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INTRODUCTION

Game-based learning is increasing in popularity within the education system (Fotaris & Mastoras, 2019). Researchers argue that one of the reasons is that this type of learning offers an experience of playfulness and collaboration among students (Fotaris & Mastoras, 2019; Friedrich et al., 2018). "Escape rooms" are one such type of game-based learning. Escape rooms expose students to a relevant story that needs to be solved in groups within a limited time (Fotaris & Mastoras, 2019). As a number of universities switched to online learning environments due to COVID-19 pandemic, it is important to understand the effectiveness of digital escape rooms. The aim of this research is to evaluate factors affecting student satisfaction/dissatisfaction with digital escape rooms during a revision lecture in the context of management and marketing courses by using an extension of the Technology Adoption Model.

The current study proposes a holistic approach to understanding students' satisfaction/dissatisfaction with the use of digital escape rooms by using fuzzy-set qualitative comparative analysis (fsQCA). Through the use of a qualitative comparative analysis approach, this study seeks insights of what causes students' satisfaction/dissatisfaction.

BACKGROUND

Escape rooms as an educational tool have been examined by researchers in various education fields such as nursing, medicine, pharmacy, chemistry, and computer programming (Hermanns et al., 2017; López-Pernas et al., 2019), to name a few. The use of escape rooms as revision tools represents an innovative approach, which can shape the learning experience of the students and bring more benefits in comparison with conventional teaching.

Previous research found that students enjoy participating in the escape rooms and consider them a valuable learning experience (Gómez-Urquiza et al., 2019; Hermanns et al., 2017; López-Pernas et al., 2019). Eukel et al. (2017) found that one of the perceived benefits of using escape rooms is peer learning. It should be remarked that previous research on escape rooms did not investigate factors affecting student satisfaction/dissatisfaction with escape rooms in the marketing and business field.

Based on previous studies in the field of digital learning and technology adoption (e.g. Davis, 1989; Muñoz-Carril et al., 2021) the following is proposed:

Proposition 1. Perceived ease of use is a necessary condition to predict student satisfaction

Proposition 2. Enjoyment is a necessary condition to predict student satisfaction

Proposition 3. Perceived usefulness is a necessary condition to predict student satisfaction

Proposition 4. Group support is a necessary condition to predict student satisfaction

Proposition 5. Disparate configurations of factors (perceived ease of use, enjoyment, perceived usefulness, and group support) are equifinal in leading to student satisfaction/dissatisfaction with digital escape rooms.

METHODOLOGY

Data collection

The design of the study was adapted from extant research on escape rooms in educational settings (e.g. Kinio et al., 2019). In total, one hundred and six MSc Business Management students were divided into 20 groups to complete the Escape Room challenge during the revision lecture. The Escape Room was designed to test students' knowledge of the module "Consumer Behaviour and Insights in the Digital Age". Participants were given 1.5 hours to complete the challenge. After solving the puzzle correctly the students could read more detailed information about concepts and use the code to move to the next puzzle. In total, students had to solve 15 puzzles. Following completion of the Escape room, teams were invited to participate in a 10-minute session to discuss their experience and were asked to complete the survey to access their experience and level of satisfaction. The survey included 7-point Likert scales to measure factors affecting student satisfaction. The questions to measure factors were adapted from previous studies (Al-hawari & Mouakket, 2010; Eom et al., 2006; MacGeorge et al., 2005; Yuen & Ma, 2008).

Fuzzy-set Quality Comparative analysis (fsQCA)

This study used fsQCA analysis. This method is gaining popularity among Information Systems (IS) and marketing researchers (Pappas & Woodside, 2021). fsQCA allows the use of a small or medium sampling size (Ragin et al., 2003). The analysis of the necessary conditions emphasises the cases that influence the outcome, which are then used to test the proposition. fsQCA allows the use of continuous and interval variables in the models. However, in the case of fsQCA, variables require calibration. During calibration, variables are converted into fuzzy variables by assigning them values between 0 (absence of set membership) and 1 (full set membership) (Pappas & Woodside, 2021). To calibrate variables, we used the 95%, 50% and 5% of our measures and used these values as three thresholds in fsQCA software (Pappas & Woodside, 2021).

RESULTS AND DISCUSSION

The first step of the analysis seeks the conditions that are necessary for student satisfaction. It examines where a single condition is always present or absent when the outcome is present. A threshold of 0.9 for necessity consistency was used based on the recommendations by previous studies (Vis & Dul, 2018). The analysis of necessary conditions showed that high level of

enjoyment, high level of perceived usefulness, and high level of group support are necessary conditions (these conditions exceeded the 0.9 benchmark). Ease of use does not seem to be a necessary condition for student satisfaction. The result also showed that low ease of use and low level of enjoyment are necessary conditions to cause student dissatisfaction (these conditions also exceeded the 0.9 benchmark).

The second step of the analysis involves the construction of the truth table which presents a set of logic statements describing the underlying causal patterns. Table 1 shows the diagrammatic representation of the sufficient solutions for modelling student satisfaction and dissatisfaction with the use of digital escape rooms as a revision tool. In order for configuration to be considered as "sufficient", its consistency should be equal or more than 0.75 while coverage should be equal or more than 0.2 (Pappas, et al., 2020). The result s in Table 1 demonstrate "do not care" situation for enjoyment in C1, which contradicts with the results of the necessary conditions. Following Mattke et al. (2021) and Hossain et al. (2022) we do not consider the presence of high enjoyment as a necessary condition for student satisfaction. Two configurations explain student satisfaction. In the first configuration (C1), a combination of high perceived usefulness and high group support is a sufficient condition for student satisfaction, even in the presence of low ease of use. In the second configuration (C2), a configuration of high enjoyment, high perceived usefulness, and high group support is a sufficient condition for student satisfaction. In the configuration that leads to Dissatisfaction, low perceived ease of use, low enjoyment, low perceived usefulness and low group support lead to student dissatisfaction.

Table 2 Diagrammatic representation of the findings from fsQCA analysis

	Satisfaction		Dissatisfaction
	C1	C2	C3
Ease of use	⊗		⊗
Enjoyment		•	⊗
Perceived usefulness	•	•	⊗
Group support	•	•	⊗
Consistency	0.96	0.99	0.98
Raw coverage	0.37	0.88	0.79
Unique coverage	0.02	0.54	0.79
Solution coverage	0.90		0.79
Solution consistency	0.97		0.98

Note:

- High level of condition ⊗ Low level of condition

CONCLUSION AND IMPLICATIONS FOR THEORY AND PRACTICE

This study analysed four conditions that affect students' satisfaction and dissatisfaction with the digital escape room as a revision tool. FsQCA analysis was employed to identify the

combination of causal relationships in a context, in this case, the effectiveness of escape rooms as a revision tool. The study confirmed propositions 3 (*Perceived usefulness is a necessary condition to predict student satisfaction*); and 4 (*Group support is a necessary condition to predict student satisfaction*). The analysis failed to confirm Proposition 1 (*Perceived ease of use is a necessary condition to predict student satisfaction*) and 2 (*Enjoyment is a necessary condition to predict student satisfaction*). The findings in Table 1 support proposition 5 (*Disparate configurations of factors (perceived ease of use, enjoyment, perceived usefulness, and group support) are equifinal in leading to student satisfaction/dissatisfaction with the digital escape rooms*). Student satisfaction is indicated by different configurations of the ease of use, enjoyment, perceived usefulness, and group support factors. For example, there are two distinct configurations which influence student satisfaction in Configuration 1 and 2. First, student satisfaction is achieved by low perceived ease of use, high perceived usefulness and high group support. However, student satisfaction is also achieved by high level of enjoyment, high perceived usefulness and high group support. Configuration 3 shows that low perceived ease of use, low enjoyment, low perceived usefulness and low group support are sufficient conditions for student dissatisfaction.

The current study is different from previous research, as it examines which configurations, rather than just which individual factor, leads to student satisfaction/dissatisfaction. The findings show that perceived usefulness and group support are usually necessary individual antecedent conditions for student satisfaction. Results also show that escape rooms that have low perceived ease of use, low level of enjoyment, low perceived usefulness, and low group support will result in student dissatisfaction.

This study contributes to the Higher Education sector by providing evidence that escape rooms can be a successful tool to support learning and teaching in the context of Marketing and Business Disciplines. When designing escape rooms practitioners should take care of the following factors, which affect students' satisfaction and dissatisfaction: ease of use, enjoyment, perceived usefulness, and group support. The results of this study provide educators with effective examples of how to use escape rooms in their teaching.

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