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Integrating AI-driven Business Simulations into Malaysian Entrepreneurship Curriculum Using Kolb's Learning Cycle: A Concept Paper

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ABSTRACT

Traditional entrepreneurship education within Higher Education Institutions (HEIs) often relies on passive pedagogical frameworks that fail to equip graduates with the dynamic competencies required to navigate volatile market landscapes. Within the Malaysian socioeconomic framework, this gap directly hinders the strategic national objectives articulated in the National Entrepreneurship Policy 2030 (NEP 2030) to cultivate resilient, innovation-driven job creators. To address this institutional limitation, this concept paper proposes a localized curriculum framework that integrates Artificial Intelligence (AI) and Generative AI (GenAI) into experiential learning structures. Grounded in David Kolb's Experiential Learning Theory (ELT), the model maps AI-driven business simulations and automated, real-time feedback loops onto the four quadrants of the experiential learning cycle. This systematic integration transforms traditional simulations from rigid, deterministic tools into context-aware, active cognitive collaborators. In doing so, the framework overcomes the instructor grading bottleneck, establishes a psychologically safe sandbox that mitigates student risk aversion, and normalizes entrepreneurial failure through continuous, data-driven reflective loops. Furthermore, by matching structural directives from the Malaysia Digital Economy Corporation (MDEC) and the Ministry of Higher Education, this framework provides an equitable model designed to bridge the resource and digital mentorship divide between urban and regional Malaysian campuses. Ultimately, this paper outlines critical pathways for institutional implementation, highlighting the necessary evolution of faculty roles from traditional lecturers to data mentors and the transition from outcome-based metrics to rigorous, process-based student assessments.

Keywords: Artificial Intelligence, Experiential Learning Theory, Entrepreneurship Curriculum, Business Simulations, Malaysian Higher Education

INTRODUCTION

The structural transformation of global economic architectures demands that higher education institutions (HEIs) abandon outdated pedagogical frameworks and adopt models that systematically build adaptive capacity, critical problem-solving skills, and resilience in graduates (Vlachopoulos & Makri, 2017). This educational mandate is highly critical within developing economies like Malaysia. The Malaysian Ministry of Higher Education (MOHE) has aggressively pushed national directives including the Malaysia Education

Blueprint 2015–2025 (Higher Education), the Entrepreneurship Education Action Plan 2021–2025, and the National Entrepreneurship Policy 2030 (NEP 2030) to establish a cohesive framework designed to produce holistic, digital-native "job creators" rather than traditional job seekers (Sirat, 2024).

Despite these clear policy initiatives, executing effective entrepreneurial cultivation inside Malaysian classrooms is consistently hindered by entrenched instructional habits (Ismail, 2010). Historical assessments of local university ecosystems reveal a persistent, systemic reliance on exam-oriented rote learning and linear business plan writing. This focus isolates abstract theory from practical application, lowers student self-efficacy, and creates a clear competency gap when graduates face the volatile, tech-driven realities of the modern marketplace (Mhlola, 2026).

To bridge this operational gap, contemporary educational research heavily advocates for constructivist experiential learning models that emphasize iterative, action-based discovery (Amiri, 2025). David Kolb's foundational Experiential Learning Theory (ELT) states that deep knowledge construction occurs through a continuous, cyclical loop: moving from a Concrete Experience to Reflective Observation, into Abstract Conceptualization, and finally to Active Experimentation (Boggu, 2020; Gemmell & Kolb, 2020). However, scaling authentic, real-world venture experiences within standard university courses presents major financial, logistical, and equity challenges for educators. While conventional Business Simulation Games (BSGs) have been introduced as risk-free digital sandboxes to practice corporate decision-making, their educational impact remains limited (Murad et al., 2025). Most traditional simulations run on rigid, pre-programmed mathematical formulas that fail to capture real-world market chaos, and they suffer from an instructor grading bottleneck that prevents students from receiving immediate, personalized feedback during key moments of business failure (Pereda et al., 2015; Wang et al., 2025).

The integration of Artificial Intelligence (AI) and Generative AI (GenAI) into these platforms solves these long-standing pedagogical challenges. When built directly into business simulations, AI functions as an active cognitive collaborator that enhances every stage of Kolb's learning cycle (Rashid, 2026). In the Concrete Experience phase, multi-agent AI systems model fluid market shifts and complex consumer profiles, while advanced large language models support Reflective Observation and Abstract Conceptualization by delivering real-time, personalized analytical feedback tailored to a student's specific operational choices (Kostopoulos et al., 2025). Finally, during Active Experimentation, generative tools allow students to execute strategic business pivots using natural language commands, giving them an equitable environment to safely normalize failure, adapt their choices, and build core digital competencies (Gonsalves et al., 2026).

This concept paper outlines a localized, AI-enhanced experiential learning curriculum model designed for Malaysian HEIs. By mapping real-time AI feedback loops and dynamic simulations onto Kolb's experiential learning framework, this paper details how digital sandboxes can shift Malaysian student entrepreneurs from passive memorization to active experimentation. This alignment helps balance institutional resource gaps across regional campuses and builds the strategic agility required by Malaysia's growing digital economy.

LITERATURE REVIEW

The intellectual foundation of modern entrepreneurship education within Higher Education Institutions (HEIs) is undergoing a major shift. It is moving away from classical, teacher-centric presentation methods and toward constructivist, action-oriented learning frameworks (Dumeayam, 2025). Scholars argue that traditional approaches such as analyzing historical case studies or writing static business plans rely too much on teaching abstract facts. This approach fails to prepare students for the fast-changing, unpredictable reality of launching a business (Kirby, 2004; Neck et al., 2014).

To address this gap, current educational research focuses on David Kolb's Experiential Learning Theory (ELT) as a foundational framework for teaching entrepreneurship. This theory views learning as a continuous process where experience is transformed into deep knowledge through a cyclical four-stage loop: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation (Marks, 2012; Wang et al., 2025). When applied to business disciplines, ELT requires students to move through each stage in an integrated way. This ensures that abstract business theories are directly connected to real-world application, critical reflection, and hands-on experimentation (Aguilar & Tafesse, 2026).

While the pedagogical value of experiential learning is widely recognized, operationalizing Kolb's full cycle inside university classrooms presents significant logistical and instructional challenges. Traditionally, institutions have used Business Simulation Games (BSGs) to provide risk-free, repeatable digital environments where students can practice strategic decision-making (Velez & Alonso, 2025). Empirical studies demonstrate that these simulations help build decision-making abilities, soft skills, data analysis capabilities, and higher-order critical thinking (Vlachopoulos & Makri, 2017).

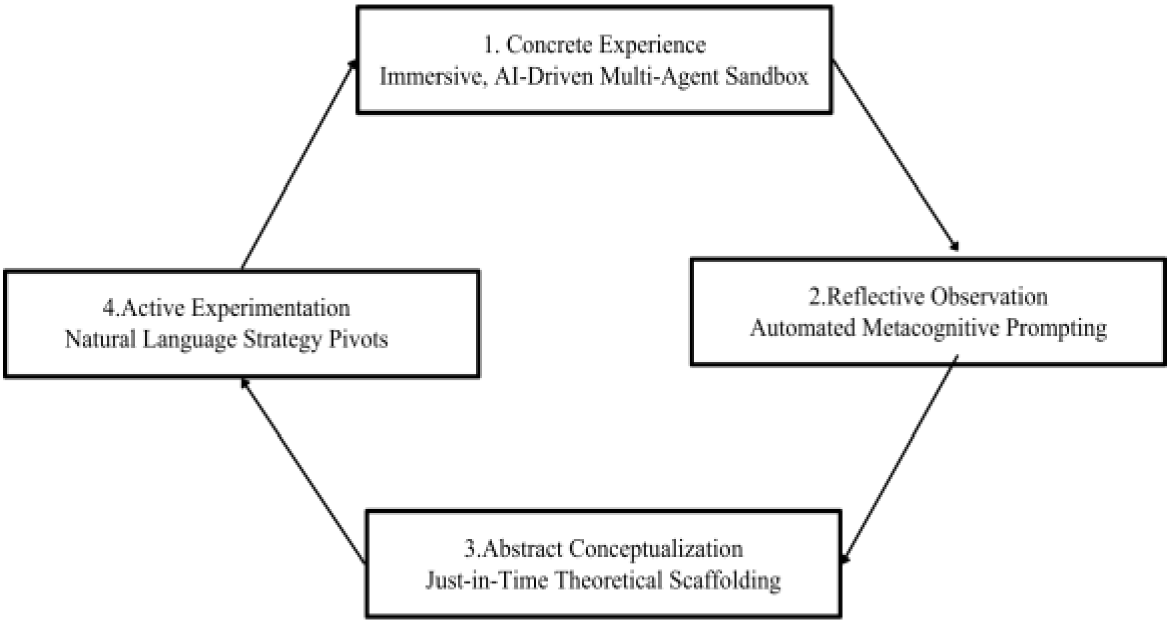

Figure 1 Proposed AI- Enhanced Simulation

However, conventional business simulations have notable limitations that can disrupt the learning process. Many standard simulations run on rigid, pre-programmed mathematical formulas. As a result, they fail to reflect the chaotic uncertainty of real markets, which can lead students to focus on "gaming" the software's code rather than learning true strategic agility (Datta, 2024). Furthermore, standard simulations often face an "instructor bottleneck" (Shibley & Middendorf, 2025). In large classes, a single professor cannot provide immediate, deeply personalized feedback to multiple student teams at once, which can lead to superficial learning and unaddressed strategic mistakes (Kayyali, 2025; Li et al., 2025).

The integration of Artificial Intelligence (AI) and Generative AI (GenAI) into these tools offers a promising solution to these long-standing pedagogical constraints. When embedded directly into business simulations, AI shifts the technology from a passive administrative tool into an active cognitive collaborator that enhances the entire experiential learning cycle (Efthimiou, 2025). During the Concrete Experience stage, advanced AI engines use multi-agent systems to model fluid market shifts, changing consumer profiles, and realistic competitor behaviors (Mazzetto, 2024). To support Reflective Observation, large language models and intelligent systems analyze real-time player data to provide instant, automated, and personalized feedback. This approach prompts students to critically evaluate their operational failures exactly when they happen (Anand & Long, 2025; Sharma et al., 2025).

For Abstract Conceptualization, these systems inject relevant business frameworks and concepts precisely when a student encounters a business problem. This targeted scaffolding helps bridge the gap between academic theory and practical execution (Siregar, 2025). Finally, during Active Experimentation, generative AI lets students quickly test new strategic changes, alter product lines, and re-run scenarios using natural language commands. This setup provides a safe space that helps build resilience and strategic flexibility (Fein et al., 2026; Salinas-Navarro et al., 2024).

Table 1 Traditional vs. AI-Enhanced Business Simulation Games (BSG)

Traditional BSG Limitations	AI-Enhanced Simulation Capabilities
• Rigid, pre-programmed math rules • Deterministic, predictable behavior • Standardized end-of-game scorecards • Instructor grading bottleneck	• Dynamic, multi-agent market conditions • Evolving consumer & competitor simulation • Instant, hyper-personalized feedback • Scalable, automated reflection loops

In the context of Malaysian higher education, deploying an AI-driven experiential learning model addresses specific national goals and systemic institutional challenges. The Malaysian Ministry of Higher Education (MOHE), guided by the National Entrepreneurship Policy 2030 (NEP 2030), has mandated that local universities transition toward producing innovative "job creators" capable of driving the digital economy (Jamaluddin et al., 2025). However, implementing this mandate can run into cultural and structural hurdles. Traditional local educational norms often rely on exam-oriented rote learning, which can inadvertently lower students' self-efficacy and increase fear of business failure.

Additionally, a persistent digital and resource gap between major urban universities and regional campuses can restrict equitable access to active venture networks and specialized business mentorship (Wang et al., 2024). Introducing localized AI-powered experiential simulators helps balance these disparities. By training AI agents on local demographic data and matching parameters from agencies like the Malaysia Digital Economy Corporation (MDEC), institutions can offer highly contextualized business training (Felker, 2025). This approach gives all Malaysian students a safe, uniform environment to normalize failure, practice adapting their business strategies, and build core digital competencies.

DISCUSSION

The systemic integration of Artificial Intelligence (AI) into experiential entrepreneurship curriculum within Malaysian Higher Education Institutions (HEIs) represents a paradigm shift in business education pedagogy. Grounded in David Kolb's Experiential Learning Theory (ELT), the proposed curriculum model directly addresses the rigid structural limitations found in conventional Business Simulation Games (BSGs) and alleviates the instructional limitations. Scholars increasingly emphasize that when advanced multi-agent systems model dynamic market changes, fluctuating economic factors, and shifting consumer demands, they provide students with a richer, non-deterministic learning environment (Haque et al., 2026; Bloembergen et al., 2015). This environmental fluidity directly activates the critical phases of Reflective Observation and Abstract Conceptualization within Kolb's learning cycle. Instead of facing generic, delayed performance scorecards at the end of a simulation cycle, student entrepreneurs receive real-time, automated metacognitive feedback tailored specifically to their operational micro-decisions (Papademetriou & Anastasiadou, 2025; Polydorou, 2025). This timely diagnostic feedback forces students to immediately confront and analyze their business failures, facilitating a deeper connection between abstract academic theories and complex, practical decision-making (Vinoth et al., 2026).

Furthermore, this AI-driven approach introduces critical psychological and behavioral advantages that help reshape student mindsets within highly structured educational cultures. In Malaysia, traditional educational practices remain heavily exam-oriented and focused on rote memorization, which can inadvertently lower student self-efficacy and create a high fear of business failure among young entrepreneurs (Siregar, 2025). By offering an entirely risk-free, interactive digital sandbox, the proposed model provides a psychologically safe environment where failing is treated as a necessary, data-driven step in the learning process rather than academic penalty (Li et al., 2026). Empirical literature shows that this continuous cycle of rapid trial, failure, reflection, and adjustment directly reduces risk aversion, helps normalize operational setbacks, and strengthens entrepreneurial intentionality and self-efficacy (Elfghi et al., 2026). By allowing students to use natural language commands to rapidly prototype business changes, adapt to simulated marketing strategies, and manage virtual cash flows, the AI-enhanced sandbox helps shift student behaviors away from passive information absorption toward highly agile, active experimentation.

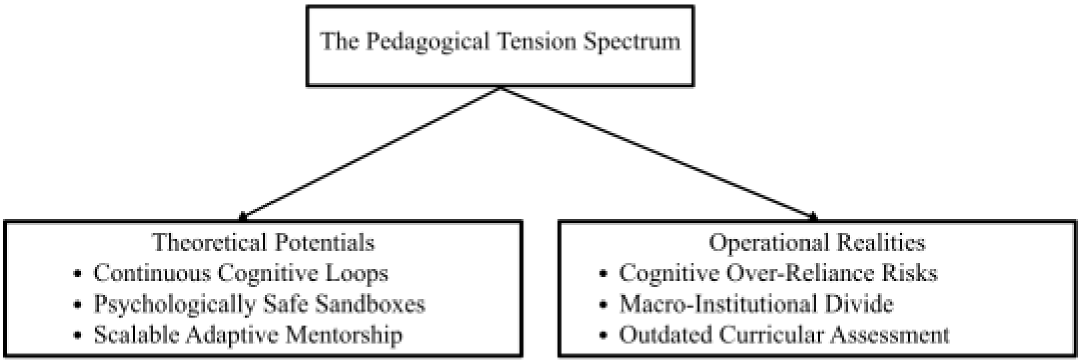

Figure 2 The Pedagogical Tension Spectrum

To systematically implement this behavioral shift inside the classroom, the proposed framework translates these experiential interactions into a structured, 14-week undergraduate entrepreneurship course module. During the initial phase of the curriculum (Weeks 1–3), which focuses on Abstract Conceptualization, student teams participate in foundational scaffolding exercise (Dorodchi, 2020) and utilize generative tools to evaluate localized macroeconomic trends and map early business assumptions against strategic growth sector (Wu, 2025) outlined by the National Entrepreneurship Policy 2030 (NEP 2030) and the Malaysia Digital Economy Corporation (MDEC). This alignment directly feeds into the Concrete Experience phase (Weeks 4–7), where student teams launch virtual ventures within the immersive, AI-driven multi-agent sandbox (Russ, 2025). Rather than navigating rigid, deterministic business simulations that rely on predictable, pre-programmed mathematical formulas (Liu, 2026), students are exposed to fluid market disruptions, shifting consumer profiles, and dynamic competitor responses generated in real time (Hamzat et al., 2023).

The subsequent curriculum phase (Weeks 8–10) targets Reflective Observation, deliberately resolving the traditional instructor grading bottleneck that frequently hinders large academic cohorts (Wei et al., 2026). Following virtual market failures or operational setbacks, the platform deploys automated metacognitive prompting driven by large language model (Brohi et al., 2025). Students receive instantaneous, hyper-personalized analytical feedback tailored to their precise strategic choices, forcing them to immediately bridge the gap between abstract academic theories and complex, practical execution (Nagasubramaniam, 2025). During the Active Experimentation phase (Weeks 11–13), students use natural language commands to execute rapid business pivots, modify marketing strategies, adjust product lines, and manage virtual cash flows (Garg et al., 2026). This rapid trial-and-error loop reinforces a safe cognitive sandbox before the module concludes in Week 14 with a process-based synthesis where teams deliver a final oral defence tracking their strategic adaptations rather than presenting simple profit outcomes (Ren, 2022).

However, expanding this theoretical framework into a functional, nationwide curriculum across Malaysian HEIs reveals complex institutional tensions regarding educational equity and technology access. Although AI simulations can be localized to mirror the specific demographics of Malaysia and align with economic strategies set by the Malaysia Digital Economy Corporation (MDEC), their actual deployment faces serious structural challenges. A persistent digital and funding divide exists between premier urban universities and smaller regional campuses across Malaysia, meaning that unequal access to computing infrastructure could inadvertently worsen the educational gaps these tools are meant to bridge (Jamaluddin et al., 2025). Additionally, current literature warns against the risk of "cognitive over-reliance" or "automation bias" among students (Rana et al., 2025; Yu & Chan, 2025). If young entrepreneurs accept AI-generated feedback and market insights blindly without cross-referencing real-world conditions or applying independent critical thinking, the simulator stops functioning as an active cognitive enhancer and becomes another routine, passive exercise (Khavasi, 2025).

To structurally mitigate this institutional divide and ensure student equity, the framework relies on a decentralized, cloud-hosted technological architecture (Subramaniam, 2023; Wang et al., 2024). By utilizing browser-accessible simulation interfaces connected via secure APIs to large language model engines, universities can deliver uniform, high-fidelity entrepreneurial training without requiring expensive localized computing hardware (Sharma et al., 2025). To maintain strict contextual relevance across both urban and regional campuses, the underlying data pipelines are calibrated using demographic profiles, localized consumer micro-data, and economic parameters unique to the Malaysian landscape (Felker, 2025; Jamaluddin et al., 2025).

To maintain academic rigor and unlock the full potential of this curriculum model, Malaysian HEIs must fundamentally transform internal assessment frameworks and faculty responsibilities. Traditional university policies that evaluate students using simple outcome-based metrics such as the final profitability of a simulated company must be replaced by process-based assessment rubrics (Ludvik, 2023). These updated grading systems must measure a student's meta-cognitive growth, the depth of their strategic reflections, and how effectively they iterate their business models based on AI diagnostic feedback. Consequently, the role of the university instructor must change from a traditional lecturer delivering content into a specialized data mentor who helps students interpret AI analytics and connect digital simulation insights to actual marketplace realities (Osadcha et al., 2025). This shift requires comprehensive professional training for university faculty, ensuring they can work alongside AI tools to guide student reflections rather than simply managing basic software inputs.

Under this process-based paradigm, grading mechanics are programmatically divided into targeted evaluation vectors that utilize automated backend data logging. Student performance is measured through integrated metrics: automated reflective micro-logs (40%) evaluating the depth of self-awareness following business failures (Anand & Long, 2025), strategic pivot trackers (40%) analyzing the data-driven justification of model iterations (Li et al., 2025), and a final presentation (20%) focusing on the team's overall cognitive growth and adaptive resilience (Kohn, 2024). Furthermore, to protect against the operational risks of automation bias, internal frameworks embed mandatory "AI-Off" diagnostic checkpoints where students are blocked from generative suggestions and must independently justify their strategic choices using baseline critical reasoning (Yu & Chan, 2025; Khavasi, 2025). This ensures that faculty development programs can be optimized around clear, data-driven milestones rather than subjective instructional observations (Osadcha et al., 2025).

CONCLUSION

The systemic integration of Artificial Intelligence (AI) into experiential entrepreneurship curriculum offers a transformative and highly scalable solution to long-standing pedagogical challenges within Malaysian Higher Education Institutions (HEIs). By grounding this framework in David Kolb's Experiential Learning Theory (ELT), the proposed curriculum model shifts the educational paradigm from passive theory memorization to active, iterative experimentation. Through the deployment of AI-driven business simulations and instantaneous, automated feedback mechanisms, the model successfully overcomes the rigid limitations of traditional simulation platforms and removes the instructional constraints imposed by the instructor bottleneck (Rashid, 2026; Scholapurapu, 2025). Consequently, this approach equips Malaysian student entrepreneurs with a low-cost, low-risk digital sandbox designed to cultivate essential high-order cognitive competencies, including strategic decision-making, adaptive resilience, and creative problem-solving.

On a national level, this conceptual framework directly supports the strategic socioeconomic mandates outlined in Malaysia's National Entrepreneurship Policy 2030 (NEP 2030) and the Ministry of Higher Education's guidelines to produce innovation-driven "job creators". By embedding localized demographic profiles and regional economic parameters within multi-agent simulation designs, the model democratizes access to high-fidelity entrepreneurial training across all public and private universities, effectively narrowing the persistent resource divide between urban and regional campuses (Moleka, 2025).

However, achieving full operationalization requires addressing critical structural dependencies. Malaysian HEIs must proactively upgrade campus technological infrastructure, design comprehensive professional training programs to transition faculty members into data mentors and shift traditional institutional grading rubrics away from basic outcome metrics toward rigorous, process-based assessments. Ultimately, by normalizing failure and building experiential learning loops within a psychologically safe environment, this AI-enhanced curriculum framework provides a robust pathway to nurture the next generation of resilient, digitally fluent entrepreneurs capable of steering Malaysia's expanding digital economy.

Conceptual Limitations and Future Research Agenda

The primary limitation of the study is that the proposed AI-enhanced experiential framework remains entirely theoretical, requiring empirical field validation to confirm its classroom efficacy. On a macro-environmental level, the persistent funding, infrastructure, and high-speed connectivity variations between premier urban universities and smaller regional campuses across Malaysia present major operational dependencies for achieving uniform nationwide deployment. Additionally, a distinct behavioral limitation within the pedagogical tension spectrum remains the threat of student automation bias. Without clear instructional guardrails, young entrepreneurs face the risk of cognitive over-reliance, where they might passively accept AI-generated feedback without applying independent critical thinking or cross-referencing real-world market dynamics.

To address these limitations, the future research agenda for this framework must incorporate empirical validation through pilot implementations, surveys, interviews, or experimental studies involving students and educators across diverse Malaysian HEIs. Future empirical designs should systematically examine how this AI-supported experiential learning cycle influences core student outcomes, specifically measuring its direct impact on entrepreneurial knowledge retention, creativity, higher-order problem-solving ability, and venture development outcomes. Longitudinal research should also track whether cultivating resilience and normalizing operational failure within a risk-free digital sandbox successfully mitigates risk aversion and translates into higher rates of actual real-world business creation upon graduation.

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