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A physical neuroscience-themed escape room: Design, implementation, and students' perceptions

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Abstract

Teaching soft skills like team dynamics and critical thinking in content-heavy higher education curriculum can be challenging. Employing educational escape rooms is a novel game-based learning strategy in various disciplines, including health sciences. Escape rooms provide the opportunity for a group to work together as they solve puzzles within a limited time. The skills harnessed and developed within the game by participants are parallel to these soft skills. The present study sought to design a neuroscience-themed physical escape room for the purpose of soft skills development and obtain feedback from undergraduate biomedical or health science students following the completion of the room. Likert-type scale statements in the feedback survey regarding the enjoyability, teamwork development and critical thinking within the game scored positively. Unsurprisingly, the recurring positive theme in the qualitative responses collected revolved around how participants found the activity fun and how it encouraged them to think critically. The present findings suggest that this escape room can in a brief period encourage students to employ communication and teamwork skills and naturally comes with an element of fun, making the experience memorable and engaging.

Keywords Critical thinking · Escape room · Game-based learning · Higher education · Soft skills · Teamwork

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1 Introduction

While the principal purpose of education is to impart knowledge of content to students, as educators, particularly in content-heavy courses like most sciences, the importance of soft skills can sometimes be overlooked. This includes skills such as critical thinking, creativity, collaboration, problem-solving, effective communication, and time management (Marakovits, 2022). Regardless of discipline and professions, these are desirable graduate attributes for learners to succeed in their future workspace. Thus, there is a need to explore ways that we can integrate curriculum content with the development of the key competencies listed above. In the recent decades, game-based learning and gamification have become increasingly popular within the education setting, at all levels (Bado, 2022; Barbetta, 2023; Lester et al., 2023). If employed correctly and intentionally, they can encourage learning, problem-solving, active engagement and often, collaborative group work (Aynsley et al., 2018). Games and activities embedded with game-based elements can stimulate motivation in learners, which is a fundamental principle of learning (Hwang & Chen, 2017). Some common examples used in higher education include role-playing (Benko & Peršolja, 2023), simulations (Amer et al., 2017), card games (Murray, 2023), board games (Arayapisit et al., 2023), and video games (López-Fernández et al., 2023). Escape rooms are known worldwide as a popular recreational activity that appeals to a wide audience range of all age groups, including adults, youth and children (Nicholson, 2015). An escape room is defined as a "live-action team-based game where players discover clues, solve puzzles, and accomplish tasks in one or more rooms in order to accomplish a specific goal (usually escaping from the room) in a limited time" (Nicholson, 2015).

2 Literature review

The use of escape rooms as pedagogical tools presents a novel approach to education, one that intertwines various learning theories with an interactive and engaging method. As a learning approach, the activity has both theoretical underpinnings and practical applications that can be observed in the educational setting. The distinction between active learning and experiential learning is crucial in understanding the educational framework of escape rooms. Active learning emphasizes student participation in the learning process, fostering knowledge retention through activities like reading, writing, and discussing (Prince, 2004). Experiential learning, a subset of active learning, emphasizes learning through experience, often involving real-world situations and problem-solving (Kolb et al., 2014). Escape rooms, embodying elements of both paradigms, require active participation while providing immersive, real-world-like environments, thus leveraging the strengths of both educational theories.

From a theoretical perspective, escape rooms are predominantly associated with socio-cultural learning theory (Taraldsen et al., 2022). The basis for

this association lies in the collaborative nature of escape rooms, emphasizing the influence of peers and social settings on the learning process (Nicholson, 2015). However, elements of other learning theories, such as constructivism and behaviourism, are also present. Constructivism manifests as participants build knowledge through immediate puzzles, tasks, and clues in the game. Simultaneously, positive behaviours are nurtured as students strive to achieve the goal of 'escaping' the room (Wargo & Garcia, 2021). The pedagogical value of escape rooms extends to promoting student engagement and persistence on tasks, conditions crucial for deep learning (Aubeux et al., 2020). Escape rooms also fit seamlessly into the growing body of literature on immersive learning, which focuses on deeply engaging students in the learning process through interactive and realistic experiences (Dede, 2009). Immersive learning scenarios can range from digital virtual worlds to physically constructed environments, and escape rooms provide a tangible and interactive platform that offers real-world problem-solving scenarios. This dynamic fosters a learner's intrinsic motivation and sustains their engagement, making the learning process enjoyable and more impactful (Dede, 2009).

Over the past seven years, the implementation of escape rooms in education straddles both 'analog' and 'digital' realms, each having unique advantages. Analog games or physical escape rooms offer tangible components and physical space that foster kinesthetic learning and enhanced teamwork (Nicholson, 2015). Digital games or virtual escape rooms, on the other hand, offer expansive and diverse environments with a potential for wider reach and less dependency on physical resources (Sidekerskienė & Damaševičius, 2023). The practical implementation of escape rooms in education has been explored across various levels and disciplines with predominantly positive outcomes (Taraldsen et al., 2022). Initial evidence supports the efficacy of escape rooms as an educational tool, resulting in enhanced knowledge acquisition (Christopoulos et al., 2022), improved camaraderie and communication skills (Lundholm et al., 2022), boosted student motivation and engagement (Terrasi et al., 2020), and refined problem-solving and critical thinking skills (Nelson & Crea, 2021).

Within the disciplines, the application of educational escape rooms has seen a marked popularity in health sciences. For instance, nursing students have reported improved knowledge, teamwork, and delegation skills after the incorporation of escape room concepts into their simulation activities (Brown et al., 2019). Furthermore, the utilization of escape rooms has facilitated the acquisition of interprofessional practice knowledge and experience in health professional undergraduate students. Following these activities, students perceive a greater understanding of their teamwork abilities and unique roles (Friedrich et al., 2019; Hursman et al., 2022; Moore & Campbell, 2021).

3 Research context

Educational escape rooms provide an opportunity for a group of students to work together as they explore a space and solve puzzles within a limited amount of time. The skills harnessed and developed within the game by participants are parallel

to soft skills like collaboration, communication, creative and critical thinking (Taraldsen et al., 2022). While they have been implemented successfully in many allied health sciences programs, the current study sought to design an on-campus escape room for undergraduate biomedical or health science students enrolled in a neuroscience subject. Within the biomedical and health sciences programs, students either go on to undertake a postgraduate course in allied health (e.g., medicine, occupational therapy, physiotherapy), pursue higher degree research or potentially, obtain a job in science laboratories. Regardless of which pathway is chosen, the necessity of soft skills is universal for the students to be successful in these outcomes. As in most science programs, the current one is content-heavy and packed with exams, tests, and assignments that assess students' knowledge acquisition. Naturally, the development of these soft skills is often forgotten. Thus, the research questions for this study were: (1) To what extent can a physical neuroscience-themed escape room for softs skills development be designed from scratch and implemented on campus successfully? and, (2) What are students' perceptions and feedback on the escape room game? Participant feedback was obtained by the means of survey following the completion of the game.

4 Methods

The research is a quasi-experimental mixed methods study conducted in 2022 at the health sciences and medicine faculty within a private Australian institution.

4.1 Ethical approval and participants

Institutional ethical approval was sought from and granted by the institutional Human Research Ethics Committee (IL00036). The sampling was intentional, where the escape room experience was offered as an optional activity in the last week of teaching before the study and final assessment period of the semester specifically to students enrolled in a neurophysiology and neuroanatomy subject. This subject is generally taken by students enrolled in the Bachelor of Biomedical Science or Health Science program at the institution. Students were encouraged to self-form their chosen teams of 3–4 participants and register for a session. Out of the 82 students enrolled in the subject during the semester, 33 students (40%) opted to take part in the escape room experience. These students gave their informed consent for the use of data obtained from their feedback forms.

4.2 Escape room development and design process

The creation and development of educational escape rooms will differ depending on the learning objectives set to be achieved. However, the general idea remains to create a scenario where a team of players solve puzzles to unlock clues, hints and items, accomplishing a series of tasks to ultimately achieve a final goal (Adams et al., 2018). The first step in the design process was to decide on the learning

objectives that the activity sought to achieve. The subject itself was already packed with synchronous and asynchronous resources for knowledge acquisition and content revision including lectures, tutorials, group learning sessions, gamified quizzes using a mobile app, crossword puzzles and practice tests. Thus, the intended main objective of the escape room was for the students to undertake an enjoyable activity that could promote the development of soft skills like collaboration, communication, and critical thinking, while simultaneously provide stress relief during a busy period within their study semester.

Upon deciding on these objectives, the puzzles and tasks within the game were designed to only require logical and lateral thinking to complete. The puzzles and tasks within the game were developed by the designer who drew from extensive experience in participation in commercialised escape rooms and online searching for puzzles that might be appropriate. The scenario and puzzles were incorporated and themed with topics and concepts related to the neuroscience subject. We opted to mimic the scenario to an environment that students are familiar with and replicated a science laboratory with a quasi-real narrative which provided the framework for embedding the puzzles, tasks, and clues. Since this was a physical escape room, it was important that the props and items were realistic as they form an important part in stimulating the environment of the game scenario and ensuring that participants are immersed in the game. With a small amount of funding available, the props were purchased and re-designed to be fit for the puzzles and tasks in the room.

4.3 Escape room scenario and puzzles

Every escape room has a quasi-real scenario as this encourages roleplay and promotes the players to be immersed in the game. In this escape room, the scenario is where a mad scientist had injected the participants with a lethal neurotoxin, and they must obtain the antidote to this neurotoxin, or it will degenerate their brain cells in 50 min. The room utilised was a teaching room within the campus and was set-up as an abandoned laboratory (see Fig. 1). Props and items that are used in laboratories were used to mimic the scene (e.g. test tubes, magnifying glasses, a laboratory coat).

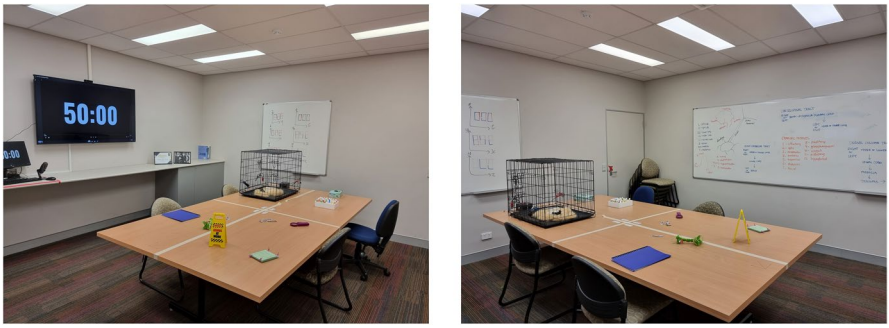

Fig. 1 Escape room setup. Items, clues, hints, and locks were scattered throughout the classroom to mimic a laboratory to match the physical space to the scenario of the game

Before the final study, a group of colleagues and higher degree research students were invited to participate as a validation cohort to ensure that all stages and aspects including the flow, puzzles and physical space of the game were optimised. These groups were invited to provide feedback and their opinions regarding puzzles and clues that were not logical, confusing, or too difficult. This validation process led to minor modifications that made the progression of the activity robust. The escape room was named 'Labscape' and the finalised puzzles and tasks of the game is summarised in Table 1. While the participants might come across items and props as they enter the room, only by completing a previous puzzle will they obtain a key clue or item for the following puzzle (Fig. 2).

4.4 Escape room administration

On the day of the escape room, a 10-min verbal briefing is given by the 'game master' where participants are provided with the ground rules and the scenario outlined above to set the scene. The ground rules provided were similar to those of traditional escape rooms. These include no climbing on furniture, no forcing locked boxes or padlocks open, no carrying heavy objects around and establishing areas in the room that were not in play (e.g., computer and equipment for livestream system).

Following the briefing, the participants are allowed into the room, after which they have 50 min to solve the series of puzzles and ultimately obtain the antidote. The whole experience was observed by the 'game master' from another room, using a webcam and microphone through a live stream system. A TV screen on the wall displayed the timer and it started counting down as soon as the students entered the room. Throughout the game, hints were given if the participants asked for them via this same TV screen, either in the form of text or picture. Occasionally, the 'game master' would also provide hints if the team appeared to be stuck on a puzzle for a long period of time. The game ended when the antidote was obtained by the participants or when the timer expired.

4.5 Data collection and analysis

Following the 'escape', the participants were invited to fill a printed survey questionnaire providing feedback on the experience and informed consent to collate this data. The questionnaire consists of socio-demographic questions and Likert-type scale statements. It was developed using existing surveys already published in the literature surrounding the use of educational escape rooms (Brady & Andersen, 2021; Caldas et al., 2019). The answers to the Likert-type scale range from 1 = strongly disagree to 5 = strongly agree. The questionnaire sought feedback from all participants in relation to three aspects: enjoyment of the game, soft skills development including teamwork and critical thinking and lastly, attitude towards games in general. At the end of the questionnaire, there were two optional open-ended questions asking for additional positive and negative feedback. The current data was collected in August 2022.

Table 1 'Labscape' escape room puzzles

No	Puzzle/Task	Answer/Item Retrieved	
1	Before the participants enter the room, a USB consisting of an audio recording is handed to them. A speaker is found on a table in the room, where the USB drive can be plugged in to listen to the recording	The recording indicates a specific date the antidote was created and directs participants to the experimental note	
2	A file consisting of dated experimental notes is found in the room where from Puzzle 1, participants should know to refer to the correct page	By referring to this page in the notes, instructions are given to open a black safe box	
3	The black safe box is locked with a 4-digit combination padlock and coloured. There is a rack of test tubes on the table filled with water coloured correspondingly	By counting the number of test tubes with the different colours, this box can be unlocked	
	Once the black box is unlocked, the items for the following puzzles are unlocked		
4	A locked mobile phone requires a correct directional password to be unlocked. A cryptic clue on the screensaver indicates a spinal tract they need to track to unlock the phone. The directions to unlock the phone can be found behind a photo frame and using information on spinal tracts on the board	The unlocked phone reveals a decoder image for the code to be revealed in Puzzle 5	The decoded sequence spells out a word combination to open another mini safe
5	A printed abstract with a reference list corresponding to textbooks in the room is found	Using the edition number of the textbooks, a digit combination can be formed to unlock a UV torchlight. The UV torchlight reveals a code written with invisible ink. This can be decoded with the unlocked mobile phone in Puzzle 4	
	Once the mini safe above is unlocked, the items for the following puzzles are unlocked		
6	Dial padlock instructions are found. These instructions refer to numbers related to chemical elements. A periodic table is found on the wall in the room	By referring to the correct elements on the periodic table, a dial padlock can be unlocked and a pair of scissors is now accessible	

Table 1 (continued)

No	Puzzle/Task	Answer/Item Retrieved	
7	Using the scissors from Puzzle 7, a cable ties binding approximately 40 math card equations can be cut. These cards are numbered and corresponds to cranial nerve numbers. These cranial nerve numbers are readily available for participants to refer in the room	When the correct math equation is solved, it unlocks a padlock	These are the 2 final padlocks in the game. When unlocked, participants obtains the antidote
8	A scrambled 2 × 2 Rubik's cube is found. When solved, each colour face has a number written	Matching the colours on a padlock with the numbers written on each colour provides the correct digit combination to unlock another padlock	

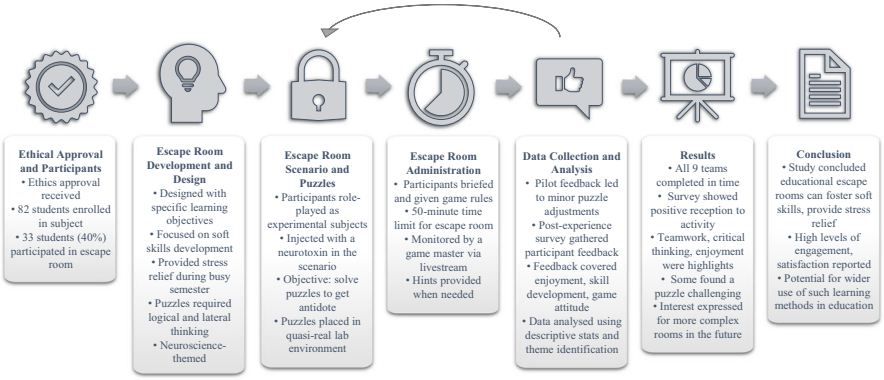

Fig. 2 Overview of the experimental design and main outcomes of the current study. Each stage highlights key findings and steps in the process

The data collected from the questionnaires were imported into GraphPad Prism (GraphPad®) in which data analysis was performed. Due to the nature of Likert scale-type data, the analysis was focused on frequencies and mean scores in relation to individual statements using descriptive statistical tests. Additionally, textual data was organised to identify emerging positive and negative themes along with their frequencies.

5 Results

A total of 9 game sessions were held (6 groups of 4 participants and 3 group of 3 participants, see Table 1). All 9 teams completed the room and achieved the goal within the time limit, with varying amounts of time left and number of hints required. All participants completed the questionnaires, hence a total of 33 complete questionnaires were collected at the conclusion of the escape room activity. Out of the 33 participants, 24 identified as female (73%) and 9 identified as male (27%). The majority (76%) was within the age group of 18 – 20 years. Twelve (36%) participants had completed an escape room prior to the current experience (see Table 2). Most participants acknowledged that they enjoy playing games in general, outside of the activity (91%) (see Table 3).

Likert-type scale statements in relations to development of teamwork scored positively, with 100% of participants agreeing that they learned from, were able to engage, valued their teammates and felt valued for their contributions. Almost all (97%) of the participants agreed that the escape room game encouraged them to think critically. The enjoyment of the game was also rated highly, where 100% of participants would recommend the game to others and felt that completing the puzzles in the room excited them. Additionally, 97% of participants felt that time passed fast within the game, which is an indication of enjoyment (Sherry, 2006). The only statement on enjoyment that had a higher variance of responses was on whether they

Table 2 Participant demographics

Total no. of responses	33
Gender	
- Male	9 (27%)
- Female	24 (73%)
Age Group	
- 18 – 20 years	25 (76%)
- 21 – 30 years	7 (21%)
- > 31 years	1 (3%)
Prior Escape Room Experience	
- Yes	12 (36%)
- No	21 (64%)

were stressed or overwhelmed in the room, which is not surprising considering there a time limit for the game to be won (see Table 3).

The open-ended responses were grouped into broader themes in order to identify major concepts that arose (see Table 4). The most common positive theme found from these responses was the enjoyment of the game ($n = 16$). Themes related to puzzles and learning also emerged, though they were mentioned less frequently ($n = 10$). Other themes that arose, were the puzzles and learning involved. About 52% of the participants (17 out of 33) did not answer the open-ended question regarding potential game improvements. Out of those who did respond, one recurring comment was in relation the Rubik's cube puzzle and that it was too challenging ($n = 3$). The remaining participants mostly stated that they would like more opportunities to take part in escape room games with higher levels of difficulty, longer periods, and more puzzles to solve ($n = 10$).

6 Discussion

In higher education, where courses are mostly content heavy, the teaching of soft skills like problem solving, critical thinking and team dynamics can prove to be challenging (Marakovits, 2022). While escape rooms can and have been utilised to reinforce educational content in different topics within health and medical sciences (Brady & Andersen, 2021; Christopoulos et al., 2022), to our knowledge, this is the first neuroscience-themed physical escape room designed to solely facilitate the application of critical thinking, teamwork and communication skills, and not to test knowledge of content within the subject. Specifically, the present investigation focused on outlining the design and implementation of the escape room and obtaining the perceptions and feedback from students following the completion of this activity.

Education games are recommended to include elements of gameplay and simultaneously, defined learning objectives (Plass et al., 2015). The escape room in this study encompasses gaming elements through the goal of solving a series of puzzles within a limited period, while the learning objectives of teamwork and

Table 3 Responses to Likert-scale type questions following completion of the 'Labscape' escape room

Theme	Item	Frequency (%)				
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Soft Skills	I learned from my team members during the escape room	-	-	-	4 (12%)	29 (88%)
	I feel I was able to engage with my teammates to complete the game	-	-	-	-	33 (100%)
	I valued the contributions from my teammates during the game	-	-	-	-	33 (100%)
	My contributions were valued by my peers during the game	-	-	-	3 (9%)	30 (91%)
	The escape room encouraged me to critically think in a different way	-	1 (3%)	-	2 (6%)	30 (91%)
Enjoyment	I would recommend the escape room to others	-	-	-	1 (3%)	32 (97%)
	I enjoyed playing the escape room	-	-	-	-	33 (100%)
	Time passed fast when I was in the room	-	-	1 (3%)	3 (9%)	29 (88%)
	Completing the puzzles in the room excited me	-	-	-	-	33 (100%)
	I felt stressed and overwhelmed in the escape room	5 (15%)	15 (46%)	7 (21%)	3 (9)	3 (9%)
	I would try another escape room in the future	-	-	-	2 (6%)	31 (94%)
Attitude towards games	I enjoy playing games (video, board, social media games, etc.)	-	-	3 (9%)	9 (27%)	21 (64%)
	I work better in a competitive environment	-	3 (9%)	6 (18%)	11 (33%)	13 (39%)
	I consider myself able to apply knowledge and skill in stressful situations	-	-	3 (9%)	13 (39%)	17 (52%)

Table 4 Questionnaire responses to open-ended questions

Theme	Representative Sample	Frequency
Positive Feedback		
Enjoyment	"It was a fun way to learn"	16
	"I like how everything was connected to the content. It was really interactive and it was creative"	
	"Great way to de-stress during exam time"	
	"I loved it! Every class should do this."	
Collaboration	"It was a fun [and] exciting way [to] collaborate with my friends to achieve the goal and work together under time pressure."	10
	"It was so fun as a first timer doing escape room, it makes me think [and] collaborate with my team"	
	"The problem solving and teamwork was [exhilarating]"	
Creative and Critical Thinking	"I loved how the escape room caused me to exit my "tunnel-vision" mindset and force me to think outside the box"	10
	"Was fun, made me think outside the box, think about my teammates ideas"	
	"Thinking quick on feet & working together as team"	
Puzzles and Scenario Design	"Good story line, good level of difficulty"	8
	"The puzzles were creative"	
	"I liked the style of puzzles and how it was all related to the content"	
Learning	"It was a great way to learn and expand knowledge"	4
	"Super fun way to apply knowledge"	
Negative Feedback		
More Opportunities	"Potentially having a series of rooms that you have to go through"	10
	"More Labscapes!"	
	"More per semester"	
	"More puzzles to solve"	
Puzzle Difficulty	"The Rubiks cube test was a bit hard"	3
	"The Rubiks cube was hard"	

communication are the focus of this room. The puzzles and tasks were designed to ensure that there was requirement for collaboration to solve and complete. At the same time, a wide variety of puzzle types were implemented, to ensure that there are opportunities for each individual participant to be involved and contribute to the team. The activity was intentionally placed to occur during the week prior to study and final assessment weeks in the semester as an additional purpose of the game was to be a form of enjoyment that would provide stress relief for the students during this busy period. Introducing an activity that did not require memory or specific knowledge of neuroscience content (the subject the participants are enrolled in) was deliberate in the hope that this would help alleviate stress and workload during this busy time of the semester. The scenario enabled students to practise and further develop their communication and teamwork skills without the pressure of having to remember content from a content-heavy subject.

During the design and implementation process, there were challenges and barriers. The successful development and implementation of the escape room required a substantial amount of resources including time, effort and expertise. This game took more than 30 h of development, a pilot run with colleagues and higher degree research students, and approximately AU$250 worth of materials including padlocks, flashlights and other props. Because the number of participants were limited, we were able to run the escape room consecutively in two days. To increase the scalability of the activity, more physical space and more facilitators to debrief participants and reset the room would be required. Nevertheless, we successfully ran the escape room games for the purpose of this study and sought feedback from the participants.

The overwhelmingly positive responses reported by the participants align with literature on gamification and escape room, describing them as enjoyable and engaging. The current neuroscience-themed escape room was well received by every student that participated and this was also the most frequent recurring theme in their positive open-ended responses. This is aligned with the literature where previously developed educational escape rooms were also reported to be embraced positively by students (Aubeux et al., 2020; Caldas et al., 2019, Rhodes, 2020, López-Pernas et al., 2019, Franco-Mariscal et al., 2015). Incorporation of elements of fun and enjoyment in games are known to be the key aspects that encourage and motivate participation in learning with enthusiasm (Lucardie, 2014, Zhang and Yu, 2021).

Regardless of profession and discipline, being able to work together and communicate within a team and to think critically are graduate attributes that are expected of students. Similar to previous studies investigating student perceptions on escape rooms, the students who took part in the activity engaged in the game by navigating communication skills and working with the team to complete challenges and puzzles to achieve the final goal (Foltz-Ramos et al., 2021). In addition, the feedback collected from all participants indicate that they found themselves practising collaboration and critical thinking within the game.

Lastly, it was interesting that although the escape room did not test the students' knowledge of content, some participants stated that they felt it aided their learning. A lot of positive feedback was also received regarding the relevance of the game scenario and set-up to the subject content. We believe that this was an essential aspect, particularly since it was developed specifically for students within one subject. This

promoted a 'buy-in' from the students as they entered the game, finding items and clues that were relevant to neuroscience.

Despite the solid evidence presented that participants perceived this escape room positively, this study is not without its limitations. The current investigation focused on the feedback and perceptions of the participants on the enjoyment and usefulness of the game to develop soft skills. To further concretise the effectiveness of the game for development of teamwork, a more in-depth inquiry could be made to explore participants' reflection on team dynamics before and after the game. For example, whether the activity encourages the overcoming of barriers as a team, how does it help in managing different personalities and whether certain teams can multitask.

7 Conclusions

Our exploration into the utilization of a neuroscience-themed escape room as a pedagogical tool has offered promising insights. In the landscape of higher education, traditionally dominated by content-heavy courses, our findings underscore the value of this innovative approach in facilitating the development of critical thinking, teamwork, and communication skills. Positioned as a stress-relief exercise during the peak assessment period, the escape room offered students a unique respite, honing their soft skills without the pressure of content memorization. The positive reception aligns with current literature on gamification and escape rooms, reinforcing the notion that integrating elements of fun and enjoyment are key to motivating participation and fostering enthusiastic learning. Despite its limitations, the study underscores the potential of escape rooms as a viable teaching tool that not only develops vital graduate attributes but also makes the learning process engaging. In conclusion, our study affirms the potential of escape rooms as innovative pedagogical tools that can nurture critical thinking, teamwork, and communication skills in a novel, enjoyable manner. As we move forward, it is our hope to see further investigations and implementations of this approach, broadening its scope across disciplines and enhancing its impact within various educational contexts.

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Data availability Data can be made available upon request to the corresponding author.

If there is any interest from readers to implement this escape room within other programs or institutions, please do not hesitate to contact the corresponding author for a full digital package with guidelines on how to set up the game. This package includes list of props required, reset checklist, map of room layout, and printable files for all clues and puzzles. The game is reproducible anywhere, as long as props can be obtained and there is a physical room that can be set up.

Declarations

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee. The study was approved by the Bond University Human Research Ethics Committee (Project ID: IL00036).

Conflict of Interests Not applicable.

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