Education

Escape rooms in paramedic education

Anthony Weber MHlthSc, MACAP is Deputy Dean (Learning and Teaching)¹ and Senior Lecturer (Paramedic Science)²; Shannon Delpont MDRSD, MTechEMC, BTechEMC, NDPEMC is Senior Lecturer (Paramedic Science)²

Affiliations:

¹School of Health, Medical and Applied Science, Central Queensland University, Rockhampton, Queensland

²School of Business and Law, Central Queensland University, Rockhampton, Queensland

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Abstract

Introduction

Even with paramedicine's evolution, clinical decision-making will always be a crucial learning and teaching requirement. As part of their learning, paramedic students need to develop critical thinking and collaborative approaches with others. The aim was to review the literature around escape room activity as a pedagogical approach for paramedic education. The intent is to contribute to the discussion around authentic and engaging approaches to teaching clinical thinking and decision making in paramedicine.

Methods

A systematic review was undertaken to review existing literature on using this approach in higher education. EBSCO, Medline, CINAHL, ScienceDirect, ProQuest and PubMed were used to review paramedic and health education strategies using the keywords 'paramedic and education', 'ambulance and education', 'paramedic and training' and 'health education and higher education curriculum'. Specific education databases were used for a more targeted search with specific keywords used ('Escape Room' OR 'Escape Game' OR 'Puzzle Room' AND 'Higher Education'). The education databases Education Research Complete, Emerald, Elsevier, ERIC and Teacher Reference Center were used, with Google Scholar also being used for its vast breadth of coverage.

Results

There were 23 scholarly papers examining the use of escape rooms in an educational context found. There was no reference to using this teaching methodology in paramedicine, but some health contexts were identified for nursing, pharmacy, radiology and medicine.

Conclusion

With an instructional design that addresses logistical requirements, educational escape rooms can be used effectively in paramedic higher education. This review highlights a longitudinal study is needed to assess an educational escape room's implementation into the paramedic higher education curriculum. A longitudinal, multi-university study can further explore the feasibility of using a blended online/offline escape room activity in large enrolment paramedic programs.

Keywords:

curriculum; education; escape room; gamification; learning; paramedic; teaching

Corresponding Author: Anthony Weber, a.weber2@cqu.edu.au

Introduction

The correlation between critical thinking and clinical judgement is identified as being controlled and purposeful, and it relies on sound strategies to get the results required (1). If problems are not resolved or prevented due to the inability to think critically, the clinician becomes part of the problem. Critical thinking is a component of many health professional's practice. In paramedics, critical thinking forms the basis of clinical judgement and problem solving through a process that reviews patient assessment; judgement based on knowledge, intuition and experience; patient management plans and care of the patient with a review of the care delivered (2). It is a systematic means of analysing the patient's complications and dealing with them. Critical thinking as a graduate attribute is employed by many universities as a trait students should attain for future employment based on industry and employer requirements. The Council of Ambulance Authorities (CAA) and the Paramedicine Board of Australia have identified critical thinking as a paramedic core competency. The CAA identifies that a paramedic "uses clinical reasoning and problem-solving skills to determine clinical judgements and appropriate actions" (3) and also states that a paramedic "draws on appropriate knowledge and skills in order to make professional judgements".

As clinicians, paramedics bring knowledge to every encounter they have with a patient. This knowledge has culminated over many years of study and practice and a paramedic's own life experiences. It can be categorised as either propositional knowledge or non-propositional knowledge, as well as tacit knowledge. Propositional knowledge is also known as scientific knowledge. It is the knowledge tested and proven to be correct or valid (4). Anatomy and physiology of the body are examples of this type of knowledge and have been studied over centuries and confirmed by various researchers. Many of the subject's students have studied during their education to comprise multiple concepts of propositional knowledge.

The knowledge that paramedics gain from their experiences in life and their time working in paramedicine, exposed to diverse cases, is known as non-propositional knowledge. It is non-propositional knowledge because it is information that has not been proven by others (5). It is the knowledge that paramedics believe to be true, but others may not know. If these ideas were published and their validity confirmed, they might then become propositional knowledge. It does not make this knowledge less critical or less correct to paramedics and plays a vital role in their clinical judgement. Paramedic students will graduate with both propositional and non-propositional knowledge. They will become successful at integrating their underpinning knowledge and applying this within the clinical context upon clinical placement and graduation. This interaction of knowledge and reasoning will give paramedic students a level of clinical reasoning. However, as students face an immense amount of new information to be understood, processed, and applied in numerous new situations, pedagogical strategies to increase their critical thinking skills need to be implemented.

Problem-solving is an effective way to enhance critical thinking (6), with team-based problem-solving approaches such as an 'escape room' activity identified as one pedagogical approach to paramedic education. Escape room puzzles have been identified as engaging, interactive and effective way for students to learn problem-solving skills that will transfer across as improving critical thinking (7). The level of technology involved in escape room puzzles would be in contrast to students' learning abilities. It can be adapted to any form of paramedic education, internal or online.

A systematic review was undertaken to identify the use of escape room puzzles in health education, focussing on paramedicine. This review aimed to identify literature around escape room activity as a pedagogical approach for paramedic education. The intent is to contribute to the discussion around authentic and engaging approaches to teaching clinical thinking in paramedicine. This review was subsequently extended to include curriculum design in other well-established healthcare fields.

Methods

To direct our review, the PRISMA review protocol was undertaken (8). Multiple databases were used to identify and include publications in the systematic literature review. We searched databases EBSCO, Medline, CINAHL, ScienceDirect, ProQuest and PubMed to review paramedic and health education strategies using the keywords 'paramedic and education', 'ambulance and education', 'paramedic and training' and 'health education and higher education curriculum'. Specific education databases were used for a more targeted search with specific keywords ('Escape Room' OR 'Escape Game' OR 'Puzzle Room' AND 'Higher Education'). Specific education databases were used for a more targeted search with specific keywords used ('Escape Room' OR 'Escape Game' OR 'Puzzle Room' AND 'Higher Education'). The education databases Education Research Complete, Emerald, Elsevier, ERIC and Teacher Reference Center were used, with Google Scholar also being used to identify any additional articles.

By incorporating both inclusion and exclusion criteria, a clear focus was maintained on the topic being investigated. Similarly, employing a delineated search strategy that utilised multiple databases ensures that the existing literature was being comprehensively represented. The search parameter was limited to articles since 1994 because this was the date higher education qualifications were introduced in Australia for paramedicine. Eligibility criteria included article title or abstract had to specifically mention 'escape rooms' or other similar terminology mentioned above as a teaching activity. They were required to be in English and had to be published papers or articles in a scholarly journal. Exclusion criteria included papers that described no specific aspects of higher education and showed no comparability to paramedic education. Excluded articles also included those not meeting the inclusion criteria and any articles identified as duplicates.

There were 519 articles identified through the search of all the databases (Figure 1). Articles that were not related to escape room use as an educational tool in higher education were not considered. Twenty articles were removed due to duplication, and 313 articles were excluded due to the title and abstract not meeting the inclusion criteria. A further 163 articles were excluded due to the article's focus not related to paramedicine or other health education or a focus on higher education teaching and learning design.

Results

Our review identified 20 papers published between 2015 and 2019. The types of studies undertaken included quantitative and qualitative methodologies, literature, prospective and discussion papers, and conference proceedings. Of the 20 articles included, most articles focussed on learning and teaching approaches to higher education. Escape rooms as an approach to learning and teaching yielded the most articles, with escape rooms within curricula (n=7), as a way of engaging students (n=3), as a form of simulation education (n=2), to teach interprofessional education (n=2) and for problem-solving (n=1). The health professions identified through the literature search included

pharmacy (n=2), surgical training (n=1), radiology training and nursing education (n=1).

There is a wealth of research that demonstrates emerging technologies are having positive impacts on learning and teaching in higher education (9-11). In various studies looking at the benefits of using engaging pedagogy, improved student satisfaction and grades have been demonstrated compared to traditional lectures (12,13). It has also been identified that students have a deeper understanding of the material in engaging models of education, benefiting from an active instead of a passive learning experience (14). The introduction of escape room educational strategies combines emerging technology to use the current escape room activities trend. Technology has allowed students to learn just about anywhere without having to be physically on a university campus. Expanding teaching strategies through mobile devices as student learning tools have identified a critical opportunity for academics to advance learning (9). The 'bring your own device' paradigm/technology is another emerging trend in generating interest. It allows students to access learning material on a device they are comfortable using and more likely to engage with. These mobile devices can be used effectively for escape room activities rather than transforming physical classroom spaces into interactive escape

Figure 1. Flowchart of the literature selection process (paramedicine)

rooms. The use of escape rooms in pharmacy education adopted an online approach due to the large class size and feasibility of an on campus approach. The approach undertaken included online clues and was well-received by students and addressed logistical issues that occur with large class enrolments (15).

The use of escape room puzzles via an online platform is a pedagogical approach to engage students and address their various learning needs (16). In an era where the millennial student depends on technology, academics need to be aware of their needs and the approach to engaging with them. The use of online escape rooms that teach critical thinking and collaboration were highlighted by Rouse (16) as necessary in the success of solving the puzzles. The use of escape rooms as an active learning teaching strategy focussed on self and peer reflection, all components relevant to improving critical thinking, was recognised using the puzzle approach to teaching cryptography (17). The authors identified that the students identified this approach to teaching cryptography as enjoyable and improved grades (17). A similar result was identified with students studying programming. A paper identifying student engagement in programming courses also had positive results with student engagement and objective learning outcomes (18).

First-year students' engagement is also necessary to reduce attrition levels and keep students engaged in university study. To engage first-year students in their studies early and commence teaching them problem-solving skills from the outset, a study into the use of escape room games for first-year engineering students provided an encouraging experience for the students and staff (19). An article by Plump and Meisel (20) also confirmed that practical learning opportunities engage students effectively. The use of escape rooms motivate students to participate and learn, which resulted in completing complex problem-solving tasks (20). With class numbers on the rise in many discipline areas, applying game-based learning in the form of escape rooms increases student enthusiasm and engagement and assists academics by distributing assessment tasks to more simple phases in a game-based approach (21). An approach to engage students upon orientation was adapted by the University of Surrey, where it was identified that orientation processes were didactic and not engaging for students. The use of escape rooms as a series of activities introducing them to all aspects of university life was undertaken with positive outcomes as a result of these activities (22).

A move away from teacher-centred learning to student-centred strategies is essential for students' ongoing engagement and to keep students motivated in their studies. A move away from didactic approaches to learning and teaching to a more interactive approach is gaining momentum in health education. Pharmacology, an essential subject required by nursing students, has traditionally been taught through didactic, teacher-centred learning approaches. To have pharmacology more engaging for nursing students, an escape room approach was

undertaken in a study of 90 nursing students. The students identified that this learning and teaching approach was engaging and provided opportunities for teamwork. However, time constraints on running the activity were frustrating for students, and the level of puzzles was considered complicated despite faculty believing they were easy (23). Problem-solving and skills proficiency is also an essential aspect of surgical training; therefore, one institution implemented an escape room teaching methodology to gauge students' interest, fulfilment, and engagement in the learning opportunity (24). The researchers identified that through the use of escape rooms, students effectively problem solved, utilised surgical skills through simulation, and met the vascular surgical topic (24).

A teaching paradigm of simulating real-life conditions is recognised across many health disciplines and has been a teaching methodology for many years. The use of game-based learning in higher education to immerse students into a simulated environment is gaining momentum due to the millennial generation and their approach to technology and the digital age. The use of escape rooms as a game-based learning in higher education enhances learning and teaching. Clarke et al highlighted that this interactive approach to higher education produces exciting results that are transferred to improved problem-solving skills (25). Through simulation, immersive learning promotes teamwork and problem-solving skills, and this notion is supported in a study on nursing students undertaking a Bachelor qualification. The study identified that students found the escape room used as an immersive simulation scenario to be engaging and supported teamwork (26). The use of simulation in preparing students for failure, allowing students to reflect on their performance in a safe environment, is a keystone of simulation in education. Like simulated scenarios, escape rooms can provide students with a task, solution and a prize; where the solution does not result in a positive outcome, students are able to reflect and improve on their problem-solving abilities (27). This notion was also supported in an article focussing on escape rooms as an adult playful teaching methodology. The use of game-based learning and teaching approaches in higher education can create a safe learning environment where students reflect on the failure, risk take without severe consequences, and be imaginative and innovative (28).

As described above, simulation-based education is a standard teaching pedagogy in enhancing students' clinical education across many health disciplines. The use of game-based approaches such as escape rooms is becoming popular across health disciplines such as nursing. This approach provides educators with an engaging and innovative approach to teaching problem-solving skills. A study into the use of escape rooms in allowing nursing students to think critically and collaborate with others to provide safe care was implemented as an alternative to a typical simulation experience with positive outcomes (29). Teaching interprofessional education is essential for all health professional students due to the interlink of health professionals in the real world; therefore, health students, through simulated

practice, collaborate across several disciplines. A pilot study in the use of escape rooms for interprofessional education focussed on many health disciplines, including dental hygiene, dental therapy, healthcare administration, healthcare ethics, medicine, nursing, pharmacy and physical therapy. The study highlighted the importance of the escape room in interprofessional education as this approach encouraged collaboration, enhanced communication and supported cross-discipline professionalism (30).

Discussion

This review highlighted the need for more creative and engaging learning and teaching strategies in higher education. The introduction of the new craze, escape room puzzles, into higher education has shown to be effective in immersive, authentic and unique approaches to learning and teaching, especially as a way of engaging students, as a form of simulation education teaching interprofessional education and problem-solving. Although paramedicine was not identified in the literature, other health disciplines such as nursing and surgery had adopted escape room puzzles to teach problem-solving skills to enhance critical thinking.

Paramedics are responsible for treating the sick and injured not only in high acuity situations but with the scope of practice of paramedics expanding to primary healthcare, the need for critical thinking is becoming more critical (31). No matter the environment paramedics work in, appropriate diagnosis and management are important in patients' outcomes. Critical thinking is paramount for paramedic students to learn and implement for patient safety and positive outcomes. As described previously, the emphasis on technology-based, student-centred learning is a trend in higher education institutions that needs to consider keeping up with students' demands into the future. Simulation-based research in paramedic education has been well researched. However, escape room pedagogy needs further investigation as a tool for paramedic students to learn critical thinking skills and interprofessional collaboration and teamwork.

Conclusion

This review highlights the need for further research to assess an educational escape room's implementation into paramedic curriculum. A longitudinal, multi-university study can further explore the feasibility of using a blended online/offline escape room activity in large enrolment paramedic qualifications.

Competing interests

The authors declare they have no competing interests. Each author of this paper has completed the ICMJE conflict of interest statement.

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