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Simulating Entrepreneurship: Developing Entrepreneurial Human Capital through Online Simulations

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Abstract:

This case study explores how online simulations can act as innovative pedagogical tools for developing entrepreneurial competencies and human capital among international business students in a UK university. It also examines how simulation-based learning supports students' sense-making and emerging entrepreneurial identities as part of competency development. Drawing on Human Capital Theory and a constructivist, abductive research approach, the study examines the extent to which the gamified platform SimVenture supports both action-oriented and growth-oriented competencies within entrepreneurship education. Qualitative data were collected through focus groups and thematically analysed in NVivo, using coding frequency analysis to identify patterns in competency development, and to capture students' reflections on their learning, sense-making, and competency development within the simulation.

Findings indicate that SimVenture effectively supports the development of action-oriented competencies such as teamwork, risk-taking, self-efficacy, problem-solving, and planning. In contrast, growth-oriented competencies including creativity, persuasion, and networking were less evident, suggesting these require longer-term engagement and reflection beyond the immediate simulation experience. The study highlights the differential impact of simulations on entrepreneurial competency development and demonstrates how gamified, experiential tools can foster both skill acquisition and identity formation.

These findings underscore the pedagogical value of integrating digital simulations with approaches that promote reflective and sustainability-oriented entrepreneurial learning. For educators, the research offers practical insights into designing blended learning experiences that combine simulations with reflective and network-building activities to cultivate a broader range of entrepreneurial competencies. While the study is limited by its single case design and small cohort size, it provides a foundation for future longitudinal and cross-context research exploring the role of gamified simulations in fostering entrepreneurial learning and human capital development.

Introduction

Entrepreneurship education (EE) increasingly incorporates experiential learning tools to develop students' entrepreneurial competencies and prepare them for dynamic business environments. Among these, online simulation platforms, often designed with gamified features, replicate the challenges of entrepreneurial decision-making in interactive ways (Bellotti et al., 2013; Landers et al., 2019). By combining active participation with feedback-driven learning, simulations such as SimVenture are positioned as promising yet underexplored methods in Higher Education.

While existing research highlights how simulations can support skill development in areas such as finance, marketing, and decision-making (Smith & Jensen, 2015; Williams, 2015; Smiderle et al., 2020), less is known about how students reflect on, make sense of, and form identities around their entrepreneurial competencies during and after such experiences (Isabelle, 2025). This presents a conceptual gap; prior work tends to catalogue *what* skills students gain, but pays limited attention to *how* learners interpret these competencies, integrate them into their sense of self, and understand their role in value creation.

This case study addresses this gap by exploring how a cohort of international MBA students at a UK Higher Education Institution (HEI) engaged with the online simulation game SimVenture. Drawing on Human Capital Theory and Experiential Learning Theory, it investigates not only the development of entrepreneurial behaviours and competencies, but also the interpretive processes of sense-making and identity construction that accompany gamified learning. Based on these conceptual considerations, the study is guided by the Research Question: Does the use of the online simulation game SimVenture enhance users' understanding of their own entrepreneurial competencies?

This study contributes to pedagogical innovation in entrepreneurship education by integrating digital simulation into reflective, experiential learning design. By framing online simulation as both a technological and pedagogical innovation, it situates simulation-based entrepreneurship learning within the broader movement toward digitally mediated, competence-based education.

Empirical data was collected through focus groups and analysed thematically using a constructivist, abductive approach. This design allows the case study paper to surface collective interpretations, social dynamics, and reflective insights on how students connect simulation-based learning to their entrepreneurial development. The analysis identifies two clusters of learning outcomes: foundational behaviours (such as self-efficacy, planning, and risk-taking) and growth-oriented competencies (including creativity, persuasion, and networking). Building on these themes, the discussion highlights how students not only acquire competencies but also make sense of them in ways that shape their entrepreneurial identities and understanding of value creation.

This case study paper begins by reviewing key concepts in experiential learning, gamification, and entrepreneurial competency frameworks. It then presents the empirical findings, before discussing their implications for the development of entrepreneurial human capital, and for the role of simulations in entrepreneurship education.

Background

SimVenture

SimVenture is a business simulation game. It was inspired by the use of gamification in other sectors, namely aviation and healthcare, and allows users to start, manage and build a virtual company. It is designed to enhance business and employability skills, and is used in education and workplace settings (SimVenture, 2025). In a study in 2015, Williams evaluated the impact of SimVenture on the development of entrepreneurial skills (Williams, 2015). In this study, Williams notes that SimVenture aims to enhance the business and entrepreneurial thinking by providing a business context in a virtual environment, allowing students from different disciplines to collaborate and network, developing project management skills, time management skills, interpersonal skills and finance skills. SimVenture also allows fluidity of approach on the part of the educator, where the educator can adopt the role of facilitator in the learning experience, thus enabling the students to be responsible for their own motivation. In a study evaluating the impact of business simulations in enterprise education, Williams (2011, p. 3) notes:

> SimVenture requires users, working as individuals or teams, to make decisions and deal with consequences in a simple to understand and coherent manner. The game has multiple difficulty levels which ensure that students are continuously challenged at a level which suits their ability. This depth of problem solving combined with the richness of information contained within SimVenture means students must deal with a breadth of issues but can monitor and evaluate their own progress at all times.

Learning through Doing Approach

Experiential Learning Theory (ELT) (Kolb, 1984; Kolb et al., 2001) positions learning as a continuous process in which knowledge emerges through the transformation of experience. Learners cycle between concrete experience, reflective observation, abstract conceptualisation, and active experimentation. This framework emphasises that understanding develops when individuals actively engage with tasks, reflect on outcomes, conceptualise insights, and re-apply them in new contexts. Learning styles vary according to educational background, professional experience, and personal preferences, shaping how individuals move through these stages.

Building on Kolb's model, McCarthy (2010) demonstrated that embedding theory into authentic, practice-based activities deepens engagement and transfer of learning. Within entrepreneurship education, Cope and Watts (2000) applied ELT to "critical incidents" where entrepreneurs confront real-time strategic choices, showing that learning by doing fosters adaptive thinking and decision-making under uncertainty. However, much of this learning remains tacit, highlighting the value of reflection to surface insights about strengths, weaknesses, and entrepreneurial identity.

Recent systematic reviews (Motta & Galina, 2023 refers) confirm that experiential approaches in entrepreneurship education enhance key competencies such as teamwork, creativity, risk-taking, and self-efficacy, while also transforming the educator's role from instructor to facilitator. Despite challenges in implementation (Hytti, 2018), the literature consistently advocates for experiential learning as a cornerstone of entrepreneurship education due to its ability to link conceptual understanding with real-world practice.

Entrepreneurial Skills and Competencies

The characteristics commonly associated with entrepreneurship were identified by Lumpkin and Dess (1996), who highlighted key entrepreneurial traits: to be autonomous; to innovate and take-risks; to be aggressive toward competitors; and being proactive in seeing opportunities. These traits form the foundation of entrepreneurial behaviours, emphasising the need for individuals to think creatively and act decisively in uncertain environments.

Expanding on this understanding, Zhoa et al. (2010) linked entrepreneurial intent to the five personality dimensions outlined in the Big Five Model. These traits include: *emotional stability* (resilience under pressure); *extraversion* (confidence and social interaction); *openness to new experiences* (willingness to explore and innovate); *agreeableness* (ability to work collaboratively); and *conscientiousness* (reliability and disciplined action).

Despite significant research on entrepreneurial traits and personality dimensions, Watson (2013) noted a paucity of studies focusing on the applied, experiential aspects of entrepreneurship. Building on Tan's (1996, p. 8) argument that economic activities should aim to generate societal value alongside profit, Watson's findings suggest that entrepreneurship extends beyond measurable outcomes like profit margins. Instead, it encompasses intangible human actions and contributions, which often hold intrinsic value that is less easily quantified.

This case study draws on the work of Motta and Galina (2023) to explore how these competencies are perceived by students when taught through gamification in EE.

The Quality Assurance Agency (QAA, 2018) in 2018 provided a structured definition of enterprise and entrepreneurship, distinguishing between these two concepts:

— Enterprise: the generation and application of ideas, which are set within practical situations during a project or undertaking. This is a generic concept that can be applied across all areas of education and professional life.
— Entrepreneurship: the application of enterprise behaviours, attributes and competencies into the creation of cultural, social or economic value. This can, but does not exclusively, lead to venture creation.

The QAA's definition reframes the idea of value in entrepreneurship, emphasising qualitative measures – such as behaviours, attributes, skills, and competencies – over purely quantitative metrics like profit and loss. This broader perspective recognises the intrinsic value of the human action, emphasising the role of intangible metrics in assessing entrepreneurial potential and impact. By re-examining and redefining the competencies

traditionally associated with entrepreneurship, this case study evaluates the impact of those competencies on human capital. It highlights how these skills not only benefit individuals who aspire to start their own businesses but also add value for those pursuing entrepreneurial roles within organisations. This dual perspective reinforces the idea that entrepreneurial competencies are universally applicable, providing a foundation for both venture creation and employment in dynamic, innovative work environments.

In Relation to Human Capital Theory

Human Capital Theory views individuals as valuable resources who possess knowledge, skills, and experiences that generate value for themselves and for the organisations they engage with. The theory suggests that investing in education and training increases a person's human capital, which in turn enhances productivity, employability, and long-term potential (Aman-Ullah et al., 2022). Just as businesses invest in infrastructure or technology, individuals and societies can invest in people through structured learning and skills development.

In the context of MBA students using SimVenture, Human Capital Theory provides a useful lens to understand how simulation-based, gamified learning can support business education. While MBA students are already immersed in business subjects, SimVenture creates an active and applied learning environment where students engage in real-time decision-making across key business functions like finance, marketing, and operations. This experiential approach develops both general and specific human capital through practical application. In a study in 2009, Kwon viewed human capital as knowledge in the individual or organisation. This human capital can be seen as an individual's accumulated knowledge, skills, talent and experience, which collectively provide value to the company the person works for (Kwon, 2009). By viewing entrepreneurial competencies in qualitative terms following the QAA definitions, we can see these become related to intangible human actions. The literature shows us by reflecting on our own accumulated skills (Clarke et al., 2020), and an enhanced understanding of the relevance of those skills (Clarke et al., 2024), this leads to an enhanced understanding of the value contained within EE and indeed within the entrepreneurial competencies discussed. Thus when we position EE and entrepreneurial competency development within Human Capital Theory, and if we view EE and its influence on entrepreneurial competencies, with reflection and relevance being the moderating factors which determine the level of understanding of that EE, we can refine the argument in that gamification in this context is the enabler of reflection and relevance for the learner. Therefore we are able to evaluate the effect of gamification in terms of its influence on the enhanced value gained by the learner in EE. For that reason the entrepreneurial competencies identified were used to test the argument in this case study.

Gamification in the Learning Journey

In their 2018 review of the literature on gamification in education, Majuri et al. (2018) highlighted the growing interest and attention gamification has received in educational settings; this is echoed in a further systematic review in 2023 (Goi, 2023). The study found that the most commonly reported outcomes of gamification include students' perceptions and experiences, with aspects such as fun and enjoyment frequently cited. However, the researchers cautioned that the effectiveness of gamification varies widely, depending on the context and implementation. As such, while gamification offers potential benefits, it is not a universal solution for improving educational outcomes.

Grivokostopoulou et al. (2019) extended this discussion by examining the use of virtual reality in EE. Their study demonstrated that incorporating immersive technologies like virtual reality results in notable increases in students' motivation, skills and competencies. While traditional approaches to EE such as primarily based on theoretical lectures were acknowledged as effective in helping students grasp core concepts, the study highlighted a significant limitation: these methods often fall short in enabling students to apply what they have learned in practical, real-world scenarios. This gap underscores the importance of integrating experiential and interactive methods to bridge theory and practice. In a study in 2020, Sanchez et al. (2020) evaluate the use of gamification in the classroom and the impact on student learning. The study noted further work was necessary to evaluate impact, however high achieving students benefited more than low achieving students.

In 2020, a study by Isabelle (2020) which evaluated the use of a web-based gamification platform for entrepreneurship education. This study supports Sanchez et al. (2020) noting students enjoyed the gamified entrepreneurship education experience, comparing the results of students who participated in gamification against those who did not, noting students who did not feel they had missed out, and fewer students dropped out of courses that used gamification. Isaabelle stated that gamification in this context enhanced three notable areas of students' experience, engagement and entrepreneurial self-efficacy (Isabelle, 2020). In a study in 2024, Sziegat (2024, p. 1099) notably stated "virtual simulation games function as digital twins to replicate real-world scenarios, (…) in entrepreneurship education". Sziegat continued stating that virtual simulation games can enhance students' entrepreneurial learning experience through their immersive and interactive nature (Sziegat, 2024).

The importance of reflection in enhancing both teaching and learning was further explored by Clarke et al. (2020). This study emphasised the role of educators in critically reflecting on their teaching practices to ensure that learners not only understand the material, but can also see its relevance to their personal and professional development. Reflection, in this context, served as a tool for educators to adapt and refine their delivery, making the content more relatable and impactful for students. Clarke et al. (2024) reinforced this notion in a later study which focused on female science students. Here they found that while students could grasp the taught material through traditional methods, a deeper and more meaningful understanding was achieved when educators tailored the content to make it personally relevant to the student cohort. This shows reflection and relevance is important when understanding how students best learn in the context of EE.

In a comprehensive review of gamification in higher education, Landers et al. (2019) examined how gameful learning environments influence psychological and behavioral changes that can, in educational settings, contribute to increased student development, but without specifying particular transferable competencies or professional/entrepreneurial outcomes, supporting their readiness for professional and entrepreneurial contexts. This finding aligns with previous research, including Clarke et al. (2024), which emphasised the importance of students gaining a practical understanding of how the skills acquired during their education can be applied in real-world settings. Landers et al. (2019) further noted that gamification systems can lead to increased engagement, enjoyment, and other psychological changes, and can change behaviors (more participation, interaction with materials, use of services for example), which in turn may improve system-level outcomes such as learning. In 2020, Isabelle (2020) evaluated the use of gamification in entrepreneurship education for undergraduate students, and found enhanced student experience, engagement and entrepreneurial self-efficacy from the use of online simulations. This study integrated the use of gamification with EE allowing students to "experience entrepreneurship rather than just reading about it" (Isabelle, 2020 p. 219), noting this combination improved students' experience, engagement and learning outcomes. In a study in 2021, Kauppinen and Choudhary (2021) also evaluated the use of online gaming for entrepreneurship students, here testing three effects they call the honeymoon effect (the time where the student has feelings of ownership of the venture project), the performance effect (a measure of how a previously successful student might be successful in the future) and the grading effect (where students might respond more slowly if they feel a higher grade may be achieved by more thought in their answer).

Research Methodology

Building on the study's aim to explore how online simulations enhance entrepreneurial competency development and human capital formation, this study investigates whether online simulations enhance entrepreneurial competencies for value creation among international business students. The research seeks to understand how diverse cultural, social, and behavioral contexts influence the development of these competencies employing a mixed-methods approach incorporating both deductive and abductive reasoning. Deductive reasoning was applied to test the argument and validate the eight key non-cognitive entrepreneurial competencies (as outlined by Motta & Galina, 2023) and their associated traits/attributes. Concurrently, abductive reasoning facilitated the iterative exploration and refinement of insights from the data, allowing for a deeper understanding of the phenomenon under study. Taking into consideration the study's aim and research question, the constructivist ontology was employed consistent with Business Anthropology's focus on the cultural and contextual construction of reality. In this case study, the reality (in this context the reality is entrepreneurial

competencies for international postgraduate students) is constructed based on different viewpoints and contexts; to follow this philosophical stance, an interpretivist epistemology was utilised in order to uncover the meaning revealed through the focus groups (Byman, 2012). This study not only investigates the efficacy of online simulations, but also provides insights into how human-centered approaches can enhance the understanding and application of entrepreneurial competencies.

Ethical Approval Statement

The BAHSS Ethics Review Panel at the University of Central Lancashire approved our research proposal (approval: BAHSS2 0223) on October 21st, 2021. Respondents gave written consent for review and signature before starting the focus groups.

As the activity formed part of a voluntary extracurricular exercise, participant risk was minimal. Power relations between staff and students were mitigated by ensuring recruitment and facilitation were conducted by non-teaching researchers.

Sampling and Participant Recruitment

Purposive and snowball sampling techniques were employed to recruit a cohort of international MBA students from a UK HEI. These techniques ensured that respondents met the inclusion criterion of active engagement in the SimVenture simulation competition. The purposive sampling strategy targeted students who had relevant experience with the simulation, while snowball sampling helped identify additional respondents.

Respondents were recruited in February 2021, and informed consent was obtained from all individuals. They were assured of their right to withdraw at any stage and that their anonymity would be preserved throughout the research. In total, 13 students participated in two focus groups, conducted in April 2021. These focus groups were formed after respondents completed a business simulation exercise, conducted over three consecutive weeks starting in late February 2021. To ensure effective engagement, additional training sessions were provided to respondents before the start of the simulation. Although the sample comprised 13 participants, this size is consistent with qualitative case study norms and achieved thematic saturation across focus groups.

Data Collection and Research Method

Focus groups were chosen as the primary data collection method to explore two key objectives:

1. To evaluate whether online simulations generate a "learning-by-doing" experience.
2. To investigate whether SimVenture enables students to develop their understanding of entrepreneurial competencies.

A structured interview format was used during the focus group discussions. This method enabled respondents to articulate their thoughts and feelings about the simulation experience. The structured interview questions were designed to elicit responses related to the eight entrepreneurial competencies: teamwork and collaboration; creativity; risk-taking; self-efficacy; problem-solving; planning and organisational abilities; persuasion; and networking. The focus group protocol included open-ended questions designed to elicit reflections on participants' experiences with SimVenture and their perceptions of entrepreneurial competency development (see Appendix One for the full list of focus group questions). The structured nature of the interviews ensured consistency, while the open-ended format allowed for in-depth exploration of respondents' perspectives.

The interviews were conducted in English, recorded with respondents' consent, and transcribed verbatim by the research team. To ensure accuracy, the transcriptions were cross-verified by other researchers in the team. Respondents' responses were coded in stages and subsequently analysed using NVivo software. This software facilitated thematic analysis, enabling the identification of recurring patterns and insights across the competencies.

Data Analysis

The analysis adopted an abductive research strategy, which acknowledges the importance of understanding human behaviour in the context of individuals' interpretations of their conditions. This strategy allowed the research team to move back and forth between empirical data and theoretical frameworks, refining the initial findings from the literature review (Saunders et al., 2019). NVivo software was employed to systematically organise and analyse the data, with codes corresponding to attitudes, knowledge, and skills. Emerging themes were mapped onto the eight entrepreneurial competencies, providing a structured framework for interpretation. For example, statements such as "everyone had to be equally involved and cooperate to run the business" were initially coded as teamwork, later merged under the higher-order theme of foundational competencies.

Rationale for Abductive Approach

The abductive approach was particularly suited to this study as it aligns with the social constructivist perspective, emphasising the need to understand respondents' experiences from an insider's viewpoint. This approach enabled the research team to incorporate both theoretical insights and participant narratives, offering a comprehensive understanding of how SimVenture contributes to the development of entrepreneurial competencies. The iterative nature of abduction ensured that findings were grounded in empirical evidence while remaining open to reinterpretation in light of new data.

Case Study Framing and Conceptual Gap

While SimVenture has been widely documented in entrepreneurial education research, much of this work treats the game as a generic tool for skill development (Williams, 2015; Smith & Jensen, 2015). What remains underexplored is how students actively construct meaning from the simulation and how these sense-making processes shape their evolving entrepreneurial identities. This study therefore contributes by framing SimVenture not just as a teaching resource, but as a site of identity work and human capital formation. In positioning the study as a case study, the analysis does not seek to generalise statistically, but rather to draw conceptual insights into how experiential, gamified environments mediate competency development in ways that are uneven, contested, and deeply tied to reflection and interpretation.

Results

The research draws on the argument that integrating gamification tools, such as online simulation games, into EE can offer students an enriched and interactive learning experience. Themes were derived inductively from participants' responses to the focus group questions (Appendix One), which were organised around the eight entrepreneurial competencies.

Therefore, the research focuses on the research question: Does the use of the online simulation game SimVenture enhance users' understanding of their own entrepreneurial competencies? This required reflection on the part of the learners which was evaluated in their focus groups. In exploring this question, the study adopts a constructivist perspective and an abductive approach, utilising focus groups to analyse the perceived impact of SimVenture on students' awareness of their entrepreneurial competencies. Additionally, it examines the connection between this enhanced understanding and its contribution to the creation of value, both for the students themselves and their broader entrepreneurial endeavors.

Respondents in the focus groups were asked whether SimVenture helped them develop skills in the eight entrepreneurial competencies identified in the study. In addition data from the NVivo analysis described the number of times each competency was referred to. This showed a clear grouping of references with Creativity (number of times respondent referenced: 1); Persuasion (3); Networking (1) scoring low in terms of number of times referenced, and Teamwork and Collaboration (14); Risk-Taking (10); Self-Efficacy (17); Problem-Solving (10); Planning and Organisational Abilities (13) referenced more frequently. Frequency counts are presented illustratively to show emphasis within discussions rather than as statistical measures of effect.

Examples of participant feedback include:

General comments about using SimVenture

When questioned about feelings and thoughts about using the game, respondents noted nerves and excitement:

> I was really excited about it and the challenge of learning new things and the competition as a whole. I have not done this before and it is in a manufacturing setting and so there is a lot of decision making.
>
> Before the competition I think in my entire group we were making small changes here and there but not really getting an overall idea what to do and we did not test out a lot of the functionality. All we knew was to play with the production and price. During the competition it was a nightmare. Thank God Shiva was so calm.
>
> In the beginning of the competition I was very anxious to know about what SimVenture was and for the team members it was a new thing for everyone.

Teamwork and collaboration

With reference to how respondents felt when reflecting on their teamwork skills, respondents noted

> I think that SimVenture helped us to develop our skills working in a team knowing each other. Everyone had to be equally involved and cooperate to run the business.
>
> It helped to create a good rapport in the team and we supported each other. It is not just one person's decision – any decision made is discussed in the team and if all people agree we would go with that decision. Whatever happens all the team will be responsible.

Respondents noted that it was necessary to involve all members of the team in decision making, but this was not always easy to do in practice:

> None of us knew everything but we collaborated to make it a success.

Creativity

Respondents were asked to comment on how they viewed SimVenture in terms of finding new ways of doing things and coming up with new ideas:

> The freedom to experiment helped with ideas generation.
>
> Innovation is mandatory at a certain point of time because every business has to have a maximum limit to grow and then you have to think out of the box to get new customers or develop a new product.

Risk-taking

When evaluating their response to risk-taking, respondents noted:

> Another risk was regarding the product upgrade and adding some resources. We made some mistakes in the second or third round but we learned that we had made mistakes from our previous part in those areas so that we got to know where we went wrong and with that experience we were experienced in making better choices and decisions in further rounds. It was a helpful skill. We should take risks sometimes so that we know what choices we can make, learning from past mistakes. It helped us develop those skills.
>
> SimVenture has allowed each and every team member to take risks at each point. Every aspect of the business impacts the bottom line or top line or the operations marketing. Everything is interlinked to each other.
>
> At the end of the risk-taking part I can only see the financial risk. I could not see any other aspect of risk so it was only the financial risk we looked at in this competition.

Self-efficacy

With relation to self-efficacy:

> I believe that Sim Venture helps to bring self-confidence and active learning skills once you complete the course. Decisions have been made and this helps to build confidence.
>
> If we are confident we know we are not going to lose anything and that gave us the confidence and we know we are learning.
>
> Each quarter was a milestone that we achieved in terms of learning. In one quarter we knew about research and development and the importance of this, in the next quarter we came to know about the importance of contractors.

Problem-solving:
With relation to adaptive learning:

> It is a great opportunity for building self-confidence and active learning.
>
> I was actively involved in the group for every part. I think I am an adaptive learner.
>
> We can analyse the situation of things that have been given such as international strategic management or in research studies but this is an opportunity where we have wealth and experience to simulate our theoretical knowledge into practicality.
>
> After doing this I felt I had learned something but in real-time scenarios where I can do this type of situation, whether this is in IT, hardware or oil and gas.
>
> Something I learned in the Sim Venture is how I need to take different real-time scenarios when I am applying a product or making my product for the market.

Planning and organisational abilities
Respondents noted experience was key to better understanding planning:

> I personally do not feel that SimVenture helped me in deciding or crafting a strategy; this took several practices.

However respondents also noted:

> SimVenture actually helped us to understand the difference between long-term goals and short-term goals.
>
> We had to do practice at first but then on the final decision it was good.

This indicates time is required to better understand this facet. Also:

> Sim venture actually helped us to understand the difference between long-term goals and short-term goals and how these affect business with profit and loss, dealing with different stakeholders and how we are supposed to take every decision.

Persuasion
When evaluating responses related to persuasion, respondents noted:

> It helped us to learn about teamwork and how we put our ideas together, how we supported each other and sometimes our ideas were not the same as everyone but we came to a point where everyone is okay with the decision.
>
> It helped us to learn about teamwork and how we put our ideas together, how we supported each other and sometimes our ideas were not the same as everyone but we came to a point where everyone is okay with the decision.

Networking
In terms of networking, respondents noted:

> We learned from mistakes and tried to recover from the effects.
>
> We tried to balance steady progress with big investments.
>
> We used the results to compare and analyse the effects so that we could see the mistakes and put them right.
>
> Most of my team's decisions were made by the team and not just me. I was actively listening to all decisions and asking what would be the outcome.

Overall, the findings show that simulation-based engagement enhanced students' employability-related competencies, particularly teamwork, self-efficacy, and strategic planning, demonstrating the formation of entrepreneurial human capital through practical, reflective experience.

Discussion

Critical Evaluation

A key contribution of this study lies in highlighting the uneven development of entrepreneurial competencies within the simulation environment. While prior literature often reports uniformly positive effects of gamification (Ruiz-Alba et al., 2019 refers), the findings here reveal a clear divide; foundational competencies (teamwork, risk-taking for example) were strengthened more readily than dynamic competencies (creativity, networking for example). This divergence points to a conceptual gap in the literature. Simulations may facilitate *doing* competencies but are less effective in nurturing the reflective, identity-based competencies that support long-term entrepreneurial growth. This gap challenges the assumption that gamification uniformly translates into holistic entrepreneurial development, and instead suggests that certain competencies require more time, reflection, and unstructured exploration to emerge.

This case study, grounded in a constructivist perspective and adopting an abductive approach, also draws on Human Capital Theory to interpret how simulation-based learning fosters entrepreneurial competency development. Human Capital Theory posits that skills, knowledge, and experiences are forms of capital that enhance both individual employability and organisational value (Aman-Ullah et al., 2022; Kwon, 2009). This provides a relevant framework to understand the value created through engagement with SimVenture.

The results noted align with the literature (Williams, 2015; Ruiz-Alba et al., 2019, Lynch et al., 2025), which evaluated the impact of the use of gamification such as SimVenture on entrepreneurial skills. These studies observed a direct correlation between gamification and enhanced business skills, with Williams (2015) noting a development of core business skills and some influence on participant awareness of different parts of the business, highlighting enhanced collaboration and networking skills, as well as the development of project management, time management, interpersonal, and finance skills. From a constructivist standpoint, this aligns with the two themes identified in this study, emphasising the human-centric process of knowledge construction through experiential learning. The abductive approach further supports this by allowing an iterative interpretation of findings, considering the ways in which increased engagement over time, as noted by Williams, aligns with the evolving understanding of entrepreneurial competencies observed in this study.

In a further study by Smith and Jensen (2015) which evaluated the use of SimVenture, noting SimVenture enhanced participants' skills in areas such as team-work and presenting, business knowledge and decision-making. This again aligns to this study, reinforcing the value of gamification in EE.

Kolb et al. (2001) noted learners move between two continuums: moving from concrete experiences to forming conceptualisations, and using reflective observation to apply new learning in real-world contexts. This observation by Kolb is supported by the themes that emerged from this case study, and is reinforced by Clarke et al. (2020) noting reflection to be important in learners gaining an enhanced understanding of the value of their entrepreneurial competencies. Overall, respondents were largely in agreement that SimVenture supported their development in various competencies. However, the results highlighted a clear distinction between the competencies that were high frequency and those that had a low frequency in terms of perceived development. These differences were grouped into two emerging themes:

Theme One: *Teamwork and Collaboration; Risk-Taking; Self-Efficacy; Problem-Solving; Planning and Organisational Abilities*

These can be grouped as competencies which are aimed at developing entrepreneurial skills, or the *foundation of entrepreneurial behaviours*. These are intangible skills and display behaviours and attitudes for both the individual and in team tasks. These are core foundations of entrepreneurial behaviours. These competencies were rated highly by respondents, who indicated that SimVenture significantly supported their development in these areas. Respondents noted that SimVenture enabled them to build self-assurance, plan strategically, collaborate with others, and take calculated risks (aligning with Isabelle, 2020). The simulation environment provided structured scenarios that allowed respondents to experience decision-making, manage resources, and work cohesively as a team. For example, respondents reported feeling more confident in setting goals and aligning short-term actions with long-term strategies. Additionally, the collaborative aspects of the simulation

fostered teamwork and persuasion by requiring respondents to share knowledge and work towards common objectives. These competencies form the foundation of entrepreneurial behaviours, equipping respondents with the tools to initiate and manage entrepreneurial activities effectively.

Theme Two: *Creativity; Persuasion; Networking*

These can be grouped as competencies which are dynamic and forward looking; they are also intangible and look more towards sustainability of an enterprise, working through challenges and evolving a business; the *sustainability and growth of an enterprise*. These are more about growing the enterprise. In contrast to Theme One, these competencies were rated much lower by respondents, suggesting that SimVenture was less effective in fostering these skills. These competencies are also intangible but are dynamic and forward-looking, focusing on the sustainability and growth of an enterprise. They emphasise working through challenges, identifying new opportunities, and evolving business strategies in response to changing circumstances. The lower ratings for creativity, persuasion and networking suggest that the simulation did not provide sufficient opportunities for respondents to engage in unstructured problem-solving or creative exploration. Respondents may have had limited time or flexibility within the simulation to experiment, adjust strategies dynamically, or explore new opportunities. These skills are critical for sustaining and scaling a business. The data indicates that while respondents gained confidence and foundational abilities, they may have lacked the experiential depth needed to develop resilience, adaptability, and an entrepreneurial mindset focused on innovation and opportunity recognition.

Concurring with previous research, theme one emphasises the importance of students gaining a practical understanding of how the skills acquired during their education can be applied in real-world settings (Cope & Watts, 2000; Kolb et al., 2001; McCarthy, 2010 refers). Developing entrepreneurial skills gives the tangible actions needed to build these competencies. The literature also shows us by reflecting on our own accumulated skills and promoting a deeper awareness of the self, theme two competencies can be enhanced (Williams, 2015; Clarke et al., 2020 refers). Within the SimVenture environment, the immediate nature of theme one competencies allowed these to be developed more than the reflective nature of theme two competencies.

This current study shows a strong alignment with the literature, but this also shows how SimVenture can support and develop the core foundations of entrepreneurial behaviours. SimVenture does also support the development of the more dynamic competencies, but this study noted that time is required to foster this development, with a deep need for reflection on the part of the participant.

These results can also be viewed by looking at three effects that shape how students build skills during the simulation in relation to the literature (Kauppinen & Chaudhary, 2021 refers): the *honeymoon effect*, the *performance effect*, and the *grading effect*. The honeymoon effect is the burst of enthusiasm students feel at the start of the project, when they feel a strong sense of ownership. This early motivation helps explain why Theme One skills – like planning, problem-solving, teamwork, and taking risks – develop quickly and strongly. The performance effect is when early successes build confidence, making students more willing to tackle harder challenges. In the simulation, this often meant moving towards Theme Two skills – such as creativity, persuasion, and networking – as students felt more capable. The grading effect is when students slow down and think more carefully if they believe higher marks depend on it. In a short simulation, this might hold back experimentation and risk-taking, but in longer or repeated simulations, it can lead to more reflection and creative problem-solving. Together, these three effects show how motivation, confidence, and assessment pressures shape the way entrepreneurial skills grow over time, fitting with Human Capital Theory's idea that skills are developed gradually through experience and reflection.

Through the lens of the student

Viewing the results through the lens of the student allows us to evaluate action-based themes, which reflects the study's constructivist orientation and abductive approach. Rather than treating entrepreneurial competencies as static, pre-defined categories, we can evaluate the processes through which students constructed their understanding during the SimVenture simulation. This allows us to continue our evaluation beyond the static nature of what competencies are developed, and also evaluate how competencies are developed. By looking at students' actions and behaviours, we gain insight into the lived experiences and mechanisms that underpin entrepreneurial learning.

Action-based themes show how entrepreneurial competencies were developed and demonstrated in the simulation, rather than simply whether students referred to them. Each action-based theme connects to one or more entrepreneurial competencies. For example, making and justifying decisions, planning and strategic thinking, and managing emotions link closely to planning, self-efficacy and problem-solving. Other themes, such as collaborating and negotiating in teams and expressing ideas, relate strongly to teamwork, persuasion and networking, while experimenting and taking risks and learning from mistakes build creativity and risk-taking. Finally, developing confidence underpins self-efficacy across all areas. These themes can also be grouped into two broader clusters: those that focus on working with others (collaboration, negotiation, communication for example) and those that centre on navigating uncertainty (risk-taking, adaptation, reflection, and planning for example). Together, they provide a dynamic picture of how students moved between individual and collective action to build entrepreneurial competencies, showing that these skills are interconnected and often developed simultaneously rather than in isolation. This dynamic view of how competencies are built aligns with Human Capital Theory, as it demonstrates that the value of learning is not only in the acquisition of discrete skills but in the ability to actively mobilise and integrate them in context. By capturing the actions and processes behind competency development, the action-based themes highlight that human capital is constructed iteratively through experience, reflection, and interaction, rather than simply accumulated as a static set of attributes. This process is also closely tied to how students make sense of their experiences and shape their professional identities. As students reflected on their actions, they interpreted successes and failures, recognised shifts in their confidence and capability, and began to picture themselves in future professional or entrepreneurial roles. This sense-making and identity work further reinforced the perceived value of their learning, adding a layer of meaning to the competencies they developed through the simulation.

Sense-Making and Identities: As students engaged with SimVenture, they did more than build competencies; they also engaged in *sense-making* about what those competencies meant to them and how they might use them in the future. This sense-making process involved interpreting successes and failures, understanding the consequences of decisions, and connecting learning within the simulation to real-world entrepreneurial and professional contexts (Ivanova-Gongne et al., 2024). For example, when students described learning from mistakes or making and justifying decisions, they were reflecting on how those experiences shaped their understanding of risk, confidence, and adaptability. These reflections often led to shifts in identity, as students began to see themselves adopting roles such as entrepreneur, team leader, or problem-solver. In particular, action-based themes like collaborating and negotiating in teams and developing confidence revealed how learners experimented with and rehearsed these identities in a low-stakes environment of SimVenture. This identity work enhanced the value students attached to the competencies they developed and helped them internalise these behaviours as part of their evolving selves, reinforcing the argument that experiential, gamified learning can support deeper, more enduring forms of human capital development.

Postscript: Skills and requirements of industry 5.0. How do these diverge from those taught in traditional universities?

Motta and Galina (2023) identified a comprehensive set of entrepreneurial competencies and skills that are developed through experiential learning: *teamwork and collaboration; creativity; risk-taking; self-efficacy; problem-solving; planning and organisational abilities; persuasion;* and *networking*. From the UK Government National Skills Service website (NCS, 2024), we can see how these competencies and attributes align with the skills required in commonplace professions in and outside of those considered to be traditional entrepreneurial professions. The link to competencies and human capital is long established (Zhao et al., 2010) and in research evaluating the impact of industry 5.0 on engineering education, Broo et al. (2022) notes a blurring of boundaries between different disciplines in terms of the skills and attributes required. This study continues to note that graduates for industry 5.0 need to be adaptable and open to change, with human-centricity, sustainability, and resiliency being seen as key characteristics in industry 5.0 (Broo et al., 2022; Leng et al., 2022).

This current study evaluates the learning outcomes from students using SimVenture software and reflection to develop their own entrepreneurial competencies, and how this will support learners in their future career development. Industry 4.0 was noted to be important as this is the first industrial revolution which blurred the lines of physical and digital in terms of humans working with machines (Mitchell & Guile, 2021). This requirement for employees to be adaptable and open to learning new skills has meant employers are

needing to factor in retraining into the organisational strategy to maintain competitive advantage (Kolade & Owoseni, 2022). This study also notes that to fully equip graduates with the skills they require for their future careers, the Higher Education sector will need to adopt an educational approach which spans boundaries and enables interdisciplinary collaboration and supports the entrepreneurial skilled worker who is more dynamic and adaptable than we traditionally see (Kolade & Owoseni, 2022).

Educators designing entrepreneurship courses could integrate: (1) structured reflective debriefs following simulation rounds; (2) peer-mentoring or networking exercises to reinforce growth-oriented competencies; and (3) scaffolded simulation tasks linking decisions to employability and human capital outcomes.

Conclusion

This paper positions itself as a case study of how SimVenture mediates both the acquisition and interpretation of entrepreneurial competencies. The contribution lies less in demonstrating that the simulation works generically, and more in showing how its impact is uneven and shaped by the interplay of action, reflection, and identity formation. In doing so, it addresses a conceptual gap in the literature by distinguishing between competencies that emerge through immediate action and those that require deeper reflective engagement. This framing repositions gamification research away from descriptive outcome checklists toward a more critical evaluation of the mechanisms through which learning and human capital are constructed.

The findings show that online simulations such as SimVenture can do more than simply build discrete entrepreneurial competencies; they can also foster the deeper processes through which these competencies are understood, enacted, and internalised. By moving beyond static categories and examining action-based themes, the analysis demonstrated that competencies develop dynamically through cycles of action, reflection, and interaction. These findings align with Human Capital Theory by highlighting that the value of education lies not only in the accumulation of skills, but also in the ability to mobilise and integrate them meaningfully across different contexts.

Equally important, the sense-making and identity work observed in this study illustrate how learners attach personal and professional meaning to their experiences, adopting and experimenting with entrepreneurial identities in a safe, simulated environment. This process strengthens both the visibility and perceived value of their competencies and enhances their readiness for real-world challenges.

Limitations

As with all case study research, there are several limitations to be acknowledged in order to contextualise the findings. First, this study was based on a single cohort of international business students in one UK Higher Education Institution. While this provides useful insight into how SimVenture was experienced within this particular learning environment, the results cannot be generalised to all student populations or educational contexts. Entrepreneurial competencies are shaped by cultural, disciplinary, and institutional factors, and further studies across different contexts would be needed to strengthen the external validity of these observations.

Second, the study relied on qualitative reflections gathered through focus groups. This approach was appropriate for exploring students' lived experiences and capturing the sense-making and identity work that emerged, but it also means that the findings are interpretive rather than definitive. Quantitative measures of competency growth, or longitudinal tracking of skill development, were not included. Future research could address this by adopting mixed methods designs or by following students over time to evaluate how competencies are sustained and applied in professional settings.

Third, the study focused exclusively on the SimVenture simulation. Although this provides a rich and structured environment for observing competency development, the simulation itself privileges certain forms of decision-making and teamwork while providing fewer opportunities for competencies such as creativity, persuasion, and networking to be exercised. This uneven development pattern highlights both the strengths and the limitations of SimVenture as a pedagogical tool. Further research could compare different types of gamified or experiential approaches to examine how they support, or fail to support, the wider range of entrepreneurial competencies.

Finally, the analysis drew primarily on Human Capital Theory as a guiding framework. While this offered a useful lens for interpreting the value of competencies, it also constrained the analysis by focusing on skill acquisition and employability outcomes. Other perspectives, such as identity theory or sensemaking approaches, may have provided additional insights into the ways students interpreted and internalised their experiences. Future research could build on these findings by more explicitly theorising how experiential simulations contribute not only to the development of competencies, but also to the construction of entrepreneurial identity and to broader debates in entrepreneurship education.

Future Research

Building on these limitations, future research could extend this study in several ways. First, studies conducted with different cohorts of students, across multiple institutions and cultural contexts, would allow a broader evaluation of how simulations like SimVenture shape entrepreneurial competencies. This would make it possible to explore whether the uneven competency development observed here is consistent across settings, or whether it reflects the specific background of this student group.

Second, longer-term or longitudinal research would provide valuable insights into how far the competencies developed in a simulation are sustained and applied beyond the classroom. Tracking students as they transition into professional or entrepreneurial roles could show how the skills, confidence, and identities rehearsed in a simulated environment translate into practice.

Third, future studies could explore the comparative value of different experiential methods. While this study focused solely on SimVenture, gamification is only one form of practice-based learning. Comparing simulation games with approaches such as live projects, business incubators, or interdisciplinary challenges could reveal how different pedagogical formats privilege different sets of competencies.

Finally, there is scope to develop the conceptual contribution of this area of research further. In particular, greater attention could be paid to theories of sense-making and identity construction, which would complement Human Capital Theory by focusing on how students attach meaning to their learning and begin to imagine themselves as entrepreneurs or professionals. This would deepen our understanding of the transformative potential of experiential education and offer a more robust theoretical grounding for the role of gamified learning in entrepreneurship education.

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Appendix One – Focus Group Questions

1. Leadership and Strategy
Main Question: How did the simulation help you develop your knowledge and skills in leadership and strategy?
- In what ways did you experience leadership during the exercise?
- What role, if any, did team motivation play in your experience?
- How did you approach setting short-term goals or creating a strategic roadmap?
- What did you learn about coordinating different parts of the organisation?

2. Teamwork and Interpersonal Skills
Main Question: How did the simulation influence your teamwork and interpersonal skills?
- How did you involve all members in decision-making?
- What role did listening and negotiation play in your team's success?
- Can you share an example of cooperation or communication that helped your group?
- How, if at all, did showing care and support for each other affect your experience?

3. Risk Taking and Perseverance
Main Question: How did the simulation help you deal with risk and perseverance?
- What kinds of risks did you take, and how did you decide on them?
- How did you balance caution with progress?
- What mistakes did you learn from, and how did you recover?
- How, if at all, did facing uncertainty influence your confidence in decision-making?

4. Innovation and Opportunity Seeking
Main Question: Did the simulation encourage innovation and opportunity seeking?
- How did experimenting in a safe environment help you?
- How did working on ideas together compare with working alone?
- How did you evaluate opportunities and weigh options?
- Could you see ways to apply this tool to real business strategies?

5. Self-Confidence and Active Learning
Main Question: In what ways did the simulation affect your self-confidence and approach to learning?
- Did feedback and practice build your confidence?
- How did sharing work and using strengths motivate you?
- How did fear of failing, if present, affect your approach?
- How did repeated decision-making influence your confidence?

6. Feelings During the Competition
Main Question: How did you feel before, during, and after the competition?
- What emotions did you experience at each stage?
- Did your confidence change over time?
- How did your team's dynamics affect your feelings?
- What was most exciting or challenging for you?

7. Suggestions for Improvement
Main Question: How could we improve the way the simulation is used in the course?
- Should it be scheduled earlier or later in the program?
- What impact, if any, do you think team size had on your experience?
- How much guidance from lecturers would be helpful?
- What changes would make the experience more effective?