledge to immediately grasp the research and concepts behind the game. They followed our briefs but also suggested changes that made the game more attractive and accessible. Despite the challenging timeline, the team managed to deliver the game on time and the support afterwards was excellent as well, as we adapted the game to different platforms. All together it was a really great experience with a highly professional team. Fungal Invaders was showcased at the Royal Society Summer Science Exhibition in 2016 and has featured in several public engagement events since. It is still being played at Aberdeen Science Centre as a retro-style arcade game."

