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Applying the Innovative Approach of Employing a Business Simulation Game and Prototype Developing Platform in an Online Flipped Classroom of an Entrepreneurial Summer Course: A Case Study of UAEU

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Abstract: As opposed to only having subject knowledge, the necessity of skills has repeatedly been emphasized as essential to succeed in the practical world. Being able to adjust to new circumstances is crucial, especially in today's world, where uncertainty, volatility, ambiguity, and complexity are ubiquitous. Experiential Learning Theory can be implemented during innovative pedagogical approaches to better prepare students for entering the market as successful entrepreneurs in such a tumultuous time—for instance, an entrepreneurial course might incorporate using business simulation games, such as MonsoonSim and prototype developing software, including Justinmind to experience enhanced experiential learning with thematic goals. In order to strengthen the quality of teaching and learning and foster self-directed learners better equipped to cope with existing challenges, this study investigates the processes of implementing a business simulation game along with prototype development software and distinguishes it from a typical classroom experience. The sample consists of students enrolled in a short summer entrepreneurial course designed by the United Arab Emirates University at the request of the Ministry of Education, United Arab Emirates (U.A.E.), for secondary and higher secondary school graduates. The students from private and government schools across all seven emirates of the United Arab Emirates participated in this course. The online flipped classroom was carefully designed by blending several approaches during the pre-class, in-class, and post-class activities. In order to provide an advanced learning experience, a web-based business simulation game (MosoonSim) and online prototype development software, Justinmind, were introduced during the course. The qualitative and quantitative results show that incorporating business simulation games had a significantly positive impact on students' learning outcomes, such as critical and higher-order thinking, idea creation, and problem-solving capabilities, and improved engagement through an easy, enjoyable, and interactive environment. Furthermore, findings show that the learning outcomes are significantly influenced by the attributes of the group members and their consistency during group activities in a flipped classroom, and assigning a dedicated instructor or a senior group member having solid background knowledge in a particular subject can assist in significantly enhancing the learning outcomes of a whole group.

Keywords: business simulation; prototype development; pedagogical approaches; collaborative learning

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1. Introduction

The emergence of the COVID-19 pandemic negatively impacted the sustainable development goals (S.D.G.s) of education, which aim to acquire the required competencies and knowledge through lifelong opportunities for youth and adults [1]. Education institutions must equip students with skills and knowledge of sustainable learning to overcome complicated and challenging circumstances. Therefore, education institutions are responsible for ensuring learners overcome challenges, which is crucial for nations' S.D.G.s [2,3]. Consider-

ing the above challenges, education institutions must reform teaching strategies to ensure sustainable and flexible learning environments during the COVID-19 lockdown [4,5].

Innovation and entrepreneurship have received far more academic recognition in recent years, and several higher education institutions have started embracing educational programs. To what extent is entrepreneurship education altering students' perceptions and motivations to pursue self-employment? is a primary concern for researchers, academia, and policymakers globally engaged in entrepreneurship and innovation. Stevenson and Jarillo [6] defined entrepreneurship as a process by which individuals pursue opportunities, whether on their own or inside organizations, regardless of the resources they already possess.

The leadership and strategic decision-makers in the United Arab Emirates (U.A.E.) have stated the significance of fostering a future generation that is more entrepreneurially minded for the growth and development of the nation. The U.A.E. is promoting entrepreneurship to improve self-employment among youth; therefore, entrepreneurship and innovation have recently become mandatory in many institutions across all academic disciplines. In this situation, it is critical to gauge the impact of entrepreneurship education and student entrepreneurial goals. This study offers fresh perspectives on pedagogical advancements that will be helpful to U.A.E. institutions, policy-making bodies, and curriculum developers. The global entrepreneurship monitor (G.E.M.) data on the U.A.E. in 2016 claimed the following rankings for various entrepreneurship metrics within the U.A.E.: fear of failure rate 54.38, perceived capabilities 55.23, and entrepreneurial intentions 48.26. The values for entrepreneurship as a career choice are far higher compared to several countries, including the U.S.A., Sweden, and India [7].

Thus, it is crucial for the nation and its leadership that students actively participate in innovation and show commitment to entrepreneurial courses. The European Conference on Entrepreneurship Education emphasized the need to distinguish entrepreneurship education from conventional business and economics education [8]. Students must adapt their abilities and skills to meet the impending difficulties in the current dynamic environment. In this regard, universities and business schools are a significant source of education in entrepreneurship, management, business, and leadership; however, these institutions are often under criticism due to applying more theoretical and bookish knowledge rather than providing practical wisdom [9].

Several studies have highlighted that the conventional mode of teaching management courses and their underlying theories lack practical and concentrated information that students often require in complex real-world scenarios [10–12]. In other words, the traditional techniques and methods of teaching entrepreneurship and business courses are not supportive enough for young learners to adapt to sudden market changes and endure in a complex environment. Therefore, the times require replacing old teaching and educational methods with contemporary ones. Students must gain more practical knowledge on implementing entrepreneurial theories. In contrast, the traditional learning methods include lectures and discussions, provide them with theoretical insights, and fall short in providing them with real-world experiences [13,14].

Living standards have drastically changed due to the rapid evolution of digital technology. Students are raised in a media-rich atmosphere that includes television, the internet, consoles, and video games. Therefore, the educational system needs to be modified to uphold this generation's diversity of behavior and practices [15]. Business simulation games and prototype development tools can be helpful in this aim as a realistic representation of market processes in a safe, dynamic virtual environment. These games can assist in developing professional and decision-making skills because they require them to make decisions while considering real-world surroundings and available options, thereby enhancing the workplace's fair and balanced judgment skills [16,17]. In order to boost their learning engagement and achievement by taking part in factual circumstances, students must use the theories and applications they learn in simulation games or when creating prototypes. A simulation is a cutting-edge tool to encourage teachers and students to be creative and is

therefore regarded as a practical and novel approach to learning [18]. However, although several educational institutions have adopted business simulation games and web-based prototype-developing software for teaching and creativity purposes, their wide adoption, especially within developing countries, is still challenging due to limited open access. Furthermore, understanding how and why learning happens in various circumstances using these platforms is still elusive [19–21].

Business simulation games focus on managing various departments within an enterprise, such as accounts, finance, human resources, marketing, management, entrepreneurship, etc. [22]. These gaming platforms assist students with creative and innovative ideas for enhancing their engagement and learning skills about actual business scenarios while playing in a virtual environment. Students' critical and technical thinking capability is boosted by integrating theoretical and practical knowledge by playing business simulation games. Incorporating business simulation games into conventional teaching methods can improve student learning and make it more effective, beneficial, and enjoyable [23,24]. Additionally, students can design and manage various businesses, encounter obstacles and losses, and reap the rewards in a more exciting, risk-free virtual environment. Several studies have endorsed using business simulation games to strengthen creativity, individual motivation, critical thinking, team management, collaborative skills, time management, experimental learning, and commitment to entrepreneurship [25–31]. Furthermore, developing critical thinking and idea generation-related capabilities is one of the significant drivers of entrepreneurial education; therefore, incorporating prototype development tools can significantly boost the learning process by enabling students to design their own prototypes for the existing challenges through an interactive environment [32].

Based on the preceding advantages, this study aims to implement a business simulation game, "MonsoonSim", and a prototype developing tool, "Justinmind", in an online flipped classroom implemented in a short entrepreneurship summer course offered by the U.A.E. University at the request of the Ministry of Education, U.A.E. Although several studies have investigated numerous aspects of employing business simulation games, there has not been much research on using simulation games incorporated with prototype development software in online flipped classrooms for introductory to intermediate entrepreneurship courses to improve learning outcomes by encouraging high-order thinking and learning engagement among the young students with little to no entrepreneurial background. Furthermore, many educators have proposed that high-order thinking is not produced automatically. Participating in business simulation games allows students to work together more effectively while enhancing their learning outcomes and high-order thinking. Since students are not very familiar with incorporating technology during class, it might negatively or positively impact the overall engagement and learning experience.

Consequently, the primary objective of this research is to look into how using a business simulation game and developing software help enhance the students' learning expertise, perceived ease, usefulness, and enjoyment through the interactive environments provided by these platforms. Furthermore, the study also examined how students felt about their flipped classroom learning experiences by employing a business simulation game and prototype development software. In the end, some crucial insights are discussed regarding the significance of group attributes and which measures should be considered while formulating groups for collaborative activities to enhance collective learning outcomes.

2. Literature Review

2.1. Flipped Classroom

The flipped classroom is a cutting-edge method of teaching that puts students in command of their own learning by converting traditional in-class activities into extracurricular ones and vice versa. [33]. The study material is provided before class in the form of videos, audio, recorded lectures, and visiting and reading course-related websites, therefore, employing more hands-on activities and developing skills during the class [34]. However, this innovative pedagogical approach requires more student participation to

ensure effective knowledge transfer [35]. Meanwhile, teachers must provide engaging activities for the classroom that improve teamwork through group projects, coordinate discussions, debates, lectures, pitch reports, presentations, gamification, and designing prototypes to boost participation [36], higher-order thinking [37], and learning achievements [38]. The literature has reported using flipped classrooms in several fields, such as engineering [39], mathematics [40], education [41], health sciences [42], business [43], entrepreneurship [44], etc.

Due to its beneficial effects, the flipped classroom concept has drawn significant interest in business and entrepreneurship education, including active engagement, improved performance, and fostering communication and real-world knowledge, which are essentially required for developing a real business environment [37,45]. Employers endorse hiring candidates with the capabilities of implanting ideas and who possess traits of self-efficacy, resilience, and proactiveness. Employers value "a positive attitude, respect for others, trustworthiness, taking the initiative, accepting responsibility, team player, good communicator, ambition, self-confidence, and critical thinking, as well as appearance, leadership ability, a good sense of humor, good writing skills, knowledge of the major field, computer software skills, work experience, math skills, high grades, involvement in student professional organizations, and knowledge of the global community" [46]. Because students cannot put theories into practice until they are involved in a genuine business environment, conventional educational systems have failed to develop crucial entrepreneurship abilities. [47,48]. Flipped learning has the ability to overcome the problems with traditional teacher-centered teaching strategies since it takes a student-centered approach. Through a variety of activities, including group discussions, presentations, creating prototypes, etc., it encourages students to put theories and necessary abilities into practice [49–51].

Despite positive outcomes, several challenges have also been highlighted, e.g., the curriculum developers should think outside the box to design a highly effective course curriculum to ensure maximum deliverance of knowledge, and, being a student-centered approach, low self-regulation of students might result in less pre-class learning, eventually affecting their overall academic performance. Therefore, in addition to effective curriculum planning, self-regulation is an essential concern regarding implementing flipped classroom activities, especially among younger students, for being lazy and having engaged in too many extracurricular activities.

2.2. Business Simulation and Prototype Development

Web-based learning incorporates technology, such as business simulation games and prototype development tools, to improve the classroom's learning process [52–54]. These exciting and entertaining tools offer a virtual environment to implement real-critical analysis under real-world scenarios. As the simulation progresses, students adapt to the challenges by comprehending the effects of their decisions and deciding their next moves based on their previous knowledge [55].

Critical thinking skills can be developed through game-based learning and developing prototypes, where students create new knowledge by applying existing knowledge to simulations [56]. Several authors have suggested utilizing game and prototype development through web software to raise student engagement by making learning more entertaining and engaging [57]. For instance, Malliarakis et al. [58] analyzed the impact of incorporating Massive Multiplayer Online Role Playing Games (MMORPG) on learning a computer programming course for first-year undergraduate students. The educational component of these games is also known as CMX. Results showed that students enjoyed playing the game while learning and felt focused and motivated. Moreover, the pre-test and post-test performance analysis showed that the overall performance of students involved with MMORPG was improved compared to those taught in the conventional teaching mode. Likewise, Xinogalos and Eleftheriadis [59] implemented a game named "Office Madness" for teaching C++ programming language to final-year undergraduate students. They investigated the impact of using the game using a real-life job and programming scenario based on player

experience and learning. The results showed a positive effect of using such games for developing excellent playing and learning experiences along with improved outcomes. Due to perceived ease and usefulness, implemented CMX and serious games are one of the promising and robust methods of teaching a variety of courses, particularly computer programming, to resolve the high attrition and failure-related issues among computing courses [60].

Web-based prototype development tools have been highlighted for creating high-fidelity prototypes of web and mobile apps. They can render realistic versions of a finished product and offer collaboration, interaction, and design features, thereby serving as a valuable means of developing idea generation and critical thinking-related capabilities through fun and engaging platforms [61]. In comparison, business simulation games are widely used in business education and assist students in enhancing their engagement, higher-order thinking, and achieving their learning goals. Several studies have demonstrated the efficiency of game-based learning in strengthening theoretical foundations and producing a rich learning environment to support students in developing higher-order thinking through challenging situations [62–64]. Participants receive quick feedback that they can use to make improvements owing to the expertise obtained from numerous decision period repetitions. Real-time feedback also enables students to define the expected outcomes, thereby reducing uncertainty by promoting better performance outcomes.

Furthermore, business simulation games entail real business scenarios in a wide range of management and commercial fields, allowing participants to experience different strategic positions such as finance, management, human resource, so and so forth [65]. Researchers have highlighted employing business simulation games in business and entrepreneurial studies, which shows the paradigm transformation from typical teaching methods toward innovative and advanced teaching strategies. It causes increased engagement among young students due to fun learning, resulting in high critical thinking and improved learning outcomes [66,67].

2.3. Entrepreneurship Education

It has been more than seven decades since a business school formulated the first entrepreneurship course at Harvard in 1947 [68]. Educational institutions are fostering entrepreneurial skills among their students because entrepreneurship can stimulate economic growth and innovation within a country [69,70]. Several studies have focused on entrepreneurship in terms of effectiveness and success [71–73]. Education in entrepreneurship is a crucial skill that graduates need to have to create their businesses and support themselves financially due to technological and globalization trends. Due to its rising significance, entrepreneurial education has been made mandatory in some institutions' university curricula because it fosters innovation, creativity, problem-solving skills, a willingness to take calculated risks, and the ability to manage and steer a business toward predetermined goals [74].

Students who receive education in entrepreneurship are prepared to take advantage of possibilities, develop their creativity and innovation, and understand the connections between business, the market, risk, and competition. Its goal is to promote entrepreneurial values among graduates and encourage a spirit of independence and entrepreneurial culture. In several countries, formal entrepreneurial education has been mandatory in higher learning institutions, including the U.A.E. [75,76], Canada [77], Singapore [78], Turkey [79], Germany [80], and the Netherlands [81]. A long-term economic strategy for the U.A.E. for 2030 was first developed in 2006 by the Abu Dhabi Council for Economic Development and the Department of Planning and Economy. This strategy aimed to hasten the shift from an economy dominated by oil and gas, from 59% in 2005 to 36% in 2030, by supporting small and medium-sized businesses [82]. Keeping this in mind, the U.A.E. is encouraging its citizens to start their businesses by fostering entrepreneurship because authorities have acknowledged that it is the primary driver of economic growth and altering the entire composition of the economy.

According to the National Council's report on graduate entrepreneurship, graduates with formal entrepreneurial education tend to show more entrepreneurial intent and a preference for novelty [83]. It contributes to changing business trends and enhancing the value of today's fiercely competitive global business environments. Education is the most substantial ingredient of entrepreneurs' success. Numerous pedagogical approaches and entrepreneurship models have been highlighted to achieve an entrepreneur's desired characteristics, including risk-taking propensity, innovativeness, locus of control, positive attitude, need for achievement, motivation, and fortitude [84–86].

2.4. Learning Outcomes

2.4.1. Engagement

Student engagement is the effort that a student invests in learning activities and is influenced by various variables and the interplay of relationships inside the classroom [87]. Regardless of the varying mode of learning, student engagement has been focused on in several studies in literature due to its correlation to learning outcomes [88]. However, a steady increase in online learning platforms has been witnessed during the past decade. Online learning abruptly took center stage due to the global public health emergency after the COVID-19 outbreak, as all educational institutions were compelled to switch to online teaching mode [89]. This abrupt change posed challenges to students and teachers due to being unprepared for online learning [90]. According to several studies, engaging students in an online learning environment could be more challenging than on-campus face-to-face courses [91–93].

Engagement is an essential element of any learning activity using three constructs: behavioral, cognitive, and emotional engagement. Emotional engagement refers to students' expressions and attitudes towards learning experiences, such as frustration or excitement, and their social connections inside school premises [94]. Behavioral engagement shows how actively a student participates in learning activities and is linked with academic outcomes, such as persistence, participation, and attendance [95].

Academic performance, class participation, course grade, and course completion are indicators of predicting learning achievements. In comparison, engagement is linked with achievements and used as a robust predictor of retention, academic outcomes, and, eventually, graduation [45,96,97]. Despite the significance of student engagement, the literature on engagement in online flipped classrooms integrated with business simulation games for high school students is still sparse. Although some research has been focused on students' online learning experience, the characteristics of student engagement in online flipped classrooms are still unclear. Furthermore, to the best of our knowledge, no study has been conducted to analyze student engagement in flipped classrooms integrated with business simulation games for high school students with little to no prior fundamental knowledge of this particular stream. Therefore, apart from analyzing other aspects, this study also intends to fill the gap in high school students' engagement in flipped classrooms integrated with business simulation games for an entrepreneurial course, which will help teachers to develop a more engaging curriculum and learning activities that facilitate students towards active learning and high-level learning outcomes.

2.4.2. Higher-Order Thinking

Higher-order thinking is a perplexing concept and could be defined as using critical and creative thinking that enables one to solve complex problems [98,99]. Nurturing young students' higher-order thinking capability is a significant goal of the current curriculum in the U.A.E. and is crucial for developing a knowledge-based society [100]. Higher-order thinking is commonly classified into three categories: critical thinking, creativity, and problem-solving [101]. Critical thinking is the ability to analyze information objectively and think clearly and rationally. Creativity develops new objects through original ideas and solutions by analyzing, improving, and assessing current processes and procedures.

Identifying the issue, analyzing information, and formulating the best solution are all components of problem-solving [102–104].

The effectiveness of assessing academic achievement in higher education and the potential uses of higher-order thinking have both been extensively studied by researchers. The purpose of course activities is to encourage students to engage in higher-order cognitive thinking and to improve their subject-matter expertise. Teachers should find creative strategies to encourage the growth of higher-order thinking.

3. Methodology

3.1. Overview of Research Design

This study uses a mixed-methods quasi-experimental methodology that integrates quantitative and qualitative perspectives to comprehend a phenomenon. Figure 1 shows the research design, and Table 1 provides an overview of an online flipped classroom lesson. The experimental study consists of ten lectures lasting 4 h 30 min, with 30 min mid-lecture breaks, for two weeks. The course content was divided into six modules focused on idea creation, entrepreneurship, and business management skills.

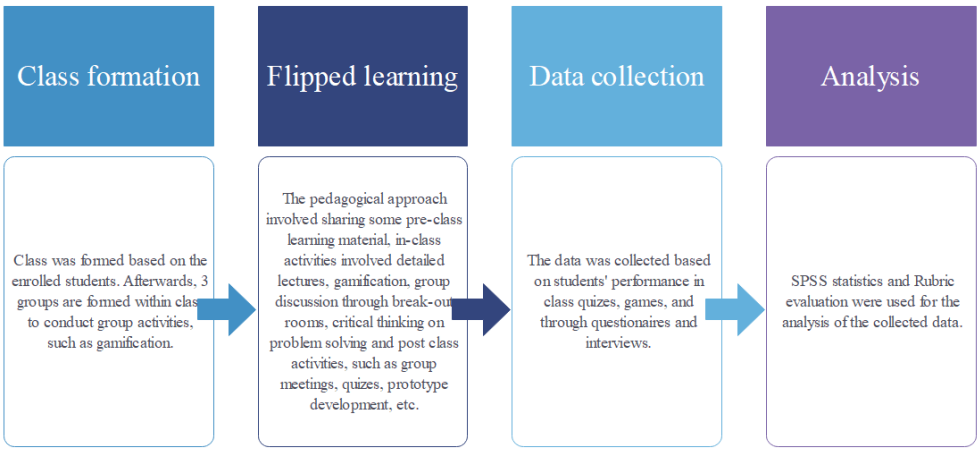


Figure 1. Pictorial view of the study design involved in this research.

Table 1. Overview of flipped lessons.

Pre-Class Activities	Class	Post-Class Activities	Deliverables
• Provide learning material in the form of notes, lectures, and videos.	• Lectures • Discussions with and without breakout rooms • Gamification • Critical thinking	• Online quizzes • Assignments • Group discussions • Group tasks	• Pitch report • Mobile prototype

3.2. Teaching Methodology

The course was divided into six modules focusing on several aspects of idea creation, entrepreneurship, and business management skills. The first module involved a brief lecture introducing the entrepreneurial mindset, entrepreneurship concepts, creativity, and idea generation. Module 2 detailed market feasibility and opportunity analysis. Module 3 covered product innovation and prototyping. Module 4 involved designing a business model. Module 5 involved entrepreneurial marketing and customer development. Meanwhile, developing a business plan was included in module 6.

After delivering entrepreneurial fundamentals, students were introduced to business simulation games. All the tasks required to finish the game were discussed, and the students were separated into three groups, while a fourth group composed of robot, to compare the students' performance with each other and against robot. MonsoonSim offers the flexibility of incorporating different business segments during simulations to regulate

the difficulty level while playing and competing in business simulations. Therefore, the first game involved general, finance, procurement, and retail modules to keep it simple and easy. In contrast, the second and third gamification sessions included the procurement and warehouse departments and all previous business modules to create a brief real-time business experience in the virtual environment. At the same time, the instructor had access to their performance through their game score and a quiz, which was scheduled at the end of each lecture.

After equipping the students with critical thinking, idea generation, and problem-solving, a brief overview of sustainable development goals (S.D.G.s) developed by the United Nations was provided to the class, and students were divided into three groups. Each group was required to identify the problem and develop a solution in the form of a mobile prototype in line with any SDG-17. Two groups chose S.D.G. 4, "quality education", and one group decided to develop a prototype in line with S.D.G. 11, "sustainable cities and communities". In the last lecture, students presented their mobile prototype in the final pitch report. All the students were required to fill out the questionnaire on perceived ease, usefulness, enjoyment, learning outcomes, understanding and recommendation for future students, and career intentions. A total of 6 students (2 with high rubric scores, 2 with medium rubric scores, and 2 with low rubric scores) were selected for the interviews. There were 10 interview questions, which were a modified version of questions proposed by Koole and Ally [105] while developing a framework for the Rational Analysis of the Mobile Education Model. The model was chosen because it can assess the learner's attitude toward using business simulation games. The modified questions analyzed the advantages of employing business simulation games along with prototype development software during the online flipped classroom for an entrepreneurial course. They also included the perspective of students' feelings while learning, their participation during group activities, how they communicated within the group, and how they made decisions while playing games and developing a prototype by incorporating the entrepreneurial fundamentals taught during the course.

3.2.1. Participants

This short summer course was specially designed by a collaboration between the faculty of the School of Humanities and Social Sciences and the School of Business, U.A.E. University, at the request of the Ministry of Education, to provide a brief overview of entrepreneurial concepts to high school students, which could be helpful in the selection of their career path. Therefore, students enrolled in this course were from different private and government sector schools in all seven emirates of the U.A.E., with diversity in nationalities, gender, and ethnicity.

3.2.2. Flipped Learning

The teaching mode of an online flipped classroom was implemented in this course. Important learning material was shared before each class to strengthen the concepts taught within the class. The teacher provided a detailed overview of all the modules, and after that, there were collaborative sessions on idea creation, problem-solving, business simulation, and prototype development. During class, the collaborative sessions were organized by using breakout rooms, and the teacher provided individual guidance if required by the students during group activities. Students were required to complete a quiz at the end of each lecture. Several group tasks were assigned as a post-class activity to maximize the learning outcomes through the extensive engagement of participants.

3.2.3. Business Simulation Game

MonsoonSim is an online business simulation game. The game is divided into 14 modules: general, finance, procurement, retail, forecast, marketing, warehouse, B2B wholesales, E-commerce, production, material requirements planning (M.R.P.), maintenance, human resource management, and service. The game allows players to customize

the difficulty levels and lets participants feel real-time business experience in a virtual world. The instructor can divide the students into teams, and all the teams can make strategic decisions by reviewing the market forecasts to compete within groups and maximize their established goals. A brief description of each MonsoonSim module involved in the games is illustrated below.

1. General: General module involves customizing the location attributes, modes of transportation, product customization, and incorporating the environmental impact.
2. Finance: The finance module allows the instructor to customize initial cost, loan parameters, maximum delinquent payouts, overflow fee, depreciation, research and development, and overdraft interest and limit.
3. Procurement: Procurement enables the customization of vendors' attributes, future delivery, and blanket purchase order.
4. Retail: Retail allows customization of the consumer's store loyalty and allows holidays.
5. Forecast: Forecast involves forecasting future market behavior.
6. Marketing: Marketing involves customization of brand awareness, marketing programs, and marketing fee.
7. Warehouse/logistics: Logistics involves customization of distance travel per day through different modes of transport, distance fee, and minimum shipping fee per shipment.
8. B2B wholesales: B2B allows customization of initial demand per day, deal profit margin, bid allow, and allowed B2B shipment.
9. E-commerce: This module allows for customization of e-commerce demand and posts to buy/sell.
10. Production: This module allows customization of material cost and equipment used to produce the product.
11. M.R.P.: This module allows material requirement planning.
12. Maintenance: Enables periodic maintenance time and cost of maintenance.
13. Human resources: This module allows customization of staff, their salaries, payroll tax, and other expenditures related to the workforce.
14. Service: This module allows feedback on products and responding to initiated complaints.

The instructor can access the real-time performance of students to assist in playing the game and visualize detailed progress reports for each group involved in the game. MonsoonSim allows students to develop their entrepreneurial business strategies for managing their inventory, sales, and management of opened stores through collaborative activities within the group, thereby offering a unique opportunity to deploy the entrepreneurial concepts learned during the lectures.

3.2.4. Justinmind

Justinmind is a web-based prototyping platform that offers several user-friendly features, such as developing high-fidelity prototypes without computer coding and creating customized apps for web or mobile. Furthermore, it allows for visualization of the realistic version of finished products, and users can work in teams through real-time collaboration and interaction. Therefore, it is an excellent platform for developing prototypes based on innovative ideas generated from critical thinking to solve existing real-world problems.

3.3. Data Acquisition and Analysis

The quantitative and qualitative data were collected through questionnaires, interviews, game scores, and rubric assessment of the developed prototype and pitch report delivered at the end of the course. Since the ultimate goal of involving advanced pedagogical approaches is to maximize the learning outcomes among the students through enhanced engagement, it is essential to analyze the perceived ease, perceived usefulness, and perceived enjoyment because adopting any pedagogical approach might have several positive and negative impacts while experiencing that specific mode of teaching. Therefore, if the student believes that adopting a particular method or incorporating particular

technology might enhance his learning outcomes, it prompts him to continue applying that technology.

Perceived usefulness means that adopting technology will result in enhanced performance. Perceived ease is the perception of the user-friendly features of any particular technology. Perceived enjoyment is the perception of the exciting features of a specific technology that are eye-catching and enjoyable and results in higher engagement of the users.

Based on the preceding motivation, this study will examine the student perception of using business simulation games and incorporating prototype development software in an entrepreneurial online class and its effect on their learning outcomes. Furthermore, the impact of the group formation based on the competencies of group members is also briefly analyzed and summarized, as illustrated in Figure 2. Therefore, the proposed hypotheses are as follows. H1: Entrepreneurial competency is influenced by perceived usefulness. H2: Entrepreneurial competency is influenced by perceived ease. H3: Entrepreneurial competency is influenced by perceived enjoyment. H4: Learning outcomes are influenced by students' entrepreneurial competency. H5: Group formation affects the learning outcomes of a whole group. The first three hypotheses were designed in accordance with the research model proposed by Dharmastuti et al. [21], while hypothesis four was tested based on the team learning model proposed by Smith and M. Spindle [106].

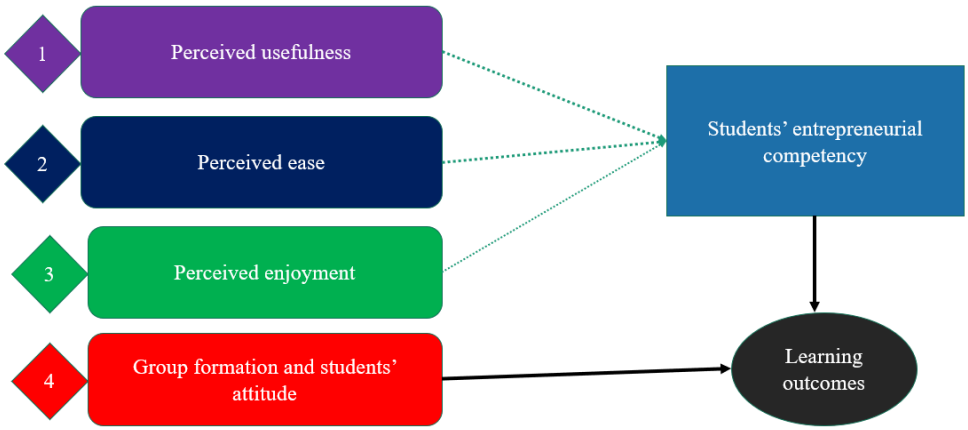


Figure 2. Overview of the research model employed in this research.

The respondents in this research were students enrolled in the summer entrepreneurship course offered by the U.A.E. University. Firstly, the questionnaire was divided into three parts: perceived usefulness, perceived ease, and perceived enjoyment, measured through questions on a scale of 1–5. Perceived ease, perceived ease, and perceived enjoyment were measured through 5, 4, and 3 questionnaire questions, respectively. In contrast, entrepreneurial competency and learning outcomes were analyzed through 8 and 5 questionnaire questions. Data analysis for the questionnaire and interviews was conducted using SPSS statistics, illustrated in the next section. Last, a rubric assessment designed by Cadotte et al. [107] was utilized to analyze the performance of each group based on their scores in the pitch report and prototype presented in the last lecture to find the correlation between the group attributes and the learning outcomes.

4. Results

The data collected through the questionnaire were exported to SPSS-statics for further analysis, and the demographic data of respondents are illustrated in Table 1. Before proceeding to the analysis, several tests, including Cronbach's alpha (C.A.), composite reliability (C.R.), and average variance (AVE), were conducted and analyzed on the collected data. C.A. is used to measure the internal consistency of the data, and it is considered to be satisfactory if it is >0.70. The calculated results show that the computed values of C.A. for perceived ease, perceived usefulness, perceived enjoyment, entrepreneurial

competency, and learning outcomes are significantly higher than 0.70, implying excellent internal consistency of the collected data. A composite reliability test was also conducted to validate the internal consistency further. The results show that the composite reliability for all the constructs is between 0.7473 and 0.8720, which is greater than 0.7, validating the conclusions extracted from the results of the C.A. test.

Furthermore, the average variance was calculated to measure the variability from the average mean. Usually, an AVE greater than 0.5 is acceptable, while in our case, all the constructs are an AVE greater than 0.6, illustrating excellent convergent validity of the collected sample data. Table 2 summarizes the detailed evaluation of the collected data, as described below.

Table 2. Model evaluation.

Item	Question	Mean	SD
Perceived usefulness (PU): Cronbach's alpha 0.949, Composite Reliability = 0.832, Average variance extracted = 0.6660			
PU_1	The use of prototype development software and business game simulation enhanced my performance.	4.1429	0.89974
PU_2	The provided content was beneficial.	4.4286	0.78680
PU_3	After employing both software, I better comprehended the theory learned during the lecture	4.2857	0.95119
PU_4	It assists me in analyzing the critical issues in product development and in running a company.	4.4286	0.78680
PU_5	The integration of prototype development too and a business simulation game allows me to understand business fundamentals more effectively.	4.2857	0.75593
Perceived ease (PE): Cronbach's alpha 0.964, Composite Reliability = 0.8720, Average variance extracted = 0.7960			
PE_1	I found it simple to use prototype development software and business simulations.	3.5714	1.39728
PE_2	I easily understand the whole process incorporated during simulations.	4.0	1.15470
PE_3	I found it easy to use both platforms.	4.0	1.0
PE_4	The material in both applications is straightforward to learn.	4.0	1.06904
Perceived enjoyment (PENJ): Cronbach's alpha 0.851, Composite Reliability = 0.7548, Average variance extracted = 0.6690			
PENJ_1	Simulation is engaging for me.	3.8571	1.06904
PENJ_2	During simulations, I feel like searching for additional details.	3.8571	1.46385
PENJ_3	I enjoyed learning to use simulations.	4.0	1.0
Entrepreneurial competency (EC): Cronbach's alpha 0.934, Composite Reliability = 0.8109, Average variance extracted = 0.6930			
EC_1	I can analyze the information.	3.7143	1.11270
EC_2	I am capable of making meaningful decisions.	4.1429	0.89974
EC_3	I can relate the existing information.	4.0	1.15470
EC_4	I am capable of time management.	4.2857	0.95119
EC-5	I am motivated to become familiar with new technology.	4.5714	0.53452
EC_6	I can resolve conflicts in groups.	4.4286	0.75593
EC_7	I became more creative.	4.2857	1.13389
EC_8	I am capable of handling deadline-related issues and problems.	4.0	1.11270
Learning outcomes (LO): Cronbach's alpha 0.891, Composite Reliability = 0.7473, Average variance extracted = 0.6387			
LO_1	I made a significant contribution to the simulation.	4.0	1.15470
LO_2	My contribution to the group is substantial.	4.2857	1.11270
LO_3	I accomplish desired targets and goals by contributing to simulation.	4.2857	0.95119
LO_4	Business simulation and prototype development make a real impact on the experiential learning process.	4.2857	0.75593
LO_5	I am satisfied with this learning experience.	4.4286	0.78680

Before proceeding further, five new variables, P.U., PE, PENJ, E.C., and L.C., were constructed based on the means of variables categorized in the perspective types. Afterward, the Shapiro–Wilk normality test was used to validate the normality of the data, which is summarized in Table 3. Since all the Sig. Shapiro–Wilk test values are less than 0.05, the data are not normally distributed, meaning the data are discrete and bound on the left and right sides. To analyze the model fitting, a −2 log-likelihood test was conducted for a null model and a full model that contains the full set of predictors. The likelihood chi-square test was used to test whether there is a significant improvement in the fit of the final model relative to the intercept-only model, and the results show that the model fitting information is statistically significant ($x^2(3) = 14.670$, $p < 0.05$), as illustrated in Table 3. Furthermore, Pearson and Deviance chi-square tests were further used to analyze the goodness of fit. The

results show the p-value > 0.05, which means the data fit the model very well, as illustrated in Table 4.

Table 3. Outcomes of Shapiro–Wilk normality test.

Variable	Statistic	Sig.
P.U.	0.838	0.026
P.E.	0.842	0.010
PENJ	0.798	0.003
B.C.	0.887	0.019
L.O.	0.800	0.041

Table 4. Model fit and goodness of fit information.

Model Fitting Information				
Model	−2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	21.698	-	-	-
Final	7.028	14.670	3	0.002
Goodness of Fit				
	Chi-square	df	Sig	
Pearson	6.547	21	0.999	
Deviance	7.028	21	0.998	

Table 5 summarizes Spearman's rank correlation coefficient to summarize the testing results of our first three hypotheses: perceived usefulness, ease, and enjoyment significantly affect the students' entrepreneurial competency. The results show that the variable "student entrepreneurial competency" can be explained by perceived usefulness, ease, and enjoyment by 90.6%, 84.9%, and 79.6%, respectively. Additionally, given that the R2 value of the perceived learning result is 0.823, the student entrepreneurial competency can account for 82.3% of the variation in the perceived learning outcomes. As a result, it can be said that perceived ease, usefulness, and fun have a favorable and considerable impact on students' entrepreneurial competency. At the same time, learning outcomes are highly influenced by the student's entrepreneurial competency, thereby proving H1, H2, H3, and H4.

Table 5. Summary of Spearman's rank correlation coefficient.

	***p*-Value**	**Correlation Coefficient (R^2)**	**Significant**
H1: PU -> SEC	0.005	0.906	Yes
H2: P.E. -> SEC	0.016	0.849	Yes
H3: PENJ -> SEC	0.032	0.796	Yes
H4: SEC -> LO	0.000	0.814	Yes

In order to prove H5, a rubric assessment was used to evaluate the performance of each group in developing the prototype and presenting the final pitch report. Students were divided into three groups, and each group was required to create a solution in line with any of the sustainable development goals developed by the United Nations.

During rubrics, the total score was the combination of the executive summary, business description, industry analysis, management plan, marketing plan, operational plan, the financial plan provided in the final pitch, and the evaluation of the developed prototype. The maximum possible score is 100, where 85–100 is assumed "exemplary", 70–84 "acceptable", 55–69 "need improvement", and below 54 "inadequate" to analyze the effect of group formation and the students' punctuality and behavior on their performance. The detailed descriptive analysis of the rubric assessment scores of each variable is summarized in Figure 3 and Table 5.

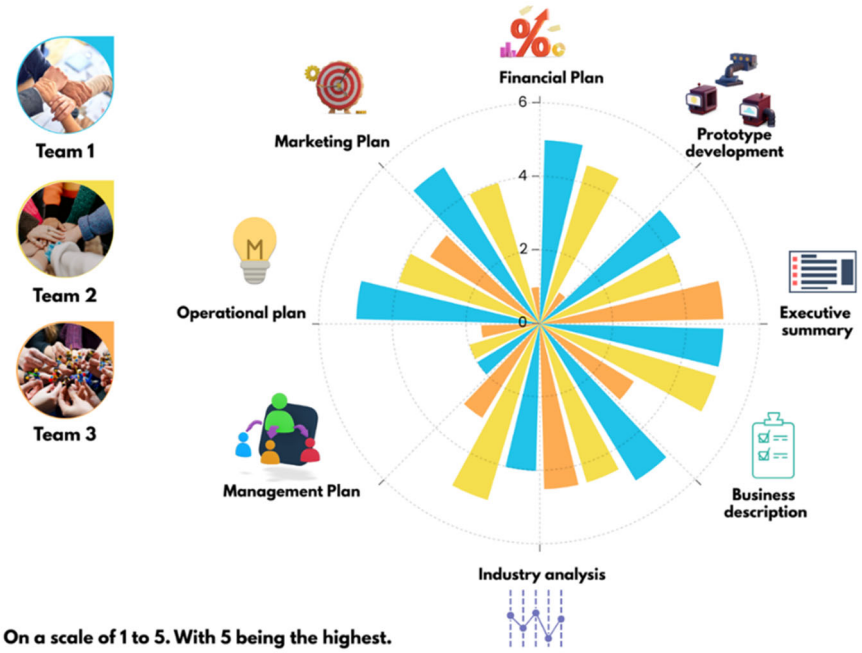


Figure 3. Overview of rubric assessment score of three groups involved in this research.

The results show that team 1 scored 87, team 2 scored 81, and team 3 scored only 58 points out of 100. The reason behind this deviation is team formation. Team 1 was assigned an instructor who helped the members to be more work-oriented and engaged. Team 2 was composed of students with high academic scores; they also worked well during this course but could not compete with team 1 due to the absence of a dedicated instructor. The behavior of team 3 was a bit non-serious; most of the group members were also inconsistent during the class, resulting in a significantly lower score than the other two groups, validating H5.

Open-ended interviews were conducted at the end of the course. The students were asked to share their experiences about their engagement throughout the class, the usefulness of using business simulation games and the prototype development software, their understanding of each module, their further study/work intentions, and whether they would recommend that others take this course.

From the perspective of business simulation and prototyping platforms, the interview questions were mainly about usefulness, ease of use, and enjoyment. For the usefulness, interviewees felt that the MonsoonSim provides a brief overview of all business segments, such as location, retail, finance, sales, warehouse, marketing, and human resource management, and real-time marketing analysis reports help develop the strategies according to market conditions, which is same as running a real business. Similarly, they felt that the prototype development platform Justinmind is highly equipped with high-end prototypes that help illustrate their ideas. Most users claimed that the user experience and functionality of Justinmind and MonsoonSim were quite entertaining and easy to adapt. Regarding enjoyment, most of them stated that the competitions between and within the group while playing MonsoonSim and earning a profit and points for each segment were fun, which resulted in high engagement in the game. Similarly, they believe that creating high-fidelity prototypes with Justinmind without employing coding was fun due to its ease of use. They will continue using this platform to build their professional prototypes.

Responses were also collected about their prior knowledge. All the respondents stated that they had never engaged in such a blended course of learning through business simulation games and prototype development platforms, and most of the respondents did not have any previous background in business courses; however, business simulation helped them understand the core functional departments of a real business even without prior knowledge of business education. Overall, all the respondents were completely

satisfied with this teaching mode, and most of them stated that they would recommend this course to others.

Questions were asked about whether perceived usefulness, enjoyment, and ease helped increase learning outcomes. The analysis shows that most interviewees specified that this online teaching method, blending business simulation games and prototype development was useful, enjoyable, and easy to develop entrepreneurial fundamentals. In addition, pre-class activities enabled them to strengthen the concepts they were taught during the class. Furthermore, joint discussion meetings improved their self-confidence and communication skills. Meanwhile, most interviewees believed that developing a prototype and playing games together in a group increased the knowledge-sharing capacity, eventually increasing the learning outcomes in an easy, enjoyable, and valuable way.

5. Discussion

This study employed a business simulation game, MonsoonSim, and an online prototype developing platform, Justinmind, in the flipped classroom of a short summer entrepreneurship course to analyze the impact of integrating these platforms to enhance the students' entrepreneurial competency and eventually improve the learning outcomes.

5.1. Impact of Business Simulation Game and Prototype Development on Student Learning

The idea of employing an innovative pedagogical approach is to improve student learning in an easy, effective, and enjoyable manner. Learning outcomes can be in different areas, such as creativity, critical thinking, problem-solving, etc. Statistical analysis shows that this unique blend of learning using pre-class and post-class activities and integrating business simulation games and prototype development platforms significantly improved learning outcomes, which is in line with the previous findings [62,63]. Engagement is linked to perceived ease and enjoyment, a predictive factor of learning grades and performance scores, as shown in Tables 5 and 6. Employing business simulation games requires team efforts, discussions, idea sharing, and critical thinking, which improves learning achievement with enjoyment and ease of use, as suggested by the previous studies conducted [20,108]. The achievement scores were extracted through the final pitch report and developed prototype after the course. Although the students did not have any previous understanding of business concepts, their performance exceeded the expectations of the instructors and researchers. The results show that involving business simulation games and prototype development platforms creates opportunities for developing more profound learning of entrepreneurial skills by simulating real-time experiences in the virtual environment, which is consistent with earlier findings [109]. In addition, in line with a study conducted by Deterding et al. [110], the interviews confirmed that incorporating business simulation games and prototype development software offer ease of use, collaborative work, and enjoyment, resulting in high engagement throughout all activities. As a result, it is concluded that this blended mode of education is a crucial innovative tool for advancing education in the future. The students recommended using this teaching/learning approach in future classes and incorporating it into new curricula.

5.2. Impact of Group Attributes on the Student Learning

Several activities, such as gamification, pitch reports, prototype development, etc., require group activities that help break complex tasks into parts but also help in developing teamwork and more robust communication skills while identifying and proposing solutions for existing problems. However, several aspects should be considered while forming a group, such as group size, roles, prior knowledge of the specific topic, etc. This study shows that it is essential to identify the characteristics of students, such as prior knowledge, previous skills, and motivation. Since entrepreneurial courses are primarily offered as elective courses, students from different disciplines and backgrounds can take these courses at any level of their degree program. Therefore, it is essential to consider the characteristics above to maximize the learning outcomes for the whole class. These findings are consistent

with the published data [111]. Learning outcomes depend on the perceived ease, which can be enhanced by collaboration and assigning one instructor or at least one team member with previous solid background knowledge of a particular subject. The results from the rubric assessment score in Figure 2 show that assigning an instructor or a senior team member with previous background knowledge helps others identify the problem and develop innovative solutions by keeping them motivated and engaged throughout the project. Meanwhile, it is also essential to consider the group members' behavior and academic scores while formulating the group [112]. For instance, results show that the group with team members who had excellent academic scores performed well even without a senior team member. However, the group with inconsistent behavior showed inadequate progress during the course.

Table 6. Descriptive analysis of rubric assessment scores.

		Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
BD	A	4.6667	.	.	.	.	4.67	4.67
	B	5.0000	.	.	.	.	5.00	5.00
	C	4.6667	.	.	.	.	4.67	4.67
	Total	4.7778	0.19245	0.11111	4.2997	5.2559	4.67	5.00
IA	A	4.0000	.	.	.	.	4.00	4.00
	B	4.0000	.	.	.	.	4.00	4.00
	C	4.0000	.	.	.	.	4.00	4.00
	Total	4.0000	0.00000	0.00000	4.0000	4.0000	4.00	4.00
MP	A	3.0000	.	.	.	.	3.00	3.00
	B	1.0000	.	.	.	.	1.00	1.00
	C	1.6667	.	.	.	.	1.67	1.67
	Total	1.8889	1.01835	0.58794	−0.6408	4.4186	1.00	3.00
MAR	A	5.0000	.	.	.	.	5.00	5.00
	B	4.0000	.	.	.	.	4.00	4.00
	C	3.5000	.	.	.	.	3.50	3.50
	Total	4.1667	0.76376	0.44096	2.2694	6.0640	3.50	5.00
OP	A	3.0000	.	.	.	.	3.00	3.00
	B	3.6667	.	.	.	.	3.67	3.67
	C	3.3333	.	.	.	.	3.33	3.33
	Total	3.3333	0.33333	0.19245	2.5053	4.1614	3.00	3.67
FP	A	5.0000	.	.	.	.	5.00	5.00
	B	4.5000	.	.	.	.	4.50	4.50
	C	1.0000	.	.	.	.	1.00	1.00
	Total	3.5000	2.17945	1.25831	−1.9141	8.9141	1.00	5.00
PD	A	4.6667	.	.	.	.	4.67	4.67
	B	4.3333	.	.	.	.	4.33	4.33
	C	4.6667	.	.	.	.	4.67	4.67
	Total	4.5556	0.19245	0.11111	4.0775	5.0336	4.33	4.67

Where B.D. is a business description, I.A. is industry analysis, M.P. is a management plan, M.A.R. is the marketing plan, O.P. operational plan, F.P. is the financial plan, and P.D. is a developed prototype. A is team 1, B is team 2, and C is team 3.

Therefore, it is suggested that the group formulation should be balanced, and assigning a dedicated instructor, or at least the presence of one senior member with sufficient

prerequisite knowledge, can enhance the learning outcomes of the whole group through perceived ease while performing collaborative tasks.

6. Conclusion and Prospects

This study summarizes the effect of incorporating a business simulation game (MonsoonSim) along with prototype developing software (Justinmind) in a flipped classroom during an online summer entrepreneurial course offered by the United Arab Emirates University to high school graduates from various private and government schools from all over the United Arab Emirates. Results show that the use of business simulation games improves learning outcomes for students through higher-order thinking, idea generation, creativity, and problem-solving. The reason for the improvement is the correlation between perceived ease, usefulness, and enjoyment with learning competency. The proposed pedagogy promotes active learning in an online flipped classroom by incorporating lectures, discussion, critical thinking, and gamification within lectures and post-class activities such as group meetings, prototype developments, study materials, etc. This blend of teaching helps keep students engaged and actively participating due to ease of learning and perceived enjoyment, resulting in enhanced academic performance.

Furthermore, the results from the rubric assessment show that group formation also strongly influenced the students' learning outcomes. Therefore, several characteristics such as group size, roles, students' academic profiles and attitudes toward learning, and students with or without previous background knowledge of particular subjects should be considered during group formation. The statistical results reveal that if a dedicated instructor or member with solid previous background is included in the group, the learning outcomes can be significantly improved. Furthermore, consistency is also a significant parameter, and the results show that the groups with inconsistent behavior during the course could not show adequate results.

The interview results show that incorporating business simulation games along with the prototype developing platform improved students' competencies such as leadership, teamwork, communication skills, working under pressure, etc. The business simulation game also enabled the opportunity to monitor and compare the real-time performance and market analysis reports to increase their ability to critically analyze the information and take action in response to those reports.

A few limitations have been highlighted for future research direction on employing gamified flipped classrooms; for instance, the sample size was small, consisting of only 9 students, which might restrict the accuracy of the statistical data. Moreover, the students in this course did not have prior entrepreneurial education background knowledge and prototype development skills; therefore, some gaming and prototype development platforms were relatively complex. Therefore, to rationalize the above findings, further studies are suggested with a sufficiently large sample size and participants having a mid to full-level understanding of prototype development and the fundamental areas incorporated in the business simulation game, such as retail, marketing, finance, etc. Furthermore, the course duration was shorter due to its alliance with the summer program; therefore, a similar study could be conducted in a regular semester to visualize the anticipated improved learning outcomes during the whole semester.

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