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Using an online escape room as a formative assessment tool during a lecture on HIV: a case study

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Abstract

Escape rooms are becoming prevalent in their use as a form of playful learning and gamification in higher education, often used for a multitude of purposes to enhance students' higher education learning experiences. Whilst studies have reported their valuable uses in a range of contexts, they have often focussed on undergraduates and fewer have explored their use in formative assessment practices. This case study seeks to address this gap by exploring the perceptions of postgraduate students in completing an online escape room activity as a form of formative assessment during an MSc lecture. Postgraduate students from the School of Psychology at the University of Surrey were invited to complete an online escape room as a form of formative assessment and took part in a follow-up qualitative survey to explore their perceptions of the activity not traditionally used in their course. The results from the case study showed that (1) the escape room was viewed positively by students as a novel and creative formative assessment practice, (2) the role of peers was important in the design of the assessment approach, and (3) students welcomed challenge and mastery of the learning outcomes and activity. This case study demonstrates initial positive findings about the use of escape rooms for formative assessment and advocates for further research to be conducted in this area. We also encourage HE teachers to think about how such practices could enhance students' learning experiences in their own teaching contexts.

Keywords: online escape room; formative assessment; playful learning; gamification.

Introduction

During the last decade, there has been a focus on new ways to use games for learning purposes (Rosas et al., 2003; Haruna et al., 2018; Campillo-Ferrer, Miralles-Martínez and Sánchez-Ibáñez, 2020; Fernandez-Antolin, del Río and Gonzalez-Lezcano, 2020; O'Brien and Farrow, 2020). This has resulted in developments including the gamification of learning experiences, game-based learning (GBL) (Haruna et al., 2018), serious games (Eleftheriou et al., 2017), as well as games informing Playful Learning pedagogies to support students' learning. An educational escape room is one type of approach that has gained increasing popularity in HE (higher education) learning and teaching in recent years.

In their systematic review focussing predominantly on face-to-face escape rooms, Veldkamp et al. (2020) discovered that escape rooms have been used for a wide range of educational teaching and research purposes including: recruiting students; helping students to get to know institutional services; student preparedness and skills development; understanding students' learning, skills, and behaviours; as well as developing knowledge in specific disciplinary areas. More recently, and possibly as a partial consequence of the Covid-19 pandemic, more studies have been published about the use of online educational escape rooms. For example, Manzano-León et al. (2021) explored an online escape room as a motivational tool to in supporting students to review curriculum content in engaging and fun ways. There have also been a limited number of studies that have started to think about online escape rooms with assessment and feedback practices. For example, Darby et al. (2020) developed an online escape room to evaluate nursing students' obstetrical skills (including teamwork and communication skills) associated with learning objectives linked to clinical practice. Bistulfi (2021) transformed a genetics final exam assessment for STEM students into an escape room activity which resulted in additional outcomes including the development of students' team working skills, problem-solving, leadership skills, and so on. Whilst studies show a diverse range of uses of educational escape rooms in HE teaching in both face-to-face and online contexts, few studies have explored the use of escape rooms as a form of formative assessment, and fewer have explored developing them within postgraduate-level teaching.

Formative assessment is a form of assessment that often calls upon students to evaluate their progress and obtain feedback (Fry, Ketteridge and Marshall, 2008). Feedback is an

invaluable source of information that students can use to check their understanding and identify knowledge gaps to help foster control over their achievements (Fry, Ketteridge and Marshall, 2008). Arguably, these skills and forms of self-regulation become increasingly important at the postgraduate level and are valued by accredited professional bodies. Importantly, as asserted by Morris, Perry and Wardle (2021), formative assessment and feedback support students' development in HE. However, they go on to suggest that many forms of formative feedback are traditionally verbal or written and that 'we still know relatively little about the types, modes and features of these approaches that are likely to be most effective' (p.20). Thus, this study also seeks to contribute to this knowledge gap by exploring student perceptions of an online educational escape room developed as a new form of formative assessment. The aim of this case study then was to explore postgraduate student perceptions of completing an online escape room as a formative assessment and if it encourages stronger engagement in formative assessment in their course.

The online escape room

This case study focuses on the delivery of an online educational escape room as a formative assessment following a lecture on HIV, part of the Chronic Condition module at the University of Surrey. This compulsory module is part of the Health Psychology MSc degree but is attended by students from other Master's programmes in Psychology as an optional module. The rationale for designing an online escape room as a formative assessment was attributed to recognising a need to promote greater independent learning at MSc level and to support their developing knowledge to achieve their career aspirations (i.e., becoming registered Health Psychologists).

When developing the HIV lecture and the educational escape room, we reflected upon and employed Biggs' (2003) Constructive Alignment theory to ensure that the learning outcomes, teaching, learning activities, and assessment were aligned. Thus, the escape room was underpinned by learning outcomes for the HIV lecture, which was vital given that the escape room was developed for formative assessment purposes.

All students were made aware of the online escape room study before the lecture, with a post on the Virtual Learning Environment (VLE) Chronic Conditions site. From there,

students were able to download the participant information sheet and consent form to take part in this study. They were also made aware that the escape room was a voluntary group activity and invited to form their groups autonomously before the lecture. Of the 30 students on the course, a total of five students attended the HIV lecture and took part in the escape room. As attendance is typically higher for this module, it is postulated that fewer students attended the session due to the pressures of other assessment deadlines. Nonetheless, the five students were divided into two teams to complete the online escape room which was delivered via Google Forms during the first part of the lecture which was face-to-face. The lecturer was there to support students if they encountered difficulties while completing the activity.

The students were invited to provide a group name to create a sense of community. Furthermore, they were encouraged to support each other through peer feedback, particularly with difficult puzzles, to provide an opportunity to reflect on their learning and knowledge gaps in a positive environment. They were not invited to enter any personal information during the escape room and no personal information was stored about their performance. Students were given 20 minutes to complete the escape room. The aim was to work through a series of five sections (rooms). Section 1 was introductory, where students generated their group name to commence community building. Sections 3-5 contained a diverse series of puzzles to formatively test their knowledge from the HIV lecture including: multiple-choice questions to challenge students' understanding of complex knowledge from lecture materials, a crossword including sub-activities to search for information online, and a map activity entailing cross-referencing learning. The puzzles/activities were designed using active learning approaches, moving away from traditional formative assessment approaches. They also increased in difficulty as the students progressed through each section in order to challenge their learning and encourage problem-solving (for example, finding and discussing information) aligned with postgraduate level study. The final section aimed to celebrate the completion of the online escape room, as well as consolidate the learning through concluding remarks and inviting students to ask questions about the activity with their peers and the lecturer. These puzzles often led to the formation of codes that allowed the students to move to the next section/room. As per Wiemker, Elumir and Clare's (2015) ideas for puzzle design, each puzzle in the escape room contained three important elements: (1) a challenge, (2) a solution, and (3) a reward. The escape room was designed in a linear configuration where each puzzle unlocks the next to ensure that students were following the intended learning

outcomes. Importantly, not being able to solve a puzzle provided students with immediate feedback that they had not met the learning outcomes, allowing them to discuss knowledge gaps with peers and/or the lecturer to move on and complete the escape room. The immediate feedback was not being able to unlock the next room and a short message would appear with a clue on how to unlock the room. Following the activity, a debrief was conducted that incorporated a summary of the learning outcomes to clarify any misunderstanding and give further feedback. Indeed, such feedback may foster the students' feeling of control over their achievements (Fry, Ketteridge and Marshall, 2008), and could be revisited later in the module.

Methodology

Students were then invited to contact the lecturer if they wanted to take part in a follow-up qualitative survey to evaluate the online escape room for formative assessment purposes. Participants were offered a £10 voucher to take part in the survey and were given one month to submit their responses. The study received favourable ethical approval by the University of Surrey's Ethics Committee (FHMS 21-22 048 EGA). A total of three students completed the qualitative survey following the escape room. The anonymised feedback was analysed using thematic analysis (Braun and Clarke, 2006) and reported verbatim. An online qualitative survey was used to collect data as this would allow the students to express themselves without the presence of the lecturer/researcher. Demographic information was separated from the answers provided to the qualitative survey, ensuring answers were not linked to individual students. An inductive process was used where the feedback guided the generation of themes. The findings of this survey are presented and discussed below.

Findings

Feedback provided by the three students who completed the qualitative survey is outlined here to explore whether they have perceived the online escape room as a formative assessment. Overall, the students highlighted how they did not expect to find an escape room activity as part of the lecture, perceiving it as a novel and creative form of formative assessment. Furthermore, they suggested that the collaborative nature of the activity

supported them in completing the activity. Lastly, participants reported feeling able to easily recall information from the lecture to complete the activity, giving them a sense of mastering and applying the knowledge learned through the formative assessment (escape room).

The escape room activity as novel and creative

The students reported being positively surprised about the escape room being incorporated into the teaching and learning activities of the lecture at the postgraduate level:

- 'I did not expect to find this activity in the lecture, nor did I expect it would be used in higher education' [Participant 1].
- 'I had never thought an escape room activity would be included during a lecture' [Participant 2].
- 'To be honest, No. This is creative method which I find it useful' [Participant 3].

As shown in the data, the students perceived the escape room as a creative type of formative assessment and broadened their preconceptions about traditional forms of formative assessment. As encountered by O'Brien and Farrow's (2020) study, an element of surprise built around excitement can enhance student engagement, which appeared to work well in the context of this case study.

Not only was the formative assessment itself viewed positively for its novelty and creativity, but more importantly, the student responses reflected that the activity also enhanced their learning from the lecture:

- 'The escape room is an activity which can definitely support students' learning and I think it this would change the approach to learning as it is an original idea and quite creative' [Participant 1].
- 'I think it could definitely be used as an educational activity as it requires participants to think critically, while also reflecting upon the content of the lecture' [Participant 2].

Aldemir, Celik and Kaplan (2018) also reported how creative activities can support students in reinforcing knowledge through consulting lecture content and encouraging self-assessment of understanding. In this case study, participants recognised the educational value in terms of formative assessment, not just its creative value.

The value of peers in the formative online escape room assessment

The students in this study explained how they enjoyed the structure of the online escape room and its activities as being group activities shared with peers, as opposed to a more individual nature:

- 'It is enjoyable working in a group and a motivating way to recap what we had learnt' [Participant 1].
- 'I felt motivated to work out the answers to the questions. This was because I was working in a group and I wanted to complete the activity' [Participant 1].
- 'I felt proud and pleased when we managed to guess the password correctly – it was very satisfying!' [Participant 2].
- 'It was challenging so it is good to see some difficult ones, because it encourages to search more and recall the things learned in that lecture' [Participant 3].

The students appeared to find the group experience of completing the escape room positive and valued the support coming from peers and being able to share the experience of achieving the formative goals of unlocking each room. This is also highlighted by Nørgård, Toft-Nielsen and Whitton (2017) in their study where they found that students perceived learning as more enjoyable when there was an element of sharing the experience with peers. Fry, Ketteridge and Marshall (2008) also suggest that the collaborative side of finding 'suitable solutions' is valued by students and that peers can be a valuable source of informal feedback.

Developing mastery through online escape rooms

Students also highlighted the importance of creating tasks that challenge them allowing them to recall and search for the answers, but without falling into the frustration of finding the activities too difficult and getting stuck. Furthermore, they acknowledged that questions

would have been difficult to answer without some mastery of the core knowledge from the lecture. It might be possible to see the positive emotion of being able to solve a puzzle as linked with the understanding of the content of the lecture and the ability to independently find the information needed to solve the puzzle. For instance, students reported:

- 'I find myself good because I remember the answer of some questions, and I search to find the ones I did not know' [Participant 3].
- 'I think the escape room allowed me to search for relevant information but this could have been furthered with more questions' [Participant 1].
- 'I definitely felt I was applying the knowledge from the HIV lecture to the escape room tasks. I did check back on the PowerPoint quite a bit too, which was helpful for answering the different questions' [Participant 2].

It seems that students were actively engaging with the feedback coming from the puzzle solutions and using the resources provided during the lecture to answer the questions. Furthermore, the results from the survey showed that some students desired more questions to enhance their knowledge and experience. The online escape room activity then appeared to provide an opportunity to explore the students' 'zone of proximal development' (Vygotsky, 1978), where students could reflect upon their knowledge and abilities, and the lecturer could identify where further knowledge gaps existed and provide further scaffolding in their learning during the task or in the future.

Discussion

This case study explored the perception of three postgraduate students who completed an online escape room as a formative assessment. Students highlighted how they valued the novelty and creativity of the online escape room whilst focusing on the collaborative nature of the activity. Furthermore, students reported how the activities of the online escape room encouraged them to recall the lecture content and consult the resources provided to solve different puzzles.

Overall, participants reported being surprised by the activities and reported positive emotions connected with those such as curiosity to know the password and to access the next task which worked as a motivator to complete the escape room. Hence, this could

increase the engagement of students in formative assessment which is particularly important when considering curricula aimed at fostering independence, understanding complex knowing, and problem-solving at the postgraduate level.

Students also highlighted the positive effect of working in groups to complete the activity where they were able to discuss and find solutions collaboratively as well as provide feedback to each other. The collaborative and social side of the escape room appeared important and useful for students in supporting them and their learning, as found by Nørgård, Toft-Nielsen and Whitton (2017).

Students also mentioned the active use of educational material to complete the activities, such as slides and online resources suggested during the lecture, which is something that might promote their ability to retrieve the information needed. The positive emotions such as enjoyment, pride, and satisfaction reported by students are in line with the perception of students completing similar activities (Gikandi, Morrow and Davis, 2011).

From the feedback received, it is possible to say that students perceived the structure of the puzzles positively. This seems to confirm that the model provided by Wiemker, Elumir and Clare (2015) to build puzzle activities is helpful and effective when applied to the online escape room used in this case study. Thus, it might be useful to follow their framework when planning online escape rooms as it provides a well-structured framework for planning puzzles. However, while it is important to plan and build interesting and compelling puzzles, it is also important to make a clear introduction to the activity and a good de-briefing as also suggested by Veldkamp et al. (2020) in their systematic review on escape rooms as educational activities.

This case study has some limitations that need to be considered. Firstly, only three students took part in the qualitative survey and a larger sample is needed to conclude the effectiveness of this online escape room. Secondly, future studies should focus on confirming which elements might be linked with engaging online escape rooms and what students perceive to be the key elements motivating them in completing the activities in a more representative way. Lastly, it could be useful to explore more explicitly if students engage more in formative assessment using this creative and innovative methodology compared with more traditional ways.

Conclusion

This case study provided the opportunity to implement an online escape room within postgraduate level teaching as a formative assessment and explore the feedback from students of this experience, allowing us to tentatively evaluate its uses and possibilities in future teaching. We discovered that postgraduate students in this study perceived the online escape room positively as an innovative practice at this level and appreciated this creative approach as a tool to support their learning and provide timely formative feedback. Therefore, we will take this forward into our teaching practice, and argue that, like us, educators may wish to consider not necessarily reserving playful approaches like escape rooms for undergraduate level students given the positive responses at the postgraduate level. As the students also appreciated the online escape room as providing an opportunity to acquire support from peers in non-competitive settings and jointly share the achievement of meeting learning outcomes, we suggest that online escape room activities can offer the opportunity to develop a stronger learning community as peers can offer emotional and practical support during these types of formative assessment activity. The students also demonstrated degrees of mastery of their learning and skills through active learning approaches which allows the lecturer to identify in real time where their learning could be further scaffolded in the future. We conclude by suggesting that given the initial positive outcomes of this online escape room activity, we would encourage educators to think about the role of these in their teaching contexts to improve the learning experience and outcomes of students at a variety of levels and to enhance engagement in formative assessment practices.

Supplementary material

Readers are invited to contact the lead author to discuss the online escape room and expected learning outcomes for further context about the study and to share learning. You can contact Stefano Licchelli using the following email address: s.licchelli@surrey.ac.uk.

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