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Theoretical article

Teachers' Competencies in Developing Digital Educational Escape Rooms

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Abstract

The development of digital educational escape rooms (DEERs) by teachers presents many advantages for student learning and engagement. By developing DEERs, teachers have the opportunity to customize the learning experience and align it with specific curricular goals and with the students' needs. Teachers can select the content that is relevant to the subject matter, and ensure that the puzzles and challenges within the DEERs promote the desired learning outcomes. Furthermore, a digital platform of DEERs enables a large group of students to play simultaneously, or to access the game remotely, and by this allows adjusting diverse learning environments to students' needs. For these reasons, it is crucial to understand the necessary competencies teachers need to possess to develop a successful DEER. This paper highlights these competencies, in order to promote dedicated training programs for teachers and encourage the adoption of the DEER educational approach in teaching.

Keywords:
Digital Educational Escape Rooms; Teachers' Training; Teachers' competencies.

Zusammenfasung

Die Entwicklung von digitalen Bildungs-Escape-Rooms (DEERs) durch Lehrer bietet viele Vorteile für das Lernen und die Motivation der Schüler. Durch die Entwicklung von DEERs haben Lehrer die Möglichkeit, das Lernerlebnis anzupassen und es mit bestimmten Lehrplanzielen und den Bedürfnissen der Schüler in Einklang zu bringen. Lehrer können den Inhalt auswählen, der für das jeweilige Fach relevant ist, und sicherstellen, dass die Rätsel und Herausforderungen innerhalb der DEERs die gewünschten Lernziele fördern. Darüber hinaus ermöglicht eine digitale Plattform für DEERs einer großen Gruppe von Schülern, gleichzeitig zu spielen oder auf das Spiel remotely zuzugreifen, und ermöglicht somit die Anpassung verschiedener Lernumgebungen an die Bedürfnisse der Schüler. Aus diesen Gründen ist es entscheidend, die erforderlichen Kompetenzen zu verstehen, über die Lehrer verfügen müssen, um erfolgreich einen DEER zu entwickeln. Dieses Papier hebt diese Kompetenzen hervor, um dedizierte Schulungsprogramme für Lehrer zu fördern und die Einführung des DEER-Bildungsansatzes im Unterricht zu unterstützen.

Schlüsselworte:
Digitale Bildung Escape Rooms; Lehrerfortbildung; Lehrerkompetenzen.

1. Introduction

The integration of technology in education is not new in teaching and learning practices, but in recent years, it has also opened the way for innovative and engaging instructional approaches such as DEERs. These digital games have gained significant popularity, offering immersive and interactive experiences for students (Fotaris & Mastoras, 2019; Makri et al., 2021). DEERs require students to solve puzzles and complete tasks to progress through a storyline, promoting critical thinking, problem-solving and collaboration (Clune, 2021; Jiménez et al., 2020; Vidergor, 2021). However, the successful implementation of digital escape rooms relies heavily on teachers' competencies in designing and developing these learning environments (Lopez-Pernas et al., 2021; Pornsakulpaisal et al., 2023; Reuter et al., 2020). This article aims to explore the essential competencies required by teachers to effectively create and implement digital educational escape rooms that engage students in learning.

1.1. Escape rooms as learning experience

Escape rooms are games in which the participants are locked in a room and must work together to solve puzzles and challenges within a set time frame in order to escape. These games are relevant in educational settings because they simulate the tasks that students typically engage in as part of their classroom learning experiences (Nicholson, 2018). Escape rooms offer a unique and immersive learning experience that can significantly enhance student engagement and motivation. By designing well-crafted escape rooms, teachers can create an interactive and dynamic learning environment that promotes active participation and deepens students' understanding of the subject matter (Makri et al., 2021). The benefits of DEERs in learning, such as achieving learning goals and improving motivation have been noted among students in higher education (Borrás-Gené et al., 2022) and in pre-service teachers' education (Neumann et al., 2020) as well. Like physical escape rooms, DEERs

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also contribute to learners' learning goals, promote motivation and involvement (Makri et al., 2021; Neumann et al., 2020). But in terms of implementing and developing the games, DEERs allow teachers to reuse the game using less resources and for a large group of students to play simultaneously and in different locations (Kroski, 2020; Monnot et al., 2020).

1.2. Benefits of designing digital games

Designing digital games helps evolve teachers' creativity and innovation. It encourages them to explore new teaching approaches and think critically about how to present content in a memorable way. This creative process allows teachers to utilize their teaching expertise and adapt their pedagogical strategies to meet the diverse needs and interests of their students (Bressler & Annetta, 2021; Frossard et al., 2015). DEERs are digital games that require teachers to leverage technology and digital tools to create interesting learning experiences and to engage and inspire students (Lopez-Pernas et al., 2019; Lopez-Pernas et al., 2021).

Through the development of DEERs, teachers gain experience in problem-based learning (Gomez, 2020; Rouse, 2017) and improve Technological Pedagogical Content Knowledge (TPACK) skills (Weisberg et al., 2022).

1.3. Advantages of teachers developing DEERs

DEERs provide an opportunity for teachers to integrate different educational goals in an effective way (Makri et al., 2021). By aligning the puzzles and challenges with specific learning outcomes, teachers can ensure that the game experience is not only enjoyable, but also meaningful and impactful in terms of knowledge acquisition and skill development (Rouse, 2017; Veldkamp et al., 2020). Furthermore, by designing DEERs, teachers can promote a collaborative learning environment. DEERs often require teamwork and promoting important 21st-century skills such as problem-solving, collaboration, and communication (Clarke et al., 2017; Makri et al., 2021; Vidergor, 2021).

2. Problem Statement

Teachers are the ones who should be designing games for their students, because they have the best knowledge about their students' needs (An & Cao, 2016; Frossard et al., 2015; Kroski, 2020; Rouse, 2017). Moreover, the process of game design itself helps teachers develop skills like creativity, design thinking, and technological proficiency (An & Cao, 2016; Bressler & Annetta, 2021; Rouse, 2017). However, the shift towards digital platforms in the context of escape rooms in education (DEERs) has presented both challenges and opportunities for teachers. Not all teachers have the necessary skills and knowledge to develop and design effective DEERs that align with the learning goals (Fotaris & Mastoras, 2019; Hayak & Avidov-Ungar, 2020; Koren & Avidov-Ungar, 2021), and they do not always have the time required for the design process (Lopez-Pernas et al., 2021; Reuter et al., 2020).

3. Study Purpose

The purpose of this article is to identify the competencies essential for teachers to develop DEERs effectively. The following questions were examined:

- What are the key competencies required by teachers to develop DEERs?
- What are the digital competencies teachers required to develop DEERs?

4. Research methods

This theoretical article brings together insights gleaned from diverse studies investigating the influence of integrating DEERs in education, with a specific emphasis on the teachers' role. It leverages recent research, predominantly from the last five years, to ensure the timeliness and pertinence of its perspectives. Theoretical frameworks, research findings, and insightful discoveries extracted from these studies were categorized based on shared attributes and interconnected themes. Based on the analysis of the findings, a conceptual framework was defined that synthesizes the key concepts. This synthesis of the current research inventory formulates a comprehensive set of competencies and skills tailored to teachers engaged in DEER development.

5. Essential competencies for developing DEERs

Below are the key purposes, principles, and competencies essential for teachers in successfully developing DEERs, based on examples of recent research in this field.

5.1. Pedagogical principles and content knowledge

One of the primary requirement is for teachers to possess a deep understanding of pedagogical principles. Similar to any other lesson plan, it is crucial to establish clear and measurable learning goals and determine the strategies and methods to achieve these goals (Rouse, 2017; Reuter et al., 2020). Teachers must consider the educational goals, learning

outcomes, and the cognitive abilities of their students (Pornsakulpaisal et al., 2023; Veldkamp et al., 2020). They need to craft a coherent storyline that integrates the DEERs' concept with the subject matter, ensuring that the tasks and challenges contribute to the learning goals (Clarke et al., 2017; Lopez-Pernas et al., 2019; Rouse, 2017). Teachers should possess a strong command of the curriculum, learning outcomes, and content standards associated with the subject area. This knowledge ensures that the DEERs align with the desired educational goals and provide valuable learning experiences for the students. Without a solid pedagogical foundation, the DEER may become just a game rather than a meaningful learning experience (Clarke et al., 2017).

5.2. Design thinking

Design thinking is additional competency essential for designing successful DEERs. Design thinking includes the ability to design coherent narratives, develop challenging puzzles and tasks and sequence activities effectively (Pornsakulpaisal et al., 2023) and enables teachers to adapt the game to the subject matter learned (Bressler & Annetta, 2022). Teachers must think out of the box to create engaging challenges and adapt the DEER's format to different subjects, grade levels, and learning styles (Gomez, 2020). Applying design-thinking principles ensures that the DEERs promote active learning, critical thinking, and problem-solving skills (Clarke et al., 2017; Rouse, 2017; Veldkamp et al., 2020). Furthermore, through a design thinking approach, teachers can engage in an iterative process wherein they develop a game prototype and then improve it based on feedback received (Bressler & Annetta, 2022; Clarke et al., 2017; Loveless et al., 2006).

5.3. Digital Creative Pedagogies (DCP)

Pedagogical creativity uses various approaches such as collaborative learning, game-based learning, problem-solving, and exploratory learning. These approaches encourage students' creativity and are effective since they connect with authentic content knowledge. Digital Creative Pedagogy (DCP) involves the use of digital technology to enhance creative teaching methods. One way to implement DCP is through the integration of manipulative technologies i.e., using figures and puzzles (Barajas et al., 2019; Frossard et al., 2015). The implementation of digital creativity enables teachers to design interesting DEERs and seamlessly integrate multimedia elements within the game (Lopez-Pernas et al., 2021; Pornsakulpaisal et al., 2023) Therefore, teachers who develop DEERs are practitioners of DCP, as they implement digital tools and manipulative technologies into their instructional practices.

5.4. Digital Competencies

Teacher Digital Competencies (TDC) offer an extended perspective on how teachers comprehend the interplay between technology, pedagogy, and content as outlined in the TPACK Model (Koehler et al., 2013). TDC emphasizes the skills and capabilities required to seamlessly integrate digital resources in order to leverage subject-matters learning, while recognizing the potential of digital technology in the teaching process (Falloon, 2020).

Developing DEERs requires a range of digital competencies. The key competencies include:

1. Digital Technological Proficiency - Teachers need to be familiar with the digital tools and platforms used to create DEERs. For instance, an interactive platform which enables integrating multimedia and the use of digital locks as part of the game (Kroski, 2020; Lopez-Pernas et al., 2019; Makri et al., 2021).

2. Multimedia Integration - Teachers should be capable of integrating various multimedia elements into DEERs, such as images, videos and audios. This requires skills in editing and manipulating multimedia content (Lopez-Pernas et al., 2021; Pornsakulpaisal et al., 2023).

3. Digital Content Creation - Teachers should be able to create digital content to generate engaging interactive content unique to the DEER. This includes designing digital puzzles, constructing challenges and interactive riddles (Lopez-Pernas et al., 2019; Reuter et al., 2020; Weisberg et al., 2022).

4. Data Management - Teachers need to manage and organize all digital content, including storing, retrieving, and updating game assets (Lopez-Pernas et al., 2021).

5.5. Collaboration and teamwork

Collaboration is another critical competency required for developing DEERs. Teachers may need to work in teams with other educators, subject matter experts, or instructional designers to harness their expertise and create high-quality escape room experiences. Open communication and collaboration promote the exchange of ideas, feedback, and resources, leading to improved DEERs (Pornsakulpaisal et al., 2023; Reuter et al., 2020).

Collaboration also encourages practice and gathering feedback from colleagues, and making necessary corrections. Through collaboration, teachers enhance the quality and impact of their DEERs over time (Gomez, 2020; Lopez-Pernas et al., 2019; Rouse, 2017).

6. Findings

The findings of this study highlight the key competencies necessary for teachers to develop DEERs successfully. These competencies include an understanding of pedagogical principles, digital literacy skills, creativity and design-thinking, collaboration, and knowledge of the subject matter. It is important to note that while each of these competencies is valuable on its own, their combination is crucial for successful DEER development.

7. Conclusions

Developing DEERs requires teachers to possess a range of competencies and unique knowledge. Defining learning goals and aligning them with the game narrative, selecting appropriate digital tools, designing effective puzzles, engaging in playtesting and sharing knowledge, are all essential components for creating successful DEERs. By equipping themselves with these necessary insights, teachers can leverage the potential of digital escape rooms as a valuable and engaging instructional tool.

Moreover, by highlighting the necessary competencies teachers need for developing DEERs, it is possible to promote dedicated training programs for teachers and encourage the adoption of this educational approach of DEERs in teaching.

Authors note:

Yael Hakshurian received bachelor's and master's degrees in education from Tel-Aviv University and the Academic Center MLA in Israel respectively. Currently doctoral student at the faculty of Psychology and Educational Sciences at "Al. I. Cuza" University of Iasi. Since 2020 she has been a lecturer in MA and BA in education programs at Kibbutzim College of Education, Technology and the Arts in Israel. Her research interests include gamification and integrating games and technology in education.

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