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Unlocking the Potential of the Metaverse: A Guide for Designing Educational Escape Rooms in Frame VR

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Abstract. As the field of immersive technologies continues to grow, so does the potential for creating more dynamic and engaging learning environments. A representative example of an interactive setting that can actively involve learners in the educational process is an educational escape room that integrates immersive technologies. On that note, the present online workshop serves as a practical guide for designing educational escape rooms in Frame VR. The platform offers an opportunity for creating immersive learning experiences without requiring advanced technical expertise. Moreover, it supports non-immersive Metaverse experiences, allowing users to access and interact within the shared 3D virtual space through a computer, thereby making such experiences more accessible across disciplines. Thus, leveraging a VR escape room designed for adult English as a foreign language learners as an example, the workshop aims to provide detailed guidelines on how to plan, structure and design a desktop-based escape room in Frame VR. The focus will be placed on the non-immersive aspect of the platform and no prior experience with VR or game design is required. By the end of the workshop, attendees will have a clear understanding of how to use Frame VR to create their own immersive, discipline-specific escape rooms, ultimately enhancing student engagement and fostering active learning.

Keywords: EFL, Escape Room Game, Game-Based Learning, Metaverse, Frame VR.

1 Introduction

The continuous rise of novel technologies has opened up new possibilities for innovative educational experiences. The incorporation of immersive technologies in the educational field has the potential to reshape how teaching and learning take place, by offering opportunities for dynamic, engaging, learner-centred environments and improved learning outcomes [1]. In this context, the Metaverse has emerged as a transformative space where educators and learners can interact in immersive, collaborative virtual environments. The Metaverse is the emerging network of interoperable multiuser virtual worlds, bridging physical and virtual environments [2].

Virtual reality (VR) plays a key role in shaping these environments in the Metaverse. Although VR is typically associated with the use of specialised equipment such as head-mounted displays, non-immersive VR, which can be experienced using a standard computer [3], is becoming more and more common in educational settings alongside fully immersive solutions. The benefits of this desktop-based approach are evident across various disciplines. Apart from the fact that non-immersive options make VR significantly more accessible to wider audiences [4], they also show promising results in improving learners' knowledge and increasing their confidence and satisfaction, while also enhancing their engagement, particularly when combined with gamification elements [5].

This shift towards technology-driven education has favoured the incorporation of more innovative teaching and learning approaches that go beyond traditional instruction. The incorporation of games and game-like elements in the educational process has been one of those cases. In particular, escape room games have recently come to the forefront of the educational landscape, allowing educators to create engaging and meaningful learning experiences. More specifically, educational escape rooms foster a playful environment that can enhance learners' motivation and engagement and positively affect learning outcomes, while simultaneously promoting the development of skills such as communication, collaboration, critical thinking, problem-solving and creativity [6–10]. As 21st-century education continuously emphasises such skills, along with the importance of digital literacy

[11], VR escape rooms hold the potential to offer a unique way to cultivate these competencies while keeping learners actively involved in the learning process.

Nonetheless, while prior studies detail the cognitive and instructional benefits of VR and escape rooms, educators often lack accessible tools to implement them. This workshop directly addresses this challenge by providing a step-by-step guide to using Frame VR for designing desktop-based VR escape room learning experiences [12]. Frame VR is a browser-based platform that enables users to meet, learn, and collaborate in customisable 3D environments accessible from desktop, mobile, and VR devices. This gives educators flexibility in selecting the mode that best suits their context and meets their learners' needs. Another advantage of this particular platform is that it has a user-friendly interface that does not necessarily require programming skills. Users can either create a 3D virtual environment from scratch or choose an existing 3D space provided by the platform and easily enrich it with a variety of assets such as 3D models, videos, images, links and text. Even though there are options for adjusting the 3D virtual space using more advanced settings, this is under no circumstances a prerequisite for creating an interactive and engaging environment. This makes it an ideal solution for education, as it can lower the technical barrier for teachers, who often lack the training and expertise to develop highly complex VR environments [13].

2 Purpose and Target Audience

The escape room presented in this workshop was originally designed as part of a master's thesis project for the online MSc and PhD program in Immersive Technologies - Innovation in Education, Training and Game Design of the Department of Computer Science at the Democritus University of Thrace, Greece [14]. The goal was to examine the effects of collaboration within a desktop-based VR escape room environment in the Metaverse on English as a Foreign Language (EFL) learners' academic performance and learning experience [14]. Employing a comparative research design, the escape room was tested in both a collaborative and a non-collaborative condition, with participants being adult EFL learners. The results of the study indicated that their academic performance improved after playing the escape room game, while the intervention also had a positive impact on their overall learning experience, positively influencing affective factors such as motivation, engagement and satisfaction, as well as their perception of their own learning. Learners who collaborated during gameplay overall exhibited better results compared to those who played individually [14].

Drawing on the strategies and practices adopted when designing and implementing this particular escape room, the workshop will attempt to provide general guidelines on how to approach the integration of such interventions in the educational context. The workshop is therefore primarily aimed at members of the educational community who are interested in integrating virtual reality escape room experiences into their teaching and learning practices. Despite the fact that the escape room used here was designed for EFL learners, in the context of the workshop it serves purely as an example to illustrate broader design principles. The concepts, strategies, and best practices discussed are applicable across various subjects and educational contexts, making this session relevant to educators of all disciplines. Therefore, whether designing escape rooms to teach science, mathematics, historical events or language skills in foreign language lessons, participants of this workshop can gain practical insights into using Frame VR to enhance engagement and learning outcomes. VR experience is not required to attend this session, making it suitable for both beginners and those with some familiarity with immersive learning environments.

3 Workshop Phases

The workshop will be divided into five phases. In the first phase, the mechanics behind planning such an intervention for an actual educational context will be analysed. Aspects such as defining the context and deciding on the narrative and background information will be discussed, focusing on their pivotal role in determining the puzzles, activities and structure of the escape room in the immersive environment. Participants will understand the key components of an educational escape room and begin outlining their own design.

The second phase will involve a demonstration in Frame VR, showcasing the platform's features that can be used to create an immersive and interactive learning experience. The focus will not be placed merely on the technical aspects – such as how to create interactive images, for example – but also on how these elements can be strategically used to enhance gameplay and learning outcomes, thus ensuring that every design choice serves a meaningful purpose within the escape room's narrative and puzzle structure. The aim is for participants to gain hands-on knowledge of Frame VR's features and how to apply them effectively in an escape room setting.

Finally, in the last phase of the workshop, participants will have the chance to experiment with the tools and mechanics introduced in the demonstration. More specifically, they will be divided into small groups in a new Frame and will be tasked with designing their own escape room activity. The workshop will conclude with a sharing session, where groups will present their designs, discuss challenges, and reflect on how they can adapt these techniques to their own teaching. Participants will therefore leave with a prototype escape room and the confidence to develop a full-scale version for their own teaching context. A schematic representation of the structure of the workshop, along with the estimated time frame for each one of the phases can be found in Table 1.

Table 1. Workshop Structure.

Time	Phase	Method	Description
15’	Planning	Presentation	- Defining target audience, choosing a framework, setting goals and objectives - Conceptualising: choosing the theme, a compelling narrative, the setting, characters and environment - Deciding on puzzles
75’	Puzzles & Interaction Design	Demonstration in Frame VR	- Leveraging Frame VR’s features to create an engaging environment (interactive images, “hidden” messages, “locked” doors, sound effects, using scenes for an interactive activity, useful tools, collaboration, optimising performance)
30’	Practical Application	Group work in Frame VR	- Small-scale practical application - Sharing results

Ultimately, this workshop will equip educators with the knowledge and skills needed to design and implement interactive educational escape rooms using Frame VR. By the end of the session, participants will have developed an understanding of the key design principles for creating engaging learning environments within this setting. In a rapidly evolving educational landscape that is significantly affected by technological advancements, it is essential that educators be prepared to navigate potential challenges such as adapting VR to diverse learning contexts and ensuring accessibility for all learners.

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