THE LAST EXPEDITION:

Enhancing Learning Through Design-Driven Approaches and Spatial Computing

A Thesis Submitted In Partial Fulfillment of the Requirements for the Degree of

MASTER OF DESIGN

in

Interaction Design

by

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I **Vaibhav Tanwar** hereby certify that the work which is being presented in the thesis entitled "**The Last Expedition – Enhancing Learning Through Design-Driven Approaches and Spatial Computing**" in partial fulfillment of the requirements for the award of the Master of Design, submitted in the Department of Design, Delhi Technological University is an authentic record of my own work carried out during the period from January 2026 to May 2026 under the supervision of **Mr. Varun Singh**.

The matter presented in the thesis has not been submitted by me for the award of any other degree of this or any other Institute.

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The Last Expedition

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ABSTRACT

"The Last Expedition" is an immersive visual novel-adventure AR/VR mobile game developed using Unity, designed to transport young players aged 7-12 on a thrilling adventure. The game is based on a story of two courageous brothers, Lucas and Daniel, as they venture into the unknown to find their missing grandfather. This project aims to foster creativity, critical thinking, and empathy through a captivating narrative that emphasizes curiosity, courage, brotherhood, and family values. The goal of this project was to create an interactive visual novel for the submission of Final Year Project.

This project is a virtual world where the two brothers go on a quest to find their missing grandfather on a mysterious island. Equipped with an ancient map and a mysterious artifact, they voyage across treacherous seas, do battle with monstrous creatures and unravel the secrets of an ancient civilization. They discover the true meaning of family, friendship and perseverance as they navigate through challenging terrains and solve intricate puzzles. This immersive experience combines stunning visuals, engaging gameplay and a compelling narrative for a truly unforgettable adventure.

TABLE OF CONTENTS

ACKNOWLEDGEMENT ii
ABSTRACT v
LIST OF FIGURES viii
INTRODUCTION 1
1.1. General 2
1.2. Flexible Learning Pathways and Design-Driven Education 3
1.3. Design Vision & Objective 4
1.4. Core Pillars of the Experience 5
1.4.1. Immersive Experience: 6
1.4.2. Value-Driven Narrative: 6
1.4.3. Interactive Agency: 7
1.4.4. Technological Proficiency: 7
1.5. Unity 8
1.6. Blender 10
1.7. Minecraft as a Design Reference and Spatial Prototyping Tool 11
1.8. Physical Book and Digital AR/VR Interaction 12
BODY 14
2.1. Existing Solutions and Comparative Study 15
2.1.1. Similar Games and Immersive Experiences 16
2.1.2. Educational Games and Interactive Learning Platforms 17
2.1.3. Key Learnings from Existing Solutions 18
2.2. Research on the topic 19
2.2.1. Educational Insights Informing the Design Framework 20
2.3. Method 23
2.4. Presentation of the Problem 24
2.5. Solution Approach: Innovation and Uniqueness 25
2.6. Design Process 26
2.6.1. Mind Mapping 26
2.6.2. Moodboard 27
2.6.3. Storyboarding 29
2.6.4. Final Design 31
2.6.5. Character Design 31
2.6.6. Set Design 34
2.6.7. App and Page Layout 35
DISCUSSION 40
3.1. Primary Research Insights & Coding 43

3.2. Quantitative & Journey Analysis (User Journey Map Synthesis) 45
3.3. Evaluative Results: Addressed Problems vs. Proven Benefits.....46
3.4. Strength and Strategic Advantages 46
3.5. Technical Limitation and Challenges.....48
3.6. Implementation 50
3.6.1. Technical Stack and Material Infrastructure.....50
3.6.2. Construction Process & Pipeline Execution 51
3.6.3. Comprehensive Testing & Validation Procedures 54
CONCLUSION.....55
4.1. Future Scope 55
4.2. Social Impact 56
REFRENCES.....57

LIST OF FIGURES

Figure:1.1: Edgar Dale, Cone of Learning
Figure:1.2: Tanmay Vora, *When Does Learning Happen?*
Figure:2.1: A Popular Sandbox Game Promoting Freedom, Creativity, and Environmental Interaction
Figure:2.2: Application of Augmented Reality in Interactive Educational Publishing
Figure:2.3: Thematic Structure of Courage and Bravery in Children's Storytelling
Figure:2.4: Mood Board Illustrating the Visual Design Direction for the Game Environment
Figure:2.5: Storyboard Representing Character Interaction
Figure:2.6: Last Expedition Notes and Maps
Figure:2.7: Character Creation Process in Unity and Blender
Figure:2.8: Character Skin from all sides
Figure:2.9: Minecraft Zombie Character
Figure:2.10: WIP from Blender
Figure:2.11: WIP from Blender
Figure:2.12: UI Layout Opening Screen
Figure:2.13: UI for Chapter Screen
Figure:2.14: Pause Menu
Figure:2.15: App working in live environment using cinematic lightning for models
Figure:2.16: Page Layout Left hand side of children’s Story Book
Figure:2.17: Page Layout Right hand side of children’s Story Book
Figure:2.18: Book Mockup Opened
Figure:2.19: Book Mockup Closed
Figure:3.1: User Persona - Vivan Mehta
Figure:3.2: User Persona - Jayati Acharya
Figure:3.3: User Journey Map
Figure:3.4: Flow Chart
Figure:3.5: Usability and Feasibility Survey

CHAPTER 1

INTRODUCTION

"*The Last Expedition*" is a unique and engaging interactive novel-adventure game, is planned and developed as a mobile-specific application with the Unity game engine. Situated at the nexus of design-based learning, narrative, interactive storytelling and upcoming immersive technologies such as Augmented Reality (AR) and Virtual Reality (VR). The project looks at the opportunities presented by AR and VR to create truly meaningful experiences for young children, as well as its potential to redefine learning and discovery. Intended for 7 to 12-year-olds, the experience turns traditional reading into an engaging, active, exploration-based and learning activity, promoting active engagement and imagination.

Unlike games that are just for fun The Last Expedition is meant to be more than just entertainment. The Last Expedition will not only appeal to children, but also help them to strengthen and enhance their cognitive, affective and social skills, by cultivating creative problem-solving, igniting curiosity and the thirst for exploration, fostering an understanding of spatial reasoning and deepening empathy-based understanding of emotional intelligence. It will be a learning environment robust enough to answer changing learner needs, and fill the wide gap between today's curriculum and needs for future learning.

Players are actively engaged in the story which emphasizes personal participation and agency. The story additionally develops important human values such as resilience, courage, brotherhood, compassion, friendship, and family.

From a design perspective this project looks at how technologies like Augmented Reality (AR) and Virtual Reality (VR) can make stories more engaging and fun for kids using NEP 2020 which prioritizes experiential learning, interdisciplinary approaches, and technology integration, which align with design-driven education.

1.1. General

Learning - A change in memory 'if nothing has changed nothing has been learned.' The experience aims to create lasting memories, as memory is often considered the residue of meaningful thought. These memories contribute to the development of schemas—mental frameworks that shape how individuals interpret and understand the world around them.



Figure:1.1: Edgar Dale, Cone of Learning

According to the Cone of Experience by Edgar Dale, the learning experience gets enhanced if people shift from passive observation to active engagement, this project goes further as it focuses on making children active and independent learners. The fact that The Last Expedition sees children as creators, actors, explorers, and makers means that it takes children out of the role of mere receivers of information.

From this point of view, the learning process can take place in reverse because children do not start from concepts and gradually move towards active participation; rather, they learn by doing, designing, performing, experimenting and experiencing everything firsthand. As a result, they create their own meaning and develop a perception of reality.

This approach gives children an opportunity to find themselves and see what they are like not as people expected by their parents, peers, trends, and the whole society but just as they are without any limitations. Learning involves not only acquiring information but also getting acquainted with oneself. In other words, in addition to cognition, learning also becomes self-exploration.

Immersion into and involvement in the story is built into The Last Expedition specifically to allow for this to happen. Children are allowed to immerse themselves into the story and participate in the process rather than remain onlookers; thus, they can be curious, imaginative, and explore possibilities in a constructive setting. It is important not just to educate children about the world, but also give them a chance to interact with it, understand it, and find their place in it.

Visually The Last Expedition uses a mix of environments movie-like storytelling, immersive sound and interactive gameplay to create a fascinating virtual world. The project focuses on designing with the user in mind making sure it's easy to use, navigate and fun for players. A lot of thought has gone into making the game challenging but not too hard so kids stay engaged and have fun.

By combining a story, interactive features and immersive tech the project adds to the conversation on how gamified experiences can shape the future of education and entertainment for kids. The Last Expedition aims to show how immersive storytelling can change Interaction Design and using digital games to make a positive impact, on children's lives through engaging experiences.

1.2. Flexible Learning Pathways and Design-Driven Education

This research explores the development of interaction design and its impact on providing entertaining and educational experiences through entertainment specifically for children. Standardly, visual novels provide a fixed interface displayed through text only. In contrast, The Last Expedition has transformed this experience into a spatial narrative system. The Last Expedition provides players with the opportunity to engage with a richly designed interactive game environment that provides players the ability to participate in an adventure rather than merely reading text.

An important principle for the development of education systems is creating multiple entry and exit points throughout the educational system. In other words, education should not be thought of as a straight path but one in which learners enter at any point, pause, when necessary, return, and advance along the learning continuum depending on their interests, experiences, and changing ambitions. This approach facilitates learning throughout life since education can take place at all ages in different ways.

In this regard, the emphasis in educational system design should not only be placed on skill development but also on learner motivation and engagement. Even though skills acquisition remains an important objective of education, motivation can be viewed as its basis and prerequisite to achieving higher outcomes, including continuous interest and curiosity in self-improvement.

Design-based approaches are highly beneficial when trying to achieve this aim because they promote learning-by-doing. Through engagement, exploration, making, and solving problems, abstract concepts become concrete. Besides the evident advantages for students, such methods give experience designers and teachers better chances to see what happens and improve learning settings based on these observations.

These notions have strong parallels with the National Education Policy (NEP) 2020 that emphasizes experiential, interdisciplinary learning and incorporation of technologies in educational processes. This document supports flexible curriculums,

innovative pedagogy, competency-based education, and other measures intended to replace rote learning with engagement.

NEP 2020 puts special stress on experiential and multidisciplinary approaches that allow learners to work on projects, solve real-life problems and apply knowledge in practice. These are exactly the characteristics of the design process which involves observation, ideation, prototyping, testing, and reflection.

Flexible paths for learning, intrinsic motivation, experiential learning, and design-based practices create premises for evolution of the educational system into more inclusive, adaptive, and learner-centered environment. With its help, learners not only master new skills and knowledge but also become more curious, inventive, resilient, and ready for lifelong learning.

Learning through play helps in developing within the child, intrinsic need to explore, discover & know more; making the experience of learning meaningful and motivating. Skills leads to habits & Habits leads to Outcomes.

Education should aim to develop not only knowledgeable individuals but also responsible and empathetic human beings. By fostering self-awareness, social consciousness, practical skills, and meaningful relationships, education can contribute to both personal growth and collective well-being.

In this way, by changing from a purely passive way of reading the story, to an active way of participating in the creation of the story by actively engaging in formalised methods of Immersion Media supports children's development of Creative/Innovative, Analytical/Critical, Curious/Exploratory, and Problem-Solving skills.

This research informs the larger discourse of future of immersive interaction design, gamified learning environments, & child-centered digital experiences. Through the infusion of storytelling, technology, and user experience design, the research on The Last Expedition highlights the significant impact AR/VR technology has had on shaping the future of interactive stories & educational entertainment platforms.

1.3. Design Vision & Objective

The project functions as an important bridge between current educational models and NCF based framework and demonstrates the very tangible representation of the aspiration of NEP. Instead of designing for a visual feast, The Last Expedition is a structured, research-driven academic work that details the entire process of design and development of the experience, including ideation, script writing, interaction design, visual stylization, game mechanics and finally programming the final system within the unity. By usingcinematics, environment-based story-telling, ambient soundscapes, and interaction driven world-building, it aims at creating a holistic and evocative story

telling experience.

This work is the final capstone project for the Master of Design (Interaction Design) program, and it represents how immersive technology can help in changing narrative delivery, digital learning and a child's interaction with the environment. In essence, it is adding a piece to the conversation about interactive media by using value driven spatial computing to revolutionize modern child-computer interaction.

1.4. Core Pillars of the Experience

The Last Expedition is based on a series of well-defined design principles to create a narrative structure, interaction mechanics, immersive involvement, and technology implementation. Together, the design principles define the fundamental conceptual framework for the project of The Last Expedition's ability to evoke emotion, stimulate cognitive thought, and allow for meaningful user interactions. Each principle creates a cohesive immersive storytelling platform that combines the elements of entertainment, educational, and user-centered design.

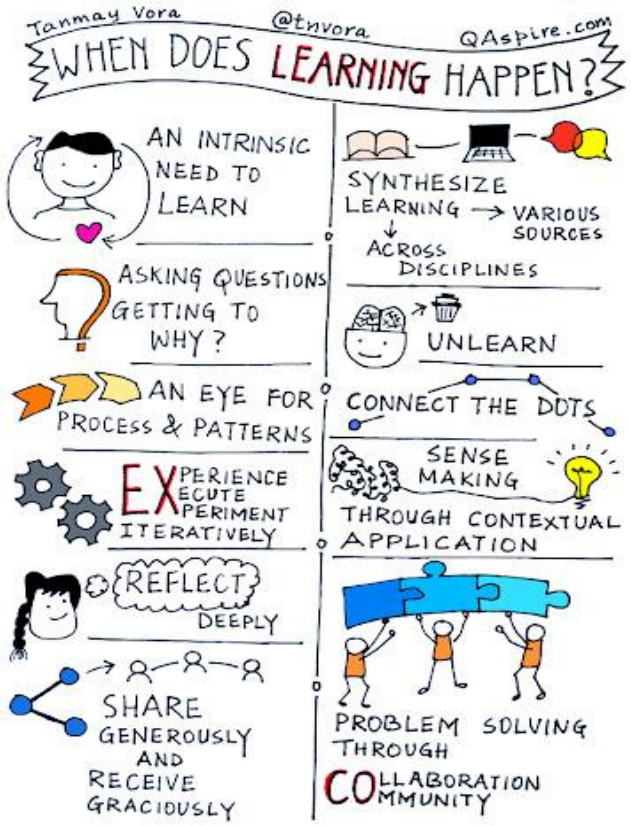


Fig1.2: Tanmay Vora, *When Does Learning Happen?*

1.4.1. Immersive Experience:

The Last Expedition's main foundation is its creation of an all-encompassing, immersive, AR/VR experience to connect the players both emotionally as well as intellectually. By providing an interactive spatial storytelling capability for users rather than being limited to just passive reading (as in a visual novel) or being unable to physically participate in an event that is taking place within the narrative (as in text-based digital narratives), this project aims to provide its users with the opportunity to become active participants in their own narratives.

Using our mobile AR mechanics, players will be provided with the tools and capabilities to scan their physical surroundings and discover different pictures/objects/clues to assist them in uncovering hidden treasures and/or reveal various environmental features, types and/or aspects that will affect their overall experience with the narrative they are immersed in. In addition to this, through the use of VR-like immersive sequences or scenes combined with various techniques associated with building cinematic worlds, the user will be able to feel/experience emotion and see large examples of how the narrative they are participating in connects to the larger fictional universe created by this project.

1.4.2. Value-Driven Narrative:

The project’s second primary component is developing emotion-based stories that promote children's emotional, social, and cognitive abilities. The storyline about Lucas and Daniel has been created to serve as an example of what children can expect to go through, as far as their emotional development stage, developmental milestones, and relationships with each other; these are stories that children will understand because they resemble an emotional situation in the real world. As well, the journey to find their grandfather allows Lucas and Daniel to experience various feelings of uncertainty and fear through teamwork, perseverance, and emotional growth.

Children only care about why? Why are they learning anything. They are learning because they want to create something. and if that happens through play its even better. In order for children to grow up with values such as family, friendship, trust, compassion, and collaboration, the storyline does a great job of weaving in these themes without overtly teaching them by just telling children what to do. Rather than providing children with direct moral lessons, children will learn morals by interacting with Lucas and Daniel throughout the interactive storytelling activities that will allow them to better understand these characters' emotions and learn to apply those same morals in their own lives.

Through the introduction of emotionally impactful scenarios and creations of character-driven challenges, players will develop emotional

intelligence and an awareness of social issues. In addition, the branching story framework will reinforce the development of decision-making awareness, relationship development and personal accountability by enabling children to see how their decision-making impacts both the consequences of their actions and their interactions with other characters in the story.

Overall, through the establishment of a value-based narrative framework, this game will provide children with an enhanced entertainment experience which will support the holistic development of a child.

1.4.3. Interactive Agency:

A key element of the overall gameplay experience for The Last Expedition has been the Interactive Agency which is the basis of our Interaction Design strategy. The overall design of the project empowers users with meaningful choices, opportunities for exploration, and active engagement along their journey through the story. As opposed to a single linear progression path, players access multiple decision-making points which directly impact how the story develops, how characters interact with one another, how puzzles can be solved and where environmental discovery can take place.

These interactive decision-making points will allow children to think critically, create strategic plans, and to develop their own decision-making skills in a fun, exciting, safe and engaging digital environment.

Open exploration will be a major aspect of the gaming experience as players will have the opportunity to discover and investigate in a creative manner through the use of the environment. Players will create their paths through the game by moving around in the environment instead of simply watching the environment. Players may interact using a variety of methodologies which may also provide players the opportunity to determine how they create meaning in the gaming experience. This play style of using an open-ended play method will promote player engagement while providing for additional problem solver/ explorer learning behaviours of the player. Involvement and agency also correspond to an increased interest in contemporary interaction design principles; user involvement, flexibility and experiential engagement are all crucial in building a functional and positive digital experience for users.

1.4.4. Technological Proficiency:

The last pillar of this project is based on exploring and developing technology related to the area of creating immersive interactive games and designing with interactions in mind. The main goals of this project were to gain hands-on experience and research- based skills for designing & developing

AR/VR type interfaces using the Unity game engine with various forms of immersive technology.

As part of the final product, the project will include systems to allow users to engage interactively in real- time, have 3D environment storytelling elements/techniques embedded into the user interface for gameplay, use separate game play modes (i.e., environment storytelling with point and click, etc.) use spatial content creation for a more immersive experience, create responsive elements based on user control, and the development of visual design pipelines specific to immersive type technology have been included.

During the process of the results developed from the project there was also a significant amount of experimentation completed with AR overlays, user interface mapping, animation systems, visual feedback devices, world building methods, and optimizing game play for mobile devices.

The results and advances from the augmented reality overlay, UI mapping animation systems, visual feedback device and mobile gaming play optimization undertaken as part of this project have resulted in a lot of successful work over a period of time. The project seeks to explore how appealing interactive features with reward systems enhance engagement and sustained participation from the younger user. Rewards and progression in the form of gameplay achievements, hidden objects, plot points and emotional reward were implemented throughout the project so as to keep the user engaged and feeling successful.

In addition to offering entertainment value itself, this project also offers a real-world example of the way in which several different disciplines may work collaboratively to employ design thinking processes to develop products. These disciplines include storytelling, interaction design, immersive technologies, user experience design and game development. The technical skills which have been learnt from this project will be useful not only in delivering successful outcomes from this project, but for further exploration of how emerging technologies might be used in the creation of valuable digital experiences for children that are inclusive and educate.

1.5. Unity

Unity Engine provided the core development platform and the real-time 3D rendering environment upon which The Last Expedition was developed. Unity's highly flexible cross platform pipeline has been used to supply a strong architectural framework in which the complicated scene management that transitions the branching 2D visual novel's nodes to low-poly 3D scenes was successfully and fluidly handled. The logic at runtime of the application's dynamic camera state machine and its state-driven interface manipulations were driven directly from the object-oriented

programming of the application using the component-based system that Unity provides and its native script compiler. Its unified asset pipeline supported compilation and optimized complicated spatial coordinates, textures and custom rigged 3D models into high quality, high-performance spatial computing on consumer mobile hardware.

The component-based design allows efficient re-use of the script and various other coding in tasks such as character interaction logic, scenes changes, animation, gameplay mechanics, interactions and other similar activities. The C# scripting language was employed for the development of essential functionality such as, dialogues, background elements, the characters, the player, interactive elements, interactive scenarios and narrative path logic.

Visually the real time capabilities allowed the development of the game world in the form of highly optimized low-poly 3D environments capable of performing well on mobile devices; visual qualities such as lighting, particles, character animations (and controllers), and various camera effects provided for a cinematic experience, and camera transitions between environments and dynamic camera movements gave cues and directed attention toward narrative events.

In the development process itself the unified asset pipeline simplified the management and integration of a multitude of different asset types such as, the 3D models, textures, animations, characters rig, sound effects and others. Optimization was considered very seriously throughout the process, with useful tools and techniques such as, asset compression, asset batching, culling of occluded objects, and mobile optimization. Unity's ability to interface with AR frameworks also played a part in integrating the functionality of spatial interactions, environment scanning and AR overlays; the latter was particularly useful to support the creation of an engaging space within which to deliver the narrative.

Overall, the technology infrastructure of the Last Expedition relied on Unity and its ability to support storytelling, interactive design, immersive media, and game play. It has been considered that the real-time rendering, the ability to achieve mobile optimization, and support for spatial interaction were the aspects that allowed the project to continue into interactive and experiential storytelling.

The **Vuforia** software development kit, which has been incorporated into the Unity engine, had a huge impact on the creation of augmented reality features in The Last Expedition game. Being one of the top AR development frameworks available for use with Unity, Vuforia served as the base technology behind the creation of highly interactive spatial experiences, blending digital content with elements of the real-life environment. Thus, its use helped the team to go beyond regular mobile gaming and offer new levels of immersive augmented reality interactions to children.

From the perspective of the project, the task of Vuforia was to work as a computer vision framework for recognition and tracking of the user's physical environment. To perform this task, the software analyzes the incoming live camera feed from the mobile device, detecting characteristic feature points in the environment. The obtained data

helps to place virtual objects into the real-life environment.

One of the features that were used is ground plane detection, which allowed for virtual objects like portals, artifacts, relics, and clues to be integrated into the real world seamlessly. This helped in integrating both spaces and enhanced immersion, making the player feel part of the action. Other features used include image marker detection, where images would unlock certain parts of the story, reveal secret scenes, and trigger interactions with environmental elements. This feature would prompt children to physically search and interact with the environment.

Another great feature about Vuforia is its reliable object recognition performance even on ordinary smartphones. Coupled with Unity's rendering and physics system, the virtual objects will be placed precisely, minimizing any issues regarding tracking errors.

In order to provide a friendly and accessible experience to the children (ages 7-12 years), we decided to incorporate interaction principles into the design of AR interactions to make them intuitive, easy to learn, and user-friendly. Vuforia facilitated the realization of AR interactions by allowing the creation of immersive experiences without having complicated procedures of configuration and the need for extra equipment.

Regarding the AR interaction performance, Vuforia allowed me to increase the performance on a wide variety of conditions, such as changes in lighting, camera movements, and device limitations, due to its accurate and stable tracking capability which provided a smooth transition from real world to digital world.

In terms of interaction design of Vuforia, we could observe that Vuforia opened the door to explore spatial computing potentials in narrative immersion. So, interaction made possible by Vuforia involved not only touch screen but also movement and discovery of space which makes the viewer more active rather than passive in receiving media content.

All in all, Vuforia SDK was a key technological bridge linking reality and virtuality, creating an immerse experience in the Last Expedition. With the library children can interact with and explore virtual world and immerse themselves in the story. It is clear that AR technologies can greatly improve user experience to interactive meaningful activity.

1.6. Blender

Blender was the main production node within the project's 3D asset pipeline, as it bridged the gap between first voxel block prototypes, to the final, real-time in-engine game experience. A fully open-source suite, Blender offers all the toolsets required to achieve low-poly geometry clean ups, texture mapping, and advanced skeletal rigging of the protagonists – Lucas and Daniel. Through non-linear animation editing tools

and the software's forward/inverse kinematics pipeline, custom character rigs can be given fully expressive keyframe animations, conveying overt socio-emotional cues to the player. Robust optimization tools enable for clean and light-poly models ready to be exported to the game engine for mobile AR/VR production.

Another major plus point was the ease with which the output of Blender's 3D modelling was integrated with Unity's pipeline. Models, rig setups, animations, and texture assets were able to seamlessly move into Unity for gameplay implementation, speeding up workflow immensely, and enabling iteration during game testing and balance.

But Blender was more than just the technical aspect of production, the software facilitated the creative aspirations of The Last Expedition by enabling us to gain better control of artistic elements that influenced visual storytelling within the game. Blender therefore acted as a gateway between concepts and interactivity, allowing creative ideation to flourish and translate into exciting and efficient real-world digital art assets.

In conclusion, Blender served as more than just another 3D modeling tool on the production pipeline of the game. As an asset, it became an incredibly valuable tool in the building of world and character, the animating of it, and the optimisation required to send the assets into the game engine for Unity based AR/VR development. The integration of the software into the pipeline demonstrates just how valuable a flexible, accessible Digital Creation Suite is to the success of modern interactive experiences and Real-Time Storytelling.

1.7. Minecraft as a Design Reference and Spatial Prototyping Tool

The idea and development process of The Last Expedition have been partly inspired by Minecraft. Firstly, due to the focus of Minecraft on exploration and playfulness, designers were able to understand the way children interact with computer game environments. In contrast to linear games which guide players step by step, the concept of Minecraft provides players with the freedom to make their own decisions during gameplay and create different scenarios and outcomes. This aspect is particularly relevant considering the main goal of The Last Expedition project.

One of the main sources of inspiration was the visual style of Minecraft based on cubes. In such an environment, players can easily move around because there is no need to perceive realistic details and structures of objects and landscapes. Moreover, the predictability and regularity of environments allow developing spatial awareness, navigation skills, and a better understanding of the environment. Simplicity of this visual language enables imagination and creativity of players.

This approach to prototyping allowed for considerable freedom during the iterative process. Spatial environments and gameplay scenarios could easily change, giving opportunity to test and improve aspects of level design, navigation instructions, and storytelling in general. With all these spatial environments verified, further

development of prototypes was carried out in 3D modeling software before being implemented into Unity Engine with improvements in geometries, textures, lighting, animation, interactivity, etc.

Aside from aesthetics and level design, however, the idea of freedom, creation, and exploration characteristic for Minecraft played an important role in the interaction design process of The Last Expedition. By leveraging an existing digital language known to many children, the game became more accessible for children as well as engaging to play. In other words, by taking advantage of what is known about Minecraft, the team created conditions that would allow kids to feel comfortable interacting with immersive technology and telling stories through it.

1.8. Physical Book and Digital AR/VR Interaction

The A crucial aspect of The Last Expedition is the combination of a physical storybook and a digital environment of immersive AR applications to create a hybrid storytelling solution that includes elements of both traditional literature and immersive technology. The goal of such an approach was to combine the best of traditional physical books and immersive technologies to engage children in their stories. To implement this idea, a storybook of large size – A3 – was created with visuals and readable text for children aged 7–12 years old.

The structure of each page of the book is quite straightforward and includes a split structure with a part of the page containing the plot of the book and the other side being used for a QR code of this particular chapter. Once this code is scanned by a smartphone, the AR story unfolds. High-quality matte paper was chosen to make it easier for children to scan these codes using their smartphones without any distractions.

After scanning the QR code, Unity and Vuforia create the augmented reality experience by overlaying digital interactive content on top of the users' real-life environment. This involves creating landscapes, artifacts, hints, and story elements in the real environment, thereby extending the game into the users' actual surroundings. In terms of aesthetics, the design of the AR experience follows the style of Minecraft as seen from its use of block-based structures.

Accessibility was another design goal that went into designing the interaction system for the project. The interaction system needed to be accessible and this was achieved by having a simple interaction system where virtual joystick for navigation, and a voice interaction button for all of the story, and its characters. Because the interface is quite simple children could be read and hear content in AR environment at the same time.

Having the elements of both a traditional book being read and also being in the virtual reality helps to create an ecosystem that helps people to read and explore their way through story as the traditional experience was separated into game play and story

– but the concept helped bring them together and make them into one coherent experience and use it tell an interactive story. It demonstrates how with AR we can create much more imaginative and accessible stories.

CHAPTER 2

BODY

Futuristic things that spark kids' imaginations are useful, but the essence of a great education changes slowly. We may use new tools and topics to achieve it, but we still want our kids to learn how to learn, wield the power of math and science, know the past, experience and create art and become good citizens.

Research on expertise and human development suggests that even though deliberate practice is essential in reaching high-levels of performance, long term success does not always require early specialization. Research that has tracked down athletes and experts through their career paths indicates that people who go through highly specialized career tracks usually experience quicker successes like getting employed earlier and receiving higher salaries. However, this might result in lower adaptability to the changes that might occur in their career paths.

People who engage themselves in a variety of activities during their learning ages will tend to gain more diverse skills and experiences. Even though they might not show any quick developments at first, they will be more adaptable and resilient, and as a result, their careers can be sustainable. In times when technology and industries keep developing rapidly, being adaptable will become one of the most crucial characteristics.

Thus, education systems should include specialization alongside exploration of other areas. Even though vocational skills should be taught, learners must be offered the opportunity to experiment and think critically to develop adaptable qualities and skills.

In the future, many jobs will exist that we can't even imagine today. So, how can we prepare children to learn new skills and, more importantly, apply them to real-world challenges? Since it's impossible to predict exactly what the future holds, the true value of education doesn't lie in memorizing facts. Instead, it lies in developing critical thinking, adaptability, and problem-solving abilities-skills that empower children to navigate and succeed in an ever-changing world.

Among the major issues in modern education is the preparation of children for an unpredictable future. Methods like active learning, working in groups, role-playing, hands-on tasks, and interactive stories offer ways for children to learn in accordance with their unique abilities and preferences. The above-stated techniques ensure the involvement, cooperation, empathy, and expression of children during teaching, thus providing learning experiences tailored to different students' needs. In addition, by letting children explore, make, try out, and evaluate things, education turns into the

process of finding new things.

The design philosophy behind *The Last Expedition* is closely aligned with these educational principles. The project seeks to transform children from passive consumers of content into active participants. Through exploration, puzzle-solving, environmental interaction, and decision-making, children are encouraged to think critically, adapt to challenges, and apply knowledge in meaningful contexts.

In summary, The Last Expedition is an interactive adventure experience composed of ten interwoven chapters. All the chapters tell an immersive story and provide different environments, puzzles, and interactions. In addition to the main storyline, this project includes two interactive mini-games: The Zombie Survival Game and The Maze Navigation Game. These games are time-based and encourage children to think quickly and engage with the game content actively.

It should be noted that these games are integral parts of the storytelling process, not separate games. The Zombie Survival Game encourages players to pass through certain obstacles and avoid enemies appearing before them as fast as possible. In turn, the Maze Navigation Game involves exploring and solving the problems that occur when moving from one point to another during a particular period of time. Overall, these mini-games help kids develop such skills as spatial orientation, memorization, logical thinking, and adaptation abilities.

The arrangement of such gameplay elements is a well-thought process aimed at promoting the storyline development while providing a balanced interplay between the elements of reading, exploring, and interacting. Through placing challenges into the story, the proposed game becomes a unique way of merging gaming and storytelling processes. It makes users the main actors of the story who will be able to affect the course of the story in a redefined manner.

In addition to gaming features, The Last Expedition can be regarded as a breakthrough point in the world of children's literature since it involves innovative AR technologies in the context of storytelling. In contrast to traditional storybooks that consist only of texts and illustrations, the game combines storytelling and gaming features providing children an opportunity to explore virtual space and find clues and objects that will help move further through the story using their smartphones' AR abilities.

2.1. Existing Solutions and Comparative Study

A core component of this research involved evaluating traditional paradigms of knowledge transmission—specifically how gesture, vocalization, and imagery serve as the three foundational channels through which knowledge is historically passed down.

Research & Development With the initial conceptualisation of the core mechanics

for The Last Expedition, an in-depth research project into the contemporary field of interactive gaming, immersive narrative technology, and digital educational learning was conducted. The purposes of this comparative analysis are to provide a distinct picture of modern trends within the world of child focused interactive media; identify best-practice design methods within the field; and critically analyse current commercial offerings within adventure gameplay, immersion technology, and storytelling for the learning context.

This is done via studies exploring the interplay between the gameplay elements, narratives, aesthetics, and interface interactions implemented within different media environments today, to learn valuable lessons to be integrated into The Last Expedition's conception and implementation of game-style and immersion story and interactive principles.

2.1.1. Similar Games and Immersive Experiences

A major portion of the research analyzed adventure, explorative, and immersive stories and ways how children interact with digital environments. In particular, games which promote spatial interaction, exploration, creativity, and problem-solving were studied as these qualities have much to do with the idea behind The Last Expedition.

Minecraft was chosen as the key example due to its popularity and success of a sandbox game design among children. The simple voxel system which is used for creating images, combined with freedom of movement and exploration and an immense amount of creativity made the researchers believe that it is possible to create immersive stories using simple visual techniques.

Also, Minecraft promotes user's involvement through activities such as exploring and interacting with the environment. It was important to use the principle of user activity in The Last Expedition as children needed to become active participants of their journey, not just consumers of pre-created content.

Finally, Minecraft proved that it is possible to make an experience easy for comprehension and navigation even if the game world contains complicated spatial structures and complicated interactions.



Figure:2.1: A Popular Sandbox Game Promoting Freedom, Creativity, and Environmental Interaction

Moreover, various adventure and immersive storytelling applications using virtual reality technology were examined in order to understand how presence, interaction with the environment, and spatial immersion can contribute to increasing user engagement. The findings have helped to develop the approach to the project regarding the design of spatial stories, usage of augmented reality technology, and embodied interaction principles.

At the same time, through the comparative analysis, some problems associated with creating an immersive experience for children have been outlined, including complicated interaction interfaces, motion sickness, sensory overload, and navigation problems. The results have become critical for designing a streamlined interaction model for The Last Expedition.

2.1.2. Educational Games and Interactive Learning Platforms

The second significant research area concerned was educational games and interactive learning platforms, incorporating story elements to improve engagement and knowledge retention. The goal was to analyze how storytelling could be utilized in a manner that would make learning engaging, enjoyable, explorative, and at the same time, would help achieve more active and thoughtful approaches towards learning.

Many interactive games and digital storytelling tools were studied in order to determine what kind of mechanisms they implement and what strategies can help balance entertainment with cognitive development in such contexts.

The most influential readings related to augmented reality-enhanced books and interactive reading systems. They provided an excellent example of

how one can turn a mundane activity like reading a book into something immersive and exciting.

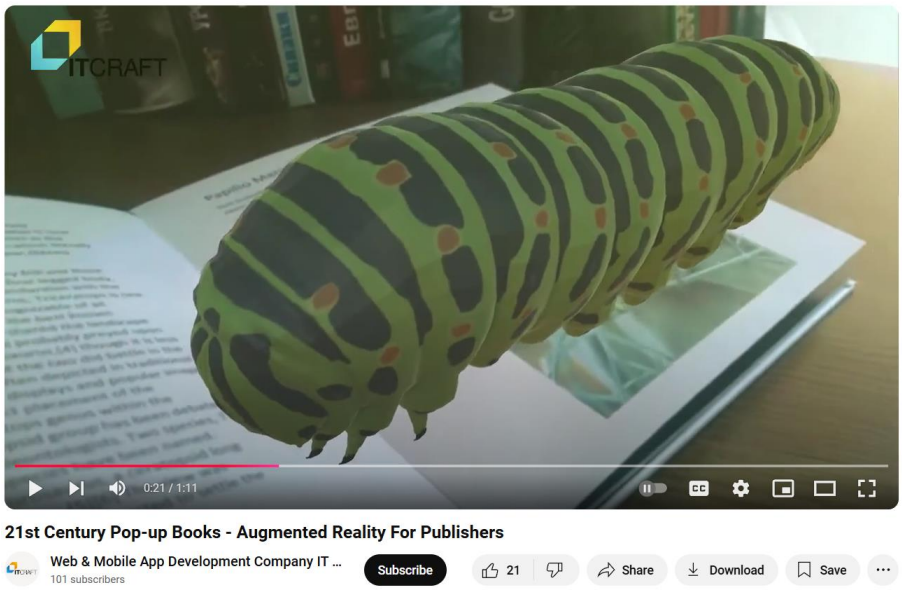


Figure:2.2: Application of Augmented Reality in Interactive Educational Publishing

The Augmented reality can bring fictional characters and settings to life, letting them interact with the reader's real world. This makes it clear how this tech can amp up imagination and learning.

Also, the study found that intuitive design is huge for education. Successful systems usually have easy-to-understand visuals, aren't complicated, and give quick feedback. They made sure to use these principles for "The Last Expedition." This included crafting a physical storybook, setting up an AR system with QR codes, and simplifying interactions.

Moreover, the research looked at ways educational games keep users motivated and engaged. To do this, they used progressions, awards, challenges, and quests. Solving puzzles and completing tasks were key. Ultimately, these features created a game where players solve problems, explore, and discover cool stuff. All these activities make for a more fun and active learning experience.

2.1.3. Key Learnings from Existing Solutions

The analysis of the current state of game projects, immersive experiences, and education systems revealed some valuable information related to the creation of The Last Expedition. For example, it became clear that kids respond better to those experiences that stimulate their creativity, exploration capabilities, and participation in the process instead of being passive

consumers of content. When the user is allowed to interact with the system, explore its features, and discover results on his own, he tends to be more involved emotionally.

Also, it should be mentioned that the combination of traditional interaction models and novel immersive technologies proved to be efficient. By analyzing successful implementations of voxel-based games and augmented reality stories, we understood that the experience would be easier and more fun for the target audience to participate in if it included the interaction model familiar to the child.

The study also stressed the importance of integrating immersion with usability. Immersive tools may help to improve engagement but if their interface is too complicated or their sensory stimuli are too many, this will have a negative impact on the performance of young users. As a result, the game was designed using principles of child-centric design, which implies a balance between simplicity, intuitiveness, easy-to-understand feedback and navigable systems, combined with high levels of immersion.

On the whole, the comparative study provided an excellent basis for the project conceptually and technically. Lessons learned from adventure games, educational applications, and augmented reality storytelling techniques were used to create an integrated platform involving interactivity, immersion, and experiential learning.

2.2. Research on the topic

The nature of traditional learning is often akin to following a road map where the route and destination are clearly set. The learners move from one set checkpoint to another, and success is often measured by the extent of the reproduction of information presented. An exploratory learning experience however, views learning as navigating uncharted territory. Here learners are not given every step to be taken but instead are given a destination and are free to discover their path.

Within Here, the learning goal and interest become the Northern Star, and an adjustable dashboard can continuously show learners how close they are to their destination and can adjust dynamically and adapt as they explore further. The measure of learning includes not just how many lessons are completed but the connections that are made, problems that are solved, skills and experience gained.

The increased adoption of Digital Learning platforms like BYJU'S, Unacademy, Khan Academy has made EduTech and EduTainment available quite easily. However, most modern learning systems still follow a linear pathway where every student must traverse through identical set of information irrespective of their interests, aptitude or learning style. Although this makes content more accessible, such systems are biased

more towards delivering information rather than nurturing curiosity, exploration, reasoning and practical application.

An alternative approach can be found in **Rhizomatic Learning**, which views learning as a network rather than a predefined path. Instead of following a fixed curriculum, learners navigate knowledge through connections, discoveries, experiences, and personal interests. Similar to the roots of a plant spreading in multiple directions, learning emerges through exploration and interaction rather than through rigid sequencing. This model acknowledges that in an era of rapidly changing information, the ability to learn, adapt, and form connections may be more valuable than memorizing predetermined content.

The framework draws upon principles from **Cognitive Learning Theory**, **Cognitive Behavioral approaches**, and **Experiential Learning**. Learning occurs through active construction of mental models, reflection on experiences, and continuous adaptation of existing knowledge structures or schemas.

2.2.1. Educational Insights Informing the Design Framework

There have been various theories of education and learning design which have informed the creation of The Last Expedition. Notably, Susan Ambrose's works point out the importance of motivation, knowledge organization, and engagement in order to establish a powerful learning experience.

It has been found out that people are motivated not just because of tangible rewards, but also because of the value, personal interest, and attainment value. Attainment value is defined as the pleasure that we derive from reaching goals that are relevant and congruent with our identity and aspirations. This means that an educational activity is not supposed to concentrate on improving skills alone; rather, they should be motivating the learner to explore, participate, and learn.

The environment has been shown to make a huge difference as far as motivation is concerned. Physical, social, and digital environments could affect whether one learns and gains knowledge and skills in the process.

Another key factor mentioned by the research is that the learning process is more engaging if it is perceived as being realistic and relevant. Abstract theories become much easier to digest when they are placed into an authentic context and experience. The idea correlates with experiential learning, and immersive stories are highly efficient in this case as knowledge is learned by doing things, experiencing them, and making decisions rather than observing.

According to theories related to attention, emotions play a vital role in keeping one engaged. Stories, surprises, discoveries, and challenges engage the learner's attention better than plain information. The process of designing educational materials must consider emotions not only information.

The way knowledge is organized makes learning more efficient and successful. If there is some kind of connection established between new knowledge and previously held schemas, then the probability of retention is increased dramatically. Knowledge connected to other concepts can be recalled and transferred, but the process cannot happen without a proper organizational framework.

In this light, memory can be described as the residue of thought. Learning experiences that are engaging, meaningful, and emotional will lead to memories being created. Through time, such memories help shape the schema that people construct to give meaning to things happening around them.

All these perspectives led to a model of learning that is open and engaging. Learning should offer people multiple opportunities of entry and exit so as to allow learners to learn through their unique contexts. Learning should not only involve passing knowledge but creating opportunities that engage learners in play and discovery, thus giving them chances to actively participate in shaping how they see the world around them.

- **Conceptual Framework and Narrative Identity:**

The underlying concept of The Last Expedition can be found in the genre of coming-of-age adventure stories. This type of literary works features stories revolving around personal growth, strength, self-awareness, and interpersonal relationships, achieved via the experience of some kind of a transformative journey. The project was created under the assumption that interactive media for kids could move on from being simply entertaining to become an effective means of emotional, imaginative, and cognitive development. As a result, the narrative and gameplay combine into one to provide a truly captivating story.

It should be noted that the theme of the story concerns a set of issues and problems which children aged between 7 and 12 are able to experience. These include the importance of exploring new things, the notion of trust and faith, perseverance, dealing with ambiguity and uncertainty, as well as emotional pain. However, unlike most of other similar works, these themes are incorporated into the plot and gameplay in a natural fashion without any forced exposition of ideas.

Another important aspect of the project involves its use of a branching digital novel format, which inspires both active participation and emotive involvement. By providing players with options for decision-making, exploring storylines, and interacting with their surroundings, one ensures the greater involvement in and immersion into the plot line, which contributes to promoting emotional literacy skills that allow children to understand causality and think about the consequences of certain actions and decisions.

And what makes *The Last Expedition* work so well is the way it balances all of these different things, and balances fantasy with a sort of emotional authenticity to make an adventure which is, at the same time, extremely thrilling and also profoundly moving. Even though the fantasy setting of exploration of some kind of magical lands and uncovering some lost civilization or interacting with fantasy beasts feels like kind of extremely unlikely circumstances, it has the underpinnings of really powerful messages about friendship, and family, and bravery, and a team ethic. So as a research and design exercise, we look at how we might exploit immersive storytelling with AR technology, how we can engage people, build empathy, in the context of this kind of story.

From the point of view of research and design, the project looks into ways of leveraging immersive storytelling and AR technology to enhance user engagement with empathy. Through making storytelling more engaging by changing its role from passive listening to interaction and immersion, The Last Expedition encourages children to foster qualities such as creativity, empathy, curiosity, resilience, and problem-solving skills through digital gameplay.

- **World Building and Character Arc:**

World building in The Last Expedition aimed at creating an interactive world that provides a solid foundation for both gameplay and a story. The story tells about two adventurous brothers Lucas and Daniel who travel on an expedition searching for answers about the disappearance of their grandfather. While traveling, the protagonists come across a mysterious island full of ancient architecture, secret caves, unknown creatures, and puzzles. At the same time, they find signs of an ancient civilization that once inhabited this land. In addition to being a place of action, the island provides opportunities for exploring the narrative elements and uncovering the secrets it contains.

Environmental storytelling plays an integral role in The Last Expedition. Visual artifacts, hints about the story, abandoned constructions, and ancient paths are incorporated into game environments in order to help players discover more about this world and its mysteries. Environments in the game were developed to be magical, adventurous, and appealing to children as well. The unique visual style of this project is based on voxel and low-poly design that creates a friendly world of adventure.

Character arcs of Lucas and Daniel are related to the mentioned ideas of exploration, growing, and strength. They reflect the traits of youth including curiosity and imagination. However, throughout the game, the characters will have to face different difficulties that may affect their self-confidence, abilities to work together and be patient and persistent. While experiencing an

adventure, players will observe how these characters grow up, and they will be able to participate in the development process personally.

First of all, the whole story revolves around the grandfather of these characters who is a famous explorer. The story is built upon his maps, journal entries, and artifacts that he left behind during his travels. Moreover, his disappearance becomes the main motivation for all these events and for an expedition to this mysterious place. Thus, besides the adventure, this story reveals other important themes such as family, memories, heritage, and emotional connections.

2.3. Method

Designing and developing an immersive AR/VR storytelling experience for children requires a careful balance between creativity, usability, emotional engagement, and educational value. While traditional digital entertainment games can be designed in any way the developer finds creative and innovative, The Last Expedition was created following a research-based methodology centered on studying the ways children perceive stories and technologies and how they interact within an environment.
The methodology of the project comprised the aspects of narrative design, interaction design, game development, immersive technologies, and user-friendly interaction and gameplay elements suitable for a child audience.

The creation of an interesting story based on augmented reality and virtual reality techniques required special consideration of factors such as cognitive load, simple user interfaces, environment readability, emotional aspect, and ease of gameplay. Children are different from adults in the way they perceive information and learn about the world around them; therefore, the interaction and gameplay processes needed to take this into account.

The following areas formed the primary research and development focus during the course of the project:

a) **Choosing a Compelling Theme:** It was about finding a theme that linked together adventure, exploration, learning and storytelling effectively. We knew children enjoy a mystery so we came up with a narrative that involved a great expedition. The core concept was using the concepts of adventure and exploration as a tool to teach children stories that have a strong emotional resonance and also allow the children themselves to participate.
    - Adventure: A sea adventure filled with treasure, creatures and quests.
    - Historical Journey: A trip that makes use of historical elements and civilizations.
    - Scientific Exploration: A voyage to distant island where no one dared to go.
    - Heroism: A story about overcoming challenges and helping others.

b) **Developing Engaging Characters:** Character design was important for making the story feel emotional. Kids really connect with characters in a story. Every character helped set the tone. The characters help tell the story in a way that feels real. Kids like characters they can relate to.
   - Relatable Protagonist: A character the child can easily identify with.
   - Memorable Antagonist: An obstacle that creates tension.
   - Supporting Cast: Characters who add depth and emotional appeal to the story.

c) Creating a Clear Narrative: A strong emphasis was placed on designing a narrative structure that remains easy to understand while still maintaining emotional depth and narrative progression.
   - Simple Plot: A straightforward storyline that is easy to follow.
   - Clear Objectives: A series of goals for the protagonist to achieve.
   - Emotional Depth: Moments of joy, sadness, and excitement to connect with the audience.

d) Utilize Immersive AR/VR Elements: The integration of immersive technologies formed one of the most important aspects of our project. AR/VR systems were used not simply as visual effects but as interaction tools that strengthened storytelling and engagement.
   - Interactive Environments: Allow the child to explore and interact with the virtual world.
   - Engaging Visuals: Using vibrant colors, dynamic animations, and captivating sound effects.
   - Sensory Experiences: Incorporate haptic feedback and spatial audio for a multi-sensory experience.

e) Imparting Educational Value: One of the primary goals of the project was to ensure that the gaming experience remains meaningful beyond entertainment alone. The narrative and gameplay systems were therefore developed with educational and developmental considerations in mind.
   - Teach a Lesson: Using the story to convey important values like courage, brotherhood and perseverance.
   - Introduce New Concepts: Explore science, history, or culture in a fun and interactive way.
   - Encourage Creativity: Providing opportunities for the child to create their own stories and experiences.

2.4. Presentation of the Problem

The present times witness an increasing amount of entertainment products that favor passive entertainment over meaningful engagement. The problem arises especially for children who live in a world full of technology; they not only watch and consume entertainment but explore it, create something new with it, and make decisions in accordance with the presented material. Thus, it seems that what is needed here is the design solution that combines storytelling and interactivity.

Understanding this challenge requires identifying user profiles among the

children. Firstly, there are **Reluctant readers**, whose inability to pay attention makes reading in text formats difficult and who would benefit from interactive and explorative storytelling. The second profile includes **Tech-savvy explorers**, who have been introduced to games, music and media and want to find ways to be engaged, explore, and interact rather than consume content passively. **Empathetic storytellers** constitute another profile of child users, who appreciate deep connections with characters, emotional interactions, and storylines that many modern technologies lack. If we don't teach our students how to critically analyze and interpret the data, they could increasingly rely on misleading and faulty AI. Thus, an approach that will take into consideration all of these factors was to be developed.

The issue that emerged in the course of research was the increasing separation of book reading and digital technologies that support interaction. Reading helps develop imagination, thinking skills, and emotional connection; however, most digital platforms focus on stimulating emotions fast and in short periods of time. Moreover, technologies like AR/VR are often created for adults, which makes it difficult for children to use them because of complex interfaces and complicated cognitive processes required by them.

Addressing these issues, The Last Expedition takes a child-centric approach which involves the incorporation of physical storytelling and augmented reality interactions into a coherent whole. The aim is to change storytelling from a one-sided experience to a more immersive one by incorporating the use of a storybook. While the emphasis is on creating a functional augmented reality application, it goes beyond to investigate the potential impact of immersive technology on children in terms of their engagement, playfulness, creativity, and cognition.

On a larger level, this work investigates the problem associated with interaction design and immersive media in particular: how do we make storytelling relevant to digital natives both emotionally, educationally, and technologically speaking? The Last Expedition tries to answer this question using the power of AR technology and interaction design techniques.

2.5. Solution Approach: Innovation and Uniqueness

In order to solve the problems that appeared during the research, a combination of storytelling, interaction design, spatial computing technology, augmented reality techniques, and child-oriented education methods was implemented within the project named *The Last Expedition*. Thus, instead of keeping the concepts of reading and gaming apart, we created a unique ecosystem in unity engine, where children can explore the story, interact with characters, and make certain decisions based on the results.

- Hybrid Storytelling: Integrates AR to traditional reading with interactive Digital Experiences.
- Personalized Learning: Offer a reward by completing challenges, create

Personalized Learning path.
- Multisensory Engagement: Engages sight, hearing, and touch for a Comprehensive Learning.

Overall, The Last Expedition presents the possibilities of using immersive technologies to create accessible child-appropriate games. The combination of elements such as interactive storytelling, sensory stimulation, learning by doing, and AR navigation creates a novel approach to designing media for children. The use of AR technology in this case is not limited to entertaining but it allows foster creativity, emotionality, activity, and engagement.

2.6. Design Process

Iteration and research were central elements in the design of The Last Expedition and involved aspects of storytelling, interaction design, immersive technology and child-centered UX. The goal was to design an emotive AR/VR experience for children and thus each stage of the design process had to achieve a delicate balance of imagination, accessibility, lucid visuals and interactive immersion. In a creative sense, several stages contributed to the process, including conceptual exploration, visual exploration, story formulation, character design, environment prototyping, and interface design.

2.6.1. Mind Mapping

Mind mapping was the first step undertaken at the very start of the creation of the game world. It helped organize ideas concerning the narrative of the game, its gameplay components, possible interactions, as well as visually inspiring aspects.

Family, adventure, and courage turned out to be the themes that were used to construct the backbone of the story world. Ideas that included the themes of mystery, discovery, exploration, resilience, and bonds between characters served as inspiration for the development of the gameplay system.

A mysterious island, an ancient ruin, a monster, treasure, environmental riddles, and emotionally driven narrative elements were the aspects that appeared due to the idea generation process.

- **Central Theme:** Family, Adventure, Courage
- **Key Elements:** Mysterious Island, Monstrous Creatures, Puzzle-Solving, Emotional Moments

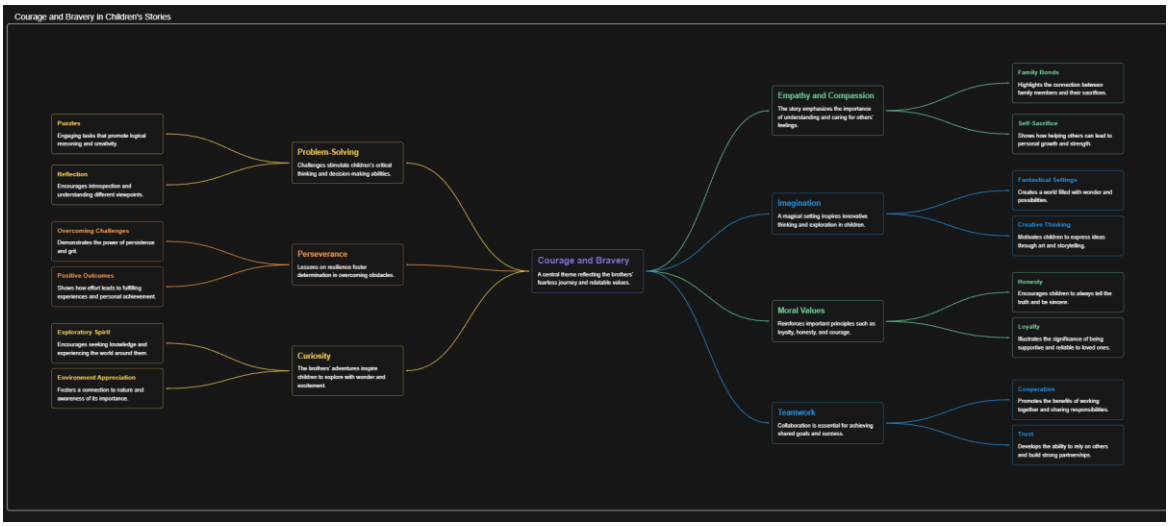


Figure:2.3: Thematic Structure of Courage and Bravery in Children's Storytelling

2.6.2. Moodboard

After establishing the concept, mood boards were created in order to describe the visual language, feeling, and art direction that would be achieved through the project. In particular, the goal at this stage was to develop the identity that would allow creating an immersive, magical, nostalgic, and accessible world for children.

The visual language was greatly inspired by Minecraft voxel environment due to its familiarity and simplicity in terms of complex space structures representation. Additionally, the project relied on dreamlike cinematic references, Pixel Art, which were complemented with nostalgic adventure aesthetic to make the overall experience mysterious and enchanting.

In terms of color palette, mostly soft pastel shades, environmental tones, and vibrant accents for magical, interactive and emotional elements were used. This palette allowed for combining realistic and fantastic aspects while retaining visual comfort for younger audience.

There are several references that played significant roles in this phase of the work, such as classic adventure films and video games like Lara Croft or Jumanji, as well as old maps, expedition diaries, fantastic landscapes, and architectural references.

- **Visual Style:** Minecraft, Dreamlike, Nostalgic, Pixel Art
- **Color Palette:** Soft pastels, earthy tones, vibrant accents
- **Reference Sources:** Adventure films, historical maps, fantasy exploration environments



Figure:2.4: Mood Board Illustrating the Visual Design Direction for the Game Environment

2.6.3. Storyboarding

Storyboarding was the method used to plan out the sequence of the narrative structure, game progression, pace of emotions, and the transitions in terms of film scenes. At this step, ideas of the narrative had been developed and translated to the story sequence that can then be implemented to the game and augmented reality interactions.

Several significant story points were covered by this storyboard and included the introduction of the main characters, the disappearance of the grandfather, arriving at the island, interaction with the dangers present in the environment, solving puzzles, emotional turning point and the conclusion of the story.

This step also determined how the augmented reality interactions and game play will be incorporated smoothly into the story. Camera work, emotional focus, scene setting and pacing were all considered in this step.

- **Key Scenes:** Introduction, Island Arrival, Puzzle Challenges, Emotional Climax, Resolution

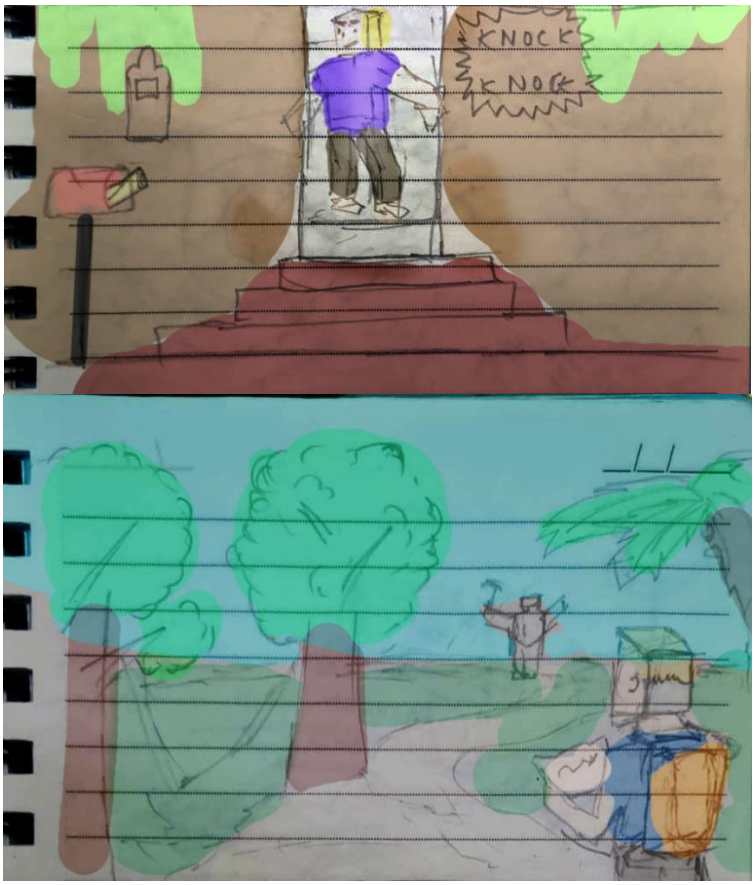


Figure:2.5: Storyboard Representing Character Interaction



Figure:2.6: Last Expedition Notes and Maps

2.6.4. Final Design

The final design phase focused on transforming the conceptual and narrative ideas into a fully interactive AR/VR storytelling experience. This stage included the development of character systems, environmental design, user interfaces, gameplay mechanics, and physical-digital integration.

2.6.5. Character Design

In terms of character design, the characters need to be approachable as well as emotional. Two central characters include Lucas and Daniel, who help to create the balance and plot of the story through their individual character traits. Lucas is the first central character. He is a calm, thoughtful, and observant character with an analytic nature.

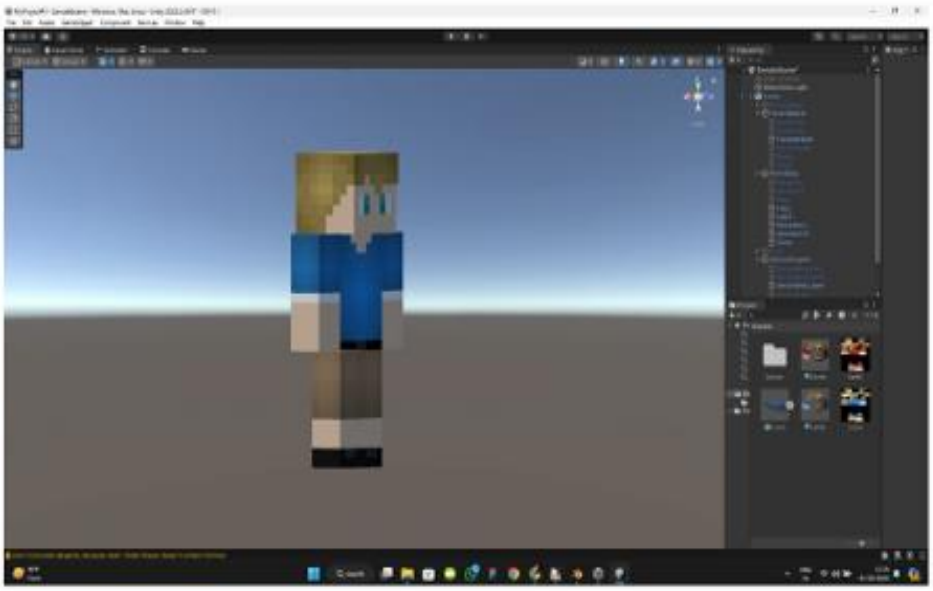
The other central character, Daniel, is the opposite of Lucas, as he is brave and adventurous with lots of confidence. He likes to take risks in the wilderness and to investigate and explore various environments. This contrasts Lucas' personality, as Lucas tends to take his time before he will be ready to make a choice. Together they make a captivating story, since they have such contrasting personalities.

The contrasting personalities between brothers make an effective relationship, and contribute to the themes of brotherhood, teamwork and growth. Since Lucas and Daniel rely on each other to survive their adventure, a strong bond develops between them. There are various challenges to overcome throughout their mission in the shape of harmful animals and environmental challenges, in addition to a host of other obstacles and danger. These circumstances teach them a valuable lesson in both trust and cooperation.

Opposition in this case arises from monsters, the natural environment and a series of tasks that the two brothers overcome by means of survival within the quest.

The grandparent is a vital character and emotional backbone of the story. He is an ex-adventurer who holds some mystery within him and aids Lucas and Daniel with various clues and findings. This is to prove love and family are better than any treasure found.

- **Protagonists:** Lucas and Daniel with contrasting personalities
- **Antagonists:** Environmental dangers and mysterious creatures
- **Supporting Character:** Wise grandfather and legendary explorer



Unity



Blender

Figure:2.7: Character Creation Process in Unity and Blender

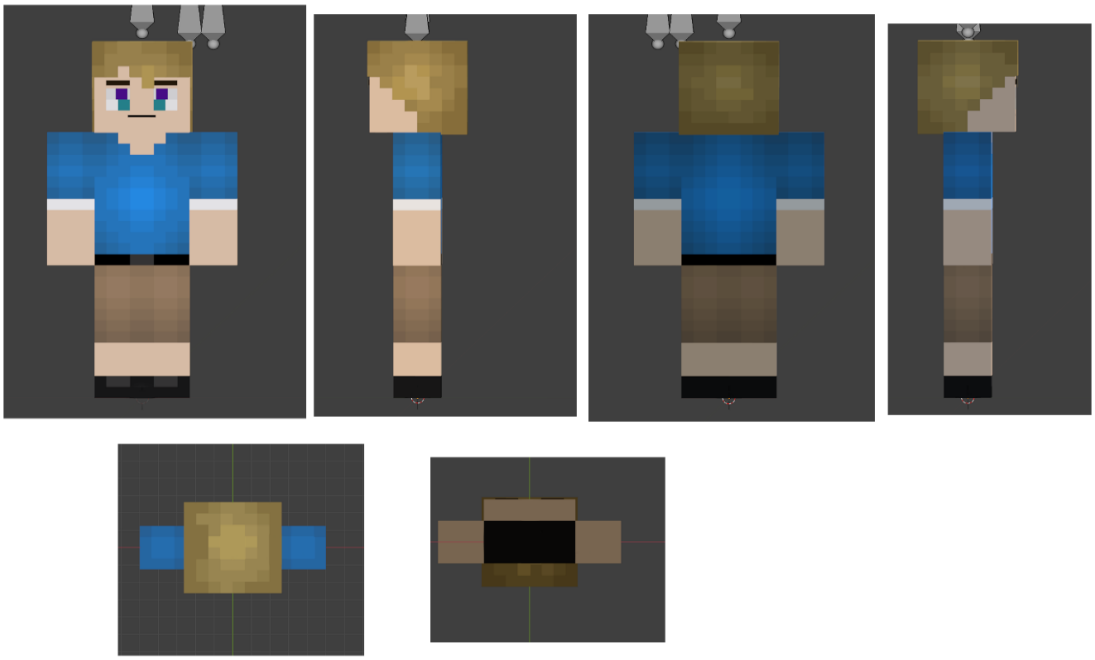


Figure: 2.8: Character Skin from all sides



Figure:2.9: Minecraft Zombie Character

2.6.6. Set Design

Environment design of *The Last Expedition* is made with the idea of providing mystery, scale, and adventure while remaining accessible enough for younger players. The islands contain dense jungle, ruins, caves, abandoned buildings, magic areas, and hidden treasures.

The process began with building the environments based on blocks in voxel form before developing them further in Blender and Unity. This allowed designers to quickly experiment with navigational elements, puzzles, story elements within the environment, and gameplay overall.

A significant focus was placed on creating the real like atmosphere at different locations like at the beach, temple etc. by introducing dynamic weather elements, magic lighting, layers of fog, sounds, and cinematically inspired visuals.

- **Island Environment:** Forests, Ruins, Caves, Hidden Treasures
- **Environmental Effects:** Dynamic Weather, Magical Lighting, Spatial Audio

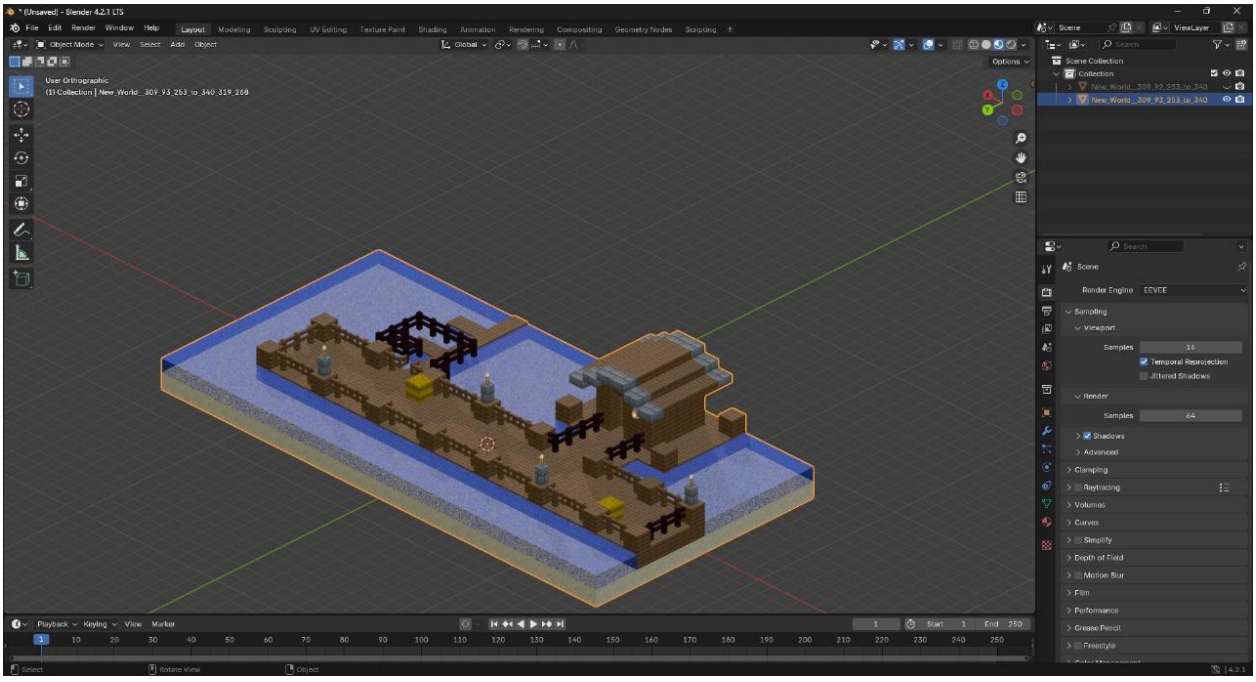


Figure: 2.10: WIP from Blender

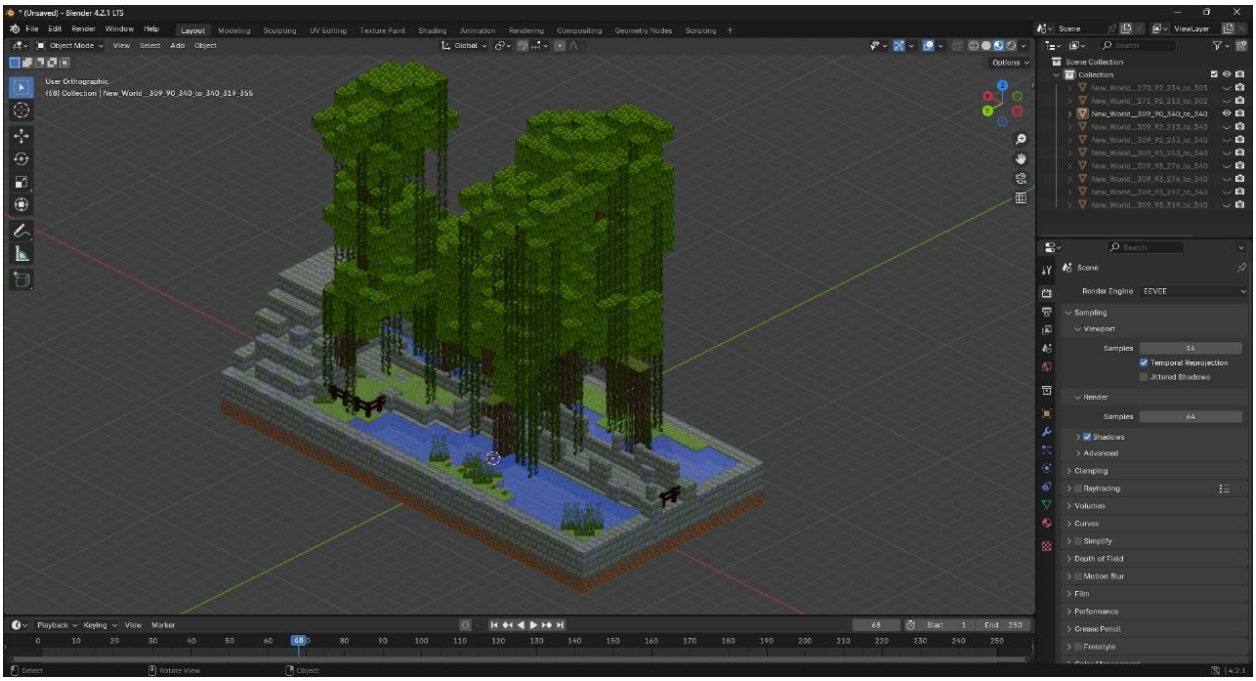


Figure:2.11: WIP from Blender

2.6.7. App and Page Layout

However, when designing the user interface and page layout, considerations of clarity, readability, simplicity, and easy navigability were key factors. Given the target audience of younger individuals, a less complicated interaction system would be more appropriate to ensure no overload for their cognitive development or lack thereof.

The application design consists of menu options, chapter navigation tools, pause options, buttons for interactive features, movement, and other features that will make it easier for children to interact within the AR space without being overwhelmed.

As part of the hybrid story structure, the layout of the book included on the physical storybook is strategically designed. While the left-hand side of the page includes the story's text and illustrations, the right-hand side holds QR codes corresponding of the chapter to be scanned for the story in the mobile application.

- **User Interface:** Intuitive and Child-Friendly Navigation.
- **Page Layout**: Split Design for Story and AR Integration
- **Interaction System**: Minimal and Accessible Controls

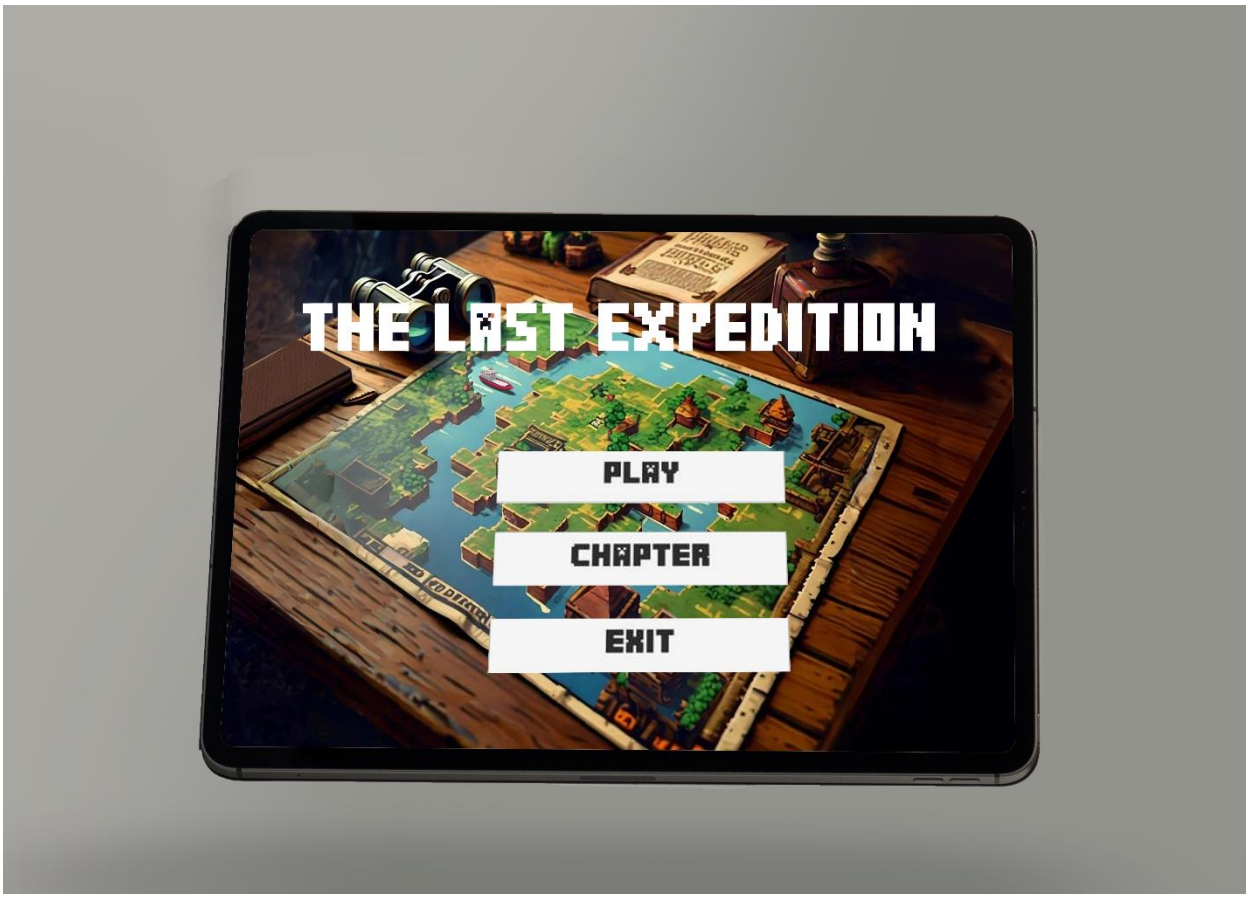


Figure:2.12: UI Layout Opening Screen



Figure:2.13: UI for Chapter Screen

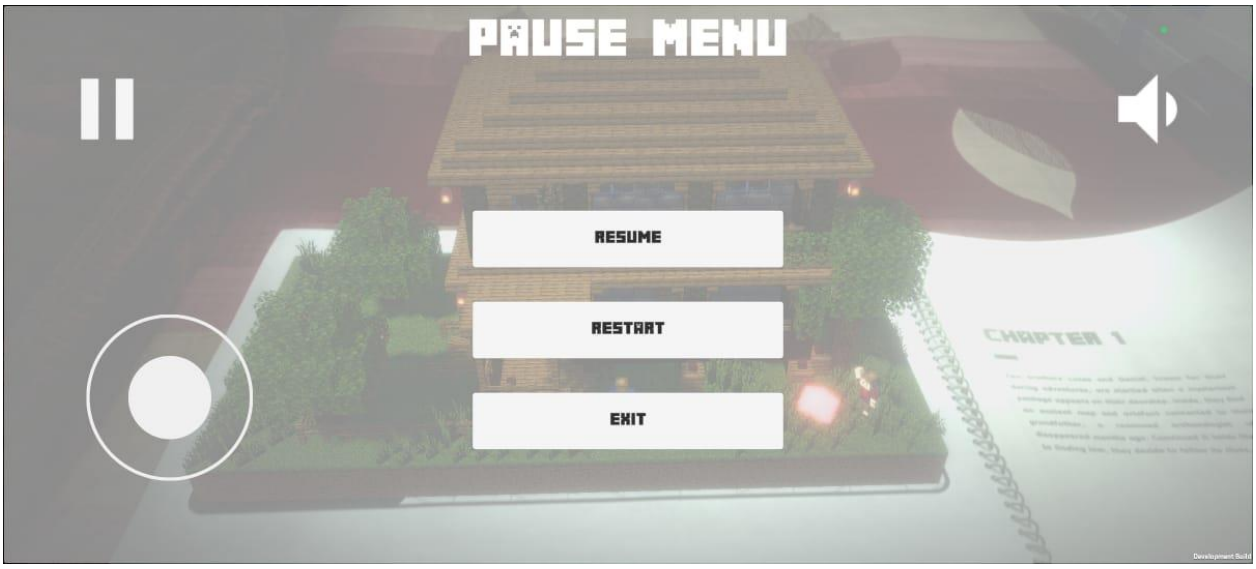


Figure:2.14: Pause Menu



Figure:2.15: App working in live environment using cinematic lightning for models

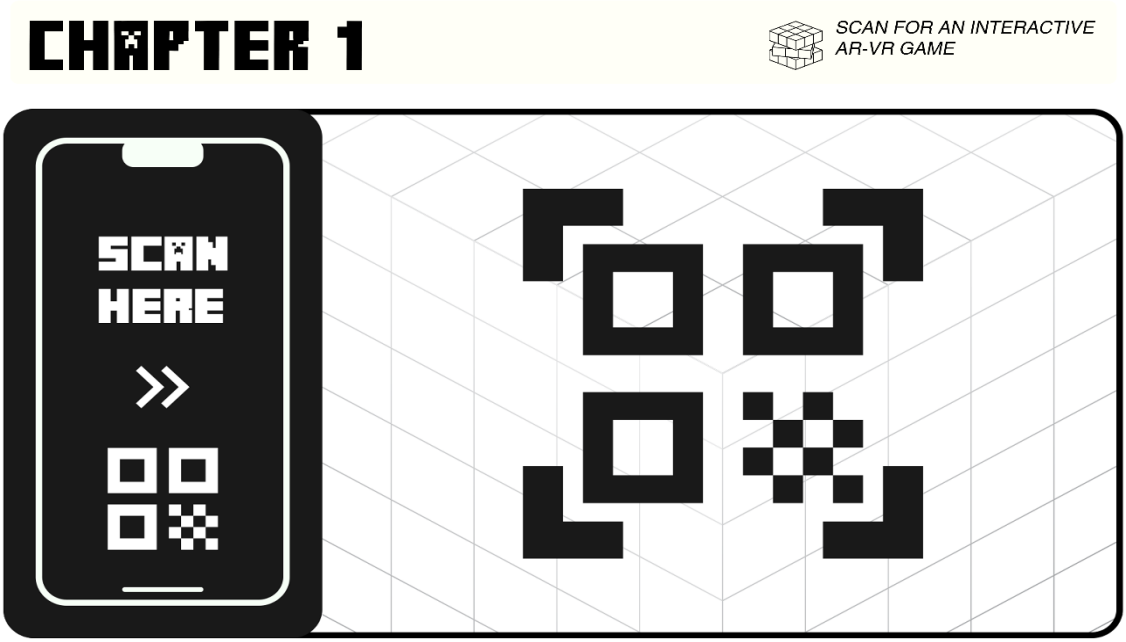


Figure:2.16: Page Layout Left hand side of children's Story Book



Figure:2.17: Page Layout Right hand side of children's Story Book



Figure:2.18: Book Mockup Opened



Figure:2.19: Book Mockup Closed

CHAPTER 3

DISCUSSION

The challenges addressed in the development of The Last Expedition have been identified not only as technical problems, but also as more general issues of interaction design and user experience associated with the ways how kids use digital devices. At the current stage, child-computer interactions are shifting from passive screen viewing towards active participation and immersion into the process. In this context, it becomes important to design experiences that are educational, emotional, mentally understandable and developmentally adequate. Thus, the current research explores ways to implement the discussed criteria in the form of immersive storytelling.

As a part of the theoretical background, The Last Expedition uses principles of **Cognitive Load Theory** which focuses on designing information in such a way that it would not be too overwhelming for users. As a rule, children aged 7-12 are extremely sensitive towards complexity of interface, abundance of visuals and complicated navigation systems. To solve this problem, the project makes an effort to simplify interaction and make it more friendly for kids. Navigation is smooth, narration is made possible via one button, and environment is presented as readable voxel environment. Cognitive load theory means cut extraneous information, simplify complex information. It is done by providing lots of examples early, encourage visualization and affirmations leading to self-explanation and slowly fading guidance, reduces load and fastens learning.

Moreover, the project is inspired by **Developmental Psychology** ideas according to which it is necessary to make learning and development happen in a participatory manner via active play, exploration, and engagement. Instead of treating users merely as recipients of information through reading, it encourages children to engage with the story world actively by using augmented reality exploration, puzzles, and games.

Another key point of our discussion is the connection between technology and emotions. Today's digital stories usually emphasize on stimulating experiences and visuals rather than a well-developed story that would resonate emotionally. The Last Expedition aims at conveying the ideas of courage, family, brotherhood, endurance, and curiosity by involving these themes in the story and game systems from the beginning. Thus, Lucas and Daniel's adventure and discoveries include personal and emotional growth and cooperation with others. Rather than absorbing information passively, children build understanding through interaction, play, observation, and discovery.

The Last Expedition also shows how a **Hybrid story-telling system** that blend

physical elements with digital ones can be effective. By merging a physical book with an augmented reality experience activated through QR code scanning, the project creates an environment in which reading a storybook merge seamlessly with the latest technologies. It combines the imagination-enhancing and tactile aspects of the traditional reading practice with the interactive features enabled by the technology itself, leading to a participatory process in which children learn to walk, move around, and interact. It is evident from the hybrid model that immersive technologies can be used to complement conventional mediums of story-telling rather than substitute them. AR experiences, using the QR code enables the reader to read in an active and immersive manner, thus creating an engaging experience.

As far as the role of immersive technologies in education is concerned, The Last Expedition shows how these new technologies and interaction design can enable playful learning. Puzzles, exploration, time-based tasks, and other elements encourage participants to think critically, observe, make decisions, and reason spatially, all of which constitute learning processes.

In conclusion, the project demonstrates that there is great promise in the development of immersive storytelling for the future of human-computer interaction with children. Through the combination of AR technology, narrative design, psychology of child development, and human-centered design of interactions, The Last Expedition showcases the potential of immersive experiences to go beyond mere entertainment into fostering creativity, emotion, learning, and engagement.

- Interactive storytelling
- Short-form narrative pacing
- Spatial exploration
- Emotional feedback systems

One of the innovative features of this project was integrating a physical storybook with the AR experiences through a mobile device. The project sought to fill in the widening gap between conventional reading practices and current digital behavior. With the integration of physical books alongside AR experiences, there is an attempt to retain the imaginative nature of conventional reading but in an interactive form through technology.

Furthermore, from the viewpoint of interaction design, the project considers the future of using XR technologies in playful learning activities. Many educational applications face the issue of finding the right balance between fun and learning, as they tend to be either very educational but not engaging or entertaining, but lacking development-related content. In turn, *The Last Expedition* tries to find a middle ground between these extremes and integrate educational goals along with emotion-based ones into the game's progression.

Environmental puzzles, timed events, exploration missions, and storytelling missions foster the development of such skills as critical thinking, attention to details, decision making, and spatial awareness. However, these skills are learned through interaction and discovering things on one's own, and not through instruction.
Another important topic discussed throughout the project was about creating inclusive

environments in the field of AR/VR technologies. Often, virtual reality is built with an assumption that only adults use it; however, it does not mean that it cannot be used by kids as well.

Consequently, the conversation about The Last Expedition is framed as an investigation of the future relationship between children and computers as well as immersive stories. This work concludes that with proper consideration, new technologies like AR and VR can be effective pedagogical and emotional instruments when paired with proper narrative design, development psychology, and user experience design.

By avoiding thinking of immersive technology strictly as entertaining or innovative devices, The Last Expedition offers a different point of view in which narrative, emotion, creativity, discovery, and learning co-exist harmoniously in one environment. In doing so, the work illustrates how child-focused immersive experiences can transcend mere entertainment and serve as a catalyst for creating a better form of interaction for future generations.

"It's not about shaping the person to fit the system; it's about shaping the system to fit the person."
– *Raymond, Grand Rapids HS student*

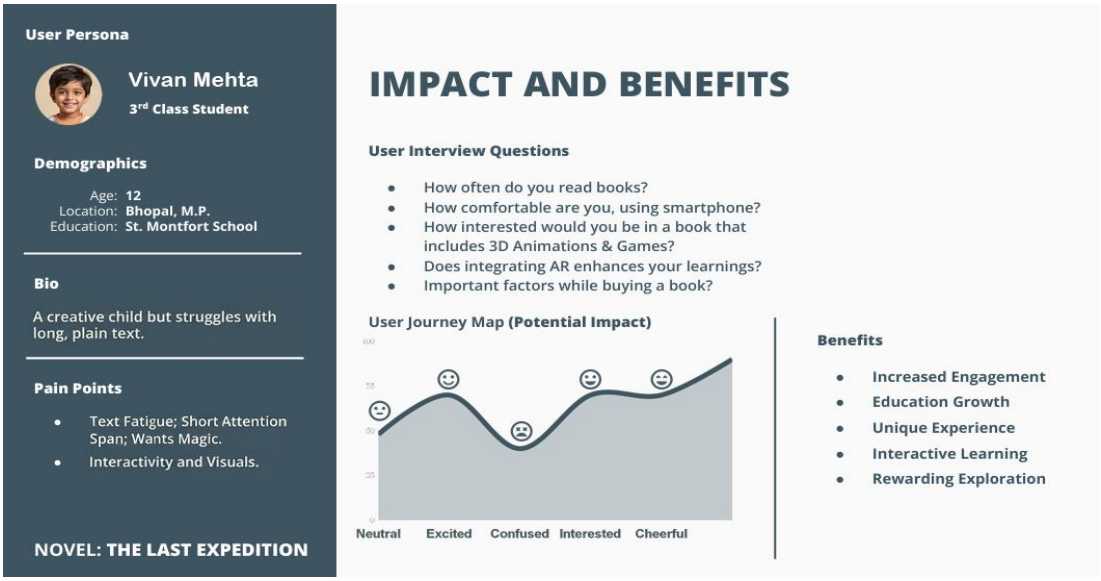


Figure:3.1: User Persona - Vivan Mehta

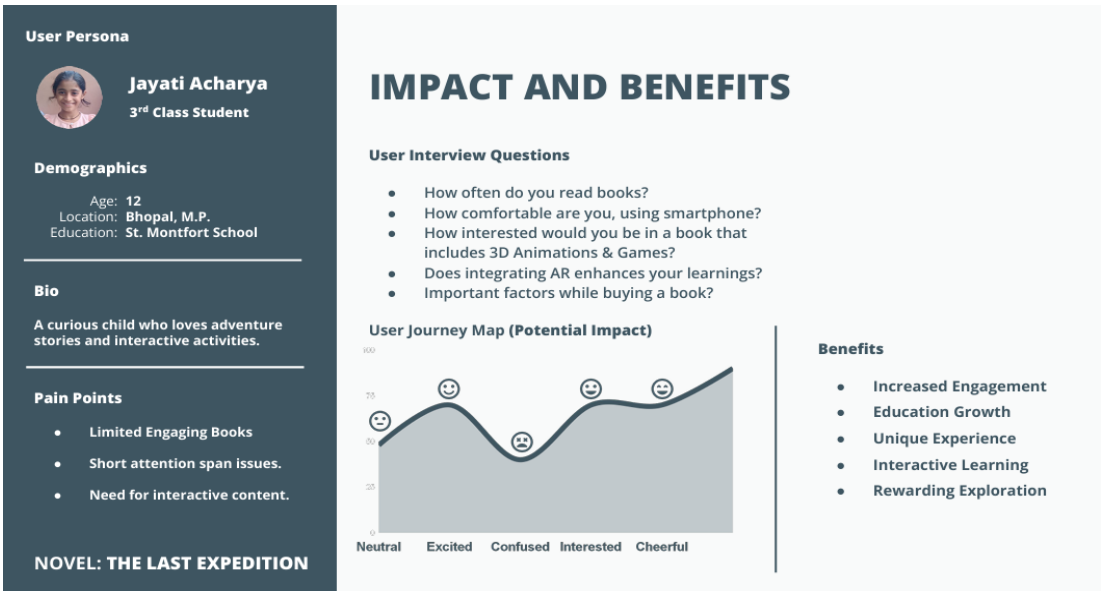


Figure:3.2: User Persona - Jayati Acharya

Based on the user profiles of **Vivan Mehta** and **Jayati Acharya**, along with the quantitative/qualitative touchpoints highlighted primary user data into clear, actionable design insights.

3.1. Primary Research Insights & Coding

The primary research investigation of *The Last Expedition* was to gain insight into the ways children in the target age group engage with stories, digital devices and immersive media in their daily lives. Several common patterns of behaviour and emotional reactions were found through user interviews, observations, user tracking and analysis of interactions with users like Vivan Mehta and Jayati Acharya. The findings were instrumental in converting user data to interpretive interaction design principles that directly fed into the conceptual and technical development for the project.

The study found that there is significant difference between how children interact with highly interactive digital environment and how they interact with traditional environment of static reading. Both avatars were confident and familiar with the digital interface but their responses also showed that there were clear limitations in the traditional approach to storytelling, when told in isolation, without interaction, stimulation and emotional involvement.

The collected data was then further coded and grouped under three general behavior themes to analyze these observations.

A. The Device-Comfort Paradox

It has been found out that children within the targeted age group exhibited great familiarity and confidence when it comes to smartphone usage, touch interfaces, and

application interaction. It seemed like navigation gestures, application operations, and other forms of interactions were very intuitive and natural for the young respondents, showing how deeply integrated digital technologies have become within children's lives.

Nonetheless, it is exactly this fact that created the problem at hand. Due to constant exposure to games that are quick, social networks, and responsive digital media, there is a tendency to expect certain levels of excitement and interactivity from any type of content that can be consumed. Traditional text-based media, therefore, fails to maintain children's attention on a long-term basis. The resulting Device-Comfort paradox indicates that technological familiarity does not necessarily lead to engagement – rather, it heightens children's expectations.

As a consequence, the choice was made to create The Last Expedition as a hybrid form of story that would incorporate reading, but would also be enriched by game mechanics and interactivity through AR experiences.

B. Text Fatigue & Cognitive Drop-offs

An important observation was the decrease in engagement during interactions where children were exposed to long stretches of continuous text or linear reading experiences. The children exhibited symptoms of lowered attention, distraction, and frustration when the narrative moved on only through reading without any interactive or exploratory options being presented.

These insights led to the understanding that engagement depends on cognitive effort. When the cognitive load increases due to reading with insufficient emotional, visual, or interactive support, engagement becomes difficult to maintain. Thus, traditional reading tasks can be challenging in terms of cognitive demands.

To counter this problem, The Last Expedition employs shorter narratives, audio stories, environmental storytelling, augmented reality, puzzles, and visual feedback loops. This strategy allows for distribution of information across multiple mediums and thus minimizes cognitive burden while keeping the reader engaged.

C. The Demand for Meaningful "Magic"

Moreover, it was established that the greatest level of satisfaction is achieved with experiences based on exploration, discovery, interactive nature of the environment, and rewarding progress. Animated visuals, three-dimensional objects, secret things, and various challenges aroused more interest from kids compared to passive storytelling.

However, it was also discovered that children were not attracted only by the process of stimulation. They required some emotional involvement which means that their interactions should have a specific goal related to the advancement of the experience they are going to have. Thus, discovering something, receiving rewards, and making emotional decisions become more interesting when these interactions have an impact on the progress.

In turn, this finding served as one of the foundations of the design philosophy of The Last Expedition. All these ideas include augmented reality exploration, environmental puzzles, discoveries, time limits, rewarding system, and many other aspects which will make sure that interactions have a meaningful purpose related to the story. Moreover, providing children with an opportunity to affect the development of the story, this experience increases immersion, curiosity, creativity, and engagement.

3.2. Quantitative & Journey Analysis (User Journey Map Synthesis)

The user journey mapping method had been crucial for assessing the emotional and behavioral reactions of the kids during their journey through The Last Expedition. Through examining the emotional flow through various stages of the experience, the study managed to pinpoint important engagement factors, cognitive friction points, and peaks in user immersion in storytelling.

The user journey map was created based on a combination of qualitative data collected through behavioral observation, interaction duration times, emotional feedback, and user testing interviews with members of the target audience. The study paid more attention not only to user engagement but also focused on emotions of the participants at the point when they moved from one stage of the experience to another.

Through creating the journey map, researchers managed to find ways to measure the performance of design through observing changes in user attention, curiosity, and re-immersion into storytelling.

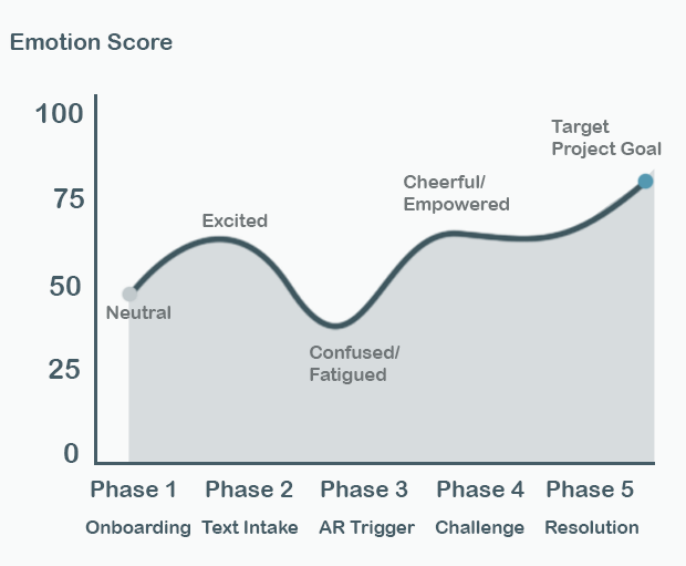


Figure:3.3: User Journey Map

- **Phase 1 to Phase 2 (The Literacy Friction):** The initial transition from an excited state to a confused/fatigued state represents the exact moment **text fatigue** takes over. Without immediate multi-sensory feedback, a child's attention span falters.

- **Phase 3 to Phase 5 (The XR Recovery):** The sharp upward recovery in user emotion directly correlates with the introduction of **multisensory elements and interactive games**. Once the user is allowed to actively hunt for clues or navigate alternative choices, engagement scores maximize toward a cheerful, rewarding resolution. This effect has been replicated by different elements like food, music in the background leading to more focus and engagement.

3.3. Evaluative Results: Addressed Problems vs. Proven Benefits

The empirical findings from your user personas validate that the features engineered into *The Last Expedition* directly resolve the core target pain points:

Result 1: Reversing Passive Consumption Through Gamified Exploration

- **The Problem Addressed:** High reliance on passive entertainment (TV/standard mobile loops) that limits cognitive growth.

Result 2: Scaffolding Literacy with Multimodal Comprehension

- **The Problem Addressed:** Text fatigue, limited engaging literature options, and short childhood attention spans.

Result 3: Transforming Static Content into Unique Spatial Experiences

- **The Problem Addressed:** The traditional book medium feels isolated or disconnected from a modern child's everyday digital ecosystem.

3.4. Strength and Strategic Advantages

The main uniqueness of The Last Expedition comes from the ability of developers to combine physical exploration and digital interaction into an immersive process. The Last Expedition will not be just another game app on a smartphone but a real adventure. With the use of an engaging story and high-quality graphics alongside the implementation of innovative Unity-powered AR/VR technology, it becomes possible to make a unique product.

No gimmicky technology or tricks are used; every element of the design is thoughtfully chosen and implemented in order to boost the kids' cognitive processes. The puzzles and choices presented within the application are meant to foster children's curiosity and help them develop problem-solving skills and creativity.

Apart from that, the game includes numerous valuable messages that kids may learn while enjoying playing. The values of bravery, perseverance, and family relationships are incorporated into the gameplay.

One more significant advantage of The Last Expedition project is the emphasis on cognitive involvement, rather than passive consumption of media content. As a result, the game and the narrative structure of the application were developed in such a way to encourage children to think, discover something new, solve puzzles and make decisions. This means that both puzzles and branching narrative paths can be viewed as tools for supporting:

- Spatial reasoning skills
- Lateral and analytical problem-solving abilities
- Decision-making confidence
- Exploratory thinking patterns
- Creative imagination and curiosity

In the case of making storytelling an interactive and explorative process, the game helps children be active participants in the narrative, rather than mere spectators. The idea of participation as a part of the overall game design makes a huge difference as far as emotional engagement is concerned.

Another key strength that results from the ability of the game to combine emotional and educational aspects becomes clear when one takes into account problems typical for most learning applications that make education entertaining.

Courage, persistence, teamwork, empathy, and other important values are communicated not through direct instruction or moral lectures but through experiencing the adventures and challenges faced by Lucas and Daniel, overcoming fears and uncertainties, and getting an insight into the emotional truth behind the grandfather's disappearance. Values about family are subtly conveyed through the storyline and journey of the characters without the need for didactic learning.

The multisensory interaction framework further strengthens the project's immersive quality. Through the combined use of:

- Dynamic visual storytelling
- Interactive AR exploration
- Responsive sound design
- Spatial audio cues
- Simplified tactile interactions
- Voice-assisted narration systems

It is worth noting that the experience is designed in such a way as to ensure high-level involvement and motivation in young users while providing them with limited cognitive load associated with the experience.

In terms of strategic interaction design considerations, it is possible to highlight another strong point of the project. In particular, due to the availability of relatively cheap smartphone hardware and lack of complex head-mounted virtual reality equipment, the experience becomes accessible and feasible for wider applications within various ecosystems, including educational, domestic, and recreational contexts.

The multisensory nature of the project makes it easier to engage with the project through the use of visual storytelling, the ability to explore the world through AR, audio response, voice guidance and interactive elements.

Overall, the strength of *The Last Expedition* lies in its interdisciplinary integration of storytelling, interaction design, immersive technology, developmental psychology,

and playful learning. By harmonizing physical reading, AR-based exploration, and experiential gameplay, the project presents a forward-looking model for immersive children's media that supports emotional engagement, creativity, learning, and active participation.

3.5. Technical Limitation and Challenges

However, despite its benefits and immersive capabilities, The Last Expedition demonstrated some technical weaknesses in terms of the use of AR technology in mobile devices. Although spatial computing provides many opportunities for interactive storytelling and children-oriented content, the effective use of this medium entails the need for careful consideration of performance, accessibility, scalability, and usability factors.

The first problem that was identified when developing the application was related to optimization issues within the Unity engine. In contrast to traditional mobile applications, immersive applications involve a number of processes at once, including environmental recognition and spatial computation, camera feed processing, animation, physics calculations, and interaction with objects. Thus, the stability of the process was essential since even minor performance issues could lead to disruption of immersion and poor usability, especially among young people. To overcome these difficulties, the game featured low poly voxel-like environments, optimized assets, compressed textures, and simplified light engines.

One major limitation faced during the development process was the difficult task of optimizing immersive AR/VR content in the Unity platform. Unlike traditional mobile apps, AR/VR systems need to process various performance heavy tasks simultaneously, including:

- Real-time environmental tracking
- Spatial mapping and plane detection
- Dynamic lighting calculations
- Continuous camera feed analysis
- 3D asset rendering
- Physics simulations
- Animation systems
- User interaction processing

Effectively managing these types of systems on the mobile hardware itself was key. It became extremely critical to achieve consistent frame rates and responsive interaction. As the target audience consists primarily of young children who have shorter attention spans than others, any form of lag or instability can detract from their immersive experience.

Another significant problem related to the project was ensuring that the devices employed are compatible. The effectiveness of AR experience will depend heavily on the processing power, camera resolution and memory of the mobile device. Advanced AR functionality is only available on the higher models; it might reduce user access to

AR. It raises other issues that may impact the adoption and use of AR in the educational context.

Another issue which affected the design process was environmental dependency. The AR application must have optimal conditions such as desirable lighting, texture of surfaces, Environmental clutter and stability of camera tracking.

The spatial mapping and object placement may be affected by poor lighting and unstable tracking environment, which will result in less immersion for the user. As they will be using the application in an unknown domestic environment, it is of critical importance that the AR functionality will work in any situation, which was always a concern in the design of the application.

The concepts of accessibility and inclusive design also constitute directions to explore in the future. The project offers simplified controls, narration and navigational support, but typically immersive media require that the user be able to interact visually-spatially and move their body. This may present a challenge for individuals with a variety of visual challenges, motor challenges, or cognitive impairments. Additional research and experimentation will be needed to develop inclusive immersive experiences that will include the development of an accessible framework for interaction.

Scalability and production complexity constitute yet another limitation of the proposed approach. The process of developing an immersive storytelling experience entails designing the plot, creating characters and a story world, modeling 3D objects, animating objects, producing sound effects, implementing augmented reality, optimizing assets, and conducting usability tests. In this regard, the development of immersive stories is considerably time-consuming when compared to the development of digital stories.

Moreover, accessibility and inclusivity on child-friendly interaction guidelines, its accessibility to children who might have various disabilities is yet another major issue. This is because most technologies depend on the interaction pattern that uses both physical space and visual-spatial movement to engage the user.

For example:

- Users with limited motor mobility may face difficulty navigating spatial AR interactions.
- Visually impaired users may struggle with environment-dependent gameplay systems.
- Neurodivergent users may respond differently to sensory stimulation, visual complexity, or interaction pacing.
- Users with limited digital literacy or technological familiarity may experience onboarding challenges.

Although the project aims at reducing the cognitive load by means of simplified controls, narration systems, and a user-friendly interface, creating an entirely accessible system of this kind would need further investigation and design strategies.

The limitations related to content scalability and development complexity were also noted during the project. Creating an immersive narrative experience is much more complicated and resource-consuming than digital publishing. The process of creation includes:

- Narrative design
- Game development
- 3D modeling
- Animation
- Spatial interaction design
- AR integration
- Audio design
- Technical optimization
- Usability testing

These aspects lead to higher costs and long-term development processes. In order to scale up the project and create an even richer world for users to immerse themselves in with multiple chapters, locations, and interactions, resource management needs to be done with great care and foresight in the future.

The limitations mentioned are pretty typical for the industry and could be useful for future research. So, "The Last Expedition" proves that finding a balance between tech and user needs is crucial. While AR can revamp storytelling and education, long-term success depends on both immersion and reliability. We also need to make sure that the tech works well, doesn't cost too much, and is safe for all ages.

3.6. Implementation

3.6.1. Technical Stack and Material Infrastructure

The execution of "The Last Expedition" relies on a cross-platform pipeline designed to optimize 3D asset generation, spatial computing, and interactive narrative logic.

[Asset Creation: Minecraft + Blender] → [Game Engine: Unity + C#] → [Spatial Computing Layer: Vuforia SDK] → [Target Platform: Mobile AR/VR]

- **Unity Engine & Core Logic:** The backbone is developed using the Unity Engine, which also features a highly versatile scene management system that allows users to switch between the 2D visual novel scenes and 3D spatial environments. The behavior of the application, state machines and branching of the story are all implemented in the C# programming language.
- **Spatial Computing & Tracking**: To help cross the physical and digital divide, the Vuforia SDK was integrated into Unity. This framework is capable of controlling the real-time camera feeds from the devices, the planar ground tracking (ground plane detection) and the image marker registration, where interactive digital content stays firmly attached to real world surfaces.

- **Asset Creation & Animation Pipeline**: A unique hybrid design language is used in the production pipeline. Minecraft's blocky geometry was used to ease the creation of low-poly, high readability voxel environments and initial levels, and these levels were quickly designed. Then these models were transferred to Blender for geometry optimization, material texturing and even keyframe character rigging, in order to provide them with expressive and kid-friendly gestures, namely for Lucas and Daniel.
- **Audio Engineering**: To optimize auditory wayfinding, dedicated sound editing software was used to mix the spatial audio tracks, to manage low-frequency haptic triggers and to fine-tune the multi-modal voice narration assets.

3.6.2. Construction Process & Pipeline Execution

The Last Expedition was created through an iterative, multidisciplinary production process that involved story, game design, interaction design, spatial computing and immersive technology. Incorporating the physical storybook with a mobile AR/VR application presented continuous challenges during development to maintain consistency in the story across the formats, ensure technical stability, and make accessibility enjoyable for the children targeted at ages 7 to 12 years. There were five key stages in the workflow, from conception to implementation.

In the first stage called **Level Design and Spatial Prototyping**, the students created their first levels for their game. The fictional island environment was created as a result of a process of spatial exploration and gameplay mapping at the large-scale level, prior to creating detailed assets. Because of the voxel-based construction system, Minecraft was used as a rapid prototyping mechanism to create environments and make changes in a short amount of time. Modular block-based structures are used to construct forests, caves, ruins, puzzle locations and exploration pathways. Through this process, scaling of the environment, player movement, placement of puzzles, navigation flow, and the composition of the story were all tested. The familiarity of the voxel environments amongst children also offered a great deal of insight for the creation of intuitive, playful, and easy to navigate environments.

The second phase was the **Character Development and Asset Optimization** in Blender. After the spatial structure was completed, the environment and character models were further enhanced for Unity integration. This included topology cleanup, polygon reduction, UV mapping, texture preparation, and material optimization to ensure efficient mobile performance. Two main characters, Lucas and Daniel, were emphasized. The characters were

designed using skeletal rigging and animation systems to allow them to have expressive body language and emotionally readable movement. Animations were designed to evoke emotions in the younger audience, such as curiosity, excitement, fear, determination and wonder, which was achieved by using carefully planned animation to strengthen the emotional engagement and narrative immersion.

In the third phase, the team focused **on Interactive Scripting and Narrative Systems** in the Unity Engine using C#. This is where they developed the main gameplay mechanics – character movement, interactions with the environment, puzzle usage, and more. They also programmed how the game follows branching storylines, and switches between the UI and different reward systems. For the visual novel part, a node-based dialogue system was created to let conversations run smoothly and player choices affect the storyline. Another node-based dialogue system was put in place to help with this aspect, allowing choices to influence the narrative. Throughout this process, simplicity was key. The developers made sure the interaction systems were easy, like having just one button for audio narration. Additional scripting managed the puzzle-solving, time-based challenges, environmental actions, and augmented reality tasks. All of these elements came together to create a game where storytelling, exploration, and play mechanics meshed perfectly.

In the fourth stage, **Asset Integration and Scene Assembly** began. All those pre-made 3D models, animations, textures, sounds, UI, and gameplay systems were put together in Unity. This created fully interactive scenes. Each bit of the environment, from lighting and colors to character positioning, was synced up nicely. They aimed for something super clear but still cozy and fun for kids. Special attention went to lighting and colors for that perfect kid-friendly vibe. Also, spatial audio helped with navigating around and feeling immersed. In essence, it's about merging all pieces into one engaging storyworld.

The last phase was dedicated to **XR Integration and Performance Optimization** using the Vuforia SDK. During this phase 3D AR was possible, including real-time camera tracking, stable anchoring in space and image recognition. The mobile optimization was heavily worked on as the AR processing can use a significant number of resources on the device in order to be able to process it continuously. Camera and sensor systems were only switched on during special interactions with AR and special sequences of puzzles for efficiency reasons. Additional optimization was aimed at frame-rate stability, rendering quality, scene loading time, tracking stability, battery efficiency and more. The improvements ensured smooth transitions between the storybook content, game interactions, and AR exploration, maintaining the seamless experience and ease of use throughout.

The Last Expedition's progress suggests a holistic approach to storytelling, game design, and immersive technologies. Through iterative prototyping, asset refinement, interaction design and AR optimisation, a whole immersive experience was built that transformed a basic concept into a children-centred activity of reading, exploring and interactive learning.

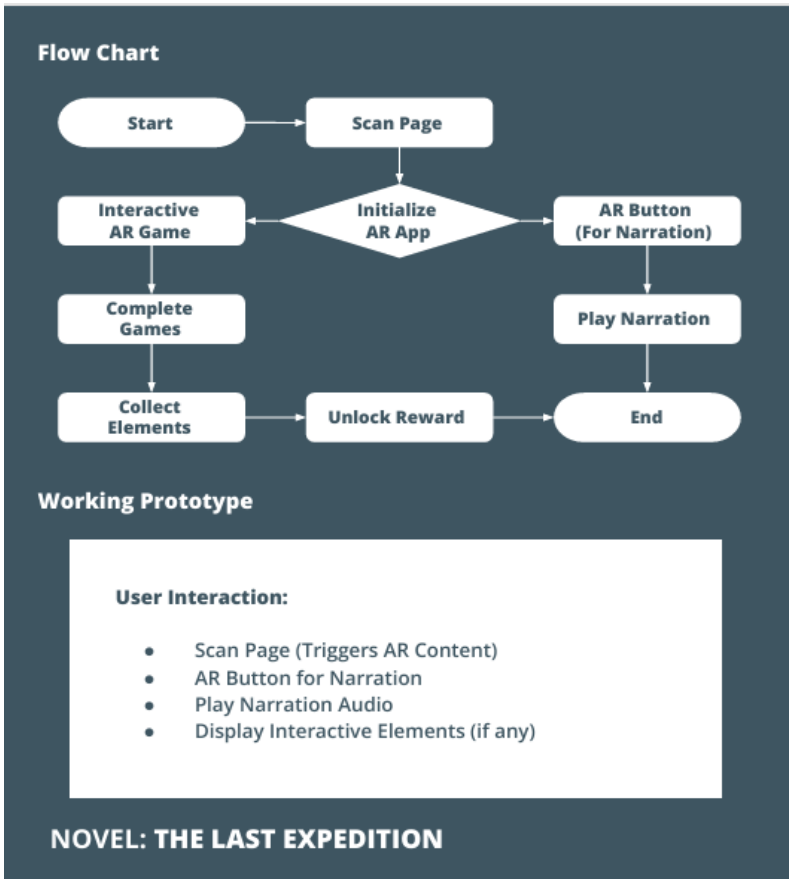


Figure:3.4: Working Prototype Flowchart

3.6.3. Comprehensive Testing & Validation Procedures

To validate usability and emotional engagement two types of testing methodology were executed across the target demographic (ages 7–14),

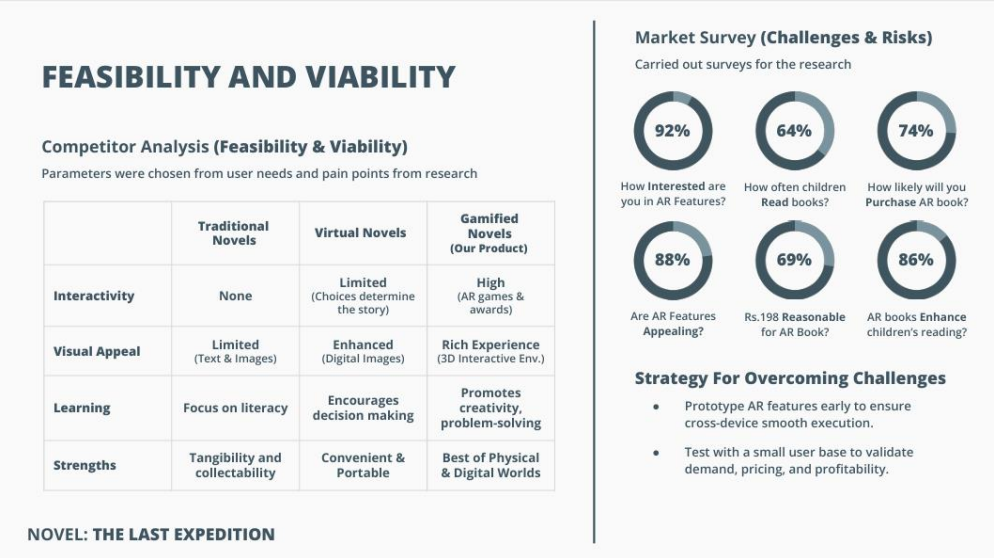


Figure:3.5: Usability and Feasibility Survey

- **Primary Empirical Playtesting**

Tests using user-centered approach were carried out among children falling in the age range of the targeted audience. Tests included observation of children's interaction with the tracking layers, assessing the speed with which they recognized the 3D spatial objectives, and measuring their attention span when reading texts.

Results from the tests were qualitative in nature, indicating that the use of voice narration using a button reduced fatigue among younger participants, aged between 7 and 9 years, while branching choices through rewards maintained high levels of excitement among older participants, aged between 10 and 14 years. Confusion among the users during spatial navigation was used to refine the user onboarding experience.

- **Technical & Cross-Hardware Verification**

On the other hand, proper technical testing was carried out in order to ensure stability and optimum functioning of the platform. The mobile app was tested on a range of different Android and iOS phones that had varied capabilities such as different processors, display resolutions, and camera features.

Some of the main key performance indicators (KPIs), including real-time frames per second (with the goal being 60 FPS in order to prevent motion sickness for VR/AR scenes), interface reaction times, and time taken by Vuforia tracking to recover from interruptions due to varying light levels indoors, were strictly observed. Memory consumption issues were addressed through debugging.

CHAPTER 4

CONCLUSION

The Last Expedition successfully demonstrates that spatial computing can be an effective tool in teaching and strengthening children's literacy through interactive stories. For all-round development, this work breaks down the walls of traditional children's books using a fun visual novel format and cutting-edge AR/VR mechanisms built with Unity to cultivate an authentic passion for learning. The scenes from the adventure of Lucas and Daniel create an engaging landscape for children to experience with the help of beautiful imagery, multi-sensory opportunities and intuitive problem-solving loops. Overall, the project demonstrates what technology can do when designed with simplicity, to enhance the otherwise passive nature of mobile screen time into a highly valued and effective activity, and how it can foster deep inclusion and personalization for learners in a variety of learning settings, while highlighting its importance in respect of family connections, collaboration and flexibility in different learning contexts.

4.1. Future Scope

With the relentless progress in spatial computing and mobile devices, The Last Expedition holds promise for future potential technological growth and pedagogical shifts, spreading its wings to explore even more horizons.As technology grows it stands to mirror the future with a scalable path for technological expansion and pedagogical transformation as a byproduct, with wings resting on additional horizons to come. In future, a single-user mobile system will be expanded to Multi-User Collaborative AR (MUCAR) system, in which siblings or classmates can enter the game world at the same time and solve the game's puzzles by collaborating physically and digitally. Like the characters in the story, this multi-user capability will come with a range of commercial scaling solutions that ensure cross-platform compatibility, time-based rendering engine optimisation, and a great flexibility in accessibility features, including typography, multi-sensory feedback channels and non-AR solutions. In addition, the use of Adaptive Learning Algorithms will enable the system to automatically tailor branching stories and puzzle difficulty to the specific reader, according to their pace and choices. Of course, this technological change will be supported by an assessment method that re-focuses the approach to learning from a memorization and fact-craming approach, and aims to apply Design Thinking perspectives.

This growth-oriented approach to education uses emerging technologies to enhance the development of agile learners and all forms of education—do not just cram facts into children's heads. The shift in pedagogy towards ongoing feedback, creativity and structural choice of a problem means that, given the complexity of

change, higher-order cognitive skills (critical thinking, strategic analysis, collaborative adaptability and more) are measured and developed, thus making learning relevant, personal and inclusive.

4.2. Social Impact

This project established an important bridge between the current educational models and the National Curriculum Framework (NCF) to align directly with the vision of the National Education Policy (NEP). On a societal level, “The Last Expedition” is tackling a significant problem of our time by challenging the trend of passive consumption of digital media that leads to shorter attention spans and the development of text fatigue among children. With its ability to provide affordable, accessible, and quality interactive stories, “The Last Expedition” offers a framework for an effective learning tool that can be used to bridge gaps between different social groups. In terms of prosocial design, which emphasizes values such as empathy, emotional intelligence, and family.

REFRENCES

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5. Faculty of the University to which the thesis is submitted: Mr. Varun Singh

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10. All sources used have been cited appropriately.	YES ☐	NO ☐
11. The thesis has not been submitted elsewhere for a degree.	YES ☐	NO ☐
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(Signature of Candidate)
Name(s): .....

Roll No: .....

Vaibhav Tanwar

Designer and Developer



EXPERIENCE

Teaching Assistant - Interaction Design

Delhi Technological University

Aug 2024 - Present - 8 months, Delhi

• Assisted in teaching interaction design principles, UX/UI design, prototyping and stakeholder management.
• Conducted tutorial sessions, workshops, and critiques to support student learning.
• Conducted user research, usability testing, and wireframing for interactive products.
• Assisted in developing personas, journey maps, and design documentation.

System Engineer

Tata Consultancy Services

Mar 2022 - Sept 2024 - 2 years 7 months, Delhi/NCR

• Tata Consultancy Services (TCS) is one of India's largest multinational company.
• Worked on multiple projects related to Database Administration and Data Analysis. My Key responsibilities included managing and maintaining IBM and Oracle databases, ensuring data integrity and security across these platforms.
• Technologies I worked with React JS, Azure, SQL, DB2, SAP (BODS), WebsphereMQ, PowerBI.

Graphic Designer

Pet Project India

Apr 2018 - Jun 2018 - 2 months, Noida

• Doggie Bazaar is an eCommerce store focused on providing wide range of pet products across India. We at Pet Project India worked with various NGOs focused on animal welfare and animal safety in India.
• My task included editing and creating high quality product images, banners, social media posts and product catalog for the website.
• Technologies used GTMetrics, Magento and Adobe Photoshop.

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Industry Knowledge

Interaction Design
UI/UX Research
User Interface
User Experience Design
Usability Testing
Wireframing
Rapid Prototyping
Design Thinking
Information Architecture
Heuristic Analysis

Tools & Technologies

Figma, Sketch, Meta Ads, Adobe Photoshop, Illustrator, Protopie, Framer, Invision, Lovable, Canva, Lottie, Zeplin, Google Analytics, Amplitude, Fullstory, Unity

Other Skills

HTML, CSS, Javascript, jQuery, ReactJS, Azure, SQL

Languages

English (professional)
Hindi (native)

Social

linkedin.com/in/vaibhav-tanwar
behance.net/vaibhavtanwar

EDUCATION

Master of Design - Interaction Design

Delhi Technological University - DTU

2024 - Present, Delhi

Bachelor of Technology - Computer Science

Guru Gobind Singh Indraprastha University - GGSIPU

2016 - 2020, Delhi

PROJECTS

The Last Expedition: An AR/VR Adventure Novel Game

Unity, VuforiaSDK, C#, Photoshop, Blender, Story telling, Illustrations

This is an immersive visual novel-adventure AR/VR mobile game developed using Unity, designed to transport young players aged 7-12 years on a thrilling adventure. This project aims to foster creativity, critical thinking, and empathy through a captivating narrative that emphasizes curiosity, courage, brotherhood, and family values.

Research on the topic: Gen AI Potential for Artists and Designers

Primary & Secondary research, User experience research, User centered design, User survey

https://www.researchgate.net/profile/Vaibhav-Tanwar-3

This paper investigates the evolving role and potential of AI in augmenting creativity, personalized artistic expression and ethical considerations in the field of art and design. This study analyses the mindset of artists and students regarding AI as both a creative assistant & a potential ethical concern.

Design For Education: Life-Centered Curriculum Design

Case studies, User exp. research, Service design, Holistic development, NEP 2020, NCF 2023

Exploring the role of design-driven approaches and technology in enhancing educational outcomes, making Indian students future skill ready.

KoshaPro: A Collaborative App for Designers

Figma, Prototyping, Wireframing, Photoshop, Intuitive interface design, WCAG guidelines, Design principles, Human centered design

A centralized collaborative platform designed to streamline communication, task management, and resource sharing among design teams to accelerate the delivery of high-quality digital products.

La Casa Website Design

HTML, CSS, Javascript, Photoshop, Branding, User Persona, User Journey mapping, Low Fidelity and High Fidelity Prototyping

https://github.com/VaibhavTanwar/LaCasa

To create a responsive and professional UI/UX looking website for an interior designing firm that attracts potential clients and facilitate meaningful engagements