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# A case report of Moodle-based escape room education for medical students through synchronous distance learning

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## I. INTRODUCTION

The COVID-19 epidemic has prompted the spread of ICT-based education, with many university classes being conducted remotely. Some education systems use asynchronous tools such as learning management systems (LMSs); others use synchronous tools such as web conference systems. This trend has affected not only lectures but also exercises among students and clinical practice. Game-based education is no exception, and classes that require direct face-to-face interaction have become difficult to implement. Escape rooms (ERs) are one example of game-based education.

ERs are defined as “live-action team-based games 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 amount of time” (Nicholson, 2015). Originally intended for entertainment purposes, ERs now also serve educational purposes (Davis et al., 2022). As an educational tool, ERs are mainly used for teaching specific content knowledge and content-related skills, general skills, and affective goals (Veldkamp et al., 2020). In addition, since ERs are categorised as game-based education, they are also useful for motivating students.

ERs may be conducted either face-to-face or online. Online-based ERs, known as “Digital Educational Escape Rooms” (DEERs), have become common since the COVID-19 pandemic (Makri et al., 2021). DEERs combine the (1) possibility of digital and analog hybrid style, (2) the potential to provide immediate feedback, and (3) the suitability for some learning objectives such as social skills.

This study is intended to design and develop DEERs based on Moodle and Zoom for teaching basic professionalism, with a focus on peer collaboration for medical students.

## II. METHODS

The authors made an online-based DEER with Moodle LMS and used it for teaching team communication and reviewing basic CPR knowledge for second-year undergraduate medical students. In this case, students solve asynchronous DEER challenges in Moodle through synchronous discussion in Zoom breakout rooms.

The learning objectives were to “learn collaboratively with peers” and to “understand concepts related to interpersonal relationships and interpersonal behaviour.” Before the class, students submitted a short report on the important elements that are required for team medicine, which they had learned as first-year students. The class

was 100 minutes in length. The first 10 minutes were used for orientation. The next 60 minutes were used for DEERs. Within 60 minutes, a hint for solving DEERs was provided via Google Documents; authors added the hint as time went on. After the game, 30 minutes were used for reflection, including the explanation of the DEER answers and the basic lectures. Despite the existence of two aforementioned learning objectives, the time limits made it particularly hard to assess students' achievement. Therefore, after the class, a report was assigned on the topic "points to keep in mind when sharing information and communicating with your team online through the game experience."

There were three stages to the DEER. A total game design is shown in Figure 1. The first stage consisted of

a 360° virtual room. Students had to explore the virtual room and solve two riddles. In this stage, some hints were hidden on the ceiling or the floor. Students had to find them by looking around the room. After solving the riddles, students inputted the answer to Moodle. If the answer was wrong, they had to wait one minute before inputting another answer. The second stage began after the two riddles. This stage had four puzzles related to CPR, such as concerning the placement of AED or metronome tempo of chest compression. Since the students learned about CPR when they were first-year students, these four puzzles were reviewed their understanding. The third stage was after the four CPR puzzles. In the third stage, students had to gather all the clues to clear the game.

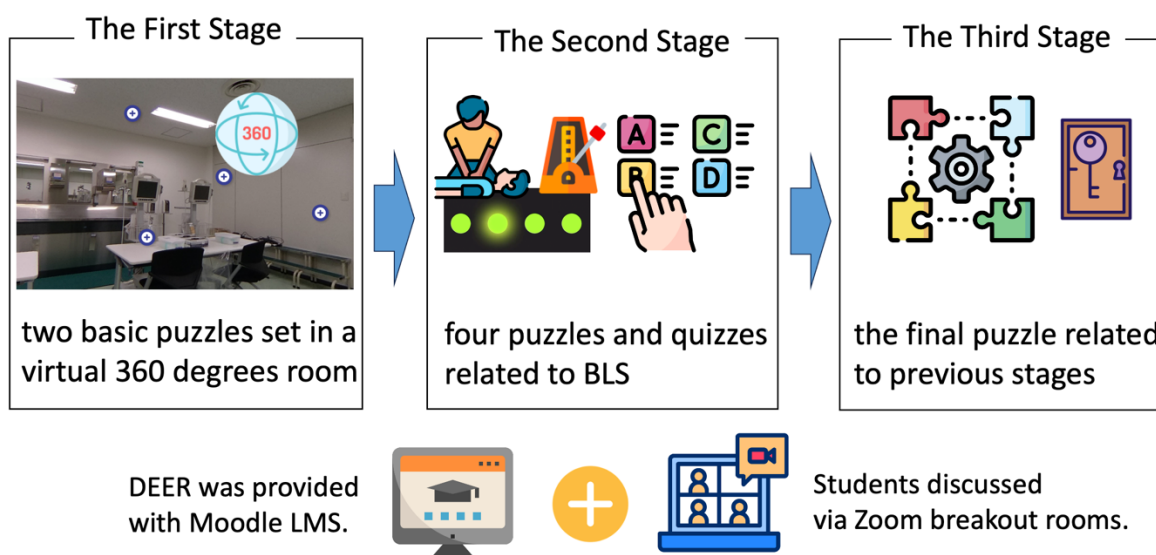


Figure 1. A total game design

Program evaluation was based on students' achievement results from the Moodle log and their comments from the questionnaires.

### III. RESULTS

There were 29 groups, and each one had three to four students. While five groups were able to solve the riddle completely, one group could not even reach stage two. Moodle log data and questionnaires suggested that the difficulty of the riddles was appropriate, since only 8% of participants answered that the first stage was difficult, and other groups used about 15 minutes for the first stage from the logs.

In some groups, students turned off their cameras and solved the riddles individually. In this case, they shared almost nothing but the answers, and very little about the

process for solving puzzles and riddles. In other groups, students turned on their cameras and shared the screen. In contrast to the previous groups, they solved the puzzles and riddles through live discussions.

### IV. DISCUSSION

Some groups could not complete the DEERs, and one group could not reach stage two. In the group that could not finish stage one, students did not share the process of solving riddles. Moreover, they turned off their cameras, which made it difficult to define how they were approaching the tasks. The communication style of students potentially affects their achievement level. It is also connected to their learning objectives.

Despite the difficulty of teaching skills and attitude only with asynchronous distance learning, some scope exists

for interactive content, for example, by having the students choose the correct tempo for chest compressions by sound with live discussion and feedback from others. Of course, it will be more effective to use face-to-face simulations to check psychomotor skills.

In this case, gathering students' learning logs was easy since DEER was provided with Moodle. In addition, observing how students discuss in online was possible, since Zoom can track the activity status in breakout rooms. Although the design, development, and implementation of the DEERs will be complicated, the hybrid-style DEER, such as using LMS with synchronous classes, might make DEERs more attractive. Furthermore, it makes collection of a variety of data, such as the timestamp of answer, pattern of the failure, and manner of online communication, possible. These data would be useful to assess students and provide feedback to them.

## V. CONCLUSION

DEERs are potentially useful for engaging student communication and discussion even in the online synchronous class. In the future, it will be possible to provide an integrated learning experience with a more appropriate difficulty level by accumulating Moodle log data and student recognition data.

### Notes on Contributors

YA and CM designed and developed DEER. They also analysed the results.

KW and CK managed the class and facilitated the breakout room.

All authors have read and approved the final manuscript.

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### Declaration of Interest

All authors declare no conflicts of interest.

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