

Escape the Evil Professor! Escape Room Review Activity

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https://osf.io/27pz3/?view_only=b0b92ddddd2341ab995c69688db6d696

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Abstract

In this article, I describe an exam review activity in which students answered questions and solved puzzles in order to escape the review session. In a general psychology (100-level) course and research methods in psychology (300-level) course, students solved a series of puzzles and review questions. This format is similar to popular escape room attractions. In the end, the first group to sing a song that would appease the evil professor was allowed to leave the review session. Perceptions of the escape room were positive and concepts questioned in the review game were retained better than concepts that were not included.

Keywords: escape room, exam review, gamification

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Escape rooms have been popping up all over the country (Spira, 2017). People pay to be locked in a room with a group of friends and to solve puzzles to escape in under an hour (Nicholson, 2015). Escape rooms have themes (e.g., haunted house, abandoned spaceship, etc.) and narratives that create an immersive experience that increases the engagement and enjoyment of the players (Nicholson, 2016a). A recent survey of game rooms across the globe found that approximately 19% of escape room players are young adults under the age of 21 (Nicholson, 2016b). Therefore, it was interesting to adapt this engaging activity to the college classroom.

Applying game mechanics to the classroom is not new to higher education (e.g., Gibson, 1991). However, the manner in which game mechanics are used has become increasingly more diverse, for example, calling assignments “quests,” posting leaderboards of student performance, and earning badges/achievements for proficiency in skills (Nah, Zeng, Telaprolu, Ayyappa, & Eschenbrenner, 2014). Some research indicates that a gamified-learning environment can increase student engagement, motivation, and learning (Banfield & Wilkerson, 2014; Buckley & Doyle, 2016), whereas others have found that it is related to lower intrinsic motivation and exam scores (Hanus & Fox, 2015). Several meta-analyses, however, indicate that gamification has an overall positive effect on student learning (typically assessed through participation, attendance, exam scores, and quality of work) and motivation (Clark, Tanner-Smith, & Killingsworth, 2015; Hamari, Koivisto, & Sarsa, 2014; Lister, 2015).

Monaghan and Nicholson (2017) recently used an escape room to reinforce course concepts and outcomes in a pathophysiology class. The narrative of the escape room was that the students were working as emergency room physicians, and puzzles were related to a case study about which students were asked to provide a diagnosis and treatment plan. The escape

room included elaborate story lines and props to enhance the experience. This setup, although exciting, is a lot of work for the instructor running the escape room. In this paper, I propose an easier way to include an escape room in a review session for both a general psychology course and an upper level research methods in psychology course.

Escape Room in General Psychology

Methods

Student demographics. Students participating in the escape room were in a general psychology class at a small liberal arts college. Of the students, 37 engaged in the escape room; however, participation in the follow-up questionnaire was voluntary, so the results from the perceptions questionnaire were based on 33 students (16 women, 16 men, one chose not to respond). Students were primarily White non-Hispanic (78%), first-year students (76%), and nonpsychology majors (84%). Their mean age was 19.33 ($SD = 2.85$).

Escape room activity. The escape room took place during week eight of the 16-week semester. Prior to the game, students were separated into eight groups of four or five. These groups were the same as the groups for their class project. I selected these groups based on self-reported strengths (i.e., each group had a self-reported leader, planner, etc.). I shut the door, pretended to lock it, and gave my best evil laugh. “The door is now locked! I, your evil professor, will not let you leave this room until you answer my riddles and sing me a song that will make me happy!” I provided each group with two hint cards that they could turn in at any time to receive a hint from me. Then I signaled that they could turn over the sheet of paper for the first challenge. All materials for the escape rooms can be found in the supplementary materials (see Figure 1 for overview).

Challenge 1. The first challenge was created to review the personality unit. Students were provided with a list of five personality descriptions. Students were to identify the personality trait from the Big 5 (McCrae & Costa, 1987). The order of the five examples was randomized for each group. From their responses, students were to identify which of the envelopes to open at the front of the room. For instance, if the responses for one group were Extroverted, Agreeable, Conscientious, Neurotic, and Open to Experiences, then that group should open the envelope marked “EACNO.” If a group opened the wrong envelope, they received a 2-min penalty during which they could not attempt to further solve the puzzle. I included an extra eight decoy envelopes.

Challenge 2. When a group selected the correct envelope, they found a crossword puzzle within it. Each question on the crossword was related to the intelligence unit. For instance, five across was “The measurement consistency of a test” for which the answer was “reliability.” Five of the boxes in the crossword puzzle were highlighted. These five boxes, when completed with the correct letters, were an anagram for the secret word, “PARTY.” In order to access the next challenge, students were instructed to say this secret word to the instructor.

Challenge 3. Once the group said the secret word, they received a 10-item review of the child development unit. At the top of the paper read “The password to Challenge 4 is hidden in the following responses.” The responses to these multiple-choice questions made up the password to a quiz on the online course management system.

Challenge 4. A five-question online quiz covering the sex and gender unit was the final challenge. Groups chose whether one student or all members of the group attempted the quiz. Students were instructed to answer the questions until they received 100%. It was only then that the song they needed to sing (or play on YouTube) was revealed to them. Each group was asked

to sing a different song (e.g., Vanilla Ice’s “Ice Ice Baby”) so that all students had a chance to escape.

Two groups escaped in 20 min. To assist the groups that were stuck on a challenge, I handed out additional hint cards every 5–10 min after the first groups finished. Two groups took the entire 65-min class to escape the room.

Exam. Student learning in the escape room was examined by comparing performance on the exam items that had been addressed in the escape room (47 out of 72 points on the exam) with items that had not been addressed in the escape room (25 points). I selected the concepts included in the escape room at random because all concepts from this unit were generally on the same level of difficulty. The 72-point multiple-choice unit exam took place two days following the escape room activity using the online course-management system. I provided students with a study guide that included short-answer questions to all concepts from the unit (concepts included *and* not included in the escape room). The study guide asked about general concepts and did not include the specific questions from the escape room. This study guide was provided to students at the beginning of the unit.

Perceptions questionnaire. Students completed the anonymous perceptions questionnaire in Google Forms two days following the exam. Students answered a subset of questions from the Intrinsic Motivation Inventory (IMI; Self-Determination Theory, 2018) that measured enjoyment, effort, competence, pressure, and value of the escape room activity. Note that self-report measures are not ideal because of a potential response bias. However, previous research has found strong support for the reliability and validity of the IMI, with the enjoyment subscale as a direct measure of intrinsic motivation and perceived competence as a positive predictor of intrinsic motivation (McAuley, Duncan, & Tammen, 1987; Monteiro, Mata, &

Peixoto, 2015). The pressure subscale, on the other hand, is a negative predictor of intrinsic motivation. There were 20 questions from the IMI (four from each of the categories previously listed), two demographic questions (age and sex), two questions about whether the escape room should be used for review in the future, and an open-ended question about students' perceptions. Each item (except for the demographic items) was rated on a scale from 1 (*not true at all*) to 7 (*very true*).

Results and Discussion

Learning. Students performed significantly better on concepts included in the escape room ($M = .81, SD = .12$)¹ compared to those that were not ($M = .65, SD = .20$), $t(36) = 4.99, p < .001, d = 0.82$. Given that all concepts were questioned on the study guide, it is likely that the escape room concepts benefitted from the additional retrieval opportunity provided by the review activity (Karpicke & Roediger, 2007).

Perceptions. Means and standard deviations for the subscales of the IMI and are displayed in Table 1. Overall enjoyment measures had the highest ratings ($M = 5.73$). Regarding average overall enjoyment, 76% of students rated a 5 or higher, indicating high intrinsic motivation on the task. Competence is a positive predictor of intrinsic motivation; however, ratings of competence were moderate ($M = 4.61$), and just 52% of students rated their overall competence on the task as a 5 or higher. Pressure, a negative predictor of intrinsic motivation, was moderate ($M = 4.05$), and just 27% of students rated overall pressure at a 5 or higher. For some students, this pressure made it exciting. For instance, one student commented, "I really liked the 'race' aspect of this review game. I am very competitive so it pushed me to do well. I wanted to win." However, another student commented, "It was stressful." Overall effort, a measure of motivation more generally, was high ($M = 5.58$), with 87% of students' average

overall effort at a 5 or higher. Lastly, 61% of students reported finding some value in the task ($M = 5.12$).

Escape Room in Research Methods

Based on performance and feedback from the general psychology class, I made some modifications to the escape room and implemented it in my 300-level research methods in psychology course. One student suggested that the escape room involve more movement around the room, so in research methods several clues were placed in cabinets and behind posters in the room. I also evaluated perceptions of the escape room immediately following the activity as opposed to waiting until after the exam to get a more accurate picture of their self-reported enjoyment.

Methods

Student demographics. There were 16 students (13 women, three men) who engaged in the escape room and who completed the perceptions and demographics survey. Students were primarily White non-Hispanic (94%) and second or third-year students (88%) who were psychology or behavioral science majors (94%). Their mean age was 20.54 ($SD = .84$).

Escape room activity. The escape room took place during week 13 of the 16-week semester. Students were separated into five groups prior to the game in the same manner as general psychology. The objective for this game was the same as in the general psychology class: Escape the room by singing a song (or playing a song on YouTube) to the evil professor. I provided each group with two hint cards. Then I signaled that they could turn over the sheet of paper for the first challenge. To prevent students from skipping any challenges, a 2-min penalty was given if students found a clue meant for a different group. See Figure 2 for format of the escape room.

Challenge 1. The first challenge was created to review scales of measurement. Students were provided with a list of four examples of measurements and were expected to identify the type of scale. The order of the four examples was randomized for each group. From their responses, groups had to identify which of the envelopes to open; these I scattered around the room. For instance, if the responses for one group were Interval, Ordinal, Ratio, and Nominal, they should open the envelope marked “IORN.” I included five decoy envelopes.

Challenge 2. The envelope contained a crossword puzzle. Each question related to threats to internal validity (e.g., maturation, attrition). Above the crossword read, “Once completed, an author will be revealed. This is your clue to access the next challenge.” Several of the boxes in the crossword puzzle were highlighted. Once completed with the correct answers, the letters within the highlighted boxes formed an anagram for one of the authors of one of several research posters hanging in the room. If they looked behind the correct poster, students found an envelope with instructions for the next challenge.

Challenge 3. The instructions in the envelope found behind a research poster told students to open a specific data set on the online course management system. They were given a brief synopsis of a study in which the evil professor was examining the best way to torture students. “She” created a study using a 2 (task: complex assignments or boring instructional videos) \times 2 (content: methods or statistics) between-subjects design that measured course dissatisfaction. I instructed students to analyze the data in Jamovi (a freeware statistical software similar to SPSS). Their clue to access the next challenge was “revealed in the interaction.” If a group of students analyzed the data correctly, they would notice that the output matched data posted on one of five cabinets that lined the back wall of the room. Each group had a slightly different data set, but the analysis that they needed to perform was the same.

Challenge 4. Inside the cabinet was an incomplete ANOVA table. At the top of the paper read, “Solve for F ...the password to your final challenge on Moodle will be revealed.” Students were required to complete the ANOVA table. The password for the quiz on the course management system was the F ratio from the ANOVA table.

Challenge 5. The final challenge was to complete the online quiz in which students matched four types of measurement validity with the corresponding example. They were instructed to answer the questions until they received 100%. It was only then that the song they needed to sing was revealed to them. Once again, each group was asked to sing a different song so that all had a chance to complete the escape room.

Two groups escaped the room in 20 min. To assist the groups that were stuck on a challenge, I began handing out additional hint cards every 5 min after the first two groups finished. All groups finished in 30 min. We discussed the answers to each question in the escape room to conclude the review session. Then students were asked to complete the perceptions questionnaire.

Exams. The unit exam, which occurred five days after the escape room, was a handwritten, short-answer exam and was worth 70 points. Student learning was examined by comparing performance on exam items that had been questioned in the escape room (48 out of 70 points on the exam) with items that were not addressed in the escape room (22 points). The concepts selected for the escape room were primarily those in which students in previous semesters had struggled. Students were provided with a short-answer study guide at the beginning of the unit that included all concepts from the unit. Four weeks after this exam, there was a final handwritten cumulative exam that contained short-answer questions and was worth 70 points.² Forty of those points were over concepts that had been questioned in the escape room

and eight points were concepts from the same unit but had not been included in the escape room review. The remaining 22 points were from other units.

Results and Discussion

Learning. Students performed significantly better on concepts included in the escape room ($M = .87, SD = .16$) compared to those that were not ($M = .53, SD = .26$)³, $t(15) = 8.46, p < .001, d = 2.12$ ⁴. This advantage persisted in the cumulative final exam. Students performed significantly better on concepts included in the escape room ($M = .85, SD = .16$) compared to those that were not ($M = .66, SD = .37$), $t(15) = 2.85, p = .012, d = 0.71$, indicating that the learning benefit of the escape room was long-lasting.

Perceptions. Means and standard deviations for the subscales of the IMI and are displayed in Table 1. Overall enjoyment had the highest ratings ($M = 6.47$). Every student rated his or her overall enjoyment a 5 or higher. Overall effort and value were also high ($M = 5.83$ and $M = 6.02$, respectively); 88% of students rated their average overall effort a 5 or higher, and 94% rated a 5 or higher for value. Overall competence was slightly lower ($M = 5.14$); 69% of students rated their average competence at a 5 or higher. Again, overall pressure rating was moderate ($M = 4.09$); just 19% of students rated overall pressure at a 5 or higher.

Concluding Remarks

The escape room review activity was well perceived and students were intrinsically motivated to complete the task. The escape room took advantage of the benefits of active (and collaborative) learning and increased student performance on later exams. In addition, it allowed me to see which concepts/skills students struggled with. For instance in research methods, one group was stuck on the ANOVA table challenge. Following the activity, I was able to direct them to a resource to help them with this skill. An escape room review activity could be

incorporated into any class and is not limited to psychology. Here, I incorporated the escape room into a more content-based course (general psychology) and a more skills-based course (research methods) with success.

Students have a poor awareness of what they know and what they do not know (Gurung, 2005). A review session involving testing may ameliorate this issue by making the concepts that they do not know more apparent (Balch, 1998). By completing the activity in groups, students were able to learn from (and to teach to) their peers. Moreover, embedding testing and collaboration within games can make the review session more engaging and memorable (Gibson, 1991). The escape room described here incorporates elements of review activities and practice testing in an exciting new way. Instructors who wish to incorporate an escape room, but are less interested in creating one themselves, can have students develop their own escape room; the development of puzzles centered on course concepts can be a learning experience in itself (Nicholson, 2018).

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Footnotes

¹Proportions were calculated by taking the number of points earned out of 47 for items addressed in the escape room and the number of points earned out of 25 for items not addressed in the escape room. Thus, the proportion .81 is equal to an average of approximately 38 points earned out of 47.

²Note that there was a review session one week prior to the final exam that involved a practice exam over all concepts in the final exam.

³Proportions were calculated by taking the number of points earned out of 48 for items addressed in the escape room and the number of points earned out of 22 for items not addressed in the escape room. Thus, the proportion .87 is equal to an average of approximately 42 points earned out of 48.

⁴The analyses were also run excluding the three men and the effects remained.

Table 1

Mean and Standard Deviations of Ratings in the Postactivity Questionnaire for the General Psychology and Research Methods Escape Rooms

Subscale	General psychology mean rating (SD)	Research methods mean rating (SD)
Enjoyment	5.72 (1.31)	6.47 (0.49)
Effort	5.58 (1.10)	5.83 (0.86)
Competence	4.61 (1.44)	5.14 (1.12)
Pressure	4.05 (1.53)	4.09 (1.11)
Value	5.12 (1.60)	6.02 (0.69)

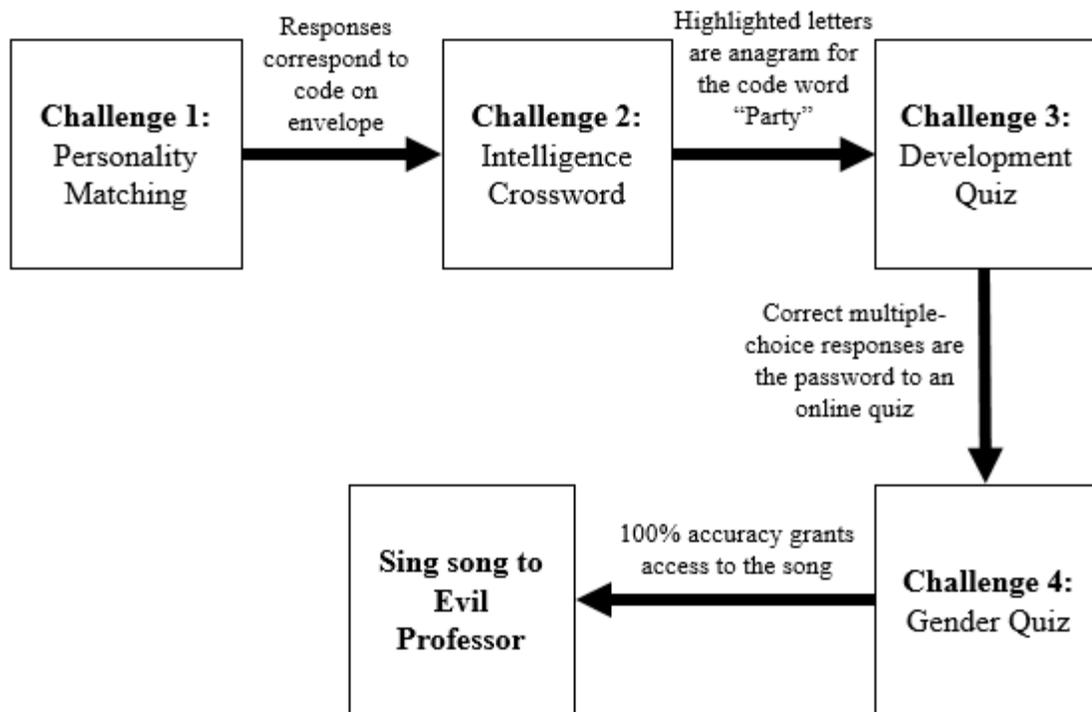


Figure 1. Format of the general psychology escape room.

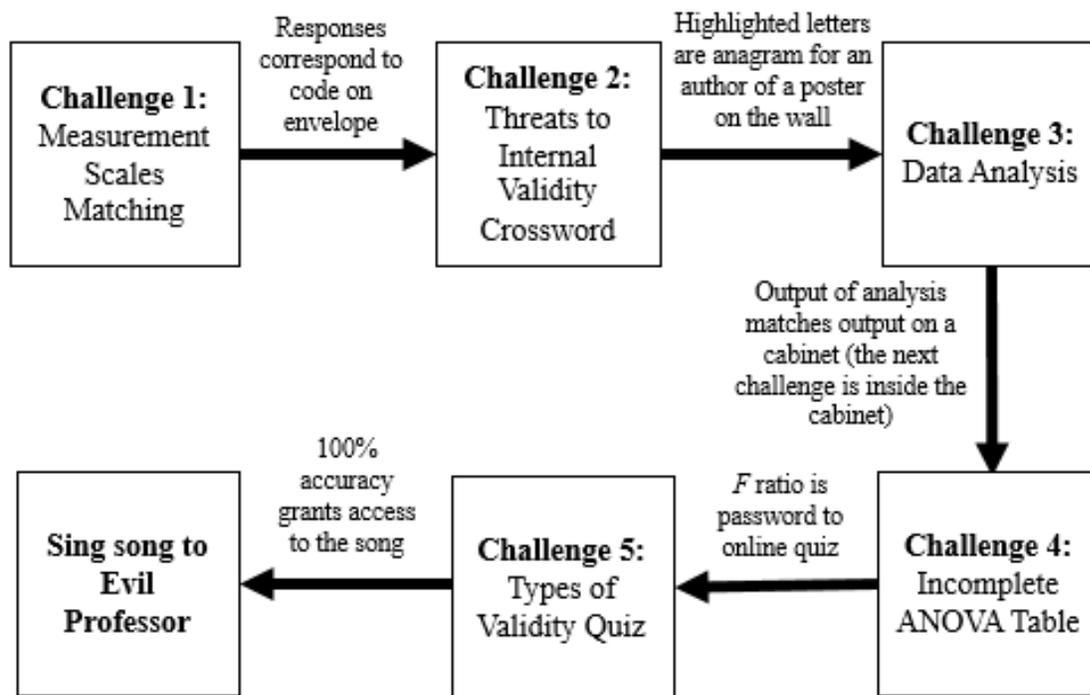


Figure 2. Format of the research methods in psychology escape room.