Online Approaches for Implementing a Digital Escape Room with Preservice Teachers

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Digital escape rooms can transform any lesson into an engaging learning environment. This article describes the implementation of a digital escape room in an undergraduate educational technology course for preservice teachers. The digital escape room was designed and developed using a 10-step process and covered the topic of gamification. Typically, this activity is facilitated during a face-to-face class meeting; however, instructors were required to modify the activity when the university transitioned to online learning in response to COVID-19. The purpose of the study was to explore the process and effects of implementing the digital escape room using two different approaches to online instruction: synchronous and asynchronous. Preliminary findings suggest that replicating the activity in a synchronous setting is similar to a face-to-face environment, whereas students in the asynchronous setting may need more reading comprehension support. Implications for practice and directions for future research are discussed.

LITERATURE REVIEW

The escape room phenomenon recently swept the nation with groups of people paying to be locked in a room to collaboratively solve a series of puzzles to escape (Kinio et al., 2019). The phenomenon ignited a spark
for educators interested in creatively engaging students of all ages. Research supports these intentions and shows that escape rooms can improve students’ engagement in a variety of educational settings (Clapson et al., 2020; Edwards et al., 2019; Morrell & Ball, 2019).

Clarke et al.’s (2017) escapED framework for designing physical, educational escape rooms highlights six considerations: participants, learning objectives, themes, puzzles, equipment, and evaluation. To be more cost effective and accessible, many educators leverage digital tools to develop digital escape rooms that can be completed in blended or online settings (Kroski, 2020). The considerations for creating digital, educational escape rooms are the same as physical ones; however, players work independently or collaboratively to solve a series of puzzles to achieve the goal of breaking out of a virtual environment.

Much of the literature on educational escape rooms describes physical escape rooms in a variety of higher education disciplines, such as medicine, nursing, pharmacy, chemistry, and information sciences (e.g., Cain, 2019; Clapson et al. 2020; Edwards et al., 2019; Kinio et al., 2019; Koelling & Russo, 2020). Few studies investigate escape rooms in teacher preparation programs. Rouse (2017) described how preservice teachers in her teacher preparation course tested her educational escape room and helped revise the puzzles; however, little is known about the effects of implementing educational escape rooms – physical or digital – with preservice teachers, and even less is known about facilitating digital escape room activities with preservice teachers in an online classroom environment. The purpose of the study was to fill a gap in the literature by exploring the process and effects of implementing a digital escape room activity in an undergraduate course for preservice teachers using two different approaches to online instruction: synchronous and asynchronous.

**PROCESS**

Gamification is a topic covered in our blended educational technology course for preservice teachers at Oklahoma State University. To model learning with technology in a gamified environment, the authors collaboratively designed and developed a digital escape room in Google Sites on the topic of gamification (see Figure 1). Puzzles are hidden in the background story and in a Google Drawing that depicts the environment to escape from. A button that links to Hill and Brunvand’s (2018) gamification chapter is provided for students’ reference. Students submit their puzzle solutions in a Google Form that requires response validation to ensure correct answers.
Figure 1. Digital Escape Room Created in Google Sites. The digital escape room is accessible at https://sites.google.com/view/edtc3123gamification/.
Normally, the activity is facilitated during a face-to-face meeting; students are grouped in teams, and the instructor presents the background story. As students work to escape the virtual environment, the instructor checks in with teams and ask questions as necessary. In Spring 2020, the digital escape room was implemented at the beginning of the university’s mandated transition to online learning. Moving to the online environment required the instructors to adapt the experience; one instructor used a synchronous approach, while the other used an asynchronous approach.

**Synchronous Approach**

The synchronous delivery began with the instructor delivering the instructions during a videoconference meeting. Teams of students were placed in breakout rooms to solve the puzzles that unlocked the form locks. The first group to finish earned extra credit, and once everyone was done, the whole group came back together. During the wrap-up discussion, the instructor recapped the activity’s learning objectives and prompted students to share their insights about the activity and the educational opportunities of gamification. The class session ended with the instructor briefly describing the steps and technology used to develop the digital escape room.

**Asynchronous Approach**

The instructor began by creating a screencast explaining gamification, its applicability to different domains and grades, and the process for completing the digital escape room. The instructor ended the video by providing helpful hints (e.g., puzzles hidden in background story and virtual environment image, cursor changes shape when hovering over a hidden puzzle) and strategies for success (e.g., write down questions, keep track of answers, follow the capitalization and spelling instructions when submitting puzzle solutions). Following the activity, students watched another video that reviewed the activity’s learning objectives, provided additional digital escape room examples, and explained the steps for designing and developing a digital escape room.
RESULTS

Synchronous Approach

All students successfully completed the digital escape room while working in teams in the synchronous online setting. Most student questions were about using shortcuts to quickly navigate to content in the gamification chapter. The instructor provided instructions for using shortcuts and encouraged students to support teammates who appeared to be struggling with the activity. During the wrap-up discussion, students asked questions about how to use the technologies from the activity to create digital escape rooms and in non-gamified environments.

Asynchronous Approach

Most students (66%) in the asynchronous setting thrived and completed the escape room without any difficulties. Some (7%) had trouble solving puzzles and sent emails seeking help, yet they persisted and successfully completed the activity. Most student questions seemed to be a result of either poor reading comprehension or not following the submission instructions. The instructor answered students’ questions without providing answers to the puzzle questions. Several (4%) students decided not to complete the activity due to frustration and complications solving puzzle questions; others (23%) neither asked questions nor completed the activity.

IMPLICATIONS

One implication of this study is that integrating digital escape room learning activities can engage students in both synchronous and asynchronous online settings. These results are consistent with prior research that found implementing escape rooms in face-to-face educational contexts can increase student engagement (Clapson et al., 2020; Edwards et al., 2019; Morrell & Ball, 2019). Each implementations’ success relied on students’ active participation in different ways. The instructor in the synchronous environment acted as a facilitator while encouraging groups of students to collaborate and support each other until they were successful. These findings are similar to implementing in face-to-face settings, where educational escape rooms have increased knowledge and promoted teamwork (Cain, 2019;
Clarke et al., 2017; Kinio et al., 2019). Replication in an asynchronous setting may require additional activities (e.g., reading comprehension) and more effort to check-in with students who opt to work independently, fail to seek help when it’s needed, and/or do not participate. As long as instructors consider factors that will support students, the online environment for delivering instructions and participating in digital escape rooms can vary.

Teacher educators and inservice teachers wanting to design and develop their own digital escape rooms can use our 10-step process (see Table 1) and planning template (see Appendix A); each step is aligned to Clarke et al.’s (2017) escapED framework considerations. Table 1 depicts the steps and provides possible tools that could be used to complete each step; Appendix B provides a list of puzzle development tools for Step 6. Additionally, we recommend viewing Whitehead’s (2017) Digital Breakouts playlist.

### Table 1
10-Step Process for Designing and Developing a Digital Escape Room

<table>
<thead>
<tr>
<th>Step</th>
<th>Design &amp; Development Procedures</th>
<th>Possible Tools</th>
</tr>
</thead>
</table>
| 1    | Determine which group of students you are creating the digital escape room for, the length of time you will give students to complete the escape room, your intended level of difficulty, topic(s) to be covered, and learning objectives. | Planning Template (Appendix A)  
- Google Docs  
- Microsoft Word |
|      | **escapED Alignment:** Participants, Learning Objectives | |
| 2    | Create a list of the 3-5 most important takeaways from the topic your digital escape room will be covering. | Planning Template (Appendix A)  
- Google Docs  
- Microsoft Word |
|      | **escapED Alignment:** Learning Objectives | |
| 3    | Write one question for each of your important takeaways that would encourage students to demonstrate and/or apply what they have learned about the topic. | Planning Template (Appendix A)  
- Google Docs  
- Microsoft Word |
|      | **escapED Alignment:** Learning Objectives | |
| 4    | Write a background story that provides the context or theme for the “room” or environment your students are trying to escape from. Hide clues in the background story that presents the first puzzle students need to solve to unlock the first lock. | Planning Template (Appendix A)  
- Google Docs  
- Microsoft Word |
|      | **escapED Alignment:** Theme, Puzzles | |
| 5    | Find or create an image of the room or environment students will be escaping from. In step 7, you will hide links to additional puzzles that assist students in unlocking other locks. | Google Drawing  
- Google Slides  
- PowerPoint |
|      | **escapED Alignment:** Theme, Equipment | |
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6. Create puzzles for the remaining questions you wrote in step 3. Consider using the provided puzzle resources to assist you in creating the puzzles.  
   *escapED Alignment: Puzzles*

7. Hide the links to each puzzle you created in step 6 in the image of the room or environment students will escape from.  
   *escapED Alignment: Theme, Puzzles, Equipment*

8. Create a form for students to submit their puzzle solutions and unlock each of the locks. If possible, create a section for each lock and require response validation for text that contains only the answer; this will prevent students from moving to the next lock before they have submitted the correct response.  
   *escapED Alignment: Puzzles, Equipment, Evaluation*

9. Compile your background story, room/environment image, and form in a single location for students to access and complete.  
   *escapED Alignment: Theme, Puzzles, Equipment, Evaluation*

10. After implementing, evaluate the learning objectives, get feedback from students about their experiences, and update the digital escape room as necessary.  
    *escapED Alignment: Evaluation*

   - Puzzle Development Tools (see Appendix B)
   - Google Drawing
   - Google Slides
   - PowerPoint
   - Google Forms
   - Microsoft Forms
   - Google Sites
   - Wix
   - Weebly
   - Sharepoint
   - Google Forms
   - Microsoft Forms
   - Flipgrid

**FUTURE RESEARCH**

The research on escape rooms – physical and digital – is in its infancy. The current study contributes to the escape room research by suggesting that digital escape rooms, like physical escape rooms, can promote engagement, active learning, and teamwork; however, many questions remain about using digital escape rooms in both P-12 and teacher education settings. While all students in the synchronous online setting successfully completed the digital escape room, about one-fourth of students in the asynchronous setting did not complete the activity. Future research should compare the learning effects of and instructional supports needed (e.g., reading comprehension activities) for integrating digital escape rooms in varying instructional settings (e.g., blended, synchronous, asynchronous) to determine if and how they differ from one another.

Finally, the field should investigate preservice and inservice teachers’ experiences integrating digital escape rooms in P-12 classrooms. Kopcha et al. (2020) described a teacher’s decision to integrate technology as a value-driven process that is responsive to emergent classroom needs and can affect a teacher’s perception of what is possible with technology. Researching
the entire process of a teacher’s decision to integrate a digital escape room – from the initial idea to the reflection after use – will help scholars understand that decision-making process and how implementation affects what a teacher views as possible with digital escape rooms in the future.

References


### APPENDIX A

**Digital Escape Room Planning Template**

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
<th>Description of Your Plan</th>
</tr>
</thead>
</table>
| 1    | Describe the audience, length of time, level of difficulty, and topic. | Audience:  
Length of time:  
Level of difficulty:  
Topic: |
| 2    | What are the 3-5 most important takeaways about your topic? | |
| 3    | Write one question for each important takeaway that encourages students to demonstrate and/or apply what they have learned about the topic and include its answer. | |
| 4    | Write a background story that provides the context or theme for the “room” or environment your audience is trying to escape from. Use a bold and italicized font to hide the clues that present the first puzzle your audience needs to solve to unlock the first lock. | |
| 5    | Find or create an image of the virtual room or environment students will escape from, and add the image to a document that will allow you to hide puzzle links on top of the image during Step 7. | If possible, add a link to your document below: |
| 6    | Develop puzzles that students will unlock for each of the remaining takeaways. | Add links to the puzzles below: |
| 7    | Add one shape for each puzzle created in Step 6 to the room/environment created in Step 5. Hyperlink each shape with one of the puzzles and make the shapes “invisible” by removing the fill and border color. | |
| 8    | Create a form for students to submit their puzzle solutions that unlocks each of the locks. **Tip:** Create a section for each lock and require response validation for text that contains only the answer; this will prevent students from moving to the next lock before they have submitted the correct response. | Add a link to the form below: |
| 9    | Compile your background story, room/environment image, and form in a single location for students to access and complete. | Add a link to your digital escape room below: |
| 10   | Evaluate the learning objectives and get feedback from your audience about their experiences completing the digital escape room you designed. Make changes as necessary. | |
## APPENDIX B

### Puzzle Development Tools

<table>
<thead>
<tr>
<th>Breakout EDU puzzle resources</th>
<th>Crossword generator</th>
<th>Jigsaw planet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom RX</td>
<td>Map treasure hunt</td>
<td>Fake text message</td>
</tr>
<tr>
<td>Periodic table writer</td>
<td>Mad lib generator</td>
<td>Ransom note generator</td>
</tr>
<tr>
<td>Secret message generator</td>
<td>Custom road sign</td>
<td>Secret message maker</td>
</tr>
<tr>
<td>Badge maker</td>
<td>Movie poster</td>
<td>Puzzle maker</td>
</tr>
<tr>
<td>Online receipt maker</td>
<td>Magazine cover</td>
<td>Stranger Things wall</td>
</tr>
<tr>
<td>Lock font</td>
<td>QR code generator</td>
<td>Embossed labels</td>
</tr>
<tr>
<td>Newspaper generator</td>
<td>Breaking news</td>
<td>Flip text upside down</td>
</tr>
<tr>
<td>Wheel of Fortune word puzzle</td>
<td>Fortune cookie generator</td>
<td>Custom eye chart</td>
</tr>
<tr>
<td>Fakebook</td>
<td>Photo booth generator</td>
<td>Custom signs</td>
</tr>
<tr>
<td>Twister fake tweets</td>
<td>Movie marquee</td>
<td>Math puzzle</td>
</tr>
<tr>
<td>Sticky note generator</td>
<td>Icing on cake</td>
<td>Create your own snote</td>
</tr>
</tbody>
</table>