A CONCEPTUAL FRAMEWORK FOR DIGITAL SIMULATIONS IN STRATEGIC MANAGEMENT EDUCATION

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Abstract. Digital game-based simulations are increasingly being adopted in business education for their interactive, experiential, and low-risk nature in developing strategic management skills. The literature provides evidence that these simulations lead to increased interest, motivation, decision-making, teamwork, and the transfer of theory to practice. However, the field is conceptually disjointed, as many studies report positive outcomes of using simulations without clearly explaining how simulation use contributes to strategic decision-making skills from a pedagogical perspective. In this conceptual paper, we attempt to fill this gap by proposing a framework that considers simulation design and use in digital games as antecedents, student engagement as an intervening mechanism, and strategic decision-making skill development as the primary educational outcome of interest. This study is based on experiential learning and constructivist learning theories, which account for the importance of the four principles of active participation, reflection, feedback, and contextualised problem-solving in effective learning in simulation-based environments. Implementation conditions (e.g. faculty readiness, curriculum alignment, technology, and planned debriefing) are also included as contextual factors that impact the strength of these relationships. The value of the framework to the literature lies in its bringing together themes that have frequently been dealt with in isolation, such as pedagogical mechanisms, processes of engagement, learning outcomes, and institutional conditions. It also has practical significance for teachers and curriculum developers, indicating that the success of digital simulations is not only determined by the quality of the technology, but also by the pedagogical and organizational conditions that allow digital simulations to be used. Finally, this study suggests a framework for future empirical validation in BME settings.

Keywords: *digital game-based simulations, business education, strategic management, student engagement, experiential learning*

Introduction

The advent of the digital age in higher education has brought new pedagogies that have shifted students from passive to active learning, with the aim of building competencies. This has made digital game-based simulation (DGBS) more relevant, as it enables students to engage with realistic business scenarios, experiment with business decisions, and experience the ramifications of their decisions in a safe environment (Faisal et al., 2022; Vij and Sharma, 2018). This is especially pertinent to the teaching and learning of strategic management, where students are required to synthesise, evaluate, cooperate, and adapt to uncertain environments (Martins and Sequeira, 2025; Kaliappen, 2019). There is ample evidence to demonstrate the positive effect of digital simulations on business learning. Research indicates that simulations improve engagement and motivation, conceptual understanding, and teamwork, as well as strategic thinking and decision making (Dermatis et al., 2025; Mohite et al., 2025).

Simulations are also seen as a way to support students' transference from theory to practice within a dynamic and realistic setting (Leigh and Levesque, 2024; Heyworth-Thomas, 2023). Even with these positive results, there is still a disjointedly conceptual literature about how these results are achieved.

One of the main limitations is that most studies focus on the value of simulation use but fail to provide an understanding of how simulation use can lead to strategic decision-making skills. Relevant gaps include the use of self-reported outcomes, limited focus on pedagogical mechanisms that have measurable learning outcomes, and limited consideration of the conditions under which simulations are likely to be most effective (Maningo and Kim, 2025; Faisal et al., 2022; O'Brien, 2021). This indicates that a parsimonious conceptual model is needed that connects simulation use, the engagement process, and strategic learning outcomes. This study fills this void by proposing a conceptual framework for digital game-based simulation in educational strategic management. It assumes that the impact of simulation design and use on skill development in strategic decision-making depends on the level of student involvement and is moderated by implementation conditions, which are included in the model as structural equation paths. In so doing, this study provides a theoretical synthesis and begins to provide a model for future empirical studies and business curriculum development.

Literature review

Digital game-based simulations in business education

Digital game-based simulations are digitally enhanced learning environments that are dynamic and incorporate features of games to emulate business practices and behaviours (Leigh and Levesque, 2024; Blazic et al., 2012). Simulations differ from gamification overlaid on activities, as they provide a richer context for students to make decisions in response to competition, uncertainty, feedback, and changes in the organisation (Bratitsis et al., 2025; Mohite et al., 2025). The difference can be important, as it can make for a more fertile ground where higher order business skills can be more easily nurtured. The evolution of business simulations goes beyond a mere role-play activity to a complex digital representation of strategic, operational, and cross-functional decisions (Reams and Andrienko, 2025; Aichinger et al., 2019). They facilitate strategic analysis, planning, communication, leadership, and ethical reasoning (O'Brien et al., 2025; Brzozowska et al., 2024; Wang, 2023) and are increasingly used in online and blended business education (Rajah and Zhu, 2025).

Student engagement as a central mechanism

This is the most common theme in the study of simulation in the literature. It is usually defined as a multi-dimensional construct consisting of cognitive, behavioural, and affective dimensions (Syynimaa et al., 2024; Hsu and Wu, 2023). All three dimensions can be hit simultaneously using interactive, challenge-rich, and feedback-rich simulation environments. Narrative, competition, real-time feedback, and collaborative problem-solving keep learners engaged in the learning process even when they do not know the answer, which fosters persistence in the face of uncertainty and helps them stay emotionally connected to learning (Calza-Perez et al., 2025; Maningo and Kim, 2025). It was found that digital simulations are always linked with the increase in motivation and engagement when compared to traditional lectures (Mohite

et al., 2025; Salunkhe et al., 2024; O'Brien and Costin, 2023). However, gaining engagement is not a given; it requires instructional design, game mechanics, and facilitation support (Syynimaa et al., 2024; Nahar, 2023). Thus, engagement should be seen as a process that is actively encouraged by the use of simulation tools, rather than as a by-product of their use.

Strategic decision-making skill development

In the field of business education, strategic decision making is a key outcome that involves analysing complex situations, evaluating alternatives, and decision making under conditions of uncertainty (O'Brien, 2021; Aldea et al., 2014). Developing these capabilities is well suited to digital simulations that offer multi-variable, dynamic scenarios with closely coupled actions and consequences (Dermatis et al., 2025; Wang, 2023). Simulation-based learning leads to better education of strategic thinking and managerial judgment compared with traditional learning approaches, especially by performing multiple iterations of decision making supported by constructive feedback (O'Brien and Costin, 2023; Kaliappen, 2019; Vij and Sharma, 2018). The use of simulations also helps develop complementary skills such as teamwork, leadership, and communication (Martins and Sequeira, 2025; Sheikh et al., 2023), further justifying strategic decision-making as an appropriate focus outcome for this framework.

Implementation conditions

Implementation conditions, such as faculty readiness, curriculum alignment, technology, induction quality, and structured debriefing, are critical to the effectiveness of simulation-based learning (Dermatis et al., 2025; Mohite et al., 2025; Reams and Andrienko, 2025). These conditions are what will make the difference between pedagogically integrated or isolated use of simulations. The cited difficulties include the costs of the program and technical challenges, as well as a lack of digital literacy and institutional readiness (Reams and Andrienko, 2025; Rajah and Zhu, 2025; Chandwaskar and Jape, 2024), highlighting the importance of including implementation conditions as part of any conceptual framework for effective simulation.

Theoretical foundation

In this study, experiential learning theory and constructivist learning theory were used as theoretical bases. Digital simulations, as a learning method, provide the learner with a four-stage cycle of concrete experience, reflective observation, abstract conceptualisation, and action experimentation, similar to how managerial scenarios are presented, immediate results are generated, and opportunities are provided for reflection and subsequent adaptation of decisions (O'Brien, 2021, Vij and Sharma, 2018). This process is relevant to strategic management education, which is done not for memorisation but for strengthening learning through judgment. This is complemented by the constructivist theory of learning, which states that students learn by creating knowledge through meaningful engagement with contextualised tasks. This constructivist process is embodied in simulations where the students are required to interpret scenarios, manage uncertainty, cooperate together, and develop responses without correct answers (Bratitsis et al., 2025; Heyworth-Thomas, 2023). These theories indicate that the effectiveness of simulations is greatest when they involve a high level of engagement, reflection, and active problem-solving.

Conceptual review approach

This study is a conceptual paper and thus does not report empirical data. The sources were selected by conducting a search based on key terms such as 'digital simulation', 'business simulation game', 'student engagement', and 'strategic decision-making' in business education, management learning, and educational technology journals, mainly from 2018 to 2025. The selection of studies was based on the inclusion of higher education business context, strategic learning outcomes, engagement mechanisms, and simulation design and implementation conditions. The selected studies were grouped into the four constructs outlined in Table 1, and the recurring relationships among the themes led to the development of the propositions outlined in the subsequent sections. This narrative synthesis approach is fitting for conceptual papers that aim to bring together disconnected ideas into a single model, but not to test hypotheses empirically (Faisal et al., 2022).

Proposed conceptual framework

Within the proposed framework, digital game-based simulation design and use are considered as antecedents, the engagement of students is the mechanism, while strategic decision-making skill development is the key outcome. Implementation conditions are contextual moderators that influence the strength of the pathway from simulation use to engagement and from engagement to skill development. Simulation design and use include how interactive, realistic, immersive, feedback-rich, and aligned with business learning tasks the simulation activities are (Leigh and Levesque, 2024; Blazic et al., 2012). Student engagement is considered in multi-dimensional aspects as it is consistently associated with effective learning through simulation (Syynimaa et al., 2024; Hsu and Wu, 2023) and includes cognitive, behavioural, and affective aspects. Strategic decision-making skill development is the development of analysis, judgment, planning, and action under uncertainty (O'Brien, 2021; Aldea et al., 2014). Implementation conditions, including faculty training, curriculum integration, technology, learner support, and structured debriefing, are not outcomes as they affect whether the pedagogical potential of the simulations is realised in practice (Dermatis et al., 2025; Mohite et al., 2025; Reams and Andrienko, 2025). Therefore, the framework illustrates the effectiveness of simulation as a pedagogically mediated process, not a direct effect of technology, and is reliant on institutional support.

The proposed framework includes four critical areas that are often found in the literature on digital game-based simulations in business education: simulation design and application, student engagement, development of strategic decision-making skills, and implementation conditions. These constructs were selected because they defined the effectiveness of simulations in strategic management training as the core themes around which engagement, skill development, and challenges of implementation were most frequently reported by the reviewed studies regarding this phenomenon. *Table 1* summarises the main constructs underpinning the proposed framework and the associated literature. The framework adopted to describe simulation-based learning as a pedagogically mediated process and not simply a technology intervention is presented in *Table 1*. While digital game-based simulation design and use serve as the starting point for instruction, it is contingent upon whether the simulation results in meaningful student engagement at the cognitive, behavioural, and affective levels. This interaction,

in turn, should enhance the development of strategic decision-making skills, and the conditions for implementation determine the degree of fullness in the educational gains of simulations that can be realised in practice.

Table 1. *Core constructs of the proposed conceptual framework.*

Construct	Conceptual Definition	Key Dimensions	Representative Literature
Digital game-based simulation design and use	Interactive technology-enhanced learning environments that simulate real-world business challenges through game mechanics, applied decision-making, and feedback processes.	Interactivity, realism, challenge, feedback, immersion, alignment with business tasks.	Blazic et al. (2012); Leigh and Levesque (2024); Faisal et al. (2022).
Student engagement	The extent of students' cognitive, behavioral, and affective involvement in simulation-based learning activities.	Cognitive engagement, behavioral participation, affective involvement.	Hsu and Wu (2023); Syynimaa et al. (2024); Mohite et al. (2025).
Strategic decision-making skill development	The development of learners' ability to analyse alternatives, exercise judgment, plan strategically, and act under uncertainty in managerial contexts.	Analysis, judgment, planning, problem-solving, and strategic action.	O'Brien (2021), Wang (2023), Martins, and Sequeira (2025).
Implementation conditions	Contextual and institutional factors influencing the effective integration and sustainability of simulation-based learning in business education.	Faculty readiness, curriculum alignment, technological infrastructure, learner support, and structured debriefing.	Dermatis et al. (2025); Reams and Andrienko (2025); Rajah and Zhu (2025).

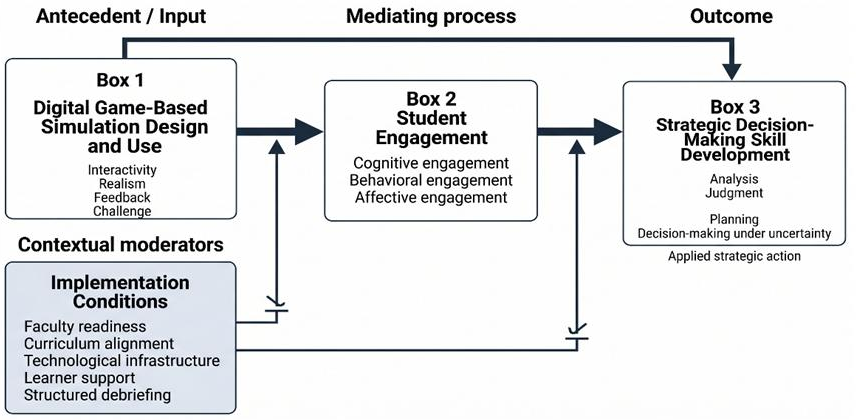


Figure 1. *A conceptual framework for digital game-based simulation in strategic management education.*

Propositions

Given the above synthesis of the literature and theoretical foundation, the following propositions are offered: (P1): The design and use of digital game-based simulations positively impact student engagement in business contexts; (P2): Students ' involvement in business education positively impacts the development of strategic decision-making skills; (P3): The application of digital game-based simulations in design and use positively impacts the development of strategic decision-making skills in students, both directly and indirectly, by engaging them; (P4): The relationship between the use of simulation and students' engagement is moderated by implementation conditions, such as faculty readiness, curriculum alignment, technological infrastructure, and support for learners; (P5): Developing students' strategic decision-making skills is linked to their engagement through structured reflection and debriefing.

Results and Discussion

The proposed framework contributes to the literature in three ways. First, it makes a direct contribution to the need for a holistic modelling of pedagogical mechanisms to measurable learning outcomes in business education through simulation (Leigh and Levesque, 2024; Faisal et al., 2022). Engagement, skills, and implementation are not separate themes but are considered interrelated themes in the framework. Second, the framework explains the mediation of student engagement. This is relevant because engagement is a human phenomenon and is often described in the literature as being beneficial; however, there is little description of how it can support learning. The framework sets the connection between simulation design and strategic skill development to better describe the pedagogical mechanism of simulation-based learning (Maningo and Kim, 2025; Hsu and Wu, 2023). Thirdly, there is greater emphasis on the context and the importance of the conditions for implementation. While this is not a negativity bias toward technology, it does recognise that even the best simulations can fall short when faculty are not ready, infrastructure is subpar, and/or curricular integration is poor (Dermatis et al., 2025; Reams and Andrienko, 2025). What this translates to for business schools is clear: Simulation, in order to be successful, cannot be divorced from instructional design and institutional support, just as much as it cannot be divorced from the quality of the simulation software.

Implications for business education

The framework has implications for three groups of stakeholders. Numerous scholars and practitioners (O'Brien, 2021; Aichinger et al., 2019) have argued for incorporating simulation-based learning into strategic management curricula, making it a part of the curriculum instead of an add-on. Instructors should design to engage, by choosing or modifying simulation activities to focus on feeding back, collaborating, reflecting, and decision pressure instead of novelty or entertainment, as these are how simulation features are connected to strategic learning gains. Faculty preparation and technological infrastructure are both identified as necessary for effective implementation and need to be invested in by institutions, especially in the context of online and blended learning (Mohite et al., 2025; Rajah and Zhu, 2025). Even the best technically designed simulation will be of limited learning value if facilitators do not have the skills to scaffold, facilitate, and debrief the simulation.

Conclusion

Digital game-based simulations have the potential to enhance strategic management education by allowing active learning, problem-solving in context, and decision-making in action. However, the literature is vague in identifying how these environments develop strategic skills. This paper attempts to fill that gap by proposing a framework in which digital game-based simulation design and use affect strategic decision-making skill development via student engagement, as moderated by implementation conditions. The framework brings together previously separate themes in a unified model and sets out a vision and research plan for future empirical testing. It provides business educators with guidelines to create more successful simulation-based learning experiences and a testable model for validation and use in a variety of institutional and cultural environments for researchers.

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Conflict of interest

The authors confirm that there is no conflicts of interest involve with any parties in this research study.

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