SKYRISE: INTERACTIVE DESIGN FUELING ENTREPRENEURIAL MINDSET IN YOUNG LEARNERS

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A Research Report

Submitted in partial fulfillment of the degree of

Bachelors in Industrial Design

B.ID

Department of Industrial Design

School of Art, Design and Architecture (SADA)

University Of National Science and Technology (NUST)

Islamabad

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A Research Report

Khadeeja Ather Abbasi

A research report submitted for evaluation to School of Art, Design and Architecture on 7th June 2024, in partial fulfillment of the requirement for the degree of B.ID.

(Signature)	**(Signature)**
Graduation Projects Coordinator (SADA)	**Examination**

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School of Art, Design & Architecture

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Abstract

Entrepreneurial skills like creativity, risk-taking, and problem-solving are increasingly vital for future success. Yet, traditional education often struggles to nurture these crucial abilities. Enter interactive games—an emerging avenue for engaging and effective learning. This study delves into their potential to develop essential entrepreneurial skills in children aged 10 and above, specifically within the Pakistani context. Through a thorough literature review, the research explores the significance of early entrepreneurial skill development and the benefits of learning through play and interactive games. It investigates existing research on leveraging these tools for entrepreneurship education, highlighting key design principles and successful game-based learning initiatives. The project aims to contribute to the field of gamified entrepreneurship education using the medium of serious board game design by investigating innovative approaches and assessing their effectiveness in cultivating vital skills for young minds. By bridging the gap between play and learning, this research seeks to empower young Pakistanis to shape their economic futures.

Keywords: *Entrepreneurship, Entrepreneurial Education, Interactive board game design, Adolescents, Learning Through Play, Innovative Pedagogy*

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1.0 Introduction

In today's rapidly evolving world, the ability to think creatively, embrace risk, and solve problems effectively are no longer solely valued traits in the realm of business ventures. As the 21st century demands adaptability and innovation across diverse fields, nurturing these entrepreneurial skills has become critical for the success and well-being of individuals in an increasingly complex and dynamic landscape.

However, traditional education systems, particularly in Pakistan, often falls short of equipping young minds with the necessary tools and experiences to develop these crucial abilities and skills that would help them create a mindset. In Pakistan, where a large young population under 30 faces challenges like high unemployment and a predominantly informal sector, fostering entrepreneurial spirit holds immense potential to create jobs, stimulate innovation, and drive economic diversification. In response to this gap, interactive games emerge as a promising avenue for engaging and effective learning, offering the potential to transform the way we approach entrepreneurial education for children.

The rapid rise of technological advancements has brought a paradigm shift in learning experiences, paving the way for innovative pedagogical approaches. Interactive games, in particular, have garnered significant attention due to their inherent ability to captivate learners, encourage exploration, and promote active engagement (De Freitas & Oliver, 2010). By amalgamating the inherent appeal of play and gamification, interactive games can transform educational learning into a dynamic and enjoyable process, effectively developing cognitive development, social skills, and emotional intelligence (Prensky, 2007).

For young children, particularly children aged 10 and above, the transition from concrete to abstract thinking begins to take shape (Piaget, 1970). Interactive games provide a safe and engaging environment for them to experiment, take risks, and learn from their mistakes without the fear of real-world consequences (Oblinger & Oblinger, 2006). Through precisely designed game mechanics and scenarios, children can navigate simulated entrepreneurial challenges, develop creative solutions, build resilience, and hone their decision-making skills (Granado-Vega et al., 2018).

This study aims to delve deeper into the potential of interactive games as a tool for nurturing essential entrepreneurial mindset and skills in children aged 10 and above. Drawing from a comprehensive literature review, this study aims to explore the significance of early entrepreneurial skill development, analyze the benefits of learning through play and interactive games, and examine existing research on their application in entrepreneurship education. Based on these findings, the study will propose the design and development of a novel interactive, yet serious game specifically tailored to equip young children with the requisite skills through engaging and playful experiences.

By bridging the gap between traditional education and the dynamic world of interactive games, this research aspires to contribute to the field of gamified entrepreneurship education. Through the creation of an innovative and captivating board game, the aim is to demonstrate the effectiveness of playful learning in cultivating essential skills for young minds, paving the way for a future generation equipped to face the challenges and opportunities of the 21st century.

2.0 Literature Review

2.1. Traditional Education

The conventional educational paradigm, recognized as passive education, revolves around a teacher-centered approach focused on unidirectional knowledge transmission to students. Typically observed in traditional classroom setups where students sit in rows facing the teacher's front stand, this structure allows for supervision of students' stationary positions (Eradze, Rodríguez-Triana, M.J. Laanpere, 2019). This method emphasizes passive learning, centering on absorbing factual information and theoretical coursework. However, its reliance on prepared lectures and textbooks often limits practical application opportunities, hindering hands-on learning experiences. Furthermore, this unilateral knowledge transfer discourages meaningful interactions among students and between students and teachers.

In contrast, integrating discussion elements into classrooms offers a myriad of advantages. This inclusive approach cultivates indispensable interpersonal skills—such as active listening, effective communication, cross-cultural engagement, and collaborative problem-solving—that hold paramount importance in professional environments (Nealy, C, 2005). The insufficiency in nurturing these crucial abilities represents a significant drawback of traditional teaching methods, largely stemming from the limited scope for student discussions within this framework.

Traditional education struggles to equip students with the dynamic skill set indispensable for success in the 21st century. According to the World Economic Forum's (2020) "The Future of Jobs Report 2020," education systems need adaptation to prioritize crucial competencies like creativity, critical thinking, and problem-solving, often overlooked in

conventional methodologies. This existing gap necessitates innovative learning approaches, such as game-based learning, to empower young minds with the essential skills required to flourish in an era characterized by unpredictability and rapid change.

2.2. The Importance of Early Entrepreneurial Education

Driven by the entrepreneurial boom in recent decades, an interest in seeking entrepreneurial education has swept through the educational systems (Valerio et al., 2013). Several countries have implemented various entrepreneurial education programs owing to their expected benefits. In this regard, the European Commission (2012) has been encouraging its member states to implement entrepreneurship programs in hopes of cultivating students' entrepreneurial skills. Entrepreneurship education was also found to enhance the intention to launch your startup or business (Noel, 2000), as well as contribute to economic growth and job creation (Falkäng and Alberti, 2000). Consequently, there has been a growing acknowledgment of the significance of entrepreneurship education (Carland & Carland, 2004).

Moreover, studies have revealed that entrepreneurship education amplifies entrepreneurial prowess, leveraging creativity, innovation, and available resources to identify pathways to success. At its core, entrepreneurship hinges on the capacity to generate novel and distinctive concepts through imaginative thinking and innovative initiatives aimed at forging new opportunities (Suryana, 2006).

The introduction of entrepreneurship in schools holds the potential to influence children's perceptions of entrepreneurship positively. Childhood stands as an opportune stage for fostering education aimed at nurturing a favorable attitude toward entrepreneurship. Additionally, preschool constitutes the take-off for the evolution of the entrepreneurial self, and childhood has been considered to be the most appropriate age group to acquire positive attitudes toward entrepreneurship and to adopt an entrepreneurial approach (Axelsson et.al, 2015). Growing the entrepreneurial spirit in early childhood is more on building the traits and characteristics of being independent, responsible, optimistic, and not easily giving up. Therefore, entrepreneurship learning in early childhood can be integrated into the curriculum through programs or activities designed by schools whose implementation involves not only principals, teachers children but also parents.

To develop robust qualities and traits as suggested by Mursid (2015), childhood learning should adhere to the following principles:

• Encouraging Active Learning in Children

Education ought to guide children toward becoming proactive learners. Well-designed educational approaches foster an environment where learners actively engage. Such educational processes are exemplified by Student Active Learning (CBSA = Student Active Learning).

• Sensory-Based Learning

Children acquire knowledge through their senses—sight, sound, touch, smell, and taste. Therefore, childhood education should encompass diverse activities that cater to the development of all sensory abilities.

• Facilitating Knowledge Building

Allowing children to learn through their experiences and accumulated knowledge since birth enables a comprehensive understanding of the world.

• Embracing Concrete Learning Objects

Utilizing tangible objects in learning aids children in conceptualizing ideas effectively. Engaging with real objects as part of the learning process minimizes confusion and stimulates cognitive development.

• Learning from the Surrounding Environment

Education should purposefully and thoughtfully aid children in optimal potential development to adapt and thrive within their environment.

2.2.1. Benefits for future success and adaptability

In the 21st century, adaptability and innovation have become imperative in various domains. Entrepreneurial competencies, encompassing creativity, problem-solving, and risk-taking, are no longer exclusive to business endeavors but are pivotal for success and thriving in our intricate modern milieu. The OECD (2019) underscores this in their publication "The Future of Education and Skills: Education 2030," emphasizing that individuals possessing higher levels of these skills exhibit enhanced adaptability, problem-solving prowess, and resilience. Consequently, they enjoy improved career prospects and overall life outcomes. This underscores the criticality of nurturing these proficiencies early on, providing young individuals with the necessary abilities to maneuver adeptly through the swiftly changing global landscape.

2.2.2. Role in personal development and social integration

Entrepreneurial skills transcend conventional business knowledge; they wield a profound influence on individual growth and societal assimilation. As detailed in the Kauffman Foundation's (2018) publication, "How Entrepreneurial Skills Benefit Young People," fostering these competencies among the youth fosters self-assurance, adept communication, and collaborative prowess. This, in turn, fosters heightened social assimilation and emotional intelligence. As young entrepreneurs delve into taking initiative, resource management, and relationship building, their holistic development augments, nurturing both personal well-being and societal integration.

2.3. The Need for Entrepreneurship Education in Pakistan

Pakistan's economy faces multiple challenges, including high unemployment, a large informal sector, and reliance on remittances. Encouraging entrepreneurial endeavors can create jobs, stimulate innovation, and drive economic diversification, contributing to sustainable growth (Ghani, 2015). Pakistan boasts a young and growing population, with over 60% under 30 (Trading Economics, 2023). This presents an opportunity to harness the potential of this demographic by equipping them with entrepreneurial skills and mindsets. Traditional education often fails to equip graduates with the skills needed for the 21st-century workforce. Entrepreneurship education fosters essential skills like critical thinking, problem-solving, creativity, risk-taking, and resilience, crucial for success in various professional endeavors (World Economic Forum, 2020). Traditional Pakistani society encourages conformity and risk aversion, potentially hindering entrepreneurial spirit. Entrepreneurship education can challenge these norms, instilling confidence, fostering self-reliance, and empowering individuals to pursue their ideas and contribute to social change (Khan, 2018).

2.4. Learning Through Play and Interactive Games

2.4.1. Theories in Play

The realm of early childhood development is a central focus among leading theorists. Mooney (2013) underscores the consensus among influential figures such as Dewey, Montessori, Erikson, Piaget, and Vygotsky, stressing the pivotal role of play-based learning during this formative period. These scholars collectively advocate for an educational ethos that revolves around tailoring learning experiences to the child's needs, emphasizing active and interactive learning embedded within the child's social and community contexts (Mooney, 2013, p. 4). Play, as highlighted by Dewey (1938), Montessori (2008), Piaget (1962; 1976), and Vygotsky (1976), encapsulates these essential components. It allows children to explore, learn, and internalize content skills seamlessly.

The core mandate of an educational setting for children lies in constructing experiences that align with their existing knowledge base, facilitating a more profound comprehension of educational content. Ensuring an environment conducive to children's learning stands as a fundamental objective for educators in early childhood settings. Within these thoughtfully prepared and structured environments, children engage in learning through exploration, discovery, investigation, critical thinking, and active utilization of classroom materials.

2.4.2. Benefits of learning by play and Gamification

Play is not simply a frivolous activity; it is a powerful tool for learning and development. As Hamari and Koivunen (2016) found in their meta-analysis, "The Flow Experience in Game-Based Learning," gamified learning environments lead to increased motivation,

engagement, and knowledge retention compared to traditional methods. Interactive games leverage the inherent appeal of play, transforming learning into a dynamic and enjoyable process. This promotes active participation, exploration, and experimentation, fostering cognitive development, social skills, and emotional intelligence (Prensky, 2007).

Research highlights numerous benefits of game-based learning:

• Increased Motivation and Engagement: Hamari and Koivunen (2016) found that gamified learning environments led to higher motivation, engagement, and knowledge retention compared to traditional methods. Game elements like storytelling, challenges, and rewards tap into our intrinsic motivation and promote active participation.

• Active Learning and Knowledge Application: Squire and Jenkins (2003) emphasize how games encourage active learning through decision-making, problem-solving, and applying knowledge in dynamic contexts. This fosters deeper understanding, critical thinking, and problem-solving skills.

• Development of Essential Skills: Games provide opportunities to develop crucial skills like collaboration, communication, leadership, and risk-taking through social interaction and teamwork within the game environment (Deterding et al., 2011).

• Personalized Learning: Adaptive learning games can tailor the experience to individual student needs and learning pace, creating a more personalized and effective learning journey.

2.4.3. Design principles for effective educational games

Disparities exist among games regarding their efficacy in facilitating learning experiences. Squire and Jenkins (2003) introduce four fundamental design principles for proficient educational games within their publication titled "Harnessing the Power of Technology to Create Authentic Learning Environments": namely,

meaning, challenge, power, and identity

Meaningful games establish connections with real-world encounters, presenting pertinent challenges that encourage problem-solving skills. Games that pose substantial challenges offer avenues for advancement and expertise while ensuring accessibility. Empowering games grant players autonomy and authority over their learning trajectory, concurrently cultivating a sense of identity and ownership concerning their achievements.

2.4.4. A shift from passive to active learning

Conventional learning methods, primarily centered around textbooks, predominantly entail passive information absorption, often sidelining the potential for active engagement. Prensky (2007) posits in the work "Digital Natives: Rethinking Learning in the Digital Age" that these traditional educational approaches inadequately capture the attention of digital natives, who incline toward interactive and immersive learning experiences. The adoption of interactive games emerges as a compelling and more effective alternative for learning, transitioning students from passive recipients of knowledge to active participants within the educational framework.

Interactive games hold promise in addressing these shortcomings by providing a more engaging and efficacious pathway for learning. The allure of gamification lies in its ability to captivate students through interactive elements, narratives, and challenges, as asserted by Hamari and Koivunen (2016). This engenders heightened motivation, concentration, and perseverance among learners (Ryan & Deci, 2000).

Moreover, interactive games foster active learning and knowledge application, encouraging students to actively participate, make decisions, tackle problems, and employ their knowledge within dynamic contexts, as highlighted by Squire and Jenkins (2003). This approach cultivates deeper comprehension, critical thinking, and problem-solving abilities.

Furthermore, game-based learning contributes to the development of essential skills such as collaboration, communication, decision-making, and risk-taking. Through social interaction, teamwork, and overcoming challenges inherent in the game environment, learners can acquire these vital competencies (Deterding et al., 2011).

"Creative and playful learning: Learning through game co-creation and games in a playful learning environment" by Obolensky et al. (2018) highlights the value of co-creating games in classrooms. This not only enhances engagement but also encourages creativity, collaboration, and ownership of the learning process. While, Yoo et al. (2012) explore the use of simulations and serious games in teaching entrepreneurship. The author found that these games effectively develop business acumen, decision-making skills, and risk tolerance in students.

2.5. Case Studies: Beyond Entrepreneurship, Games that Encourage Learning and Skill Development

Games, revered for their inherent appeal and interactive dynamics, transcend the boundaries of entrepreneurship education, offering valuable learning experiences across diverse domains. Expanding beyond the confines of business acumen, several case studies underscore the transformative power of games in fostering essential skills and experiences:

Settlers of Catan

Renowned as a popular board game, Settlers of Catan is a robust tool for cultivating negotiation, resource management, and strategic thinking. Participants immerse themselves in a resource-rich environment, engaging in trade, barter, and settlement-building to secure dominance. The game facilitates strategic decision-making, honing skills in risk assessment, resource utilization, and adaptability – competencies highly transferrable to various personal and professional spheres.

Figure 1. Settlers of Catan

Lemonade Stand

Lemonade Stand is a classic simulation game available in both physical and digital formats, as an effective catalyst for nurturing financial literacy and entrepreneurial acumen. Players manage a virtual lemonade stand, manipulating prices, adjusting recipes, and responding to market fluctuations. The gamified experience introduces players to fundamental economic principles, enabling them to experiment with supply and demand dynamics, price sensitivity, and profit optimization – offering valuable insights for young minds exploring financial concepts.

Figure 2. Lemonade Stand Activity

Playing by the Rules: Co-Designing Interactive Installations with Pupils

Documented by Sharples et al. (2009), this case study illuminates the collaborative learning potential inherent in game design. Pupils collaboratively conceptualize interactive installations exploring local social issues and community values. This participatory process

fosters communication, teamwork, creative problem-solving, and civic engagement. Beyond technology and design knowledge, students develop essential social and collaborative skills with broad applicability across various contexts.

Figure 3. Playing by the Rules: Co-Designing Interactive Installations with Pupils

These case studies elucidate the multifaceted contributions of games:

• Development of Essential Skills: Games transcend subject-specific knowledge, fostering critical thinking, communication, problem-solving, and adaptability – crucial proficiencies essential for navigating the complexities of the 21st century.

• Motivation and Engagement: Leveraging innate motivations for play and exploration, games create an engaging learning environment that enhances attention, focus, and

perseverance. This heightened engagement leads to deeper understanding and improved knowledge retention.

• Safe Spaces for Experimentation: Games offer simulated environments where players can experiment with diverse strategies, make errors without real-world repercussions, and glean valuable lessons from their experiences.

• Encouragement of Collaboration and Empathy: Many games involve teamwork and interaction, promoting collaboration, effective communication, and the development of empathy. These interpersonal skills are pivotal for fostering successful relationships and navigating various social contexts.

2.5.1. Analysis of game mechanics and pedagogical strategies

The impact of games extends beyond their surface allure. The symphony of mechanics and pedagogical strategies orchestrates successful learning experiences. The Center for Game Science at the University of Rochester (2013) identified several key elements that amplify learning outcomes:

• Simulations: Virtual worlds mirroring real-world scenarios provide safe spaces for experimentation and decision-making without real-world consequences. This allows learners to actively engage with complex concepts and apply knowledge in dynamic contexts (Hamari & Koivunen, 2016).

• Role-Playing: Stepping into different roles fosters empathy, understanding of diverse perspectives, and development of soft skills like communication, collaboration, and negotiation (Obolensky et al., 2018). It also encourages critical thinking and problem-solving as players navigate challenges from different viewpoints.

• Reward Systems: Tangible rewards, like points, badges, or virtual achievements, provide positive reinforcement, boosting motivation and engagement (Deterding et al., 2011). These systems can be designed to align with learning goals, encouraging desired behaviors and progress.

Understanding these core mechanics equips game developers to craft experiences tailored to specific learning objectives. For example, a game aiming to develop negotiation skills might incorporate role-playing scenarios where players must interact with virtual merchants, navigate trade deals, and overcome bargaining challenges.

2.5.2. Evaluation methods and effectiveness of existing games

Existing research highlights the effectiveness of game-based learning in developing diverse skills beyond knowledge acquisition. Studies by Venturelli et al. (2018) and Yoo et al. (2012) demonstrate positive impacts on:

• Creativity and Risk-Taking: Games encourage experimentation and exploration, fostering creative problem-solving and the ability to take calculated risks (Venturelli et al., 2018).

• Leadership and Communication: Collaborative game environments provide opportunities to develop leadership skills, practice effective communication, and build teamwork (Yoo et al., 2012).

• Self-Efficacy and Motivation: Gamification elements like rewards and progression systems boost confidence and intrinsic motivation, leading to increased engagement and persistence (Hamari & Koivunen, 2016).

3.0 Research Methodology

This study employs a mixed-methods research design, combining qualitative and quantitative approaches. Participants included children, entrepreneurs, parents, and educational institutes. Around 50 children aged 9-12 from various schools in Islamabad were made a part of a focus group to understand their knowledge of entrepreneurship and also to understand the schooling system. Data collection methods involved pre- and post-focus group questionnaires and observational studies. Data were analyzed using thematic analysis for qualitative data and statistical methods for quantitative data. Ethical considerations included obtaining parental consent and ensuring the anonymity of participants. Entrepreneurs were interviewed to understand their perspective on this issue and what they think is very important to learn that too at an early age. To gather further insights, a variety of methods were employed, journey mapping, empathy mapping, and affinity mapping. These approaches provided valuable data that informed the design of the board game and its mechanics for young learners.

3.1 Focus Group and Observation

Figure 4. Focus Group for Research Phase

During the research phases, focus groups were conducted with children to understand their knowledge of entrepreneurship and entrepreneurial skills, as well as to gain insights into the educational system in Pakistan and the prevalent teaching styles. The key findings from these focus groups are summarized below:

3.1.1 Understanding of Entrepreneurship and Entrepreneurial Skills

- **Basic Knowledge:** Children have a basic understanding of business concepts such as selling, earning money, and saving money. This knowledge is primarily gained from peers, siblings, and their surroundings.
- **Lack of Formal Education:** There is little to no formal education on entrepreneurship or the development of entrepreneurial skills in the current educational curriculum.

- **Role Models:** Children often follow the behaviors and actions of their parents, with limited encouragement to step out of their comfort zones and take risks.

3.1.2 Educational System and Teaching Styles

- **Traditional Methods:** The current educational system in Pakistan largely relies on traditional learning methods, which focus on rote memorization and unidirectional knowledge transmission from teacher to student.
- **Lack of Creativity and Critical Thinking:** There are few initiatives to encourage creativity or critical thinking skills in students. The educational system does not prioritize the development of these essential skills.

3.1.3 Children's Preferences and Learning Styles

- **Love for Role-Playing:** Children enjoy role-playing activities, which allow them to immerse themselves in different scenarios and think creatively.
- **Preference for Interactive Games:** Interactive games that encourage out-of-the-box thinking are highly favored by children. These games help them produce creative ideas and engage deeply with the content.
- **Learning Through Objects and Games:** Children grasp concepts more easily when they are explained through tangible objects or games. For example, using a number board to teach math concepts.
- **Motivation Through Rewards:** Children are more engaged and motivated in the learning process when they know there is a reward involved. The anticipation of earning a reward enhances their participation and effort.

- **Lessons from Games:** Certain games have taught children valuable lessons such as patience and resilience, and have helped them learn not to worry about others' opinions.

3.2 Empathy Mapping

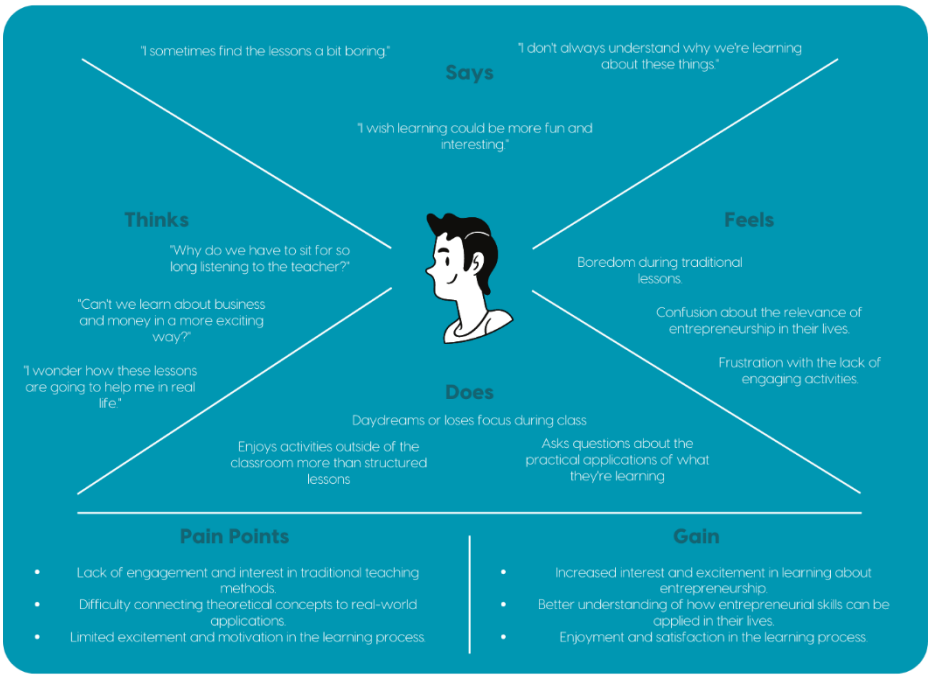


Figure 5. Empathy Map

A visualization tool based around a hypothetical user to study what they may Say, Think, Do or Feel when presented with the problem scenario

The insights from the empathy map highlight several important aspects of childrens' experiences with traditional education. Many find lessons boring and struggle to see their relevance, leading to confusion and frustration. They wish learning could be more fun and engaging, often questioning the necessity of passive, long lectures. This disengagement results in daydreaming, a preference for activities outside the classroom, and frequent questions about practical applications. The main pain points are a lack of engagement and

difficulty connecting theoretical concepts to real-world use. However, when learning is interactive and relevant, students show increased interest, a better understanding of entrepreneurial skills, and greater enjoyment in the learning process. These insights emphasize the need for more interactive and practically oriented educational methods.

3.3 User Persona

Derived based on results and interpretations of conducted interviews, following user persona was created and can be seen:

Minahil is a 10-year-old student attending a public school. She enjoys drawing and storytelling, but she feels limited by the lack of opportunities for creative expression in her school curriculum. Minahil finds traditional teaching methods boring and struggles with rote memorization, making it difficult for her to stay engaged. She also has limited exposure to entrepreneurship, which further reduces her interest and excitement in learning. Minahil wishes for a more interactive and engaging educational experience that connects theoretical concepts to real-world applications and allows her creativity to flourish.

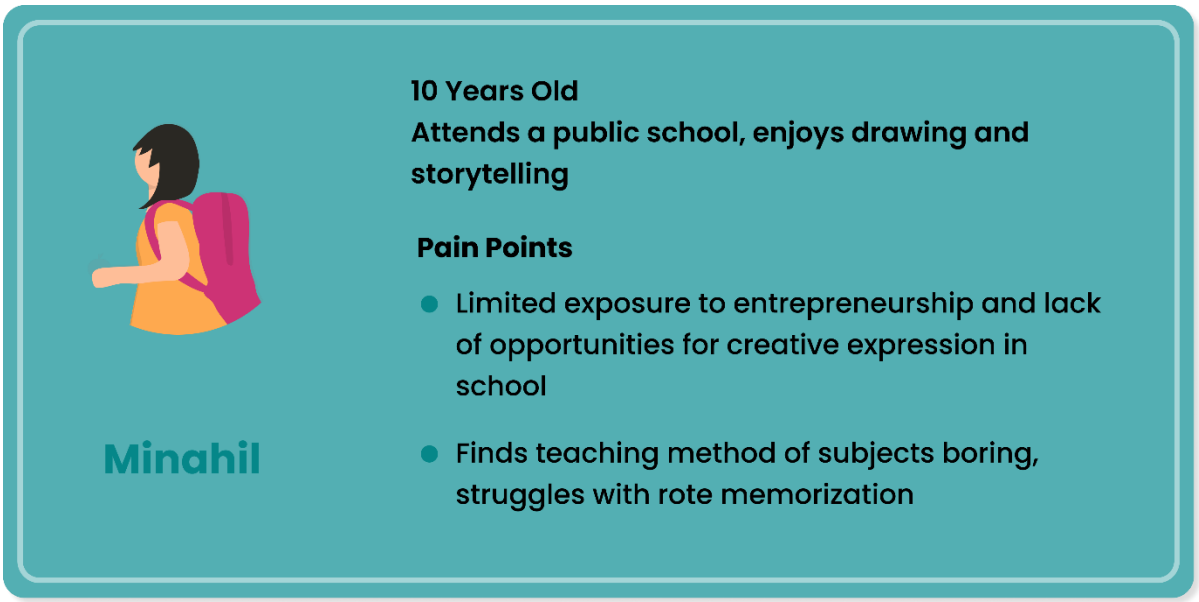


Figure 6. User Persona

4.0 Solution Statement

An interactive gamified solution that primarily acts as an educational learning tool for children that blends immersive worlds, intuitive interfaces, and dynamic challenges to provide a fun and engaging play-based learning experience to develop foundational entrepreneurial mindset and skills in them.

5.0 Design Development

5.1 Design Objectives

Using the research findings as a foundation, a list of design objectives was created before the commencement of the ideation phase in order to have a defining set of goals and criteria that if met in ideal circumstances would allow for maximum user satisfaction and fulfillment of the aforementioned solution statement. This set of objectives is listed as follow

- Encourages Problem Solving
- Initiates Discussions
- Enhanced Learning Experience
- habitually build a Positive mindset
- Pushes users to critically think

5.2 Design Ideation Process

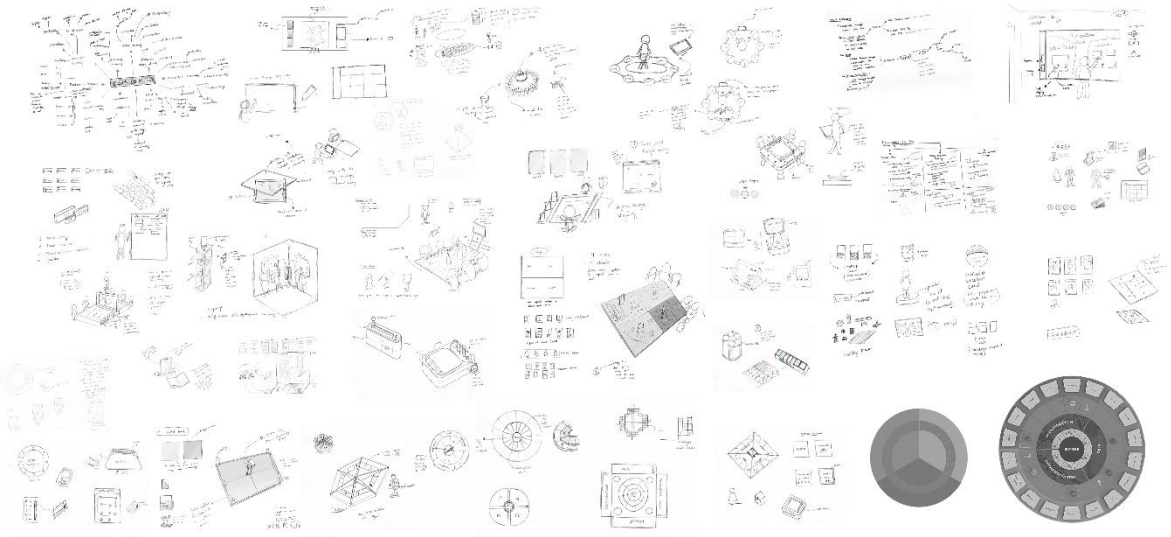


Figure 7. Ideation

During the ideation phase, various concepts were explored to address the key objectives that were identified during the research phase. The focus was on developing a gamified solution that would help in very positive and engaging learning of entrepreneurial skills. Several different designs and strategies along with mechanics were considered, each aimed at engaging children in meaningful and interactive ways.

Initially, the idea of creating interactive installations was considered. These installations would transform classroom spaces into dynamic learning environments where students could engage in hands-on activities related to entrepreneurship. For instance, we envisioned stations where students could simulate running a small business, complete with mock products and financial transactions. This approach was intended to provide a tangible, immersive experience that would make abstract concepts more concrete and relatable.

Following the exploration of interactive installations, the concept evolved towards developing a dedicated entrepreneurial space within classrooms. This space would be designed to facilitate collaborative projects, brainstorming sessions, and creative problem-solving exercises. The goal was to create an environment that nurtures entrepreneurial thinking by encouraging students to work together, share ideas, and develop their own mini-businesses. This setup aimed to blend traditional learning with innovative, student-driven projects.

Ultimately, the idea of designing a board game as a serious game emerged as the most promising solution. This approach combined the benefits of interactive learning with the accessibility and fun of a game format. The board game was designed to teach entrepreneurial skills through scenarios and challenges that mimic real-world business situations. Players would learn about market research, financial management, product development, and marketing in a competitive yet supportive setting.

By integrating elements from the initial interactive installations and the collaborative entrepreneurial space, the board game encapsulates the best aspects of these ideas. It provides a scalable and versatile tool for educators to enhance their teaching methods, making the learning process enjoyable and impactful. This gamified approach ensures that students are not only engaged but also able to see the practical applications of their learning, ultimately fostering a love for entrepreneurship among them.

6.0 The Final Game Design

Based on the findings from the research and ideation, a game design proposal has been developed to address the identified needs and preferences of young learners.

6.1 Game Concept

The proposed board game, "SKYRISE", an educational board game, is designed to spark entrepreneurial spirit and creativity in children aged 9 and above. The game aims to bridge the gap between theoretical knowledge and practical skills by providing a fun and interactive platform where children can learn the fundamentals of entrepreneurship and entrepreneurial

skills. SKYRISE helps players understand the complexities of running a business, from gathering resources to marketing products, all within an engaging and dynamic gameplay experience.

This board game is a serious game that can raise awareness about social issues, encourage players to act, and create a sense of empathy and understanding toward those affected by social problems.

6.4 Implementation and Testing

To ensure that the game was effective, it underwent several different user testing sessions to iterate on the mechanics of the game. It leads to the changing of the design of the board and some mechanics.

6.4.1 Pilot Testing

Figure 8. User Testing for game mechanics

- Participants: 50 children aged 10-12 from various schools.

- Methodology: Observational studies and feedback sessions during gameplay to gather data on engagement, learning outcomes, and user experience.

- Evaluation Metrics: Motivation levels, understanding of entrepreneurial concepts, development of critical skills, and overall enjoyment.

6.4.2 Feedback and Iteration

Based on pilot testing feedback, iterations were made to improve game mechanics, visual elements, and learning modules.

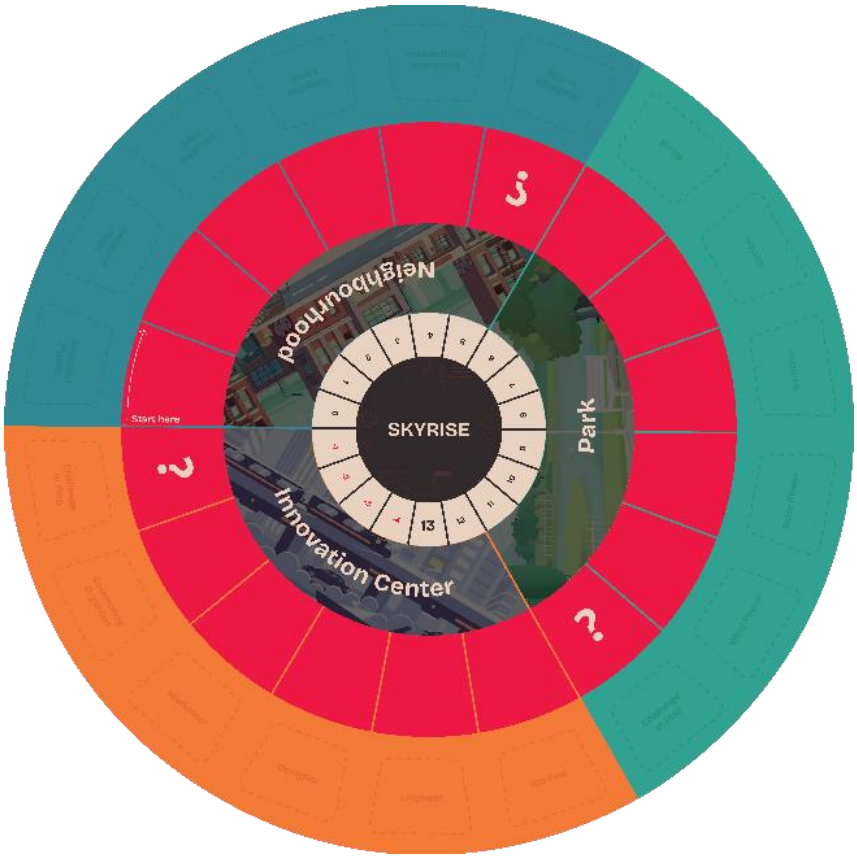


Figure 9. Illustration of older version of the board used for testing

6.3 Final Design

Figure 10. Final 3D Model of the Boardgame

SKYRISE is designed to address the educational gap by making learning fun, interactive, and practical. By simulating real-world entrepreneurial challenges, the game helps children develop essential skills such as creativity, strategic thinking, collaboration, and financial literacy. SKYRISE transforms traditional learning into an engaging experience that prepares children for future success, regardless of whether they pursue entrepreneurship or other career paths

6.4 Game Mechanics

Take Turns:

Players move clockwise around the board. On your turn, roll both dice:

- Movement Die (White):
  Move your player token to the number of spaces indicated on the die.

- Resource Die (Blue):
  This die shows a number that can be used to purchase a resource card from the current zone you're in (Neighbourhood, Park, or Innovation Zone). Each zone has 5 resource cards and 1 challenge card. You can only buy one resource card per turn

Landing on a Resource Space:

If you land on a resource space, you can use the number rolled on the Resource Die to purchase a corresponding resource card from the current zone's available cards. Pay the indicated price (shown on the dice by multiplying it by 100) by discarding resource cards from your hand that match the required resources

Landing on a Challenge Space:

If you land on a challenge space, draw a Challenge Card and scan it with the Interaction Device. The device will display a real-life startup/business challenge, categorized as either a positive or negative event with varying difficulty levels. The challenge will be accompanied by a sound effect (positive or negative) for added immersion.

Developing Products:

As you collect resources, keep an eye on the Product Cards. These cards show a specific product, the resources needed to create it, progress points awarded for completion, and the money earned upon production. Once you've gathered all the necessary resources from your hand that match those required by a Product Card, you can choose to develop that product.

Product Production:

Announce your intention to produce a product. Discard the corresponding resource cards used for production and move your progress token the number of spaces indicated on the Product Card. Gain the progress points awarded for completing the product. You also receive a Product Token, representing your completed product

Marketing Pitch:

When you have a completed product (Product Token), you get a chance to market it to the other players who act as your audience. You have 1 minute to prepare and 1 minute to present your product, highlighting its features and benefits

Marketing Points:

If a player in the audience likes your marketing pitch or product, they can award you a Marketing/Reward Token. Collecting 3 Marketing/Reward Tokens earns you 1 progress point. Marketing Points act as an incentive for the players to continue playing.

Winning the Game:

The first player to reach 13 Progress Points AND have 7 Product Tokens wins the game and is declared the most successful young entrepreneur in Skyrise!

Strategy Cards:

These cards can be used throughout the game to overcome challenges or enhance your gameplay. Use the card strategically and discard it after use

Challenge Cards (Reserve Deck):

If the Interaction Device malfunctions, you can use the Challenge Card Reserve Deck. Draw a card from this deck whenever you land on a challenge space. These cards will have pre-written challenges like those displayed by the Interaction Device.

Additional Notes:

Players can discuss and trade resources with each other during their turns.

You can only hold a maximum of 5 resource cards in your hand at any time. Discard excess cards before drawing new ones.

The game encourages creativity and innovation! Feel free to come up with unique product ideas and marketing strategies. Have fun, learn valuable skills, and become a top entrepreneur in Skyrise!

6.5 Game Components

The boardgame “Skyrise” is composed of the following components:

- Game Board

Figure 11. Final Illustration of the Boardgame

- Player Tokens

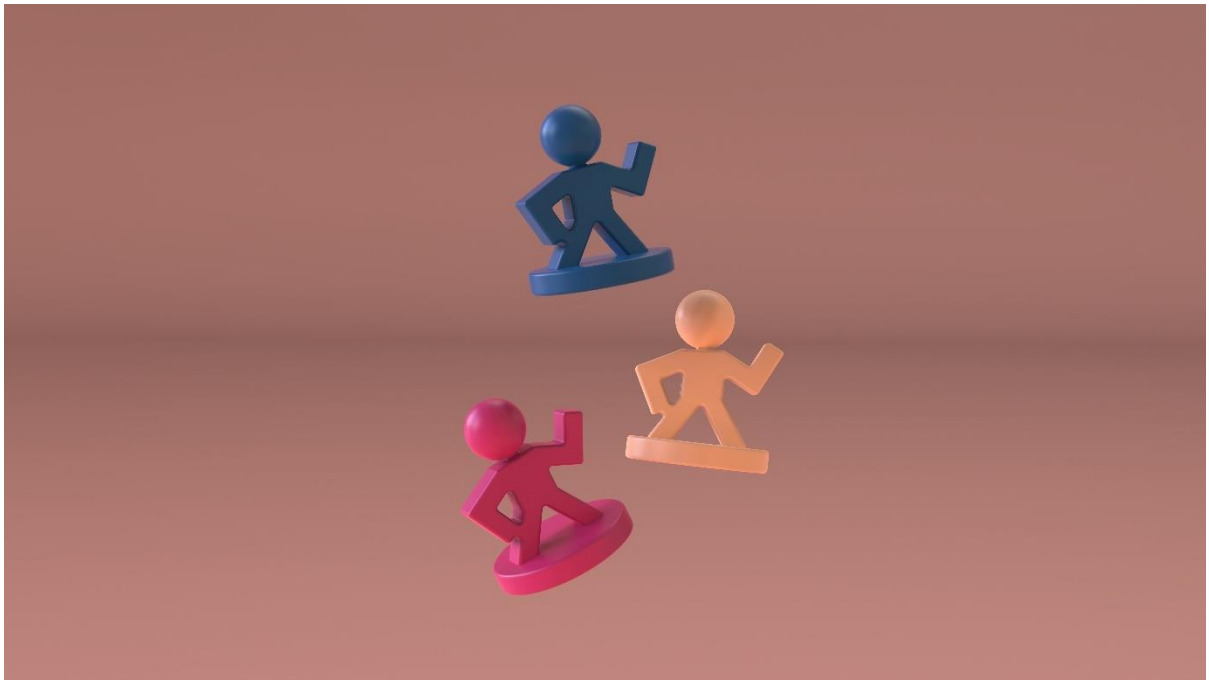


Figure 12. 3D Model of Player Tokens

- Progress Tokens

Figure 13. 3D Model of Progress Tokens

- Product Tokens

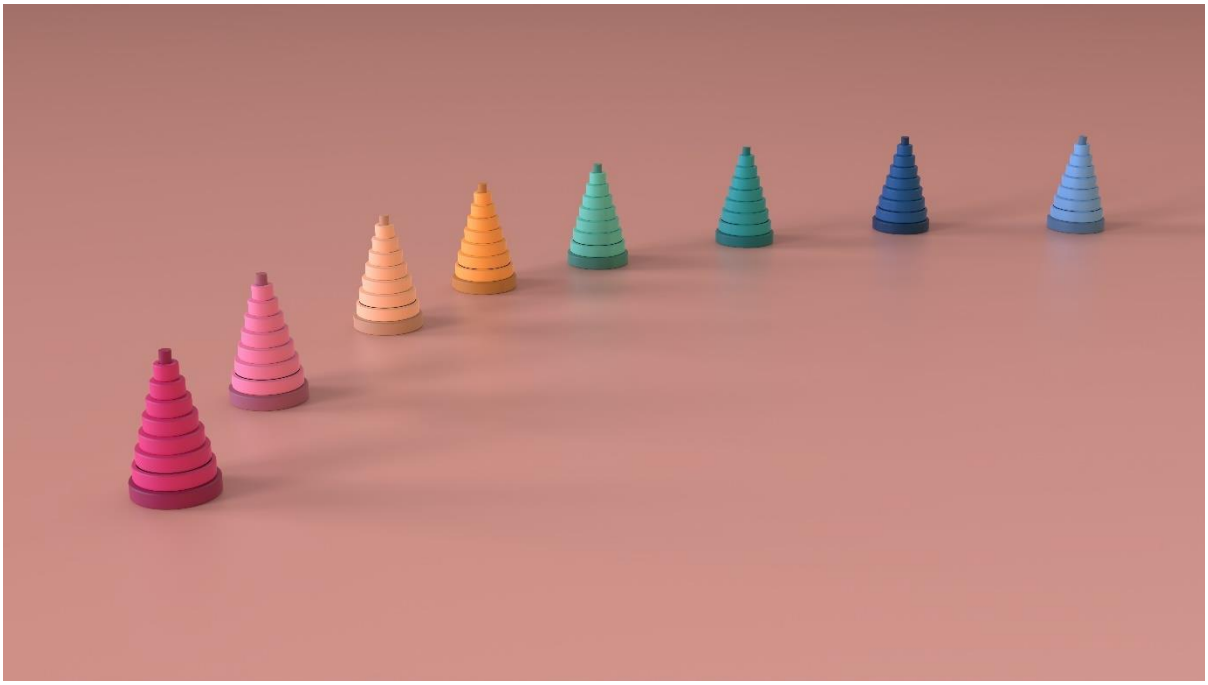


Figure 14. 3D Model of Progress Tokens

- Reward Tokens

Figure 15. 3D Model of Reward Tokens

- Resource Cards

Figure 16. Illustration of Resource Cards

- Product Cards

Figure 17. Illustration of Product Cards

- Strategy Cards

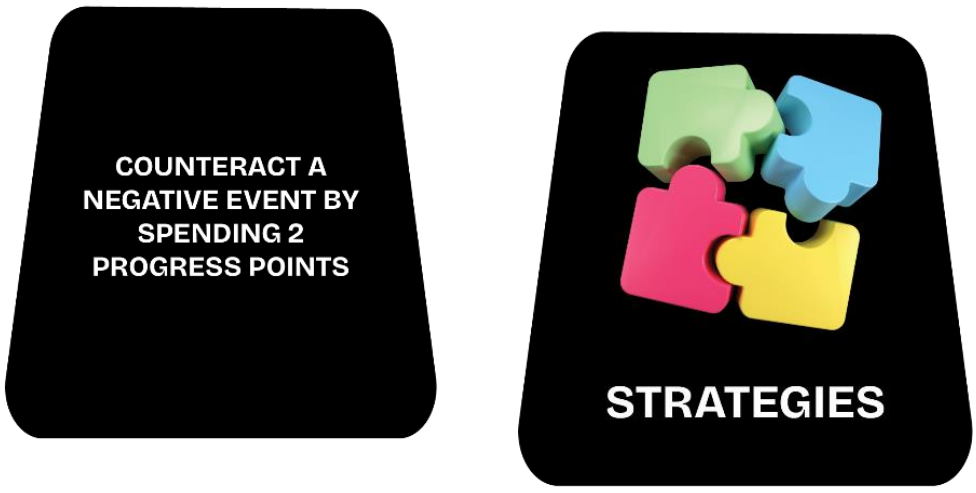


Figure 18. Illustration of Strategy Cards

- Challenge Cards

Figure 19. Illustration of Challenge Cards

- Challenge Reserve Deck

Figure 20. Illustration of Reserve Deck of Challenge Cards

- Money

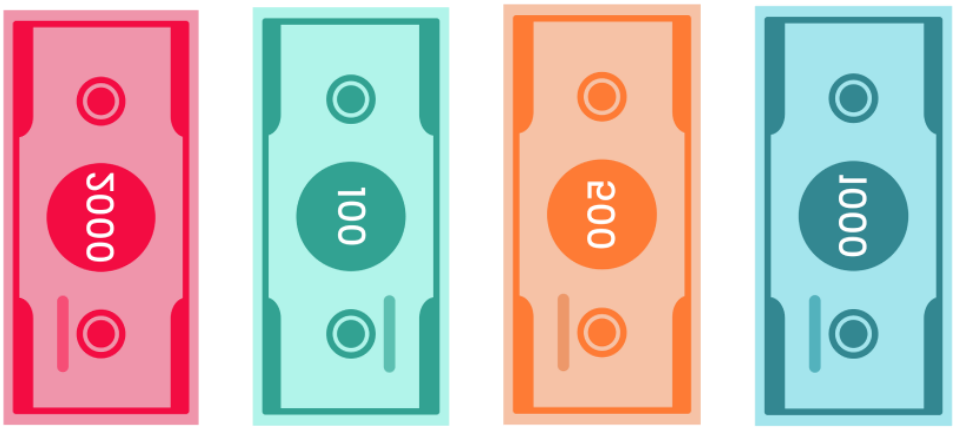


Figure 21. Illustration of Money Notes

- Cards Mat

Figure 22. Illustration of Cards Deck Placement Mat

- Bank Mat

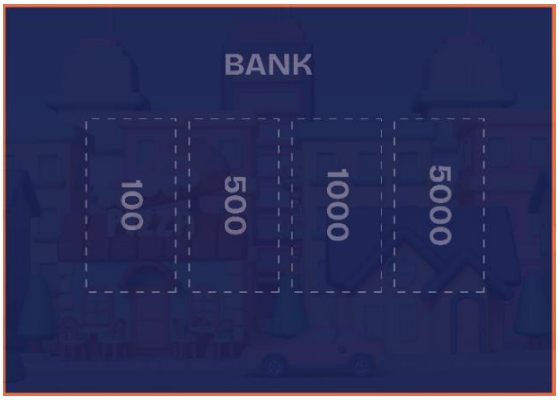


Figure 23. Illustration of Money Notes Placement Mat

- Interaction Device

Figure 24. 3D Model of IoT based Device

- Hourglass

Figure 25. Hourglass

- Dice

Figure 26. Playing Dice

7.0 Product Branding

Product branding involves creating a unique identity for a product through elements like logos, packaging, and marketing. It's about linking a symbol, name, and design to give the product its own character, distinguishing it from competitors and attracting repeat customers. Color is crucial in branding, influencing emotions and associations. But effective branding goes beyond color—it includes names, logos, typography, and packaging design. By combining these elements, a strong emotional connection is formed between the product and its audience.

With Skyrise, the name was selected because it captures the essence of reaching for new heights and elevating one's potential and dreams. "Sky" evokes images of vastness, freedom, and endless possibilities, symbolizing the expansive horizons and boundless opportunities that lie ahead. "Rise" signifies growth, progress, and upward movement, suggesting the journey of personal and entrepreneurial development. Together, "SkyRise" reflects the game's mission to inspire players to ascend to greater heights, both in their entrepreneurial endeavors and in their personal growth. It encourages them to aim high, overcome challenges, and soar towards success.

This lead to development of the logo for the boardgame which features a dynamic 3D character—a child riding a rocket, soaring through the skies. This image encapsulates the spirit of adventure, innovation, and ambition inherent in the game. The child symbolizes young entrepreneurs embarking on their journey, fueled by creativity and determination, while the rocket represents the rapid ascent and growth that comes with entrepreneurial success. Together, they form a captivating visual metaphor for the game's themes of entrepreneurship and personal development, inviting players to embark on an exciting journey of discovery and achievement.

Figure 27. Logo of Skyrise

The color palette for SkyRise blends blue, green, white, and touches of yellow to evoke innovation, growth, and possibility. Blue signifies trust and stability, while green represents vitality and creativity. White symbolizes purity and endless potential, and yellow adds warmth and optimism. Together, these colors create a harmonious and inviting environment that reflects the game's themes of entrepreneurship and learning.

8.0 Prototyping

To bring SkyRise from concept to reality, prototyping played a crucial role in refining and perfecting every aspect of the game. The game pawns were meticulously crafted through 3D modeling and printing, followed by a meticulous vapor smoothing process in an acetone vapor chamber to ensure a sleek surface finish. Custom colors were achieved by mixing car paint to match the desired hues, creating vibrant and eye-catching pieces.

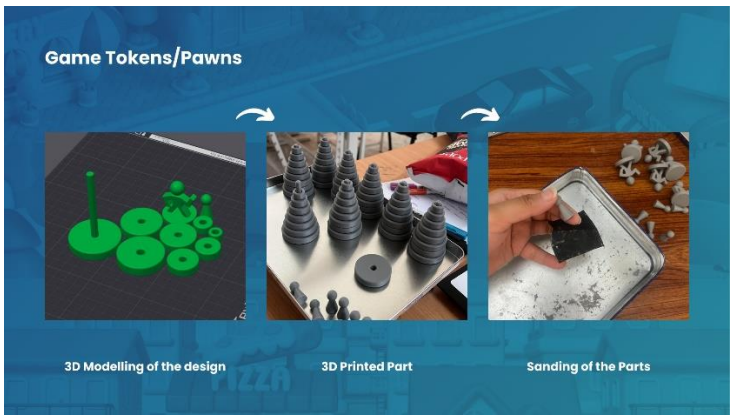
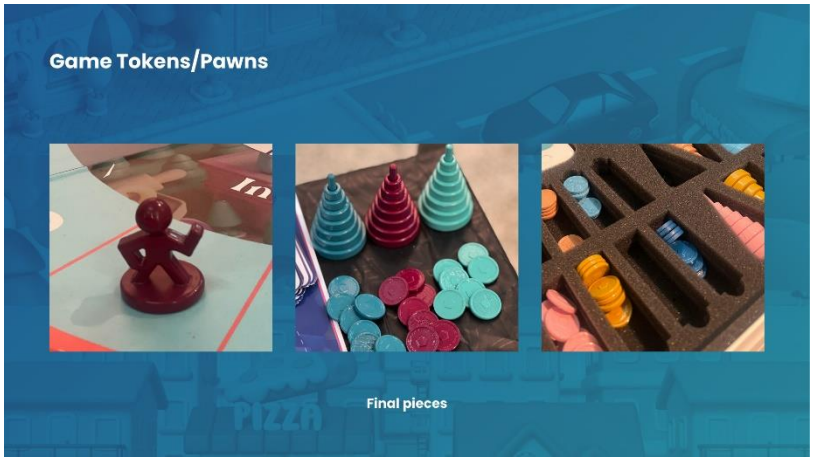


Figure 28. Prototyping

For the game board, the design was meticulously crafted using Adobe Illustrator before being printed onto sticker vinyl sheets. These stickers were then carefully applied to sturdy cardboard and reinforced with Moroccan paper on the back for durability.



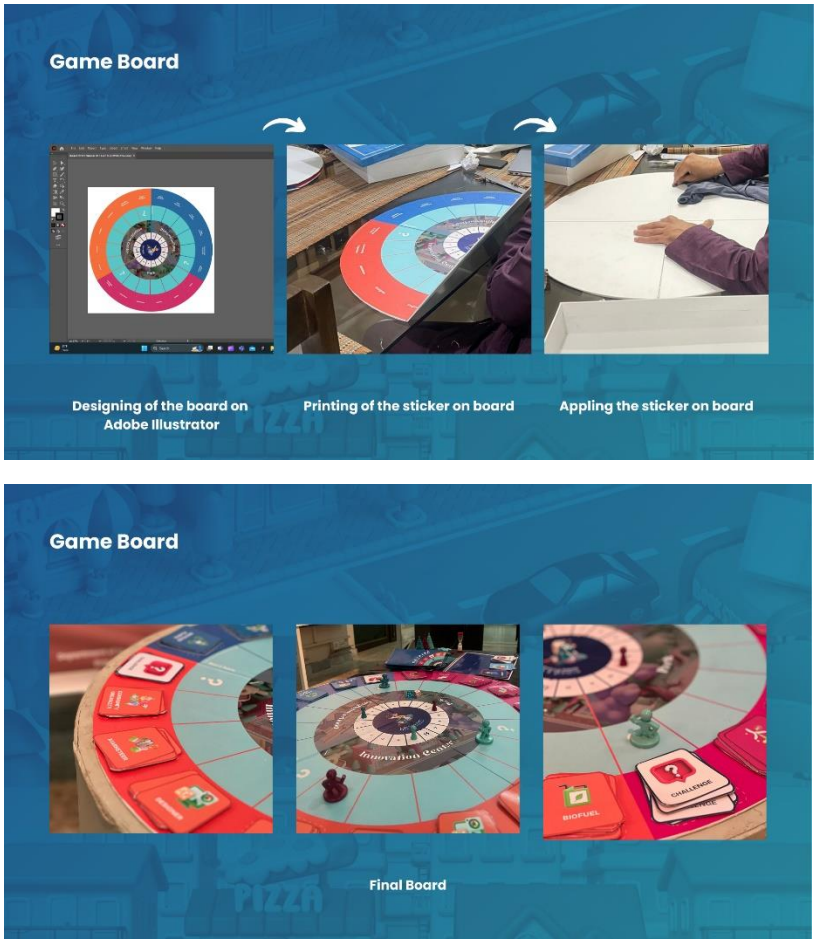


Figure 29. Prototyping

The working prototype incorporated advanced technology, including a color sensor and LED circuitry, to scan challenge cards and provide real-time prompts, enhancing the interactive gameplay experience. Each step of the prototyping process was meticulously executed to ensure that SkyRise not only met but exceeded expectations in terms of quality, functionality, and overall player experience.

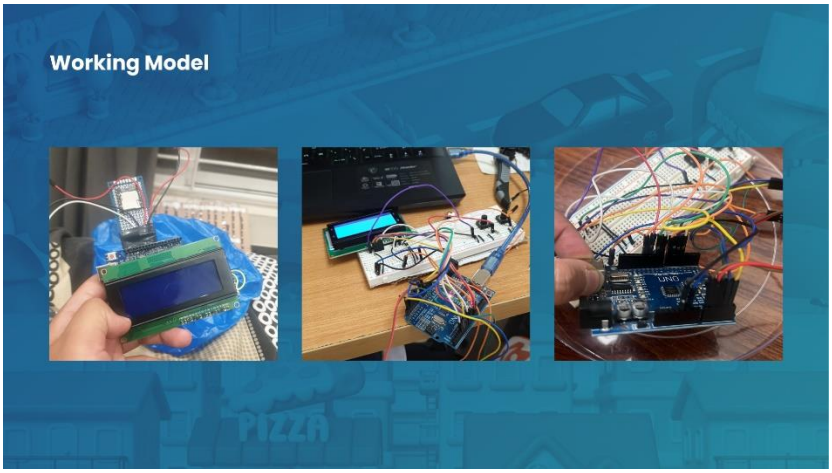


Figure 30. Technical Prototyping

9.0 Conclusion

Future success in an increasingly complicated and dynamic environment depends on developing entrepreneurial abilities including creativity, risk-taking, and problem-solving. The weaknesses of conventional educational systems, especially those in Pakistan, have been brought to light by this research, as they frequently fall short of developing these vital skills. Children find traditional lessons uninteresting and find it difficult to comprehend their significance, which causes disengagement and dissatisfaction, per outcomes from the focus groups and empathy mapping workshops.

This research addressed these challenges by exploring interactive games as a compelling solution for entrepreneurship education**.** Our game, SKYRISE, embodies this approach by incorporating role-playing, engaging challenges, and a rewarding system to boost motivation and keep children interested. Through simulated scenarios that mirror real-world entrepreneurial experiences, SKYRISE helps young people develop crucial skills in a fun and interactive way.

Initial testing of SKYRISE demonstrated a significant improvement in children's creativity, problem-solving abilities, and financial literacy**.** The game's hands-on approach fostered a positive learning environment where participants found the experience enjoyable and meaningful. SKYRISE bridges the gap between theoretical knowledge and practical skill development by seamlessly blending game-based learning with traditional educational methods.

This research contributes to the advancement of gamified entrepreneurship education by emphasizing the transformative power of interactive games in educational settings**.** SKYRISE goes beyond preparing children for future entrepreneurial endeavors; it equips them with valuable skills like adaptability and resilience that will benefit them in various professional and personal situations. As educational models continue to evolve, integrating interactive and play-based learning tools like SKYRISE will be crucial in fostering well-rounded, innovative individuals who possess the tools to navigate the complexities of the modern world.

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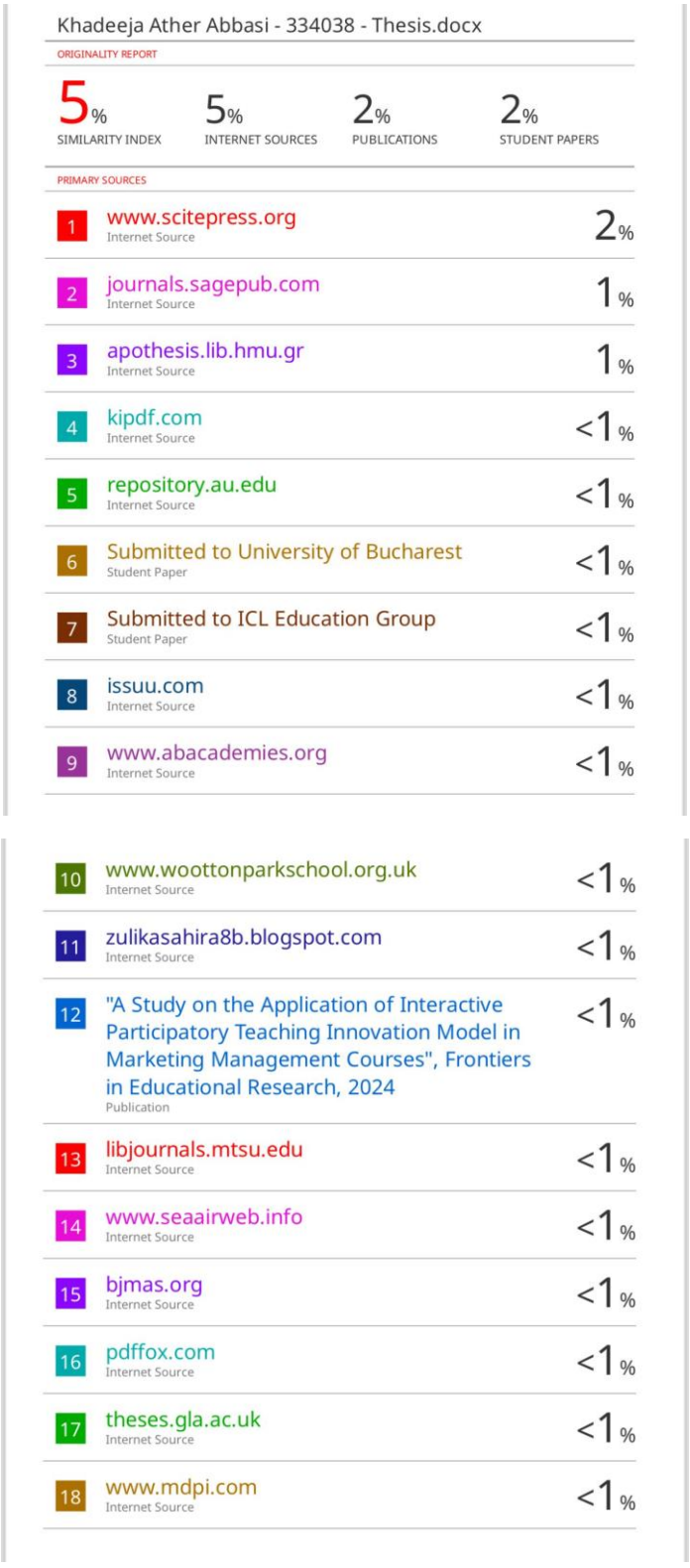
Plagiaarism Report



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