

Learning Through Consequence: Entrepreneurial Learning in a Games-based Simulation

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Abstract: Games-based learning is increasingly embedded within entrepreneurship education; however, limited empirical attention has been given to how business simulations support entrepreneurial learning. This study examines how a business simulation operates as a learning environment in which students learn through the consequences of their decisions. A primarily quantitative, cross-sectional survey design was adopted, with a limited qualitative element provided by open-ended questions. Survey data were collected from 33 postgraduate students participating in an 18-credit business analytics simulation module using SimVenture Evolution. Most attitudinal and evaluative items used five-point response scales. Measures captured perceptions of realism, decision-making confidence, preparedness for entrepreneurial challenges, risk orientation, and mindset development, while six substantive open-ended responses provided contextual insight into decision-making and feedback. Findings indicate that students perceived the simulation as a realistic and immersive entrepreneurial environment supporting experimentation and iterative decision-making. Students reported increased confidence under uncertainty and greater awareness of risk, trade-offs, and strategic consequences. A central feature associated with perceived learning was the ability to observe and respond to decision outcomes over multiple simulated periods, enabling reflection and adaptation. One open-ended response illustrated how the absence of real-world risk could support experimentation. The findings suggest that entrepreneurial learning in business simulations may be supported by consequence-based feedback and iterative decision cycles. The study proposes the “learning through consequence loop” as an evidence-informed interpretation of how decision, consequence, feedback, reflection, and adaptation may interact in the development of decision-making capability. Given the post-only, self-reported design, the model is presented for further testing rather than as a demonstrated causal mechanism.

Keywords: Games-based learning, Business simulation, Entrepreneurial decision-making, Experiential learning, Learning through consequence

1. Introduction

Within entrepreneurship education, business simulations are increasingly used to provide students with opportunities for experiential learning through games-based learning (GBL). Games-based learning has become an established feature of contemporary entrepreneurship education in higher education, enabling students to test ideas, make decisions, and observe outcomes in a controlled and simulated entrepreneurial environment (O'Brien and Costin, 2023). Despite their growing adoption, there remains limited empirical understanding of how such simulations support entrepreneurial learning, particularly from the perspective of the learner. Much of the existing literature reports outcomes such as engagement, motivation, satisfaction, skill development, and performance (Connolly et al, 2012; Plass, Homer and Kinzer, 2015; Faisal et al, 2022; Casau et al, 2023). While these outcomes provide useful insight into student experience, they do not fully explain how students connect decisions with consequences or develop the capacity to act under uncertainty—an essential feature of entrepreneurial practice. There is therefore a need to move beyond outcome-based evaluations and examine the processes through which simulation-based environments may support entrepreneurial learning and decision-making under uncertainty (Bagheri et al, 2020).

This study addresses this gap by examining how a games-based business simulation functions as a learning environment in which students learn through the consequences of their decisions. Drawing on survey data from postgraduate business analytics students participating in the SimVenture Evolution simulation, the study explores how students experience decision-making, feedback, and reflection within the simulation environment. In doing so, it provides a more nuanced understanding of how games-based learning supports entrepreneurial learning and decision-making.

This study makes two contributions. Firstly, it provides descriptive evidence that students associated entrepreneurial learning within a business simulation with consequence-based feedback and iterative decision cycles. Secondly, it introduces the “learning through consequence loop” as an evidence-informed interpretation of how simulation-based learning may support entrepreneurial decision-making under uncertainty. By focusing on perceived learning processes rather than outcomes alone, the study contributes to a more nuanced

understanding of simulation-based entrepreneurial learning. The loop is proposed for further empirical testing rather than presented as proof of a causal mechanism.

2. Literature Review

2.1 Entrepreneurial Learning Through Experiential Learning

Entrepreneurial learning is an ongoing process through which students develop the knowledge, skills and mindset required to recognise opportunities, act on them, and create value in uncertain business environments (Politis, 2005). Traditional models of entrepreneurship education and learning often centre on linear business planning and theoretical knowledge, but have been criticised for failing to capture the uncertainty, complexity, and iterative nature of entrepreneurial practice (Hameed and Irfan, 2019; Solvoll and Haneberg, 2022). As a result, entrepreneurship education has increasingly shifted towards experiential approaches, reflecting the recognition that entrepreneurial learning develops through action rather than passive learning (Neck and Greene, 2011). Students engage in activities, experiment, reflect on outcomes, and adjust their strategies (Cope, 2005; Neck et al, 2014; Hägg and Kurczewska, 2020). Decision-making is central to entrepreneurial learning because entrepreneurs make strategic choices with limited resources and incomplete information. Cycles of action, feedback and reflection may strengthen confidence and capability in uncertain environments (Kolb, 1984; Cope, 2005).

Within this context, simulations offer a valuable pedagogical tool, allowing students to gain experience and engage safely with uncertain business environments while avoiding the financial and reputational risks associated with real-world ventures (Bellotti et al, 2013). Recent research supports the growing integration of games-based and simulation-based approaches within entrepreneurship education. Systematic reviews indicate that such approaches can support opportunity recognition, problem-solving, decision-making, and other entrepreneurial learning outcomes (Soares et al, 2024; Casau et al, 2023). Much of the research, however, continues to focus on outcomes rather than processes. There remains insufficient understanding of how learners engage with simulation environments and how these interactions contribute to entrepreneurial learning (Pacheco-Velazquez et al, 2024), which is the focus of this paper.

2.2 Entrepreneurial Learning Through Consequence and Iterative Decision-Making

Entrepreneurial learning is a dynamic experiential process through which students develop cognitive, behavioural and emotional capabilities (Politis, 2005). This learning emerges through action, experimentation and reflection, aligning with experiential learning theory (Kolb, 1984). Repeated cycles of trial, error, feedback, and adaptation may strengthen students' confidence and decision-making capability. Simulations facilitate this process through consequence-based feedback, whereby student decisions produce observable outcomes within the simulated environment. This contrasts with more traditional instruction, where feedback may be delayed or disconnected from action. Immediate and context-specific feedback is widely recognised as important to effective learning, particularly in complex and dynamic settings (Hattie and Timperley, 2007).

In simulation environments, feedback is embedded within iterative decision cycles. Students make decisions, observe outcomes, reflect, and adjust their strategies accordingly, creating a continuous loop of action, feedback, and adaptation. This aligns with experiential and organisational learning theories, which emphasise feedback and reflection in developing expertise (Kolb, 1984; Argyris and Schön, 1978). Recent research highlights feedback, iteration, and learner agency as key design features supporting deeper learning in games-based environments (Ding and Yu, 2024; Lai and Hu, 2025). Repeated decision cycles allow learners to test assumptions, explore strategies, and refine their understanding over time.

This process is particularly relevant for entrepreneurial learning, where decision-making involves navigating uncertainty, evaluating trade-offs, and responding to evolving conditions (Sarasvathy, 2001; Fisher, 2012; McMullen and Dimov, 2013). Despite this, there remains limited empirical understanding of how students experience consequence-based feedback within games-based learning (GBL) business simulations. This study addresses this gap by examining how students engage with iterative decision-making and feedback, and how these processes support entrepreneurial learning.

2.3 Games-based Learning and Simulation

Games-based learning (GBL) refers to the use of game elements or game environments to support learning through active engagement, interaction, and feedback (Plass, Homer and Kinzer, 2015). Within higher education, simulations represent a prominent form of GBL, particularly in business, management, and entrepreneurship education, where they are used to replicate complex organisational and entrepreneurial environments and

decision-making contexts (Lean et al, 2006; Faisal et al, 2022; Ding and Yu, 2024; Lee and Yu, 2025; O'Brien et al, 2025).

Business simulations enable learners to engage with dynamic and interactive scenarios that require strategic thinking, problem-solving, and decision-making. Unlike traditional teaching approaches, which often rely on static case studies or theoretical instruction, simulations place learners in environments where decisions have consequences that unfold over time (Salas et al, 2009). This temporal and interactive structure aligns closely with experiential learning theory, which conceptualises learning as a cyclical process involving experience, reflection, and adaptation (Kolb, 1984).

While early research on games-based learning emphasised engagement and motivation, more recent work has shifted towards understanding the development of higher-order cognitive skills. Research indicates that game-based approaches can support problem-solving, collaboration, and decision-making, particularly when learning activities are embedded within authentic and interactive environments (Casau et al, 2023). In business education specifically, emerging evidence suggests that simulation-based learning environments can enhance decision-making capabilities by enabling learners to engage with complex systems and observe the consequences of strategic choices over time (Lee and Yu, 2025).

At the same time, recent research has begun to emphasise the importance of simulation design, particularly the role of feedback, interactivity, and system complexity in shaping learning outcomes (Faisal et al, 2022). This suggests that the effectiveness of simulations is not inherent, but contingent on how learning experiences are structured. Consequently, there is a growing need to move beyond evaluating whether simulations “work” and instead examine how specific design features support learning processes.

3. Teaching Context

The study was conducted within a postgraduate business programme at an Irish university. The simulation was embedded within an 18-credit business analytics module designed to develop students' entrepreneurial learning and decision-making capability in complex and uncertain business environments. Participants came from diverse academic backgrounds, including business, computing, and engineering, and their prior exposure to entrepreneurial decision-making varied.

The module adopts an experiential learning approach, with the SimVenture Evolution simulation as a central component. Students manage a virtual business over multiple simulated periods, making decisions across key functional areas including pricing, marketing, operations, and finance. The simulation is designed to reflect the interdependencies and uncertainties characteristic of real-world entrepreneurial business environments. Importantly, the simulation is positioned not solely as an assessment tool, but as a learning environment that supports experimentation, iteration, and learning through the consequences of decisions.

4. Methodology

4.1 Research Design

This study adopts a primarily quantitative, cross-sectional survey design with a limited qualitative element to examine students' perceptions of entrepreneurial learning within a business simulation. Quantitative items provide the principal evidence, while optional open-ended responses contextualise how some respondents described decision-making, feedback, and reflection. The study is not presented as a full mixed-methods design because the qualitative component was limited and was not intended to provide an independently developed or saturated qualitative analysis.

A survey-based design was selected to capture students' subjective perceptions of confidence, preparedness, and decision-making under uncertainty. Self-reported data do not provide direct measures of learning performance, but offer insight into how learners interpret their simulation experiences. Accordingly, the analysis identifies descriptive patterns in reported perceptions and does not test the causal effects of the simulation.

4.2 Participants

A total of 33 postgraduate students completed the questionnaire and were included in the analysis. Participants had diverse academic backgrounds, including business, computing, and engineering, with varying levels of prior work experience. The cohort included students with prior full-time work experience (57.6%), internship or placement experience (21.2%), and limited or no prior experience (21.2%). This diversity provides a relevant context for examining how learners with different backgrounds engage with simulation-based decision-making.

4.3 The Simulation Environment

The simulation used in this study, *SimVenture Evolution*, is a computer-based business simulation that requires students to manage a virtual enterprise over multiple simulated periods.

A defining feature of the simulation is its temporal and iterative structure, in which decisions made in one period influence outcomes in subsequent periods. This creates a dynamic environment characterised by interdependencies, uncertainty, and consequences. Students receive continuous feedback in the form of financial results, market responses, and operational performance indicators, enabling them to evaluate, reflect, and adjust their strategies over time.

The simulation was integrated as a central learning activity over several weeks. Importantly, the simulation was positioned not only as an assessment tool, but as a learning environment that encourages experimentation, iteration, and reflection.

4.4 Data Collection

Data were collected through a structured online questionnaire administered following completion of the module, ensuring participants had sufficient exposure to reflect on their learning experiences.

Most attitudinal and evaluative items used five-point response scales. Agreement items ranged from “strongly disagree” (1) to “strongly agree” (5), while perceived-change items ranged from “significantly worsened” (1) to “significantly improved” (5). Realism and overall experience used corresponding five-category verbal anchors appropriate to each question, while recommendation used “yes”, “maybe”, and “no”. Five categories were selected for the principal scales to retain a neutral midpoint and provide sufficient differentiation without unnecessary response burden; research on agree–disagree scales also supports five rather than seven or eleven categories when this format is used (Revilla, Saris and Krosnick, 2014). Items captured simulation realism, engagement, decision-making confidence, preparedness, risk orientation, and entrepreneurial mindset development.

Open-ended questions explored decision-making processes, perceived benefits, and key challenges. Six respondents provided substantive comments. These supplied a limited qualitative element and were used to contextualise quantitative patterns, not to infer prevalence, representativeness, or thematic saturation.

4.5 Data Analysis

Quantitative data were analysed using descriptive statistics, including frequencies and percentages. Given the exploratory nature of the study and the relatively small sample, the analysis identified dominant trends rather than conducting inferential tests. Positive-response percentages combine the two favourable categories relevant to each item, such as “agree” and “strongly agree” or “improved” and “significantly improved”.

The six substantive open-ended responses were reviewed descriptively using principles of thematic analysis (Braun and Clarke, 2006). Comments were coded for recurring ideas relating to decision-making, feedback, mistakes, and strategy adaptation. Given their small number and limited depth, they are treated as illustrative contextual material rather than a standalone qualitative dataset. The quotations in Sections 5.6 and 5.7 illustrate individual accounts and are not presented as representative of the cohort.

5. Findings

5.1 Cohort Profile and Baseline Orientation

The cohort demonstrated a relatively high level of prior professional exposure, with a majority reporting full-time work experience (57.6%) and a further 21.2% having completed internships or placements. Students also exhibited a strong baseline interest in entrepreneurship. A total of 90.9% reported high or very high interest in developing an entrepreneurial mindset, while 97.0% agreed or strongly agreed that such a mindset is beneficial for all graduates. Participants therefore entered the simulation with a broadly positive orientation towards entrepreneurship. This favourable baseline may have contributed to positive evaluations and is important when interpreting subsequent findings.

5.2 Perceived Quality and Realism of the Simulation

Students reported highly positive perceptions of the simulation experience overall. A total of 63.6% rated their experience as “excellent”, with a further 30.3% rating it as “good”. Only 6.1% rated the experience as “fair”, with

no negative responses. These figures describe student evaluations and should not, by themselves, be interpreted as objective evidence of learning effectiveness.

Perceived realism was also high, with 84.8% indicating that the simulation scenarios were “very” or “somewhat” realistic. This suggests that participants perceived the environment as credible and representative of real-world business decision-making contexts, although perceived realism does not itself establish learning gain.

5.3 Development of Decision-making Confidence

A prominent pattern relates to students’ confidence in making business decisions. A total of 93.9% reported that their confidence had improved or significantly improved following the simulation, with 36.4% indicating significant improvement. Students therefore associated the simulation with greater confidence in navigating uncertainty. Without a pre-simulation measure or comparison group, however, the magnitude of actual improvement cannot be established.

5.4 Preparedness and Entrepreneurial Orientation

Students also reported increased preparedness to approach challenges from an entrepreneurial perspective. A total of 87.9% agreed or strongly agreed that the simulation helped them feel more prepared to address entrepreneurial challenges. Similarly, 87.9% indicated that they were likely or very likely to apply an entrepreneurial mindset in their future careers. These responses suggest perceived relevance beyond the simulation, although stated intention should not be equated with subsequent behaviour.

5.5 Risk Awareness and Opportunity Orientation

The simulation also appeared to be associated with reported attitudes towards risk. A total of 81.8% agreed or strongly agreed that they were more open to taking risks and exploring opportunities following the simulation. The results suggest a perceived shift towards a more exploratory orientation, but represent self-reported perceptions rather than evidence of behavioural change.

Table 1 summarises key quantitative indicators of perceived simulation outcomes.

Table 1: Key Quantitative Indicators of Perceived Simulation Outcomes

Indicator	% Positive Response	Supporting Interpretation
Decision-making confidence	93.9%	Reported increased confidence under uncertainty
Preparedness for entrepreneurial challenges	87.9%	Reported improved readiness to address complex problems
Openness to risk-taking	81.8%	Reported greater willingness to experiment and explore opportunities
Understanding the importance of entrepreneurial mindset	87.9%	Reported enhanced understanding of its importance
Simulation realism	84.8%	Perceived as reflective of real-world decision contexts
Overall recommendation	97.0%	Strong endorsement of perceived value

5.6 Learning Through Consequence: Iteration, Feedback, and Integrated Decision-Making

A central interpretation concerns consequence-based feedback as a possible learning mechanism. Quantitative responses indicated that 87.9% believed the simulation enhanced their understanding of the importance of an entrepreneurial mindset. Within the six substantive open-ended responses, individual comments also referred to observing outcomes and reconsidering later decisions. One respondent noted, “you could see exactly how your decisions played out over time, which made you think more carefully about your next move.” This quotation illustrates one account and is not evidence that the view was shared across the cohort.

The limited comments were consistent with the simulation’s iterative structure, in which decisions in one period influenced later outcomes. Learners could test strategies, observe consequences, and refine their approach. The evidence therefore supports a cautious interpretation that some students associated learning with cycles of action, feedback, and adaptation; it does not establish the prevalence of this view or demonstrate that iteration independently caused learning.

Students’ accounts also referred to the interdependence of decisions across functional areas and the need to adapt to evolving outcomes. This is consistent with learning emerging not from isolated decisions alone, but

from seeing how choices interact within a dynamic system. It remains an interpretation of self-reported experience rather than an objective measure of integrated capability.

5.7 Simulation as a Safe Space for Experimentation

The open-ended responses also included an individual account of the simulation as a safe learning environment. One participant reflected that “you could make mistakes without real consequences, which made it easier to try different strategies and learn from them.” This is an illustrative example from the six substantive comments, not a standalone theme or evidence of how commonly the view was held.

The account is consistent with the quantitative finding that 81.8% reported greater openness to risks and opportunities. By removing direct financial and reputational consequences, the simulation may enable experimentation and engagement with uncertainty. Nevertheless, the post-only design cannot establish that safe failure caused the reported changes in confidence or risk orientation.

5.8 Overall Value and Recommendation

The overall perceived value of the simulation was very high. A total of 97.0% indicated that they would recommend it to others, with only one respondent selecting “maybe” and none selecting “no”. This shows strong perceived value, but should not be treated as confirmation of educational effectiveness.

Overall, the quantitative patterns and limited qualitative comments suggest that students associated learning with iterative decision cycles in which actions produced observable outcomes. This interpretation highlights feedback and iteration as potentially important design features, while recognising that the study does not test their independent effects.

6. Discussion

The findings provide insight into how students perceived entrepreneurial learning within a business simulation. Respondents reported positive perceptions of realism, confidence, preparedness, risk orientation, and entrepreneurial mindset development. Limited qualitative comments describing the observation of decision outcomes and reconsideration of later choices are consistent with experiential learning theory (Kolb, 1984). However, these findings represent self-reported perceptions and support a cautious conceptual interpretation rather than objective or causal claims.

The findings suggest that iteration may be central to this process. Repeated decision cycles allowed earlier choices to shape later outcomes, potentially enabling learners to refine strategies, recognise patterns, and develop a more nuanced understanding of business dynamics. This is conceptualised as a learning through consequence loop, in which decision, consequence, feedback, reflection, and adaptation interact iteratively. The model is an evidence-informed proposition derived from perceived experience and requires further empirical testing; it is not a demonstrated causal model. Figure 1 conceptualises this iterative cycle, illustrating how learners make decisions, observe consequences, interpret feedback, and adapt strategies over time. While experiential learning models describe learning as cyclical, this conceptualisation emphasises the explicit role of consequence visibility and temporal feedback in shaping decision-making capability.



Figure 1: Learning Through Consequence Loop in Simulation-Based Entrepreneurial Learning

The findings also identify uncertainty, safe experimentation, and functional interdependence as potentially important features of the learning environment. Students reported increased confidence when making decisions with incomplete information, while one response illustrated how the absence of real-world financial and reputational consequences enabled experimentation and learning from mistakes. Students also perceived learning as integrative, requiring consideration of trade-offs across strategy, finance, operations, and marketing. These interpretations remain tentative and require confirmation through stronger qualitative and performance-based evidence.

From a games-based learning perspective, the study shifts attention from engagement as an outcome towards the processes that may accompany learning. Prior reviews identify engagement, motivation, satisfaction, perceived usefulness, and performance as common benefits or outcomes of games and simulations (Connolly et al, 2012; Plass, Homer and Kinzer, 2015; Faisal et al, 2022; Casau et al, 2023). While educationally relevant, engagement alone is not evidence that learning has occurred. The present findings suggest that repeated decisions, visible consequences, feedback, and opportunities to adapt were associated with students' perceptions of learning. They do not demonstrate that these features independently produced decision-making capability, but provide a basis for further testing. Students may learn not simply by doing, but by seeing what happens, reflecting, and adapting subsequent decisions.

6.1 Pedagogical Implications

The findings have several implications for educators designing simulation-based learning experiences. Firstly, simulations should be structured to emphasise clear and meaningful consequences of decisions. If learners cannot easily connect actions to outcomes, the potential for learning is reduced. Secondly, simulations should allow for multiple iterative cycles, enabling students to refine their decision-making over time. One-off simulation exercises may not provide sufficient depth for meaningful learning. Thirdly, educators should explicitly encourage reflection on decision outcomes. While the simulation provides the experience, learning is enhanced when students are guided to reflect on why particular outcomes occurred and how strategies might be improved. Finally, the role of safe failure should be recognised and supported. Educators should position simulations as spaces for experimentation, where mistakes are viewed as opportunities for learning rather than as failures to be avoided.

6.2 Limitations and Future Research

Several limitations should be acknowledged. The study uses post-simulation self-reports, which capture perceptions rather than objective learning. No pre-simulation measure or comparison group was included, so reported changes cannot be attributed to the simulation. The study is also vulnerable to positive-response, expectancy, and social-desirability bias: the module was designed and delivered by members of the research team, the survey followed completion of the activity, participants had a strongly positive baseline orientation towards entrepreneurship, and participation was voluntary. These conditions may have encouraged favourable evaluations or attracted particularly positive respondents. Anonymous collection reduced, but could not eliminate, this risk.

The qualitative element was also limited. Only six respondents provided substantive open-ended comments, and the two quotations are illustrative rather than representative evidence or independently established themes. The study further concerns one simulation and one postgraduate cohort within a single institution. Its findings may be relevant to similar contexts, but should not be assumed to generalise across simulations, institutions, disciplines, or learner populations.

Future research should triangulate student perceptions with pre-post measures, performance data, comparison groups, interviews, or focus groups. It could also examine how variations in feedback, complexity, facilitation, and competition influence decision-making, and whether perceived learning translates into sustained behavioural change.

7. Conclusion

This study examined how business simulations may support entrepreneurial learning within a games-based learning context. Postgraduate students perceived the simulation as more than an engaging experience; they associated learning with seeing the consequences of decisions across repeated simulated periods. Consequence-based feedback and iterative decision cycles emerged as features associated with perceived learning. Students reported greater confidence, awareness of risk and trade-offs, and preparedness for entrepreneurial challenges,

while a limited number of comments illustrated connections between experimentation, mistakes, reflection, and adaptation. These findings represent reported perceptions rather than objective evidence of learning gain.

By focusing on learning processes rather than outcomes alone, the study proposes that structured feedback loops and iterative decision cycles may help explain how students experience learning in business simulations. The “learning through consequence loop” is offered as an evidence-informed conceptual proposition underpinning entrepreneurial decision-making development. Stronger quantitative and qualitative designs are required to test the model and its causal assumptions.

For educators, the findings underscore the importance of designing simulation-based learning experiences that emphasise consequence, iteration, and reflection. When designed effectively, business simulations may support meaningful learning and help prepare students to navigate the complexities of real-world decision-making in entrepreneurial contexts.

Ethics Declaration: This study involved human participants, and formal ethical approval was obtained from the university's ethics committee prior to data collection. All participants were informed of the purpose of the study and provided informed consent in accordance with institutional ethical guidelines. Participation was voluntary, and all responses were collected anonymously to ensure confidentiality.

AI Declaration: Artificial intelligence tools were used during the preparation of this manuscript to support proofreading, language refinement, and clarification of ideas. All intellectual contributions, critical analysis, and final decisions regarding the content were made by the authors.

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