

# Riddle Me Out: Emerging Utilization of Escape Rooms as a NoVel Approach to NP Student EducAtion and Learning, The “REVEAL – NP Curriculum Project”

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## ABSTRACT

**Introduction:** This study explores the use of a virtual escape room to enhance clinical reasoning (CR) skills in Nurse Practitioner (NP) students, specifically in the diagnosis and management of headaches in primary care. With increasing demand for NP education and faculty shortages, innovative teaching methods are needed. Virtual escape rooms, a gamified learning approach, provide an interactive, engaging way to develop CR skills.

**Methods:** A mixed-methods design was used to assess the perceptions of 12 NP students from two cohorts at Thompson Rivers University.

**Results:** All 12 students participated in the virtual escape room experience and the virtual debriefing session. Only 7 of the 12 students completed the post-simulation survey, accounting for a 58% return.

**Discussion:** Tenants of the escape room emerged, such as enjoyment, versatility, and transferability of this learning modality to other topics, summarized within the theme of satisfaction. Much of the commentary was positive and participants expressed gratitude for being part of the experience.

**Conclusion:** The study supports virtual escape rooms as a promising educational tool for NP programs and suggests further research with larger samples and improvements in the platform's usability.

Nearly one-third of nursing schools in Canada offer Nurse Practitioner (NP) programs. Distance education (DE) and virtual modalities are embedded within approximately 56% of all NP programs (Canadian Association of Schools of Nursing, 2022). Virtual modalities rely on technological advances including, but not limited to, simulation. Replicating real-world encounters as a learning modality offers meaningful virtual interactions, encouraging engagement and demonstrating advanced knowledge and skill acquisition while challenging the landscape of traditional NP education delivery.

Nurse practitioner students favour DE's flexible educational delivery model and virtual means (Luimes,

2021). Nation-wide, challenges in NP faculty recruitment and retention persist. The literature reveals that around 40% of NP schools have a shortage of qualified NP faculty (Canadian Association of Schools of Nursing, 2022). Despite this shortage, the NP designation has increased significantly and is one of the fastest-growing healthcare professions since 2020, with a reported growth of nearly 11% (Canadian Nurses Association, 2024).

Given educational institutions' challenges in meeting the continued projected growth, novel approaches to educating NP students are necessary to meet the mounting demands, irrespective of the shortages in NP faculty. Furthermore, students have identified their

preference for more enjoyable and engaging learning modalities, suggesting a need to diverge from traditional, didactic learning styles (Bass et al., 2024). Escape rooms are an emerging approach for NP education delivery, mitigating gaps in instructional resources while capturing student-preferred delivery modes of knowledge acquisition. Virtual strategies are relevant and versatile in a multitude of settings, including in-class or via DE.

## Background and Significance

The undertaking of game thinking using technology and game mechanics to solve problems in non-game contexts is the foundation for a movement in learning referred to as, Gamification (Mackavery & Cron, 2019). Gamification is the genesis for escape rooms and is gaining traction in revamping NP learning modules. While novel, the gamification of learning strategies in healthcare has yet to see the breadth of research to infer its benefits.

However, recent literature is revealing the innovative ways of caring, redesigning, and reinventing practices through gamification, wherein the data gleaned (datafication) forges personal insights for long-lasting self-improvement, ultimately enhancing care (Krishnamurthy et al., 2022; Wallenburg & Bal, 2018). Gamification provides the overarching umbrella for simulation, making escape rooms an enjoyable and relatable endeavour, bringing real-world scenarios to life in a risk-free learning space. In a culture of risk aversion, the emerging utilization of escape rooms as a novel approach to NP student learning has merit in revealing the benefits of a just culture of learning and healthcare delivery.

Escape rooms represent a novel active learning strategy, providing an interactive instructional method which promotes collaboration, empowerment, clinical reasoning, and critical inquiry (Mullen et al., 2019). Gaming principles are employed to actively engage learners who must complete puzzles or riddles to master a scenario, escaping the room when the problem is solved (Iverson et al., 2022). Moreover, game-based learning enables problem-based learning principles utilizing technology that promotes immersive learning virtually, a concept and study method familiar and widely used by Millennial and Generation Z students (Hebert, 2023). The Canadian Nurses Association (2024) reports that the nursing workforce (including NPs) is becoming younger, with many falling categorically within the Millennial generation. While escape rooms have been developed for use in undergraduate nursing and medical programs, further literature examining the utility of and outcomes for NP student delegations is needed (Iverson et al., 2022).

NPs care for diverse populations across a lifespan, often with increasingly complex care needs in various practice settings. NP scope of practice has broadened; thus, NP education must shift to meet the myriads of educational needs. With the projected growth of NPs to

meet Canadian healthcare needs, NP education delivery must supersede growth predictions. However, meeting this demand is limited by the requisite number of NP faculty, with many NP faculty positions presently unfilled (Canadian Association of Schools of Nursing, 2022). Despite these vacancies, NP educational institutions must ensure students have the skills outlined by deliverable core competencies set out by national and provincial governing bodies. Clinical reasoning (CR) is foundational to safe practice, encompassing the cognitive knowledge and decision-making abilities to diagnose and prioritize care plans (Cantero et al., 2024). CR is the fulcrum of NP education, necessitating NP faculty expertise to solidify this core competence skill in NP education. While not a replacement for qualified NP faculty, existing NP faculties can utilize immersive education techniques, such as escape rooms, to address the complexities and time constraints of delivering comprehensive NP education (Koelewijn et al., 2024).

## Headaches in Primary Care: Topic of Interest

Our study proposed an inquiry into the utility of a virtual escape room simulation to support NP students' development of CR skills in diagnosing and managing headaches in a primary care setting. The common chief complaint of headache was chosen as the topic of interest given its clinical relevancy for NP students. Canadian primary care practitioners will encounter headaches, one of the most common chief complaints, with a predicted lifetime prevalence of around 66%, accounting for 20% of workforce absenteeism (Becker et al., 2015). These prevalence rates are consistent with the findings globally that headache disorders produce a high ill-health burden and loss of productivity. Headaches are listed among the top three causes of disability across the lifespan, given both the chronic and episodic nature of these disorders (Steiner et al., 2021).

Despite the frequency of headaches seen in primary care, diagnosis and treatments could be improved, with a lack of formal education on headache management cited as a root cause for provider shortcomings in the area (Minen et al., 2020). Thus, clinical decision-making and reasoning for managing headaches in NP programs is a vital topic for instruction. Little is known about the utility of escape rooms in enhancing NP students' knowledge of headache management. As such, a virtual escape room activity was created to promote NP student knowledge and CR skills for the management of headaches at a regional NP program in British Columbia. This research aimed to evaluate NP student's perception of the use of a virtual escape room simulation in solidifying their knowledge of headaches and developing clinical reasoning skills in headache management.

# Methods

This study used a mixed methodology approach using quantitative and qualitative data to understand NP students' perception of the utility of the headache virtual escape room to solidify knowledge and build clinical reasoning skills.

## Escape Room Development

The content for the virtual escape room was developed by NP faculty with knowledge and experience in primary care and headache management. The escape room itself was developed by a computer science student using Google Pages. The NP faculty and the computer science student worked collaboratively to ensure the educational content and clinical decision-making points were intentionally placed to allow the introduction of gamification techniques to solidify learning. This approach is consistent with the literature findings for gamification in education to build clinical reasoning skills (Koelewijn et al., 2024). Simulation expertise was provided by faculty specializing in this area of education delivery for nursing, shaping the delivery of the content. The content and functionality were vetted by other allied health professionals and faculty, who provided feedback on the useability of the intervention.

## Participants

The NP virtual escape room simulation experience was offered to two groups of NP students: NP students in either the first year (two year stream) or second year (3 year stream) of the NP program who were enrolled in pharmacology (cohort 1) and NP students in the second year (2 year stream) of the NP program who were enrolled in the second of three clinical courses (cohort 2).

## Ethical Considerations

Thompson Rivers University Review Ethics Board approval was obtained. Participation in the escape room was voluntary and was not considered part of their existing courses or course marks. Written consent for participation was obtained. As the virtual escape room simulation experience was completed with students from different cohorts with different trajectories of their NP learning, two separate debriefs were conducted to maintain psychological safety.

## Implementation

The virtual escape room simulation experience consisted of participation in the virtual escape room platform, a post-simulation survey, and a virtual debriefing session.

## Escape Room Simulation Experience

The timing of the escape room simulation experiences was intentional. The first cohort of NP students had completed pathophysiology and were subsequently enrolled in their pharmacology course. The escape room simulation coincided with the week students were scheduled to learn pharmacological approaches to headache management. The timing was meant to solidify the students' knowledge of headache pathophysiology and build on CR skills to incorporate appropriate management planning, including pharmacological and non-pharmacological treatment selection, into the decision-making process. The second cohort of students, were offered the simulation experience to solidify their knowledge as they are nearing entry-level NP competencies, having completed courses in CR, health assessment, and clinical placements.

Participants were emailed with the relevant assigned readings to support their successful completion of the virtual escape room simulation. Within the email, participants were pre-briefed on how to prepare for the escape room simulation experience, including having a pen and paper handy to write down 'codes' that would be needed to advance through the escape room, and how to navigate the technology being used.

## Post-Simulation Survey

Participants were emailed a post-simulation survey to elicit their perceptions of the utility of the headache virtual escape room to solidify knowledge and build CR skills. Survey Monkey was used to collect both quantitative and qualitative data. Our survey questions were guided by the Levett-Jones Clinical Reasoning Cycle to assess student perceptions of clinical reasoning skill development (Levett-Jones et al., 2010).

## Virtual Debriefing Session

Students participated in a live virtual debriefing session using Microsoft Teams with NP faculty and the Simulation Educator. The literature supports timely virtual debriefing based on an established framework that promotes learning (Verkuyl & Atack, 2024). Best practices for virtual debriefing were followed, including setting ground rules such as keeping cameras on, actively engaging in discussions, and using the "raise hand" feature before unmuting (Verkuyl et al., 2022). The PEARLS Healthcare Debriefing Tool was implemented (Baja et al., 2018), which is evidence-based, and a blended debriefing model from the original PEARLS framework (Eppich & Cheng, 2015). This model integrates learner self-assessment, guided discussion, and feedback/teaching. Additionally, we aimed to capture students' initial reactions to the

escape room experience, assessing their feelings toward this innovative learning approach. The time allotted for the debriefing was one hour at the end of their virtual classroom education session, with permission from the lead faculty instructor.

### Data Analysis

Post-simulation surveys were utilized to gather quantitative and qualitative data, and two separate debriefing sessions were held to gather qualitative data from each cohort. The debriefing sessions were conducted within 3-5 days from the student’s completion of the escape room as per best practice principles on debriefing (Verkuyl et al., 2022). Qualitative data was collected and organized using thematic analysis.

## Results

This study had a total of 12 participants: 7 students from the first cohort and 5 students from the second cohort. All 12 students participated in the virtual escape room experience and the virtual debriefing session. Only 7 of the 12 students completed the post-simulation survey, accounting for a 58% return.

### Post-Simulation Survey

Seven participants completed the post-simulation survey. The survey used a 5-point Likert scale with response options ranging from strongly disagree to strongly to measure students’ perceptions of the virtual escape room. Most participants either agreed or strongly agreed that the escape room simulation helped with their capabilities. Three responses indicated neutral perceptions regarding the impact on their clinical decision-making in a particular area, and no responses indicating, “strongly disagree” or “disagree.” See Table 1 for quantitative survey results.

There were three qualitative post-simulation survey questions. Six of the seven students completed questions 11 and 12, and five of the seven students responded to question 13. See Table 2 for qualitative survey findings.

### Virtual Debriefing Session

The PEARLS Healthcare Debriefing Tool was used, and several themes emerged from the debriefing sessions. Through thematic review, themes revealed benefits of the escape room modality of education on headaches, supporting the intent of providing learning through gamification, which offered additional and alternative learning to enhance and consolidate knowledge.

**Table 1: Post-Simulation Survey – Quantitative Findings**

Survey Question	Neutral	Agree	Strongly Agree
1. Overall, I enjoyed this escape room?	0.00%	42.86%	57.14%
2. In regards to clinical reasoning, this escape room helped my capability to consider the patient situation.	0.00%	57.14%	42.86%
3. In regards to clinical reasoning, this escape room helped my capability to collect cues/information.	0.00%	57.14%	42.86%
4. In regards to clinical reasoning, this escape room helped my capability to process information.	14.29%	42.86%	42.86%
5. In regards to clinical reasoning, this escape room helped my capability to identify key problems/issues.	0.00%	57.14%	42.86%
6. In regards to clinical reasoning, this escape room helped my capability to establish patient goals.	0.00%	57.14%	42.86%
7. In regards to clinical reasoning, this escape room helped my capability to take action.	0.00%	57.14%	42.86%
8. In regards to clinical reasoning, this escape room helped my capability to evaluate outcomes.	0.00%	57.14%	42.86%
9. In regards to clinical reasoning, this escape room helped my capability to reflect and process new learning.	14.29%	42.86%	42.86%
10. This escape room activity helped me to identify my knowledge gaps related to assessment and management of headaches in primary care?	14.29%	42.86%	42.86%

**Table 2: Table 1: Post-Simulation Survey – Qualitative Findings**

Survey Question	Survey Response
11. Would you like to see other escape rooms or methods of gamification in your NP education (yes/no). If so, do you have any ideas of what type of scenarios would be beneficial for your learning?	1. Yes. "Anything diagnostic that is a common issue seen in primary care. Similar to our presentations for pathophysiology (i.e.: approach to fatigue, approach to amenorrhea, etc)"
	2. Yes – No comment
	3. Yes. "I think an escape room with multiple systems would be helpful. And then the final should be a complex patient without any hints as to the diagnosis"
	4. Yes. "Chest pain, MSK – knee, wrist, elbow, shoulder, Mental Health – Anxiety, Depression, ADHD, Bipolar, PTSD, Shortness of breath, Infections"
	5. Yes. "It can be incorporated into every aspect of learning, i.e., a systematic way of HPI, physical assessment, and exam review. It is such a fun way of learning. It is so interactive, helps you problem-solve, and uses critical thinking"
	6. Yes. "Newborn visit, PV bleeding"
12. Do you have any feedback or recommendations for improving the escape room experience?	1. "Felt a bit clunky having to go to so many different websites, more flow and integration? The jeopardy game would have been better if participant could actually type in the answer (although this would be time consuming)"
	2. "The use of different videos and games was helpful. I left like I had really learned a lot by the last scenario"
	3. "I mentioned them in the debrief"
	4. "Making embedded videos into full screen without having to go to another page. I liked all the games and quizzes, but keeping it within one site would be nice, although maybe not possible. Could be done individually or together, I think. I liked you could go back"
	5. "I like to see more graphics"
	6. "Can the video screen be a little bigger?"
13. Thank you so much for participating. Please leave any thoughts or questions below.	1. "Really enjoyed this, Thank you"
	2. "Thank you for allowing us to participate"
	3. "Change MVA to MVI or MVC"
	4. "Such a unique way of learning. Very creative. Enjoyable"
	5. "This could potentially replace traditional evaluation tools for students"

## Discussion

The notion of competition, or competitiveness as a trait emerged as a driver behind the satisfaction gained from participating in the escape room, yet also as an impetus for growing RNs to NPs. Louwen et al. (2023) noted that competitiveness is a type A behaviour exhibited by nurses who are most likely to seek out challenging tasks to influence satisfaction and is associated with an elevated

level of performance. The benefits of real-time feedback and reward systems on learning were other notable themes gleaned from this study.

Stemming from the theme of **competition**, students identified that to satisfy this innate trait, a recommendation was to have more immediate feedback and rewards. Students commented, "I was unclear if I made it through," and "I would like to know my time," elaborating that rewards for best time and a certificate

of completion would appease the need for positive feedback. Students explained that this competitive nature compelled them to persevere through stages of the escape room at times when they felt “stuck” or “frustrated,” yet this competitive nature was also a source of joy and accomplishment, pushing them to want to excel and do well.

While competing against the clock provided some participants with motivation and drive, others did comment that the race against time was distracting. One comment revealed that “time was a bit stressful,” highlighting that what propels some to success, may stifle others.

The importance of acknowledging **varied learning styles** was a prominent theme. Students affirmed that the escape room provided consolidation and assimilation of their knowledge on headaches. Students enjoyed the varied delivery of information. Students stated:

“Consolidated information, multiple ways to intake knowledge”; “Such a good way to learn and consolidate information”; “Really good for consolidating my knowledge. Trying to frame my lens differently for the possible differentials. Instead of narrowing it down right away”; “Enjoyed active component, using different parts of my brain.”

Notwithstanding learning at the individual level, **fit into curriculum mapping** surfaced as a tangible consideration at the macro level of education delivery. Students in the first cohort acknowledged the timing of when the escape room was placed within their program to be helpful. Discussions were held around the utility of having had the pathophysiology course first and then the pharmacological content building on prior knowledge. The addition of the escape room to solidify the two components of learning was deemed meaningful. This was particularly affirming for the research team as the timing and placement of the escape room content was intentional. One participant remarked, “I loved it! It was fantastic. Was a great time within the program. Super helpful for consolidating.”

Tenants of the escape room emerged, such as enjoyment, versatility, and transferability of this learning modality to other topics, summarized within the theme of **satisfaction**. Much of the commentary was positive and participants expressed gratitude for being part of the experience.

Furthermore, consolidating knowledge through the escape room highlighted the learning journey from RN knowledge and CR pathways, transitioning to NP CR pathways as a provider. One participant commented, “Format compared to shadow health, as we flip from RN to NP brain, I liked how the information was incorporated. Shadow health is more about ticking a box. How it was

presented helped flip to new lens.” The other participants echoed these sentiments, highlighting that from a provider perspective, there is a better understanding of relevant diagnostics and treatment options and acknowledging the pathway to CR for diagnosing and recognizing pertinent positives and negative findings. **Cultivating the transition from RN to NP** is a notable theme in the learning journey.

Themes on improvements included **technical recommendations**, such as building in a means to recall the prior historical information provided and feedback on the wording of some questions for clarity. For example, “Code came up before being finished, could have been clearer, wasn’t sure what to do with it,” and “Some things were clunky.” Some students were unable to navigate certain areas of the escape room, increasing frustration.

## Limitations

Sample size limited the generalizability of the study findings. There were also limitations in the quantitative data collection as only 7 of the 12 participants completed the post-simulation survey. The approach to the escape room development was strongly influenced by the capabilities and limitations of the chosen platform which required a reliance on external sites for gamification components.

While not considered a limitation of the study, the time it took to develop the content for three scenarios, including correct answers and wrong answer justifications, create the escape room platform, and source and integrate complementary gamification content might be considered a limitation for further use. It was estimated that roughly 80-100 hours over 2-3 months between both the faculty and the computer science student was needed to create this escape room virtual simulation experience. This estimation does not include the time needed for vetting and editing to ensure it was ready for launch.

## Conclusion

The goal of this research was to evaluate NP student application of clinical reasoning via a virtual gamification platform, while understanding students’ preferences for learning modalities. The findings of this study suggest that escape rooms as a platform for NP education have merit and are endorsed as a useful tool for consolidating knowledge by the NP students involved. Themes revealed information on student traits, preferences, and enhancements to technology that should be considered when developing future escape rooms for NP education. Further studies are needed with higher numbers of participants to confirm these inferences. Dedicated time and resources are needed in NP programs to design, refine, and implement the technological requirements of future escape rooms.

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