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## **The Impact of collective Pre-game Organization in the perceived Experience of Digital Management Simulations in Higher Education.**

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### **Declaration of Conflicting Interests**

The Authors declare that there is no conflict of interest.

## The Impact of Collective Pre-game Organisation in the Perceived Experience of Digital Management Simulations in Higher Education

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**Abstract:** This study investigates the impact of pre-game preparation on the perceptions and outcomes of participants in a digital simulation game. Conducted on 542 students from 28 management schools, the research explores how team organisation and strategic planning in the early stages influence game experience and performance in a business simulation context. The findings reveal that effective pre-game preparation significantly enhances both the participants' perception of the game and their performance outcomes. These results underline the importance of structured team organisation and the strategic definition of roles before the game begins. This study also contributes to the literature on simulation games by highlighting the crucial role of pre-game activities, especially in team-based settings. In addition, it offers practical insights for educators on optimizing the use of simulation games by focusing on preparation and organisation strategies that mimic real-world business environments. This research not only fills a gap in our understanding of the preparatory phase of game-based learning but also enhances our knowledge of how simulation games can be effectively integrated into management education.

**Keywords:** digital simulation, game experience, pre-game preparation, team organisation, pre-game preparation, team organization, educational outcomes, management education.

### Introduction

The popularity of gaming has been steadily increasing worldwide (Lee, Jang & Rollins, 2024). Playing video games is not solely for entertainment but can also serve educational purposes. Furthermore, integrating professional practice into management education presents a significant challenge (Billett & Henderson, 2011). Consequently, many young graduates often lack practical training, typically only gaining experience by taking part in real projects, where poor decisions can lead to project failure (Wickenheiser et al., 2024). This necessity has led teachers to adopt new pedagogical techniques, particularly drawing on digital innovations, to promote practical learning and to increase student motivation during apprenticeships (Wijnia et al., 2024). One such method is the development and use of digital business simulations. Digital simulations are described as “internet-based, synthetic learning environments where decisions are made within a complex and dynamic setting, and where students experience real-time information and feedback” (Lovelace et al., 2016, p. 101). They allow students to experiment, learn from their mistakes, and experience real situations in a risk-free environment.

Digital simulations are widely used in marketing and management higher education, and are popular among students (Vlachopoulos & Makri, 2017). However, questions persist regarding their actual utility and impact on perceptions of pedagogical methods and student performance. A growing body of literature on the use of digital games in management education (Mittal et al., 2022) aims to demonstrate its transformative potential (Landers, 2019), providing participants with a positive experience (Vesa & Harviainen, 2019).

Despite increasing global interest in game-based learning within educational settings, research focused on its application in classroom environments, particularly in higher education, remains sparse (Zhong et al., 2022). Notably, no studies have yet examined the significance of the pre-

game phase (Bado, 2019). This study aims to address this gap by exploring the impact of collaborative gaming among university students, with a specific focus on team preparation and organisation before the start of the game.

The importance of an introductory session for a course, to set the stage for the building up of knowledge and for pedagogical purposes, is well recognized (Lam & Muldner, 2017; Zhonggen, 2019). What is now necessary is to investigate how prior collaborative activities influence the experience during the game, and the ensuing outcomes. Indeed, without adequate prior preparation (time devoted to understanding the activity before it starts) and organisation (considerations such as the composition of the teams), digital business simulations could fall into the trap of being just another routine activity. Therefore, the purpose of this empirical study is to clarify how participants prepare for a digital simulation, and to determine the impact of this preparation and organisation on their satisfaction with the game and on their performance outcomes.

Our research question is as follows: *Does the preparation of participants and their organization into specific teams prior to their entry into a digital simulation game influence their perception of the game experience, and their final outcomes?*

To address this, we conducted a survey of 452 students participating in a national digital management simulation<sup>1</sup>. We employed the “Unified Theory of Acceptance and Use of Technology” (UTAUT) and principles of experiential learning to gain insight into the relationships between preparation, perceptions of game experience, and performance within a digital simulation. Our results indicate that the organisation of the team in terms of the component members significantly impacts game experience – including enjoyment, effort, and performance expectations – and also influences final outcomes. Interestingly, we found that performance subsequently influences the perceived experience, which is a new finding in this area of study.

Our contribution to the marketing and management education literature is twofold. Firstly, while existing literature on digital business simulations predominantly focuses on the architecture and design of games (Canhoto & Murphy, 2016), our investigation into team organisation before the game begins is a novel approach. Secondly, previous research has largely concentrated on the game itself and its technology; our study enriches this by examining the relationship between preparatory activities and experience perception, thereby addressing a gap the literature.

The article is structured as follows: in the first section, we explore the pedagogical advantages of gamification and highlight the critical role of collective engagement and teamwork dynamics in enhancing learning outcomes. The methodology section goes on to describe the methods employed for the empirical research used here. Following this, we present our findings, with the discussion focusing on the importance of studying the overall ‘environment’ of a digital business simulation, not merely the game-playing part. We conclude by offering theoretical implications, possibilities for further research, and suggestions for educators on how to enhance students' perceptions of the experience gained through the digital games utilised in classrooms.

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<sup>1</sup> Institutions names have been anonymized to comply with the rules of the article review process. They will be specified in the final version.

## **Conceptual framework**

We begin by exploring the application of digital simulations in higher education, highlighting the pedagogical advantages of gamification in the first section, and the role of experiential learning in the second section. This background underscores the real-world relevance of simulations and emphasises the critical role of collective engagement and teamwork dynamics in enhancing learning outcomes, as described in the third section.

### ***Serious games, simulations and marketing /management education***

In higher education, the integration of digital games creates a diverse landscape of pedagogical strategies, including serious games and educational simulations, each offering distinct applications and benefits. This trend stems partly from a desire to gamify teaching on the part of educators, rendering it more dynamic, active, and collective. Gamification of learning activities is defined as the integration of various forms of games into educational contexts to facilitate experiential learning, encompassing role-playing games, simulations and serious games (Bechkoff, 2019), although these modalities are often mistakenly conflated.

In the context of higher education, serious games are primarily employed to impart comprehensive knowledge and best practices (Allal-Cherif & Makhlof, 2016). These simulations offer business-type activities, reproducing a company rather than an academic environment (Romme, 2003). They recreate scaled-down, yet realistic, business settings on online platforms, facilitating numerous decision-making opportunities in an environment that closely mirrors authentic business contexts (Canhoto & Murphy, 2016; Bolton et al., 2019).

Furthermore, enriched interactions within the gaming experience (Allal-Cherif & Makhlof, 2016) and the presence of tutors in the game environment provide crucial support and guidance, assisting players in navigating challenges and making informed decisions (Bacon & Stewart, 2022). This collaborative approach motivates players to engage more actively in the game, resulting in improved outcomes (Harding, 2017). These findings suggest that fostering a conducive environment can enhance knowledge exchange, development of skills, participant satisfaction, and overall performance. Beyond providing an enriching experience, simulations also enhance the learning processes, a topic we will explore in the next section.

### ***Benefits of experiential learning with simulations***

Experiential learning methods are particularly effective in achieving optimal outcomes (Brennan, 2014). They have long proven successful in marketing and management education, driven by the objectives targeted (employability, practical application) and the expectations of today's students for more engaging methods (Wijnia et al., 2024).

Simulation games, together with case studies and role-playing exercises, form a comprehensive range of experiential pedagogical tools in marketing education (Caruana et al., 2016), adhering to the core principles of experiential learning theory (Kolb & Kolb, 2005).

Simulations offer significant learning-related benefits, of which we highlight here two primary ones. Firstly, simulations provide experiential learning opportunities that actively engage learners. Through frequent feedback and the freedom to explore various options and initiatives, learners are actively immersed in the simulated experience (Canhoto & Murphy, 2016). Research suggests that using simulations can increase student involvement and empowerment (Bacon & Stewart, 2022), underscoring the crucial role of both personal and collective engagement in the effectiveness of the game (Hamari & Koivisto, 2014).

Secondly, simulation games significantly boost learner motivation, as participants become immersed in intense activities and undergo emotional experiences (Mullins & Sabherwal, 2018). The process requires energy and decision-making specific to the activities involved, driven either by intrinsic motivation (Friedrich et al., 2019) or extrinsic motivation (Mitchell et al., 2018). However, the effectiveness of simulations varies based on numerous factors, including learner perceptions and outcomes (Caruana et al., 2016). The choice of topic and content of the simulation are critical factors to consider. Furthermore, the balance between the time spent learning how to play the game and the time actually spent playing it requires further investigation (Bacon & Stewart, 2022).

Teamwork, both during the preparatory phase and within the game itself, can play a pivotal part due to the social roles and shared perceptions that can strengthen collective identity, thereby facilitating experiential learning for students (Murillo-Zamorano et al., 2021). Consequently, there is a need to examine the effectiveness of simulations from the perspective of teamwork in game-based learning, especially in the context of simulations.

### ***Team cohesiveness in simulation games***

The argument that cohesion in teams significantly enhances learning effectiveness is well-supported by extensive research (Ashforth et al., 2008). Team cohesiveness goes beyond smooth interpersonal dynamics; it profoundly affects team members' well-being, which, in turn, influences the overall learning process and outcomes (Caruana et al., 2016; Laverie, 2006). Research also indicates a curvilinear and reciprocal relationship between team adaptation and cohesiveness, highlighting the complex dynamics that contribute to learning effectiveness within team environments (Vanhove & Herian, 2015; Maynard et al., 2015).

In addition, team cohesiveness has been shown to positively impact both student engagement and learning effectiveness (Bozanta et al., 2016). When students work in cohesive groups, their engagement with the material and their ability to learn effectively are enhanced. Positive influences such as team experiences can shape favourable perceptions of learning (Harding, 2017; Lancellotti & Boyd, 2008), whereas negative dynamics may result in disengagement. Importantly, engagement is critically tied to learning effectiveness, forming a feedback loop in which increased student engagement enhances learning effectiveness, and improved learning outcomes in turn boost engagement.

In practice, fostering team cohesiveness within business simulations involves creating an environment that promotes trust, collaboration, and mutual support (Dimas et al., 2023). This approach not only enriches the learning experience but also reflects the collaborative nature of professional business environments. The empirical evidence underlines the need for educators to consider the structure and dynamics of teams carefully when designing and implementing simulations in business education (Dimas et al., 2023).

There is strong evidence that team cohesiveness and organisation significantly enhance the learning experience and outcomes in experiential learning scenarios, such as business simulations. However, the impact of students working in groups within marketing and management education has shown mixed results (Bacon & Stewart, 2022). Therefore, it is essential to examine various factors that contribute to adherence to the game and platform, particularly how the absorption of extensive information and collective decision-making impact simulations (Caruana et al., 2016). Consequently, there is a pressing need to explore how engaging in preparatory tasks, whether through lectures or autonomous group preparation before a game, prepares students for better learning.

To summarise, our literature review reveals that although there is extensive research on gamification, relatively little focus has been placed on collective behavior and team dynamics within business simulations (Bacon & Stewart, 2022). Furthermore, there is a need to deepen our understanding of how players engage with business simulations and the significance of the preparatory phase. The role of pre-game activities remains underexplored (Tsay et al., 2018); although Lam and Muldner (2017) observed that preparation prior to collaboration led to enhanced deep learning outcomes, their focus was limited to cognitive engagement preparation involving tasks (learning activities) given by the teacher.

Consequently, we aim to address the following research question: *does the preparation and organisation of participants prior to their entry into a simulation game influence their perception of the game experience, and their final outcomes?*

### **Hypothesis Development and the Conceptual Model**

In this empirical study, we investigate the relationships between team cohesiveness – established prior to initiating a simulation game – and various outcomes: performance, players' perceptions of their participation, and their views on the technology used for the simulation. This section details the conceptual framework we adopted and describes how we operationalized these concepts for our research.

#### ***Team cohesiveness***

Research emphasizes the profound influence of team cohesiveness on performance, where cohesiveness involves meticulous preparation for simulation games, including the composition of the team and assignment of roles (Pasin & Giroux, 2011). Dey and Ganesh (2020) link team boundedness and coordination with enhanced task and social cohesion. Al-Rawi (2008) further explores this relationship, finding that cohesiveness correlates with positive attitudes towards the organisation, increased value commitment, and a nuanced interaction with performance commitment. These studies collectively highlight the complex dynamics of teams and the essential role of cohesion in optimising both team satisfaction and overall organizational effectiveness. They deepen our understanding of how team cohesiveness influences performance, underscoring the need to consider elements like team composition and diversity. They suggest that initial conditions, such as group affiliation or educational background, as well as team composition, significantly impact both the performance outcomes of simulation games and participants' perceptions of their experiences.

In this empirical case study, team cohesiveness was assessed using five distinct measures. 'School belonging' evaluates whether team members selected each other from within the same school or opted to form teams across multiple schools. 'Same class' looks at whether the members grouped themselves with classmates or with acquaintances from different classes within the same school. 'Random' assesses whether participants were assigned to teams randomly by the game organisers, which was the case for a few students who did not initially belong to a team. 'By profiles' determines if team members were chosen based on complementary specialties, such as marketing or strategy. Lastly, 'By roles' examines whether participants had predefined roles, such as analysing market research or managing data in spreadsheets, before the game began.

#### ***Game performance***

For empirical accuracy, we measured the participants' performance in a serious game using actual data – scores and rankings – instead of relying on self-reported questionnaire data. This methodology, supported by literature, underscores the directness, objectivity, and reliability of empirical measures, especially in experiential learning settings where precise, quantifiable outcomes are vital (Lopez & Tucker, 2019; Bacon & Stewart, 2022; Pazos et al., 2022). Research in knowledge management also correlates the use of empirical metrics with improvements in firm performance, highlighting the utility of tangible performance metrics in evaluating strategy effectiveness (Inkinen, 2016). Moreover, systematic reviews demonstrate that serious games effectively achieve educational goals by enhancing skills acquisition and learning retention (Vlachopoulos & Makri, 2017). Transitioning to a learner-centred educational model is essential in today's knowledge economy, necessitating technologies that support customised learning and mastery (Watson et al., 2015). These insights validate the effectiveness of using actual game outcomes to assess the impact of preparation and organisational strategies on performance in educational and training interventions through serious games (Hooshyar et al., 2016; Lam & Muldner, 2017; Rodrigues et al., 2016).

### ***Game experience***

We are interested in examining both the perception of the team's organisation and the perception of the gaming experience before and during the decision-making processes. Team organisation is an important component of performance (Nicolaidis et al., 2014), and has become essential for increasing team effectiveness (Cox, 2003; Mathieu et al., 2019). In the field of research focusing on team effects (Ali et al., 2020), studies have explored team-based games, psychological states, and team learning (Parker & du Plooy, 2021). These factors may influence the perception of the gaming experience, regarding team functioning and the dynamics of the game itself. We hypothesise that these variables positively influence in-game activities.

### ***Technology perception***

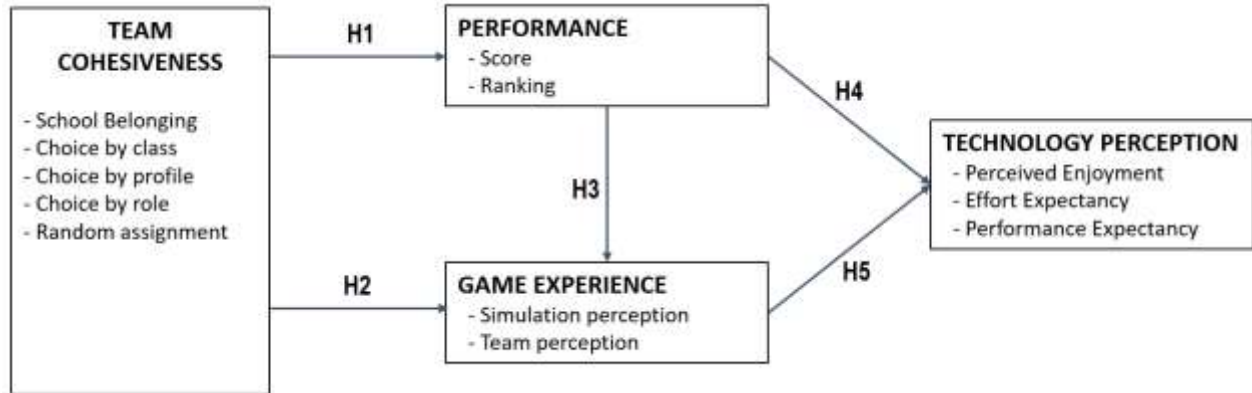
Experiential learning theory and the Unified Theory of Acceptance and Use of Technology (UTAUT; Davis, 1989; Eppman et al., 2018; Venkatesh et al., 2003) offer insights into the dynamics between learner satisfaction, performance expectancy, effort expectancy, and the use of management simulation games (Caruana et al., 2016). These variables are among the most discussed in literature on the utilisation of educational games (Baptista & Oliveira, 2019). Performance expectancy, effort expectancy, and satisfaction with participating in a serious game are all positively correlated with successful outcomes.

Perceptions of a pedagogical tool, in terms of both content and form, are essential when promoting its use. The UTAUT provides a framework for this, indicating that adoption of technology is influenced by a positive attitude, which is driven by expected effort and performance (Davis, 1989; Venkatesh et al., 2003). Although the UTAUT considers antecedent factors like social influence and facilitating conditions, our analysis centres on how simulations are perceived, focusing on both the content (game experience) and the form (perception of technology). In a similar approach to that of Caruana et al. (2016), we prioritise understanding these perceptions rather than the behavioural intentions typically explored in UTAUT studies. This approach helps identify the elements that encourage or hinder the adoption of technology-based learning tools, aiding in the development of strategies that enhance user satisfaction and performance.

We therefore formulated our hypotheses as follows:



- H1: Team cohesiveness has a positive effect on team performance in the game.
- H2: Team cohesiveness has a positive effect on game experience.
- H3: Team performance has a positive effect on game experience.
- H4: Team performance has a positive effect on perception of technology.
- H5: Game experience has a positive effect on perception of technology.



**Figure 1. Theoretical Conceptualization**

## Methodology

### *Data Collection: Case study of the Inter-IAE 2021 Business Game*

This study examined an online management simulation involving 601 students from 28 different management schools, conducted in January 2021. The simulation was an international marketing game hosted on an online platform, allowing participants to connect and play together from various locations (Appendix A provides a detailed game description). Participants were grouped into teams of 3 to 5 members, simulating companies launching new mobile phones in European and Asian markets. The teams collaborated to make key business decisions, competing against other teams in areas such as product design, marketing plan development, distribution strategies, and communication budget allocation. The game consisted of four one-hour cycles, each cycle representing a year, with performance indicators displayed at the end of each cycle, allowing teams to assess their competitors' results and adjust their strategies for the next cycle. The recorded results included metrics like profit and loss accounts, and volume of sales. Data collection involved an online questionnaire split into two stages: one before the game and the other after its conclusion. Each survey response was linked to a unique identifier for each participant, resulting in 337 valid responses (representing 74.5% of the 452 total responses received). Data was also extracted from the game platform, recording real-time player activities, including their decisions and the outcomes. Descriptive statistics were used to present the characteristics of the survey respondents. These comprehensive data collection methods provided a robust basis for analysing the impact of team decisions and interactions on game performance.

### *Sample*

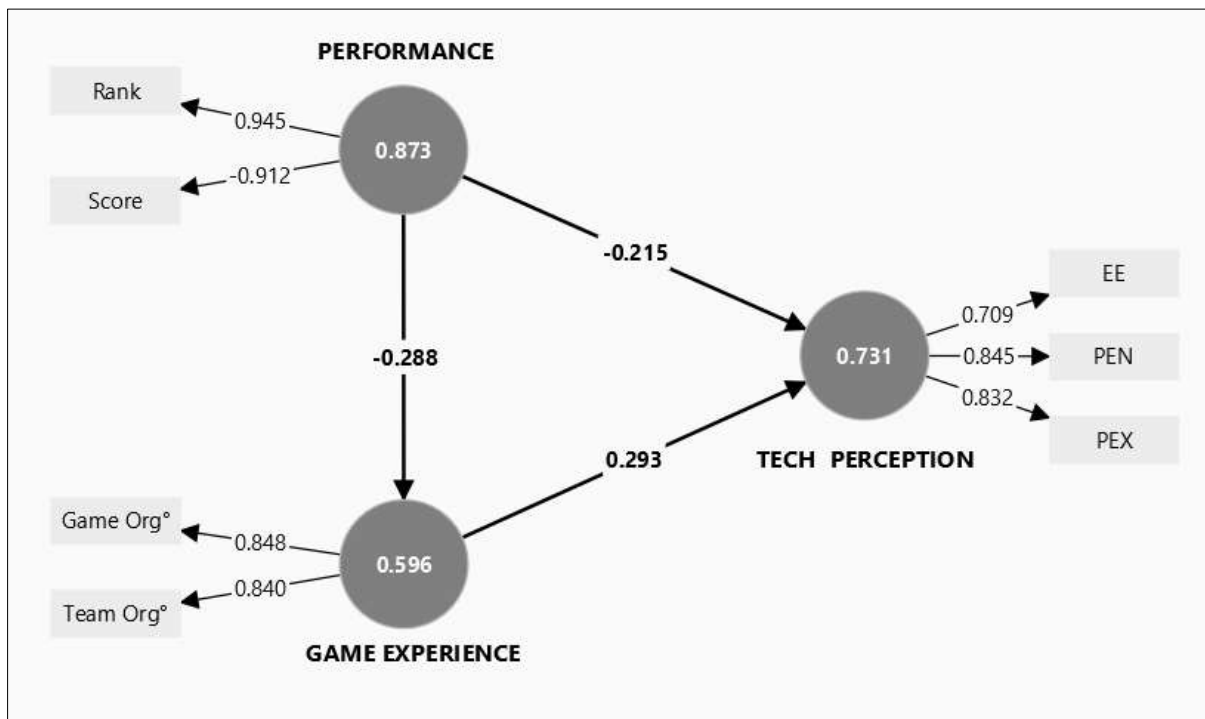
Among the survey respondents, 18.2% were undergraduates, while the majority were graduate students. Regarding academic focus, 30.6% of participants were primarily enrolled in international

management, with a further 24.9% specialising in marketing-sales. Gender distribution among respondents was relatively even. The median age of the participants was 22 years old (see Appendix B for more details). In terms of team composition, 82.6% of participants formed teams with peers from the same school, and 65.8% were in the same class, indicating reliance on existing social ties. Notably, 75.9% did not choose their team members at random, and 69.1% joined the game voluntarily. Reflecting a more strategic approach, 57.4% assembled their teams based on the complementarity of their skills (such as marketing, strategy, etc.), although only 17.1% had established a strategy prior to starting the game. In terms of familiarity, 69.8% of participants had known each other for a year or less, while 14.9% had known each other for at least three years. These insights into team dynamics offer a glimpse into how existing relationships and strategic planning influenced the game's outcomes.

## Findings

### *Reliability and validity of scales*

To evaluate the performance of the measurement model, an estimation was carried out using Partial Least Square and Structural Equation Modelling (PLS-SEM; Hair et al., 2012), for that part of the model with quantitative variables. The reliability test uses the coefficient of Cronbach Alpha for both variables built on scales for 'Game experience' and 'Perception of technology'. The results fulfilled the threshold value of 0.5 for further study of this phenomena. (Figure 2). This is an indication of the internal consistency of the measuring scale of our constructs and reflected sufficient convergent reliability.



**Figure 2. The Game Experience Model**

‘Game experience’ was assessed by means of two items, the perception of the organisation of the team and the perception of the organisation of the game. We performed the outer reflective model using PLS-SEM to validate the research model in terms of internal consistency reliability, giving convergent validity (Table 1), while discriminant validity was demonstrated using Fornell-Lacker’s Criterion (1981; see Table 2).

Latent variable	Items	Loadings	Composite reliability	AVE	Cronbach’ Alpha
Game experience	Game organisation	0.848	0.596	0.712	0.596
	Team organisation	0.840			
Technology perception	EE	0.709	0.731	0.637	0.713
	PEN	0.845			
	PEX	0.832			

Source: Authors’ elaboration extracted from SmartPLS.

**Table 1. Quality criteria for outer reflective model**

Outer loadings indicate the strength and significance of the relationship between each indicator and its respective latent variable. In PLS-SEM, outer loadings higher than 0.7 suggest that the indicator is a good measure of the latent variable. Values close to, or above, 0.9 indicate a very strong relationship. High loadings suggest that these indicators are strongly and positively related to their respective constructs, effectively validating the constructs they are intended to measure. The composite reliability of the variables exceeded 0.6 for technology perception and is very close (0.596) for game experience. The analyses showed the estimated path coefficients regarding construct dependencies or variable relationships and their significance in the above structural model.

Fornell-Larcker criterion	Game Experience	Performance	Technology Perception
Game Experience	0,844		
Performance	-0,288	0,929	
Technology Perception	0,355	-0,300	0,798

**Table 2. Test of discriminant validity**

### *Testing the hypotheses*

*Team cohesiveness, Performance, and Game experience (H1 and H2).*

A one-way non-parametric analysis of variance (ANOVA) was performed using Jamovi 2.0 (Jamovi Project, 2022) to analyse the influence of team cohesiveness on team performance and on the perceived experience of the game. We chose Jamovi for its free, user-friendly interface, community-driven development, R and Python integration (R Core Team, 2021), and real-time analysis capabilities, providing a flexible and reproducible platform for statistical analysis (e.g. Abbasnasab Sardareh et al., 2021; Bartlett & Charles, 2022; Shepherd & Richardson, 2024).

For Hypothesis H1, we tested the influence of five qualitative items of team cohesiveness on both performance metrics. Performance is a proxy of learning through incremental success: observing

their cumulative results motivates participants to persist in their efforts. Out of these five factors, three positively influenced the teams' final scores (Table 3). However, the factor 'same class' did not have a significant impact on the final ranking. Consequently, H1 was only partially supported. For Hypothesis H2, the five items of team cohesiveness positively influenced the game experience: the result of Kruskal-Wallis test shows that  $\chi^2$  values range from 4.34 to 62.5 and are all significant. Team members belonging to the same school, the same class, who chose each other, shared specialties and roles, rather than being assigned by a teacher, all have a positive effect on the perception of the game. Thus, hypothesis H2 was supported.

	School belonging		Same class		Random		By profiles		By roles	
	$\chi^2$	$\epsilon^2$	$\chi^2$	$\epsilon^2$	$\chi^2$	$\epsilon^2$	$\chi^2$	$\epsilon^2$	$\chi^2$	$\epsilon^2$
Score (H1)	85.3***	0.255	ns		9.394**	0.028	ns		11.22***	0.034
Ranking (H1)	59.7***	0.178	ns		9.578**	0.029	5.578*	0.017	6.84**	0.020
Game Experience (H2)	62.5***	0.187	17.556***	0.052	12.401***	0.037	12.197***	0.036	4.34*	0.013

One-way Anova, non-parametric (Kruskal-Wallis) - \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

**Table 3. Hypotheses H1 and H2 test**

***Performance, Game experience and Perception of technology (H3, H4, and H5).***

We employed PLS structural equation modelling to test hypotheses H3 to H5, analysing the relationships between key constructs in our model. The path coefficients provided a measure of the strength and direction of these relationships (Table 4).

Direct and indirect effects	Path coefficients
H3: Performance → Game Experience	-0.287***
H4: Performance → Technology Perception	-0.215***
H5: Game Experience → Technology Perception	0.293***
Performance → Game Experience → Technology Perception	-0.084*

**Table 4. Direct Effect Measures**

Our results indicate that high performance may reduce the quality of the game experience, as demonstrated by the negative path coefficient for H3. This could be due to increased challenges or complexities associated with high performance, which may lead to decreased engagement and enjoyment. The negative coefficient for H4 suggests that high performance might contribute to a less favorable perception of technology, potentially caused by increased stress, cognitive overload, or an overestimated sense of one's capabilities. When examining specific relationships, 'ranking' has a strong positive loading with performance (0.945), suggesting that as ranking improves, so does performance. On the other hand, 'score' has a negative loading with performance (-0.912), indicating that higher scores might not necessarily align with better performance outcomes. These findings suggest that hypotheses H3 and H4, as originally defined, are not supported. Conversely, hypothesis H5 has a positive path coefficient, implying that an enhanced game experience is

associated with a more positive perception of technology. This indicates that improving the game experience could lead to greater acceptance of technology, thereby supporting H5.

Further analysis of indirect effects, as measured through the PLS approach, agrees with these findings. The negative indirect effect for [Performance → Game Experience → Technology Perception] underscores the concept that high performance can reduce game experience, thereby adversely affecting the perception of technology. This reveals a complex interplay between these constructs, illustrating that while a positive game experience can improve the perception of technology, high performance can actually impair both game experience and perception of technology.

## **Discussion**

Our study provides valuable insights into the complex relationships between team cohesiveness, game experience, technology perception, and performance in a management simulation context. To summarise our key findings and their implications:

Firstly, our results emphasise the importance of the pre-game phase, showing that thorough preparation and strong team cohesiveness contribute to a more positive game experience. Teams formed based on existing relationships, such as from the same school or class, and those with complementary skills, achieved a higher performance (Fredricks et al., 2004; Lemken & Siguaw, 2019). This is in agreement with previous research, indicating that socialisation, team organisation, and shared identity foster better outcomes (Allal-Cherif & Makhoulouf, 2016; Anderson, 2005; Lancellotti & Boyd, 2008). These factors create a conducive environment by promoting familiarity and reducing uncertainty, reinforcing the importance of building cognitive trust and social ties (Dimas et al., 2023).

Secondly, teams that were better prepared in terms of roles and profiles consistently achieved a higher performance during the game, challenging the assumption that in-game activities are more critical than preparation (Kottkamp, 2010). Effective preparation contributes to team well-being and cohesion. This finding highlights the need for schools and coaches to emphasise the rationale behind educational games, encouraging sustained preparation and a reflective understanding of commitment (Huang & Hew, 2018). It also highlights the role of good working conditions in fostering successful outcomes (Mitchell et al., 2018).

Thirdly, contrary to our expectations, our study found a negative relationship between performance and game experience, suggesting that higher performance might diminish enjoyment and engagement due to increased stress and complexity. The negative path coefficient between performance and perception of technology indicates that higher performance might lead to a less favourable view of the technology used in the game. This could be attributed to cognitive overload or an inflated sense of self-confidence. However, the positive relationship between game experience and perception of technology suggests that improving the game experience can lead to a greater acceptance of technology, highlighting the need to focus on creating engaging and enjoyable simulations.

The observed results challenge conventional expectations, suggesting that reducing performance pressures could improve the game experience, thereby enhancing the perception of technology. Simulation games can be an effective educational tool, offering students hands-on learning and increased confidence in their abilities (Hamari & Koivisto, 2014; Xi & Hamari, 2019). These

results agree with the findings of earlier studies that explore the role of team psychological safety in team effectiveness (Dimas et al., 2023). Simplifying game mechanics, providing a supportive environment, and focusing on team collaboration are crucial strategies for achieving this balance. Overall, our findings highlight the importance of understanding the dynamics between team cohesiveness, game experience, performance, and the perception of technology. By addressing these factors, educators and game designers can create more effective and enjoyable simulation games, fostering learning and positively influencing the adoption of technology. Ultimately, this would contribute to a more engaging and successful educational experience for students.

## Conclusion

This research aimed to address the following question: *does the preparation and organisation of participants prior to their entry into a simulation game influence their perception of the game experience, and their final outcomes?* Through this study, we provide new insights into the effect of the participants' pre-game preparation on their perceptions within a simulation game and on their results. Moreover, we shed light on how initial engagement and action within a simulation game enhance the perception of the game experience. Understanding the drivers of this perception is a major issue for effective learning (Vesa & Harviainen, 2019).

This article offers evidence that the pre-game phase of a simulation game is crucial, particularly the participants' reflection on team organisation before starting the game, and demonstrates that there are significant relationships between pre-game preparation, experience perception, and outcomes. Therefore, we contribute to the long-discussed and intriguing question regarding game preparation: what type of non-game and player-specific factors lead to optimal performance during a game (Da Rocha Seixas et al., 2016)?

Three main theoretical contributions emerge from this research. Firstly, this study adds to the existing literature on the use of games in marketing and management education, specifically focusing on game-based learning among adult learners. It supports a shift towards more humanistic management practices, where economic and social pressures are softened by the more relaxed context provided by the game (Deterding, 2019). Secondly, the thorough preparation of players is identified as a critical success factor in their performance within the simulated environment. This should be further explored by future research, to explore its effectiveness in developing practical skills. This is particularly important in game-based pedagogy, which carries significant implications for learners: it offers them a platform to assess their capabilities realistically outside the actual job environment, and to learn from their mistakes before entering the workforce. Thirdly, the strength of the relationships between descriptive variables and game outcomes is in agreement with the results of existing studies. We demonstrated that various personal or group characteristics influence experience perceptions in a simulation game and influence the outcomes achieved in such an activity by students.

This article also offers several practical implications for educators on how to coach and support players effectively before the game begins. To facilitate this, we identify three key preparatory factors: a well-designed technical framework that ensures players can easily engage with the tool;

a detailed organisational script that clearly defines roles and facilitates credible and fluid decision-making; and an incentive to get to know the game before it starts.

The first factor concerns the tripartite role of teacher-designer-manager: our study shows the importance of the pedagogical framework leading students to prepare their team, define roles, or select game options effectively. For game designers, this could involve the creation of “advice bricks” to help player learning. For managers, it encourages planning in terms of the desired competencies that can be scripted through gamified activities in both academic and corporate settings, effectively blurring the boundaries between these two worlds.

The second factor, focusing on interactivity, emphasises the importance of clarifying the stakes and objectives rather than imposing procedures and methods. It advocates for relying on group dynamics to devise effective strategies and achieve satisfactory outcomes, even if this involves learning through failure.

The third factor relates to finding an optimal balance: the experience of the simulation game therefore illustrates the need to strike a balance between acquiring skills and adhering to pedagogical practices. On one hand, it involves defining clear training objectives and a script with definable progress. On the other hand, it is crucial to allow sufficient flexibility in terms of methods and potential solutions to foster strong engagement and commitment.

In terms of limitations, further investigation into other fields is necessary to gauge whether our results can be generalized to apply to them. The preparation conditions and the perceived experience also merit more in-depth examination. These limitations open up different avenues, such as replicating this study with other student groups to see if they confirm our findings. Consequently, we plan to replicate this study over several years, utilizing the same national network of business schools as a research setting. In addition, the conceptual tools used can be refined to enable comparisons with other studies. A further direction involves investigating this ‘black box’ gaming situation qualitatively via semi-structured interviews, to gain a better understanding of the participants' perspectives before and during the game. Given that our findings indicate the importance of pre-game preparation, this approach could be used to clarify the interplay between the cognitive and emotional dimensions of engagement, to optimise the experience and outcomes. These research directions promise to provide valuable insights that will better equip educators to incorporate simulation games into their teaching practices.

### **Declaration of Conflicting Interests**

The Author(s) declare(s) that there is no conflict of interest.

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## Appendix A

(Credits: Cesim, T. Descombes, Area Manager, cesim.com)

The simulation game that serves as the subject of this research, developed and provided by Cesim, was chosen by the management team of a national network comprising 36 management schools across the country, for their annual event “The Night of the International.” The selection was made in favor of a business simulation that emphasizes international marketing and sales development functions within a company, known as the Global Challenge simulation.

The screenshot displays the Cesim Marketing interface. At the top, it shows the user's name (Jared Wright), the last modification (Aucune modification), and the current round (Tour 2, 7/13 11:24:51). The main navigation bar includes ACCUEIL, DÉCISIONS, RÉSULTATS, PLANNING, ÉQUIPES, MANUELS, and FORUMS. The current view is for the 'Europe' market, with tabs for 'Europe' and 'ASIE'. Below the market selection, there are three product icons: 'Product 1', 'Normie', and 'Miracle'. The 'Europe' section shows a product card for 'Product 1' with a smartphone icon. The card lists attributes: 'Marché cible: Les deux', 'Design: Classique', 'Performance: 55', 'Autonomie de la batterie: 43', and 'Coût variable unitaire, €: 154.23'. To the right, a 'Prix, €' table compares 'Tour N' and 'Tour N+1' for 'Prix de vente', 'Coût variable unitaire', and 'Marge unitaire avant publicité'. The 'Publicité, k €' section is partially visible at the bottom.

	Tour N	Δ %	Tour N+1
Prix de vente	250.00	-14	210.00
Coût variable unitaire	154.23	-0	154.92
Marge unitaire avant publicité	95.77	-31	125.08

Participants in the game, enrolled in either bachelor's or master's degree programs in management, engage with a variety of courses such as marketing mix, product marketing, segmentation and positioning, distribution and sales, sales forecasting, market research, and profit and loss accounts. Comprehensive documentation is made available to them, which includes detailed written materials outlining the game's context, an online user guide, video tutorials for navigating the game platform, and preliminary access before the actual game night to acquaint themselves with the game mechanics. Additionally, the opportunity for dialogue with teacher-coaches is provided, varying by school.

Three distinct universes (competitive groups) are established to allocate nearly 120 teams, initiating play autonomously at 5, 6, and 7 pm respectively. A gaming evening typically spans approximately five hours, incorporating an initial familiarization period followed by one-hour decision-making cycles, each simulating a fictitious year of company operations. The game's format offers flexibility with adjustable numbers of cycles and the potential to span over two or three days, integrating classroom debriefings and student presentations. To facilitate team coaching, twenty instructors from various schools were enlisted. They were distributed across the three universes, independently of their home institutions, thereby coaching teams from different schools. These educators had received prior training in the game mechanics from Cesim's country representative. To enable seamless communication throughout the event, a live forum was employed alongside other online tools (such as Zoom, Teams, WhatsApp, etc.), allowing for continuous interaction among team

members and with their coaches. The outcomes of the competition are revealed to the teams shortly after the conclusion of the fourth game cycle.

**Appendix B. Description of the sample.**

	N (337)	%			%
<b>Gender</b>			<b>Speciality</b>		
Female	180	53.40%	International Mgt	103	30.60%
Male	157	46.60%	Marketing-Sales	84	24.90%
<b>Age</b>			General Mgt	82	24.30%
21 and less	103	30.60%	Others	68	20.20%
22-23	125	37.10%	<b>Game experience</b>		
24 and more	109	32.20%	No	156	46.30%
<b>Education</b>			Yes	181	53.70%
Bachelor	61	18.20%	<b>Online game experience</b>		
Master 1	104	31%	No	250	74.20%
Master 2	168	50%	Yes	87	25.80%
Other	3	0.90%			

*(missing: 1)*